Weekly Assessment of CVP and SWP Delta Operations on Green Sturgeon

September 29, 2025

Executive Summary

On September 24, the cumulative salvage of 18 Green Sturgeon exceeded the single-year incidental take limit (salvage of 14 green sturgeon) in the 2024 NMFS Biological Opinion. Additional salvage on September 25 and 30 brought the cumulative salvage through September 30 for WY 2025 to 20. Juvenile Green Sturgeon are typically in the Delta year-round and salvaged at low levels.

Juvenile production is likely higher than historically due in part to improved access to spawning areas upstream of the Red Bluff Diversion Dam. The zone of influence from export pumping is currently large. Green Sturgeon are likely moving volitionally; there is uncertainty about whether or how green sturgeon movements respond to Delta hydrodynamics. Salvage effects are likely non-lethal.

Detections of Green Sturgeon in salvage are likely due to both higher populations as well as the influence of export pumping. No information suggests salvage poses additional risks to the population than Reclamation considered in the 2024 Record of Decision.

Operational and Regulatory Conditions

Green Sturgeon annual cumulative salvage reached 18 on September 24, exceeding the single-year (14 individuals) Incidental Take Limit set by the 2024 NMFS BiOp. Cumulative salvage through September 30 for WY 2025 is 20. The cumulative salvage ITL threshold resets on October 1, 2025, with the start of WY 2026.

Biology Distribution and Evaluation of Green Sturgeon

Delta Life Stages

Juvenile/Adult/Subadult (see Figure A2 in Appendix)

Historic Information

Subadult/Adult: Most abundant during spring spawning migration period of March through May, and post spawning outmigration periods May through June (early outmigrants) or after September through January (late outmigrants) depending on interannual flow conditions in the spring and winter (Colborne et al. 2022, Table A1). Adults present year-round to a lesser extent in San Pablo Bay. The 2021 adult abundance estimate was 13,161 (Dudley et al. 2021 in NMFS 2021).

Juvenile: Age-1 through Age-3 juveniles present year-round and widely distributed, with more frequent detections in the Delta, especially between late winter and early spring, with some

peaks in spring and summer (Miller et al. 2020; see figure A1 in the Appendix). Juveniles tagged with acoustic tags in the main channel Sacramento River near Sherman Island were detected in the Sacramento River as far upstream as the Cache Slough complex, in the San Joaquin River at the Antioch Bridge, in Threemile, Horseshoe Bend, and Montezuma Sloughs. Seasonal abundance at the primary sampling site (near Sherman Island) appears to be highest during summer based on capture and telemetry data. Residence time at the primary sampling site for individual fish ranges from one day to over one year but telemetry data show outmigration from the primary sampling site to the Pacific Ocean ranges from 27 to 552 days. In 2021, the juvenile abundance estimate was 4,387 (Dudley et al 2021 in NMFS 2021). Juvenile Green Sturgeon develop osmoregulatory capacity by 1.5 years (~750mm, Allen and Cech 2007) and are hypothesized to migrate into estuarine conditions to maintain optimal growth.

Salvage: Salvage events have historically been infrequent (**Figure 1**). Since 2008, juvenile salvage has occurred only in 2011, 2016, 2020 and 2024 with recent salvage events occurring in the summer.

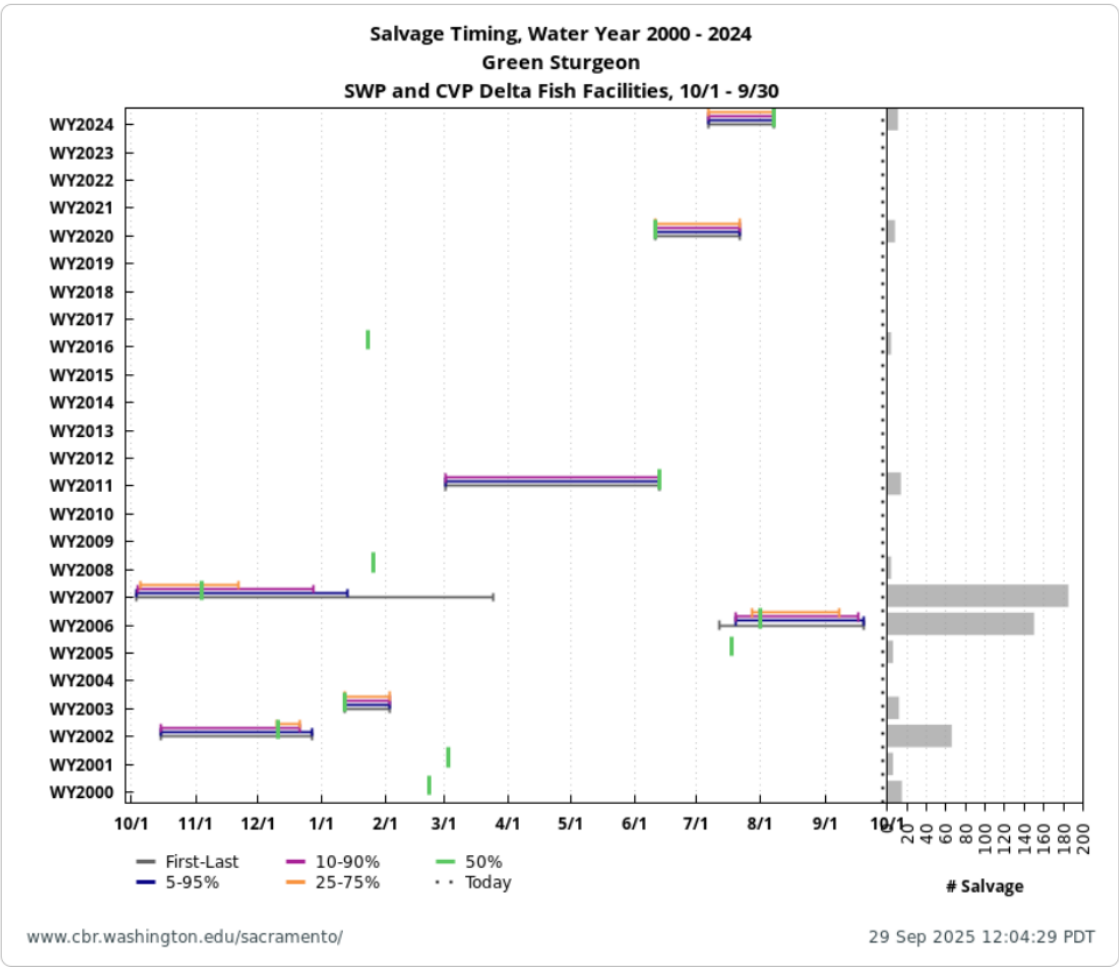

Figure 1. Historical salvage timing, Water Years 2000-2024. Source: SacPAS Salvage Timing Query (https://www.cbr.washington.edu/sacramento/data/query_salvage_hrt.html).

Table 1. Historical Green Sturgeon Catch and Catch per Unit Volume (CPUV), 2010-2025

Water Year	Water Year Type	CVP + SWP Salvage Facility Captures (Individuals)	CDFW Bay Study Captures (Individuals)	USFWS Red Bluff Green Sturgeon RST CPUV (fish/ac-ft)
2010	BN	0	2	
2011	W	2	0	
2012	BN	0	0	
2013	D	0	3	2.86
2014	C	0	4	2.98
2015	C	0	1	3.25
2016	BN	1	0	30.35
2017	W	1	1	29.79
2018	BN	0	2	0.41
2019	W	0	1	22.19
2020	D	2	0	1.58
2021	C	0	0	12.32
2022	C	0	1	0.02
2023	W	0	0	37.05
2024	AN	3	3	
2025	AN	7	4	

Current Information

As of September 30, 2025, a total of 7 individual Green Sturgeon were salvaged at the CVP (2 fish) and SWP (5 fish) facilities, resulting in a WY2025 cumulative salvage of 20 fish (annual salvage threshold = 14 fish). Fish were salvaged between 5/22/2025 and 9/30/2025. Size of the fish range from 430-526 mm with back-calculated ages based on Von Bertalanffy growth curves developed in Farr et al. (2002) for Oregon Green Sturgeon ranging from Age 1 to Age 2.

Other recent Green Sturgeon catch in the Delta is summarized below. While overall numbers are low, WYs 2024 and 2024 do show higher catch in salvage and the Bay Study.

CDFW Bay Study (Kenji Soto, pers. comm.):

- 7/1/2025 Green Sturgeon at Station 736 (Sacramento River near Sherman Island) – 423 mm TL
- 7/15/2025 Green Sturgeon at Station 106 (San Francisco Bay) – 767 mm TL
- 8/11/2025 Green Sturgeon at Station 431 (Suisun Bay) – 417mm TL
- 9/3/2025 Green Sturgeon at Station 431 (Suisun Bay) – 591mm
- All fish were released alive.

CDFW Juvenile Sturgeon monitoring and tagging (Marc Beccio, pers. comm.):

- 6 green sturgeon in 2025 (4 were BY 2024 and 2 were BY 2023)
- 23 green sturgeon in 2024 (21 were BY 2023)
- Sampling primarily in Grizzly Bay and Sacramento River near Sherman Island

Evaluation

At current operations is salvage of Green Sturgeon likely to continue?

Possibly. Based on historical salvage data (Figure 1), salvage has occurred through summer and fall months. Juvenile and subadult Green Sturgeon are observed in the Delta and Bay in the Fall, though usually in low abundance in the Delta (Miller et al. 2020, Figure A1). Limited detections occurred this summer.

Will continued salvage of Green Sturgeon have population level effects?

With limited recent juvenile or adult abundance data, there is high uncertainty regarding the magnitude of Green Sturgeon salvage relative to population size. However, based on historical salvage levels, periodicity patterns, and lack of mortality observed in 2025 so far, Reclamation and DWR conclude that continued salvage on Green Sturgeon is unlikely to have a population level effect. The levels of salvage observed between 2016-2020 (annual salvage= 0 to 8 fish) were considered a low threat in the most recent 5-year status review (NMFS 2021) compared to the period prior to 2009, when annual salvage ranged from 0 to nearly 200 fishes (Figure 1).

All sturgeon salvaged in 2025 were successfully released alive in the Delta. Laboratory studies by Steel et al. (2022) demonstrated that fish guidance efficiency through louvers similar to those utilized in salvage facilities was varied for sturgeon less than 120 mm (43%-99%), but much higher (99%) for sturgeon exceeding 120 mm in length and 100% for sturgeon greater than 280 mm. Furthermore, research by Baird et al. (2019) indicates that Green Sturgeon larger than 200 mm face minimal predation risk from common predators such as Striped Bass and Largemouth Bass present adjacent to salvage facilities. While it is possible that unobserved take of sturgeon less than 120 mm has occurred during WY 2025, unobserved take of sturgeon >120 mm during WY 2025 was likely minimal.

Is increased facility entrainment in WY 2025 a result of delta hydrodynamics due to delta operations or increased population size of Green Sturgeon due to ongoing recovery?

Favorable spring hydrologic conditions during Above Normal (AN) and Wet (W) water years in 2023, 2024, and 2025 may have promoted spawning migration of adults, and increased survival

rates for early life stages in these years, contributing to increased juvenile Green Sturgeon presence in the Delta. Annual Red Bluff Green Sturgeon CPUV for 2023 was the highest recorded estimate in 26 years of monitoring (Poytress & McCraney 2025; Table 1), with 4,290 larvae and 26 juveniles caught. The fish salvaged this year were likely 1+ and 2-year old fish spawned and hatched during these favorable spring hydrological conditions. This year, in addition to individuals collected at salvage facilities, four individuals were captured through Bay Study monitoring efforts. In 2024, three fish were captured at salvage facilities and three through the Bay Study. Five total individuals were documented across both monitoring programs combined during the 2020-2023 period.

The presence of Green Sturgeon salvage over the past week may have been influenced by hydrodynamic conditions during the collection period. Over the 7-day period from September 19 through September 25, 2025, which encompasses the majority of WY 2025 salvage, mean flows at Sacramento River at Freeport, San Joaquin River at Vernalis, and 5-day OMRI were 16,922 cfs, 823 cfs, and -10,567, respectively. The combination of low inflow in both the Sacramento and San Joaquin Rivers ('lolo' in Figure A3) and a more negative OMRI suggests a spatial increase in the Zone of Influence compared to periods of higher inflow ('hihi' in Figure A3), potentially routing more migrating juvenile sturgeon, since they are of the age where they follow net flow to more saline water, toward the interior and south Delta and increasing the likelihood of salvage observations.

Appendix

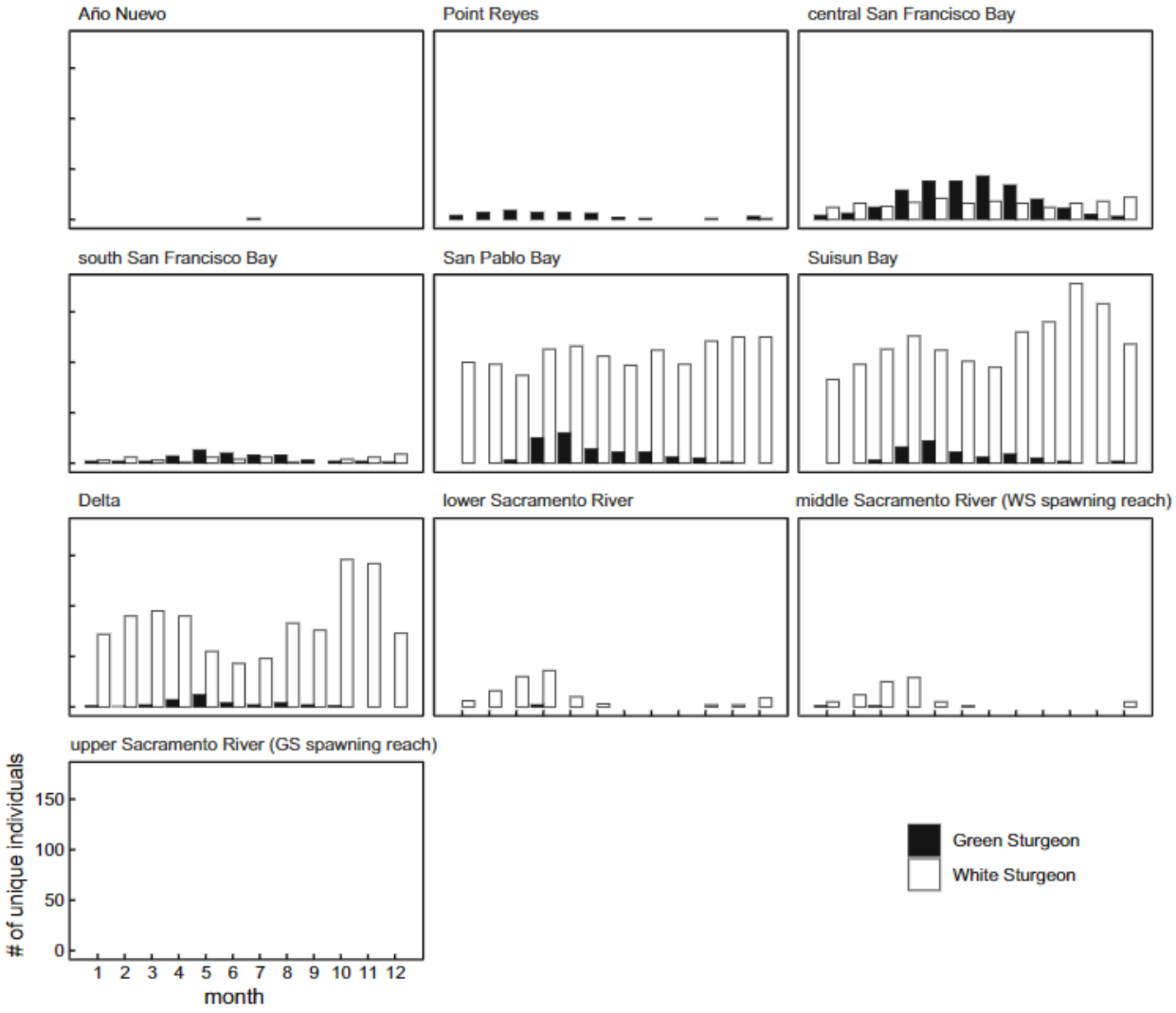

Figure A1. Subadult Green Sturgeon Presence Across all Months by River Reach (Source: Miller et al. 2020)

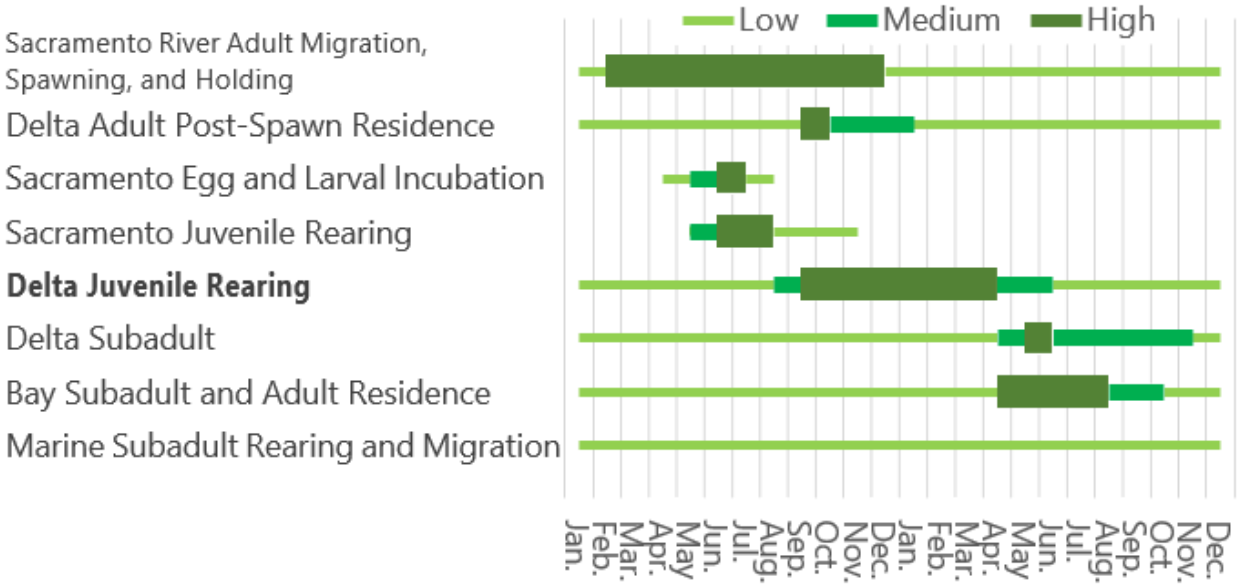

Figure A2. Temporal Life Stage Domains for Green Sturgeon (Figure D-8 from LTO EIS Appendix AB-D)

Table A1. Downriver Adult Migration Timing Based on Early and Late Groups Identified in Telemetry Analysis (Table C-125 of LTO EIS Appendix AB-C)

	Early Downriver				Late Downriver			
Year	Count	First Date	Mean Date	Last Date	Count	First Date	Mean Date	Last Date
2007	1	Aug 17	–	–	3	Dec 7	Dec 18	Jan 6
2008	0	–	–	–	–	–	–	–
2009	0	–	–	–	3	Oct 14	Nov 16	Jan 14
2010	0	–	–	–	3	Dec 7	Dec 9	Dec 11
2011	1	Jun 28	–	–	1	Jan 23	–	–
2012	10	May 24	Jun 14	Jul 24	7	Nov 21	Nov 25	Dec 2
2013	3	Jul 1	Jul 7	Jul 12	10	Dec 15	Feb 5	Feb 14
2014	3	May 22	Jun 11	Jul 26	10	Dec 1	Dec 4	Dec 6
2015	4	May 20	Jun 23	Jul 26	16	Oct 15	Dec 14	Jan 9
2016	9	Apr 15	May 21	Jul 7	17	Sep 22	Nov 13	Dec 12
2017	6	May 18	Jun 9	Jul 7	10	Nov 22	Jan 14	Mar 24

Source: Colborne pers. comm.

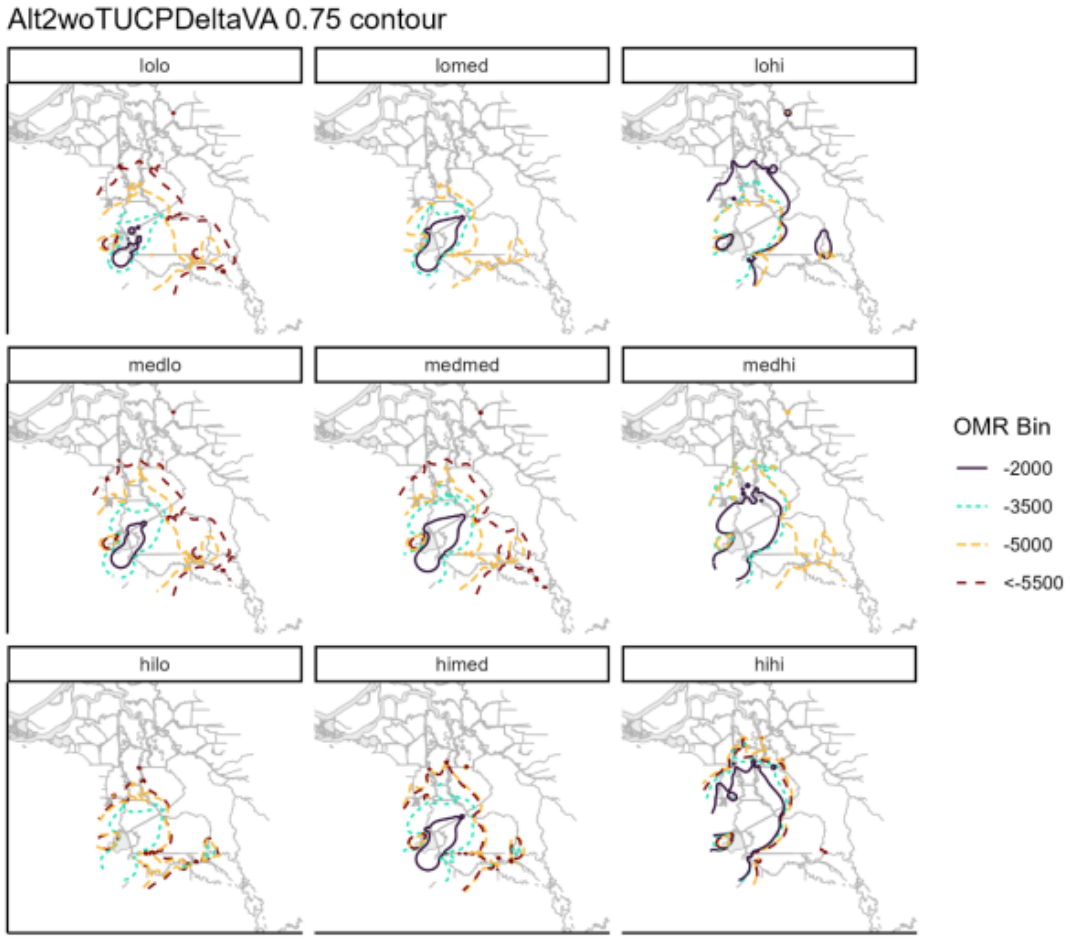

Figure A3. Contour maps delineating Delta Export Zone of Influence under varying inflows and OMR (Source NMFS 2024).

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