

Memorandum

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Subject: Tisdale Bypass Sturgeon Rescue

Purpose

The report documents sturgeon rescue operations conducted within a Tisdale Bypass scour pool located approximately 2.9 km downstream of Tisdale Weir or 300 m west of Reclamation Road.

Background

Tisdale Weir is a passive flood control weir on the Sacramento River located near Meridian, California. When the Sacramento River reaches a stage height of 44.1 feet above mean sea level, water from the Sacramento River flows over Tisdale Weir and into Tisdale Bypass which joins the Sutter Bypass 6.9 km downstream from Tisdale Weir. Sutter Bypass conveys floodwaters from Tisdale and Sutter bypasses to the Sacramento River near Verona. During periods when Fremont Weir is overtopping, much of Sutter Bypass flows continue downstream in the Yolo Bypass. Anadromous fish species migrating up the Sacramento River during their spawning migrations, including both green sturgeon (*Acipenser medirostris*), and white sturgeon (*Acipenser transmontanus*), may be attracted into the Yolo Bypass at the Cache Slough complex rather continuing upstream in the river, as bypass flows may convey up to 80 percent of

the lower Sacramento River basin runoff. Fish migrating up the bypasses may become stranded within the Tisdale Weir stilling basin and scour pools within Tisdale Weir when overtopping events cease. CDFW has conducted several fish rescue operations within the Tisdale Weir stilling basin and scour ponds immediately downstream of this feature, most recently in late April and early May of 2019 when 19 green sturgeon and two white sturgeon were returned to the Sacramento River (CDFW unpublished). Tisdale Weir did not overtop during the 2019-2020 season, however; scour pools or channels along both the north and south levees remained inundated as of early May 2020. A turkey hunter observed an unidentified sturgeon species in a scour pond 24 April 2020 and reported the observation to CDFW Fisheries Branch staff.

Methods

CDFW staff conducted a reconnaissance survey on 29 April 2020 but were unable to locate the scour pool due to the somewhat ambiguous directions provided by the hunter. CDFW staff returned on 1 May 2020 and located the scour pool situated along the south Tisdale Bypass levee. (**Figure 1**). The pool was approximately 600 m² with a maximum depth later determined to be in excess of three meters (**Figure 2**). Although turbidity in the feature reduced visibility to around 0.5 m, staff were able to conduct a visual survey and observed an unidentified sturgeon species in the scour pool. A 100-ft by 12-ft; 4-in square mesh heavy-duty beach seine was deployed to capture the sturgeon. There were several large partially and completely submerged logs which snagged the seine and facilitated the sturgeon escaping during the initial seining attempts. On the third seine haul, two sturgeon were observed in the net. The larger of the two sturgeon was able to escape but was eventually captured during the fifth or sixth seine haul.

Captured sturgeon were placed ventral surface up in a hooded stretcher and carried approximately 300 meters where they were placed in a tank filled with Sacramento River water at ambient temperature. The sturgeon were then returned to the cradle, measured and internally tagged with uniquely coded VEMCO® 69 kHz acoustic transmitters and passive integrated transponder (PIT) tags. The sturgeon were transported to the Tisdale Boat Launch Ramp and released into the Sacramento River once they had demonstrated full recovery (e.g., a strong swimming response when grasped by the caudal peduncle).



Figure 1. Tisdale Bypass sturgeon rescue location and potential stranding sites.



Figure 2. Tisdale Bypass scour pool along south levee; 1 May 2020.

Results

Two white sturgeon (*Acipenser transmontanus*) were captured from the scour pool and released in the Sacramento River (**Table 1**). Staff were fairly confident that these were the only two sturgeon in the pool, as successive attempts to capture the second sturgeon entrained only one sturgeon that appeared readily identifiable based on size and coloration. A water temperature of 23° C was recorded in shallow nearshore water at the initiation of rescue operations, however; the water temperature in the deep middle area of the scour pool was considerably cooler. Both sturgeon appeared to be in surprisingly good condition considering they had spent over a year in the scour pool. A desiccated sturgeon carcass was also collected from the shoreline of the scour pool and later identified as that of a white sturgeon based on lateral scute count.

Table 1. Tag and metadata for white sturgeon rescued from Tisdale Bypass scour pool, 1 May 2020.

Fork length (cm)	Condition (visual assessment)	Acoustic tag ID	PIT tag ID
125	Good; slightly underweight for length; no external injuries	A69-9001-5043	384.3515DC8A4E
162	Excellent; appears to be well fed; no external injuries	A69-9001-5040	384.3515DC8A4F

Other fish species observed in the scour pool but not captured included bluegill, redear sunfish, or green sunfish (*Lepomis* spp.) and western mosquitofish (*Gambusia affinis*). Several western pond turtles (*Actinemys marmorata*), a reptile species of special concern in California, were also observed in the scour pool. Other aquatic organisms observed included bullfrog tadpoles and adults (*Lithobates catesbeianus*) and red swamp crayfish (*Procambarus clarkia*).

Discussion

The two white sturgeon rescued from the Tisdale Bypass scour pool bring the total to four white sturgeon rescued from Tisdale Bypass after being stranded after 2019 water year overtopping events. Somewhat surprisingly, no green sturgeon were rescued or observed in the scour pool, as 19 green sturgeon were rescued from Tisdale Weir in late April and early May 2019. White sturgeon typically make their spawning migrations a month or more before green sturgeon, and therefore likely had enough floodwater flow through the Sutter and Tisdale bypasses to continue upstream while flows were overtopping Tisdale Weir. One possible explanation is that the white sturgeon rescued from the scour pond were migrating downstream after spawning and swam over the weir into the bypass and became stranded when floodwaters receded.

The surprisingly good condition of the rescued white sturgeon indicate that the inundated areas of the Tisdale Bypass can support relatively long-term survival of stranded sturgeon. There appears to be an adequate prey base consisting of small fish, amphibians, crayfish, and possibly terrestrial organisms to support at least a few sturgeon. Importantly, these scour pools likely receive some groundwater augmentation which would keep summertime temperatures somewhat cooler and dissolved oxygen concentrations higher. The areas along both the north and south levees appear to remain at least partially inundated on a perennial basis as evidenced by historical aerial photographs (Google Earth Pro 2020). It is very likely that there are adult sturgeon present within the feature. Rescue of sturgeon stranded within the bypass scour areas would be exceedingly difficult when these features are even partially inundated given the size, maximum depths, abundance of large woody debris in the features, and the distance required to carry heavy equipment and adult sturgeon.

The Department of Water Resources (DWR) is proposing the Tisdale Weir Rehabilitation and Fish Passage Project which will promote volitional passage of sturgeon, salmon, and other fish species through Tisdale Weir with an estimated completion date of 30 June 2027. Consideration should be given to include measures to maximize connectivity between or infill the scour pool features along the north and south bypass levees to the fishway to minimize stranding in the Tisdale Bypass downstream of the weir. While some sturgeon may be able to survive for a year in the perennially inundated scour features, they are unable to continue with their spawning migrations. Sturgeon stranded in these areas are also more susceptible to poaching and may not survive a second season.

References

CDFW 2019 unpublished data from 2019 Tisdale Weir Fish Rescue Memorandum Report (report in progress).

Google Earth Pro. Accessed 12 May 2020.

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