

2011 Adult Striped Bass Tagging Cruise Report

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

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Cruise Dates: 14 April 2011 – 25 May 2011

Introduction

An adult striped bass population study conducted by the California Department of Fish and Game (CDFG) has been ongoing since 1969. Part of the study is a “high-value” reward tagging program. Presented here is a summary of the 2011 striped bass-tagging field season.

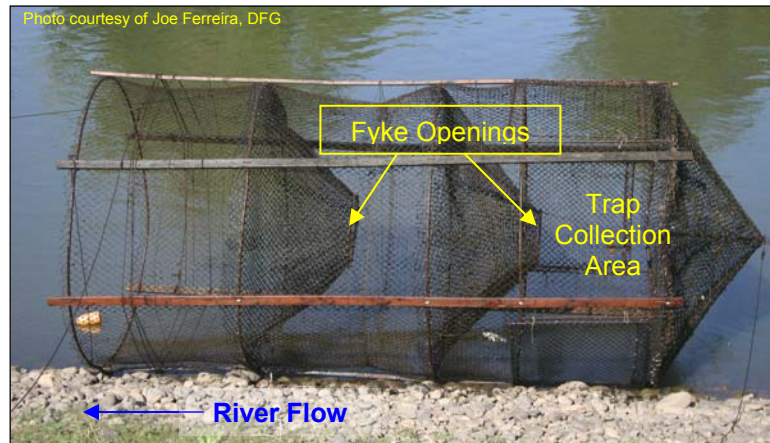
The tagging program is designed to understand and monitor the population dynamics of striped bass (*Morone saxatilis*), with the ultimate goal being to provide the tools to inform science-based resource management decisions. These tools include relative and absolute abundance, harvest rate, mortality rate, individual growth rates, and large-scale movement/migration patterns.

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

Methods and Gear

California Department of Fish and Game staff participated in this project (Appendix 1). The crew typically included one Associate Biologist, two Scientific Aides or Technicians, and a Mate. Tagging was performed per procedure outlined in Appendix 2 of the Sacramento-San Joaquin Sport Fish Management Striped Bass Population Study Quality Control and Operating Manual.

Up to ten cylindrical fyke traps (length 20'; diameter 10') were fished in the Sacramento River near Knights Landing (see photo at right of a fyke trap). Five traps were placed on the east riverbank about two miles upstream of the Knights Landing Bridge (Highway 113). Five traps were placed on the east riverbank about one mile downstream of the Knights Landing Bridge. Traps were placed approximately 50 to 150 feet apart from each other and were secured to temporary (i.e., for the season) moorings on the levee terrace, or level area.



Traps were completely or near-completely submerged while fishing (collecting fish). Striped bass swam through the two openings (marked in photo above) and collected in the front (cone) of the trap. To remove fish from a trap, the trap was rolled up the riverbank until one of the doors was positioned in such a way as to facilitate easy access for tending the trap from the ~20-foot pontoon boat, the *Kayot*, while ensuring the trap remained in enough water to minimize fish stress.

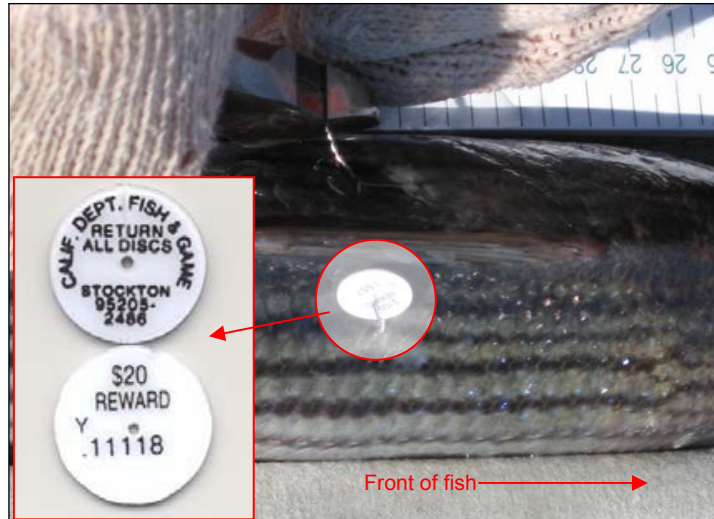
One of two methods was used to roll the traps up and down the riverbank: a cable-and-block system or an electric winch. When the trap and boat were in position, fish were netted from the trap and tagged on board the *Kayot*.



Striped bass were measured to the nearest centimeter fork length (cm FL). Most fish were sexed and fitted with a Petersen disc-dangler tag (see photo below of disc tag as it was applied to the fish; inset is example of the two sides of the tag).

Each tag possessed a unique 6-digit numeric or alpha-numeric identifier and the location of the Fish and Game office to where the tag should be returned. To evaluate return-rate, ~10% of all tags applied offered rewards of \$20 (example shown), \$50, or \$100.

For recaptures (i.e., fish possessing tags from previous years), length, sex, and tag number were recorded.



All fish were processed at and returned to the location of capture, and condition (general health) of the fish was noted upon return to the water.

Not all captured striped bass were tagged. Dead fish were recorded accordingly and added to the total catch. Fish in poor condition were released without a tag, recorded as "over", and added to the total catch. Healthy fish that could not be tagged safely (e.g., due to time constraints) were enumerated, measured, and sexed but not tagged¹; scales were collected from about a third (N≈300).

Because of limited staffing, gill nets were fished only one day this season (19-Apr at Schad Landing). The crew (onboard the *Striper II*) deployed the gill net seven times (average drift time ~30 minutes/drift). The gill net was 100 fathoms long and 21 ft deep, with mesh sizes of 4, 4.5, 5, and 5.5 inches. Gill netting operations caught 17 striped bass, of which 16 (ranging 38-56 cm FL) were then tagged (one was over); no other species or no old tags were caught. For simplicity, the Results section below summarizes only fyke trap data.

Results

The season started late and lasted seven weeks, beginning April 13 and ending May 25. The season typically starts the beginning of April, but was delayed in part due to rains that made the terrace unworkable (i.e., too soft for vehicle passage).

Field days were Monday through Friday, and tagging occurred Tuesday through Friday. To comply with requirements of the National Marine Fisheries Service, each trap was fished no more than one day before being inspected for listed fishes. Field days began at 0800 and ended at 1700 or earlier/later depending on the number of fish caught and/or the number of available personnel.

Fyke traps were deployed 22 days, inspected each day for the presence of listed fishes, and tended 177 times (Table 1). On average, traps fished 24.0 hours per day (range: 15.75 – 31.50 hours).

Five thousand six hundred ninety-six (5,696) striped bass were caught, of which 4,580² were

¹ We described these fish as having been "creeled".

² 1,581 of which were sub-legal, defined as < 42 cm FL, and seven of which were not measured

then tagged (Table 1). Eight fish were recaptures from previous tagging seasons (three from 2010, three from 2009, one from 2008, and one for which the release year was unknown because the tag was broken and the complete tag number could not be recorded — number recorded = “2236”³). Forty-two fish were recorded as “over” and 1,060 were “creeled”.

Table 1. Summary of fyke trap effort and striped bass catch during 2011

	Total Caught	Total Tagged	# Traps Fished	# Traps Tended	# Days Fished
Total	5,696	4,580	185	177	22
Daily Minimum	22	22	4	0	N/A
Daily Maximum	1,026	506	10	10	N/A
Daily Average	271	218	8	8	N/A
Minimum/Day/Trap	0	0	N/A	N/A	N/A
Maximum/Day/Trap	426	290	N/A	N/A	N/A
Average/Day/Trap	32	26	N/A	N/A	N/A

A tended trap = fish handled and removed from the trap

Not all traps fished were tended. If the trap had few striped bass and no ESA species, the trap was rolled back into the water without handling fish.

Of the fish that were caught and for which a length measurement was recorded (N=5,633), length ranged from 31 to 110 cm FL and averaged 46 ± 8.2 cm FL (\pm SD). Males were more abundant than females. Of the fish that were caught and for which sex was recorded (N=5,638), 5,484 were male and 154 were female (~37 males to 1 female). On average, females were larger ($\text{♀} = 64 \pm 12.0$ cm FL, $\text{♂} = 45 \pm 7.4$ cm FL).

Daily average river stage for the Knights Landing-portion of the Sacramento River was calculated from quarter-hourly readings (N=96/day) posted on-line at the California Data Exchange Center's website. River stage was between 25 and 30 ft during the first three weeks of the season. Levels dropped precipitously to about 15 ft in week 4 and then increased to about 25 ft for the remainder of the season (Figure 1A). Water temperature was recorded by field crew at the beginning of each tagging day (Figure 1B). Average water temperature was 14 degrees Celsius ($^{\circ}\text{C}$, or about 57 degrees Fahrenheit) for the tagging season. Water temperature was unusually cold in week 2, about 5 $^{\circ}\text{C}$.

Striped bass catch per trap-hour⁴ by day was calculated and plotted against river stage (Figure 1A) and water temperature (Figure 1B). Average catch per trap-hour for the tagging season was 1.5 fish (represented as the dashed grey line in Figures 1A and 1B). Seven days were above this average.

³ Uncertain as to where these four numbers are in the sequence of 6 (e.g., XX2236 or 2236XX)

⁴ Rounded to nearest ¼-hour and cumulative for the number of traps fishing (for example, if 10 traps each fished 24 hours in one day, then trap-hours for that day equaled 240.) Catch includes any fish left in the trap from the preceding day.

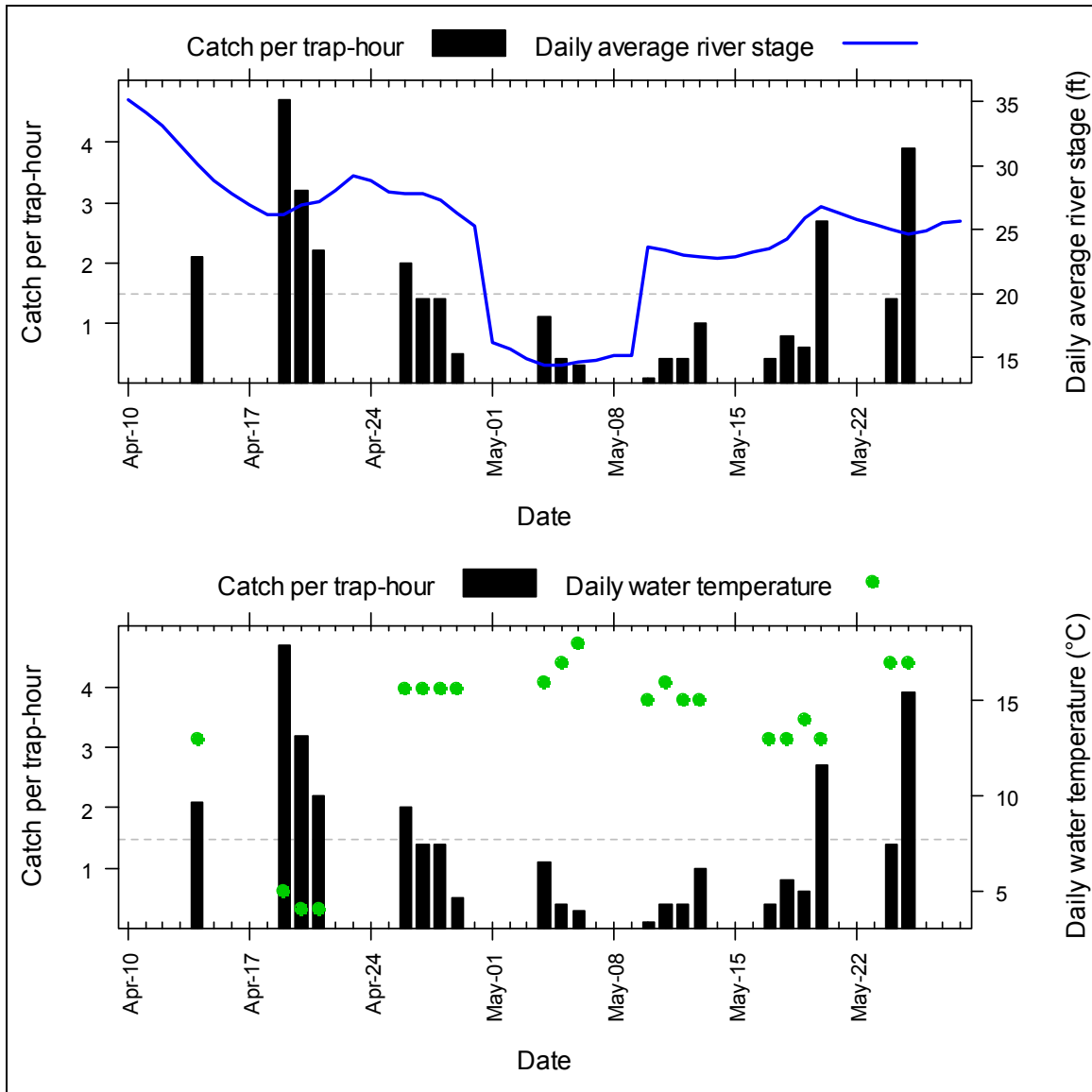


Figure 1. (A – top) Striped bass catch per trap-hour by day with daily average river stage at Knights Landing; (B – bottom) Striped bass catch per trap-hour by day with daily water temperature at Knights Landing; on May-03, traps inspected but not tended; date shown = Sunday

Most striped bass were caught at the beginning and at the ending of the season (Table 2). Average fork length of tagged fish remained fairly consistent from week to week.

Table 2. Summary of fyke trap effort and striped bass catch in 2011

Week	1	2	3	4	5	6	7
Tagged	242	943	791	414	469	965	756
Creeled	-	294	-	-	-	162	604
Over	1	4	13	6	4	3	11
Dead	-	2	1	1	1	1	-
Recapture (from previous seasons)	1	1	1	2	-	1	2
Weekly Total Catch	244	1,244	806	423	474	1,132	1,373
Number of Traps Tended	5	16	26	30	40	40	20
Number of Days Fished	1	3	4	4	4	4	2
Minimum FL (cm)	32	32	34	34	34	34	31
Maximum FL (cm)	65	97	88	86	92	110	95
Average FL (cm)	44	45	46	46	47	47	46

About 35% of all striped bass caught (and measured) were sub-legal size (Figure 2). This was an increase of about 12% from 2010. Fish between 42 and 51 cm FL made up a greater percent of total in 2010 (~59%) than in 2011 (~46%). Percent of total catch of fish greater than 51 cm FL was about the same for both years (between 18% and 19%). By week 4, fish larger than 71 cm FL were observed (Appendix 2).

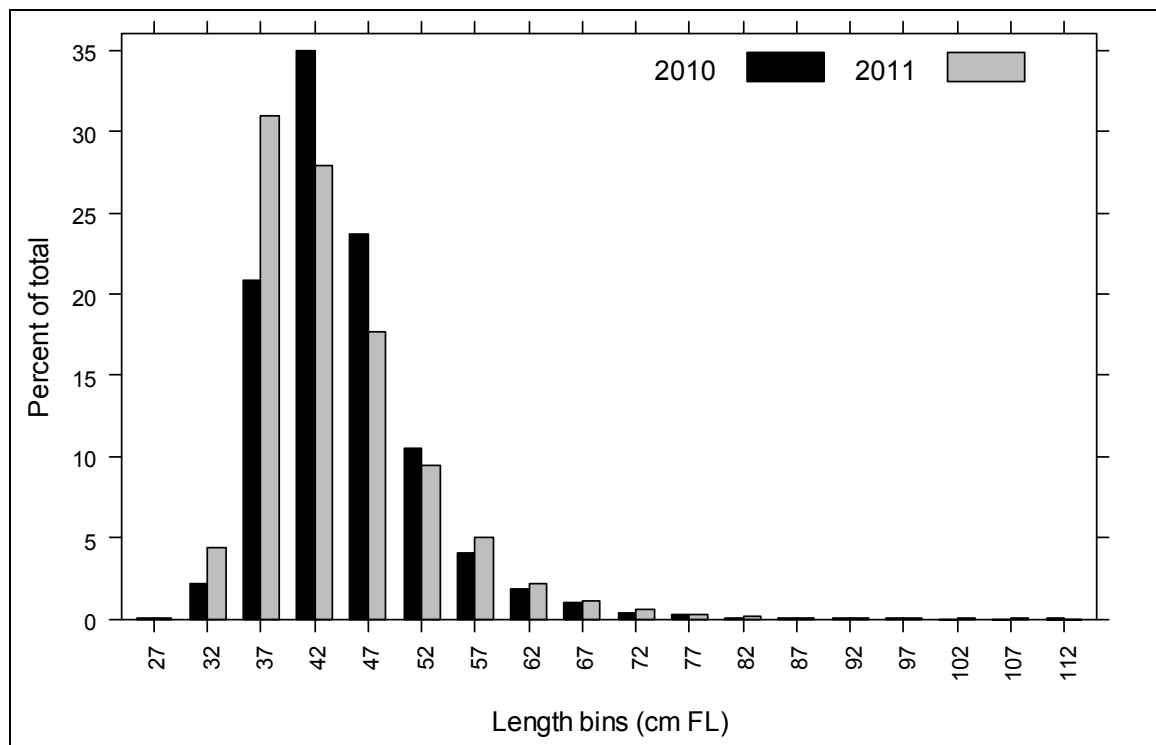


Figure 2. Length frequency of all striped bass collected in fyke traps during 2011; 2010 data included for comparison; bins by 5 (e.g., 37 = 37 to 41 cm FL); (legal size: ≥ 42 cm FL)

Listed Species and other By-catch

Only one ESA-listed species (six Chinook salmon) was caught this season (Table 3). All salmon were released alive in excellent condition with bright coloration (guesstimated lengths between 20 and 90 cm).

Nineteen white sturgeon were caught in one day, 18 of which were caught in one trap (20-May, Trap 1; Table 3). White sturgeon ranged in length from about 1 to 2 meters. All other by-catch was noted (Table 3). American shad was the dominant by-catch.

Table 3. By-catch of the 2011 striped bass tagging season

Other Species (common name)	Scientific Name	Total Count
American Shad	<i>Alosa sapidissima</i>	459
Carp	<i>Cyprinus carpio</i>	3
Channel Catfish	<i>Ictalurus punctatus</i>	14
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	6
Sacramento Pikeminnow	<i>Ptychocheilus grandis</i>	2
Sacramento Sucker	<i>Catostomus occidentalis</i>	5
White Catfish	<i>Ameiurus catus</i>	2
White Sturgeon	<i>Acipenser transmontanus</i>	19

Discussion

Average catch per trap-hour was about 28% higher than in 2010 (1.5 versus 1.17), which suggests the abundance of striped bass in the reach was greater this year than last.

We tagged more fish this season than the last two seasons (2009 and 2010) combined, a fact attributable in part to (1) more field days due to the lifting of mandatory furloughs and (2) a strong pulse of fish late in the season — possibly a result of increased river flows. Not since the 2007 and 2008 tagging seasons have we tagged this many fish in a single season. However, of all fish tagged this season about 35% (N≈1,600) were less than 42 cm FL (sub-legal). Last season (2010) we — for the first time — tagged sub-legal fish, and this season we continued systematically tagging sub-legal fish.

Acknowledgements

We recognize and give a very special thanks to our friends at *StingRayz Beach Boardwalk and Marina* in Knights Landing. They generously allowed us to berth the *Kayot* at their marina.

We thank Mr. Jack Bailey (Reclamation District 1500) for his efforts in presenting to the trustees of Reclamation District 1500 and to local landowners our request for access to the Sacramento River through various properties. His efforts allowed us to begin our fieldwork in a timely manner.

Last but not least...we thank all personnel involved in this project. Their commitment and hard work ensured the collection of sound scientific data.

Appendix 1. Personnel list. All were employees of the California Department of Fish and Game (Bay Delta Region, 4001 N. Wilson Way, Stockton, CA 95205), except Metzger and MacColl — US Bureau of Reclamation (USBR)

Name	Position Title
Aaron Ngo	Senior Lab Assistant
Brian Delano	Mate
Dave Hull	Fish and Wildlife Technician
Dorothy Crystal	Senior Lab Assistant
Gary Webb	Mate
Jason DuBois	Associate Biologist
Ken Flowers	Mate
Lauren Damon	Scientific Aide
Marty Gingras	Supervising Biologist
Mike Harris	Associate Biologist
Ramiro Soto	Mate
Steve Metzger	Technician - USBR
Teresa MacColl	Technician - USBR

Appendix 2. Weekly length frequency distribution of striped bass caught (and measured) in fyke traps at Knights Landing during 2011

