CRAMER FISH SCIENCES
Oregon · California · Washington · Idaho · Alaska

Paul Bergman
13300 New Airport Rd. Suite 102
Auburn, CA 95602
530.888.7773
pbergman@fishsciences.net

Memo: Green Sturgeon Observations at Daguerre Point Dam, Yuba River, CA

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Submitted to: Elizabeth Campbell, AFRP
Prepared by: Paul S. Bergman, Joe Merz, and Ben Rook, Cramer Fish Sciences

Cramer Fish Sciences sampled for sturgeon immediately downstream of Daguerre Point Dam in the Yuba River for three consecutive days (24-26 May 2011). This work was performed as part of ongoing sturgeon monitoring efforts in the Feather River Basin under the Anadromous Fish Restoration Program and to follow up on recent sturgeon observations of California Department of Fish and Game (CDFG) staff in the Yuba River. Each day we conducted roving underwater video surveys of the habitat using a drop-down camera suspended from a motorized boat. We attempted to survey all habitat below the dam and upstream of the first riffle downstream of the dam.

The video survey was performed using a Splash Cam© Deep Blue Pro underwater camera, housed in a steel sled with a 4.5 kg ballast weight affixed to its base for stability. This apparatus was attached to 15 m of video and power cable. The video camera was suspended from the port side of the boat. A Cannon Mag 5HS electric downrigger was used to raise and lower the camera in the water column during deployment. Video images were recorded on a EverFocus ECOR 4D 465 GB DVR unit with GPS and time overlay and displayed in real-time on a 38 cm LCD monitor. The camera was lowered in the water column until the river bottom was visible in the lower 1/3 of the image on the LCD monitor. The survey progressed through the habitat site (1- 2 km/hr) with the video camera being raised and lowered using the electric downrigger to keep the river bottom in the lower 1/3 of the LCD monitor's image. A GPS track and depth measurements were recorded simultaneous with the video survey to track the boat's location and water depth during the survey.

Water turbidity was measured using a Hach 2100P portable turbidity meter and water temperature was measured using the Lowrance sonar unit. Additionally, water clarity was estimated by lowering and raising a secchi disk in the water column and calculating the average depth of disappearance and reappearance to the nearest meter (McMahon et al. 1996).

Underwater video surveys were conducted for 109 minutes on 24 May, 68 minutes on 25 May, and 33 minutes on 26 May. Water depths at the site ranged from 1-4.5 meters. Water clarity over the three days of sampling ranged from 3.5 m (24 and 25 May) to 2 m (26 May). Turbidity measured 1.5 NTU on 24 May, 1.77 NTU on 25 May, and 2.33 NTU on 26 May. Average water temperatures were 11.7^{o}C on 24 May, 12.0^{o}C on 25 May, and 12.3^{o}C on 26 May. Yuba River average daily flow measured at Marysville ranged from 6,903-7,292 cfs (California Department of Water Resources) across the three days of sampling.

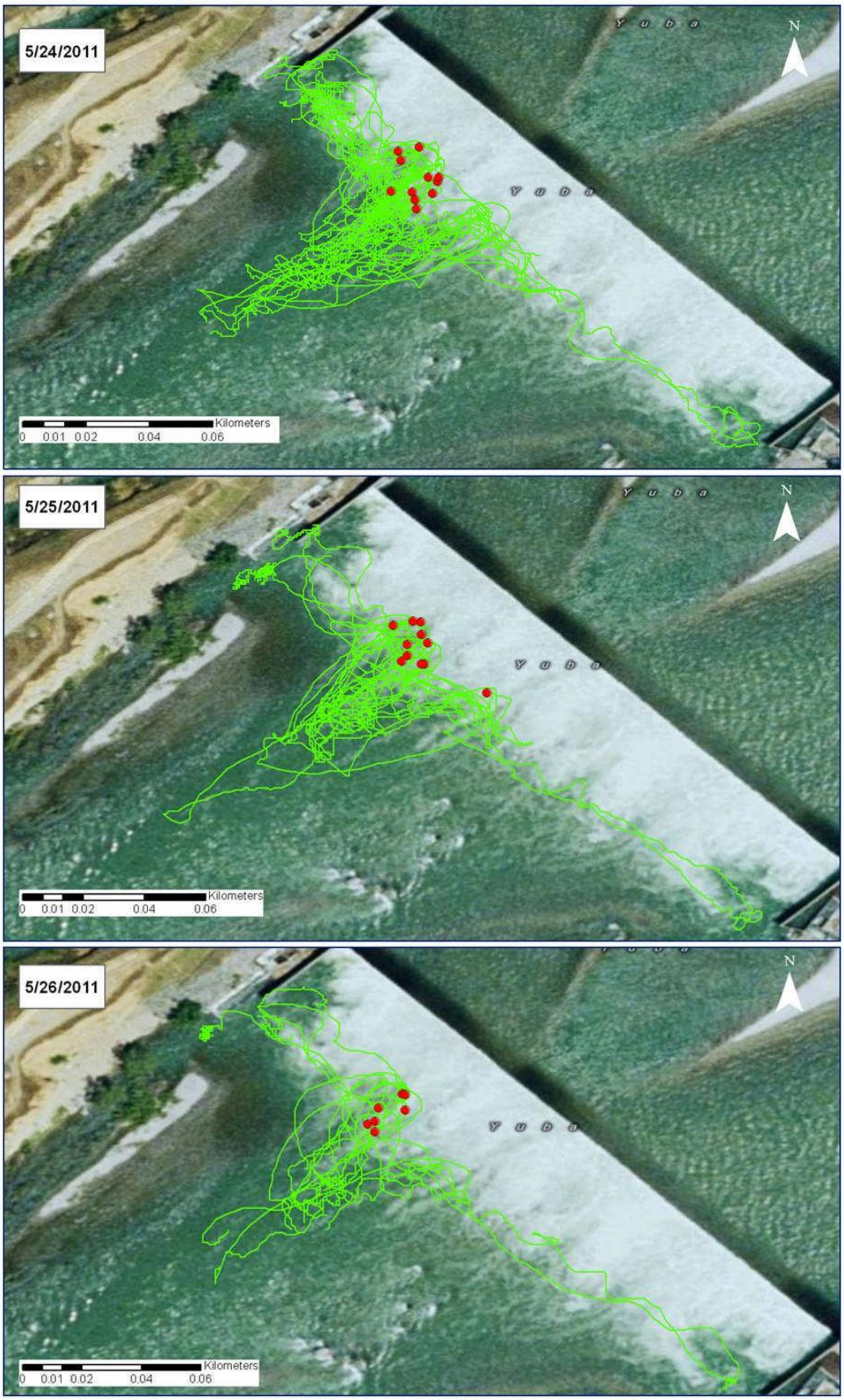

Figure 1. Sonar tracks (green line) of boat location and green sturgeon locations (red dots) for each day of underwater video sampling conducted 5/24/11-5/26/11 immediately downstream of Daguerre Point Dam, Yuba River, CA.

Twenty-nine observations of green sturgeon *Acipenser medirostris* were made during playback of the video footage (11 on 24 May, 11 on 25 May, and 7 on 26 May). All green sturgeon were observed near the center of the channel at the edge of the bubble curtain below Daguerre Dam (Figure 1). The sturgeon were observed either on a gravel bar approximately 1.5 meters deep, or in a pool approximately 4 meters deep immediately adjacent to the gravel bar. On two passes of the video camera, 2 sturgeon appeared to be exhibiting spawning behavior, and were holding in the current (facing upstream) next to one another on the gravel bar. Although no literature exists documenting the spawning behavior of green sturgeon, male sturgeon of a similar species, lake sturgeon *Acipensar fulvescens*, have been observed to swim alongside female sturgeon, facing against the current in preparation for spawning (Priegal and Wirth 1971).

We also observed green sturgeon from the surface as we conducted the video surveys. As many as 4 sturgeon were visible from the surface at any one time, and we frequently saw them "paired-up" on the gravel bar. On 4 occasions we observed sturgeon breaching on the surface. When breaching, sturgeon would lunge out of the water with up to ¾ of their body length exposed before returning to the water.

Without having thoroughly analyzed the video footage yet, we believe there were 4-5 green sturgeon present (Figure 2). During video sampling it was apparent there were only a few fish present, with many repeat viewings of the same fish. Also, we never saw more than 4 sturgeon from the surface at any one viewing. Review of the video footage also shows many apparent repeat viewings of the same fish. For instance, images A and B, and images C and D, appear to be repeat sightings of 2 different sturgeon (Figure 2). Similar markings appear on the operculum of fish A and B, and the general head shape and color appear identical for fish C and D (Figure 2).

We believe all observed sturgeon were likely green sturgeon, and not the closely related white sturgeon. All images of sturgeon where the front half of the fish was observed (above the pelvic fin), dark lateral stripes are clearly evident (see fish A-C, E) between the lateral scutes and the ventral scutes. These lateral stripes are only present in green sturgeon (North et al. 2002). Although it is possible that some of the sturgeon only seen from the rear half of the fish may be white sturgeon, we believe this is unlikely since no fish seen from the front lacked the characteristic lateral stripes.

With future work we intend to estimate lengths of the sturgeon using body morphometrics. We also will relate sturgeon location with substrate type, water depth, and estimated water velocity.


A
39 12.5221N
121 26.6774W
16:18:06-08
05/25/11
PIC-SJ
3.9 kts
234.8°
05/25/2011 14:49:54


B
39 12.5158N
121 26.6759W
16:12:20-08
05/25/11
PIC-SJ
1.8 kts
56.0°
05/25/2011 14:44:07

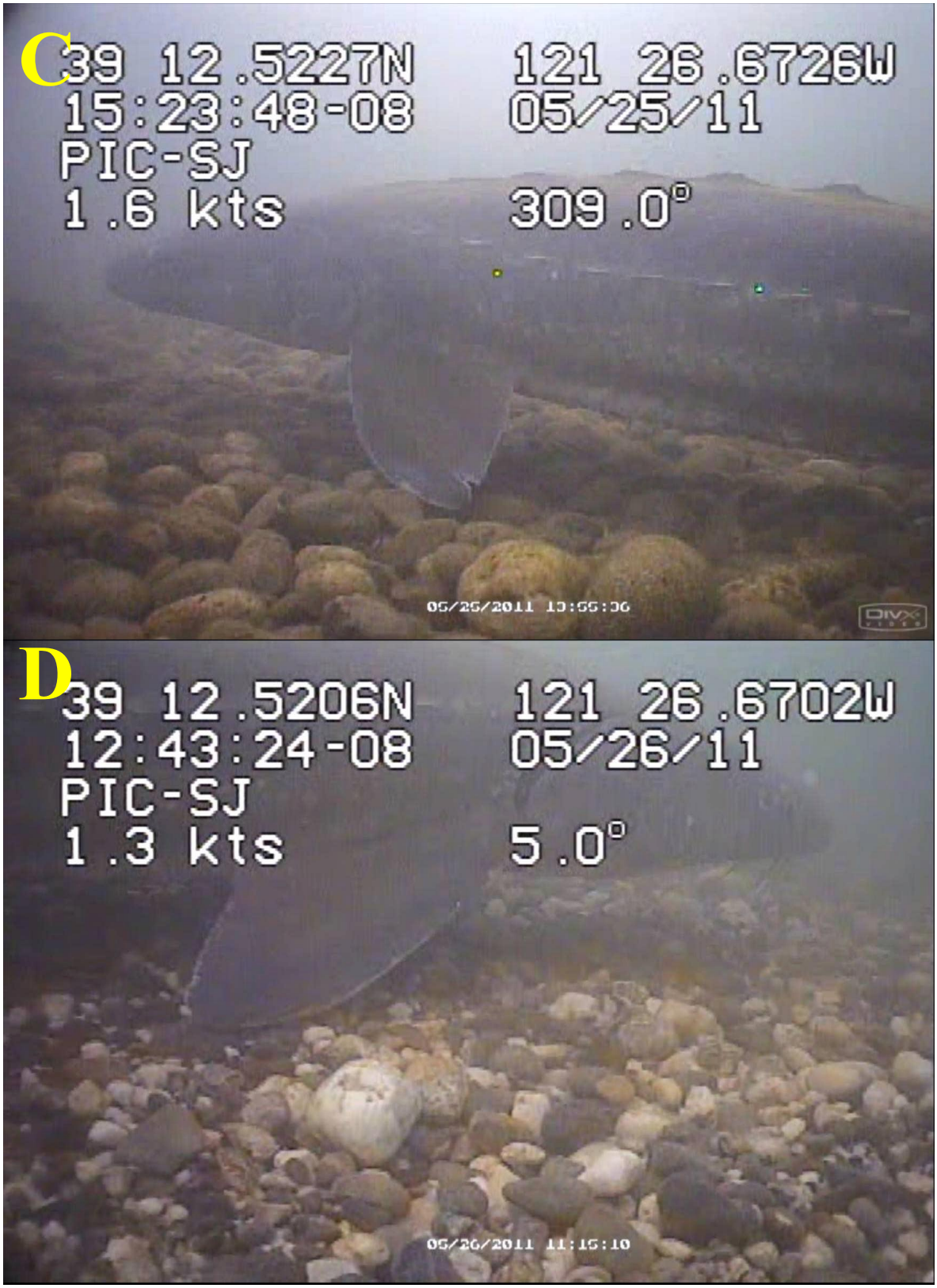
C
39 12.5227N
121 26.6726W
15:23:48-08
05/25/11
PIC-SJ
1.6 kts
309.0°
05/25/2011 15:55:36
D
39 12.5206N
121 26.6702W
12:43:24-08
05/26/11
PIC-SJ
1.3 kts
5.0°
05/26/2011 11:15:10

Figure 2. Five of the 29 screen captures of green sturgeon taken from underwater video surveys conducted 5/24/11-5/26/11 immediately downstream of Daguerre Point Dam, Yuba River, CA.