# 2012 Adult Striped Bass Tagging Cruise Report 

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

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Cruise Dates: 03 April 2012-22 May 2012

## 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 2012 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

The crew (Appendix 1) typically included two Environmental Scientists, one Scientific Aide or Technician, 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 nine cylindrical fyke traps (length 20'; diameter 10'; 9 gauge 2¼-inch mesh) 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). Four 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 $\sim 20$-foot pontoon boat, the Kayot, while ensuring the trap remained in enough water to minimize fish stress.

An electric winch was used to roll the traps up and down the riverbank (we did not need to use the cable-and-block system this season). 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 6digit 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, $\sim 10 \%$ of all tags applied offered rewards of \$20 (example shown), \$50, or $\$ 100$.

For fish possessing tags from previous years (i.e., recaptures), 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 upon return to the water was noted.

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 tagged'; scales were collected from about a tenth ( $\mathrm{N} \approx 250$ ) of these fish.

## Results

The season began on 03-April and ended on 22-May. 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 25 days, inspected each day for the presence of listed fishes, and tended 161 times (Table 1). On average, traps fished 24.0 hours per day (range: 15.5-31.0 hours).

On 10-May, the crew observed that five of the eight traps fishing had been vandalized and were not fishing properly (i.e., not completely submerged or not oriented correctly in relation to the channel).

Six thousand six hundred seventy-one $(6,671)$ striped bass were caught, of which $3,912^{2}$ were then tagged (Table 1). Thirty-eight fish were recorded as "over" and 2,676 were "creeled".

[^0]Table 1. Summary of fyke trap effort and striped bass catch during 2012

|  | Total Caught | Total Tagged | \# Traps Fished | \# Traps Tended | \# Days Fished |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Total | 6,671 | 3,912 | 214 | 161 | 25 |
| Daily Minimum | 18 | 18 | 6 | - | N/A |
| Daily Maximum | 1,314 | 505 | 9 | 9 | N/A |
| Daily Average | 278 | 170 | 9 | 6 | N/A |
| Minimum/Day/Trap | 1 | 1 | N/A | N/A | N/A |
| Maximum/Day/Trap | 995 | 364 | N/A | N/A | N/A |
| Average/Day/Trap | 43 | 27 | 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, then trap was rolled back into the water without handling fish.

Twenty-nine fish were recaptures, of which seven were within-season ${ }^{3}, 19$ were from 2011, and two were from 2007 (Table 2). For one of the 29 recaptured tags, the release year was unknown because the tag was broken and the complete tag number could not be recorded (number recorded $=$ "xxx631"4).

[^1]Table 2. Striped bass recaptured during 2012 striped bass-tagging field work

| Date of Recapture | Tag Number | Date Tagged | Days at Large | Length at Tagging (cm FL) | Length at Recapture (cm FL) | Growth per Year (cm) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 20-Apr | 270047 | 8-Apr-07 | 1,839 | 50 | 63 | 2.6 |
| 17-May | F01411 | 8-May-07 | 1,836 | 58 | 60 | 0.4 |
| 15-May | 281646 | 19-Apr-11 | 392 | 55 | 65 | 9.3 |
| 18-May | 283289 | 4-May-11 | 380 | 40 | 50 | 9.6 |
| 20-Apr | 281494 | 14-Apr-11 | 372 | 44 | 49 | 4.9 |
| 24-Apr | 281949 | 19-Apr-11 | 371 | 42 | 47 | 4.9 |
| 25-Apr | 282341 | 26-Apr-11 | 365 | 47 | 54 | 7.0 |
| 3-May | F01757 | 4-May-11 | 365 | 54 | 57 | 3.0 |
| 18-Apr | 282088 | 20-Apr-11 | 364 | 49 | 58 | 9.0 |
| 24-Apr | 282177 | 26-Apr-11 | 364 | 41 | 44 | 3.0 |
| 24-Apr | 283134 | 28-Apr-11 | 362 | 46 | 51 | 5.0 |
| 2-May | 283590 | 6-May-11 | 362 | 43 | 48 | 5.0 |
| 17-May | 284878 | 24-May-11 | 359 | 40 | 43 | 3.1 |
| 18-May | Y11946 | 25-May-11 | 359 | 52 | 57 | 5.1 |
| 3-May | 283671 | 11-May-11 | 358 | 50 | 52 | 2.0 |
| 19-Apr | 283630 | 6-May-11 | 349 | 43 | 49 | 6.3 |
| 26-Apr | 284019 | 13-May-11 | 349 | 43 | 50 | 7.3 |
| 25-Apr | 284287 | 18-May-11 | 343 | 41 | 48 | 7.4 |
| 26-Apr | 284838 | 20-May-11 | 342 | 55 | 59 | 4.3 |
| 25-Apr | Y11931 | 24-May-11 | 337 | 38 | 49 | 11.9 |
| 18-Apr | 284886 | 24-May-11 | 330 | 43 | 51 | 8.8 |
| 17-May | 286644 | 19-Apr-12 | 28 | 58 | 58 | N/A |
| 2-May | 285863 | 5-Apr-12 | 27 | 53 | 52 | N/A |
| 26-Apr | 285663 | 4-Apr-12 | 22 | 47 | 47 | N/A |
| 9-May | 286129 | 18-Apr-12 | 21 | 48 | 47 | N/A |
| 25-Apr | 285832 | 5-Apr-12 | 20 | 57 | 57 | N/A |
| 9-May | C01881 | 19-Apr-12 | 20 | 40 | 39 | N/A |
| 24-Apr | 285981 | 13-Apr-12 | 11 | 41 | 40 | N/A |
| 16-May | xxx631 ${ }^{\text {a }}$ | N/A | N/A | N/A | 66 | N/A |

${ }^{\text {a }}$ Tag broken, could not determine complete tag number; fish retagged with new tag

## Note: Days at large < $31=$ within-season recapture

Of the fish for which a length measurement was recorded ( $N=6,621$ ), length ranged from 30 to 114 cm FL and averaged $47 \pm 7 \mathrm{~cm} \mathrm{FL}( \pm \mathrm{SD})$. Males were more abundant than females. Of the fish for which sex was recorded ( $\mathrm{N}=6,618$ ), 6,490 were male and 128 were female ( $\sim 50$ males to 1 female). On average, females were larger than males ( $\&=63 \pm 14 \mathrm{~cm} \mathrm{FL}, \delta=47 \pm 6 \mathrm{~cm} \mathrm{FL}$ ).

Daily average river stage for the Knights Landing-portion of the Sacramento River was calculated from quarter-hourly readings ( $\mathrm{N}=96 /$ day ) posted on-line at the California Data Exchange Center's website. River stage fluctuated between 20 and 28 ft during the first five weeks of the season. Stage declined steadily during weeks five and six, then tapered to about 15 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 15 degrees Celsius ( ${ }^{C}$, or about 59
degrees Fahrenheit) for the tagging season. Water temperature was never lower than about 10 C ( 50 F).

Striped bass catch per trap-hour ${ }^{5}$ 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 1.4 fish (represented as the dashed grey line in Figures 1A and 1B). Eight days were above this average.


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 08-May, traps inspected but not tended; 16-May temperature not recorded; date shown = Sunday

[^2]Most striped bass were caught during the middle of the season (Table 3). Average fork length of tagged fish remained fairly consistent from week to week, until about week six and seven when the average increased by 3 to 5 cm .

Table 3. Summary of fyke trap effort and striped bass catch in 2012

| Week | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ | $\mathbf{7}$ | $\mathbf{8}$ |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Tagged | 303 | 135 | 932 | 790 | 716 | 154 | 805 | 77 |
| Creeled/Not Tagged | - | - | 1 | 1,193 | 1,374 | - | 108 | - |
| Over | 2 | - | 10 | 11 | 9 | - | 6 | - |
| Dead | - | - | 7 | 5 | 2 | - | 2 | - |
| Recapture (previous and within season) | - | - | 5 | 11 | 4 | 2 | 7 | - |
| Weekly Total Catch | 305 | 135 | 955 | 2,010 | 2,105 | 156 | 928 | 77 |
| Number of Traps Tended | 21 | 18 | 32 | 19 | 14 | 16 | 33 | 8 |
| Number of Days Fished | 3 | 4 | 4 | 3 | 3 | 3 | 4 | 1 |
| Minimum FL (cm) | 35 | 35 | 33 | 35 | 30 | 37 | 35 | 36 |
| Maximum FL (cm) | 72 | 76 | 91 | 79 | 103 | 101 | 101 | 114 |
| Average FL (cm) | 48 | 48 | 48 | 47 | 47 | 52 | 50 | 48 |

About 14\% of all striped bass caught (and measured) were sub-legal size (Figure 2). This was a decrease of about $20 \%$ from 2011 ( $35 \%$ ). Fish between 42 and 51 cm FL made up a greater percent of total in $2012(\sim 65 \%)$ than in $2011(\sim 46 \%)$. Percent of total catch of fish greater than 51 cm FL was about the same for both years (between $19 \%$ and $21 \%$ ). Larger fish (i.e., > 72 cm FL ) appeared early on but seemed to be more prevalent starting in week 6 (Appendix 2).


Figure 2. Length frequency of all striped bass collected in fyke traps during 2012; 2011 data included for comparison; (legal size: $\geq \mathbf{4 2} \mathbf{~ c m ~ F L ) ~}$

Listed Species and other By-catch
Thirty-seven Chinook salmon, one steelhead, and one green sturgeon were caught this season (Table 4). All salmon were brightly colored, had an adipose fin, and were released alive in good to excellent condition (guesstimated lengths between 40 and 80 cm ). The steelhead ( $\sim 50 \mathrm{~cm}$ ) had an adipose fin and was released alive in excellent condition. The green sturgeon ( $\sim 1.5 \mathrm{~m}$ ) was released alive and in good condition.

Fifty-five (55) white sturgeon were caught in one day, 46 of which were caught in one trap (19Apr, Trap 7; Table 4). White sturgeon ranged in length from about 1 to 2 meters. All other bycatch was noted (Table 3).

Table 4. By-catch of the 2012 striped bass tagging season

| Other Species (common name) | Scientific Name | Total Count |
| :---: | :---: | :---: |
| American Shad | Alosa sapidissima | 510 |
| Black Crappie | Pomoxis nigromaculatus | 1 |
| Carp | Cyprinus carpio | 7 |
| Channel Catfish | Ictalurus punctatus | 80 |
| Chinook Salmon ${ }^{\text {a }}$ | Oncorhynchus tshawytscha | 37 |
| Green Sturgeon ${ }^{\text {b }}$ | Acipenser medirostris | 1 |
| Largemouth Bass | Micropterus salmoides | 1 |
| Sacramento Blackfish | Orthodon microlepidotus | 1 |
| Sacramento Pikeminnow | Ptychocheilus grandis | 6 |
| Sacramento Sucker | Catostomus occidentalis | 9 |
| Smallmouth Bass | Micropterus dolomieu | 6 |
| Steelhead | Oncorhynchus mykiss | 1 |
| White Catfish | Ameiurus catus | 2 |
| White Sturgeon ${ }^{\text {c }}$ | Acipenser transmontanus | 62 |

${ }^{\text {a }}$ All were released alive in good/excellent condition (all had adipose fin)
${ }^{\text {b }}$ Caught on 25-Apr
${ }^{\text {c }} 55$ caught during one day (19-Apr), 46 of which were in one trap

## Discussion

We tagged about 600 fewer fish this year than in 2011, but we caught (overall) about 1,000 more fish - a fact attributable in part to three additional field days this season.

Average catch per trap-hour was about the same this year as in 2011 (1.4 versus 1.5), which suggests the abundance of striped bass in the reach was similar to last year.

## 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 |
| Christina Harper | Scientific Aide |
| Dave Hull | Mate |
| Eric Haydt | Environmental Scientist |
| Gary Webb | Mate |
| Jennifer Messineo | Environmental Scientist |
| Katherine Osborn | Environmental Scientist |
| Lindsey Koos | Scientific Aide |
| Marty Gingras | Environmental Program Manager I |
| Maxfield Fish | Environmental Scientist |
| Michelle Avila | Scientific Aide |
| Mike Harris | Environmental Scientist |
| 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 2012; bins by 5 (e.g., $37=37$ to 41 cm FL); legal size: $\geq \mathbf{4 2} \mathbf{~ c m ~ F L ~}$



[^0]:    ${ }^{1}$ We described these fish as having been "creeled".
    ${ }^{2} 563$ of which were sub-legal, defined as $<42 \mathrm{~cm} \mathrm{FL}$

[^1]:    ${ }^{3}$ Tagged and recaptured within the 2012 season
    ${ }^{4}$ The first 3 -digits are unknown (thus, "xxx631")

[^2]:    ${ }^{5}$ Rounded to nearest $1 / 4$-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.

