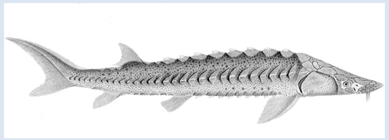
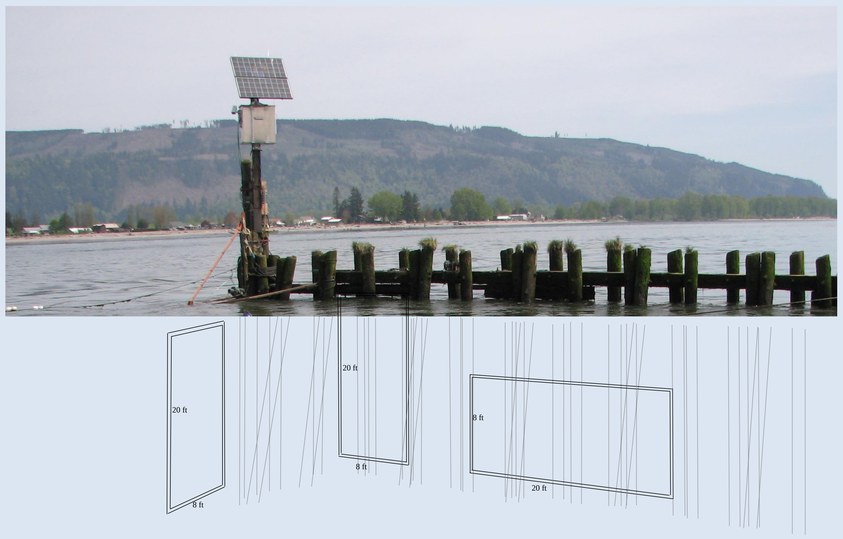


Observations of white sturgeon behavior at four pile dikes in the Columbia River Estuary.

Paul J. Bentley[1], Kara E. Jaenecke[2], Joseph H. Vinarcsik[2] and Matthew S. Morris[3],Gabriel T. Brooks[1], Adam F. Palik[1]

[1]NOAA Fisheries; Northwest Fisheries Science Center, Seattle, WA
[2]Ocean Associates, Inc.; Point Adams Biological Station, Hammond, OR
[3]Astor Environmental LLC; Point Adams Biological Station, Hammond, OR

Locations of the four pile dike antenna arrays active in 2023



The pile dike is shown for reference only. Actual antenna locations may be different relative to the dike.

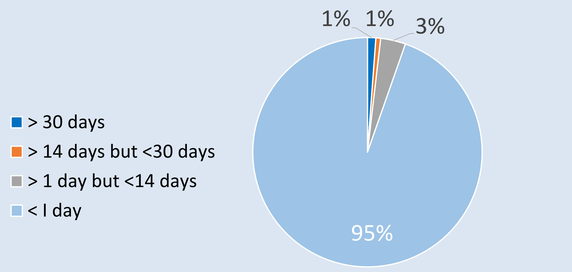
Detections of PIT tagged white sturgeon separated by months and year

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2022	2023	Grand Total
January								1	4	4			9
February							7	5	1				13
March				1		3	1	1	2	1			9
April				3	1	4	6	1	8	2		1	26
May		6	3	22	12	10	24	20	5	16	6	12	136
June		14	10	60	42	52	28	60	16	38	26	80	426
July		17	10	64	46	62	63	56	7	43	39	100	507
August	8	14	20	70	44	64	68	46	12	41	50	124	561
September	13	12	58	66	17	32	128	37	11	14	17	36	441
October	8	4	30	44	2	6	32	24				3	153
November				4			1	13	1				19
December							1		1			1	3
Grand Total	**29**	**67**	**131**	**334**	**164**	**233**	**359**	**264**	**68**	**159**	**138**	**357**	**2303**

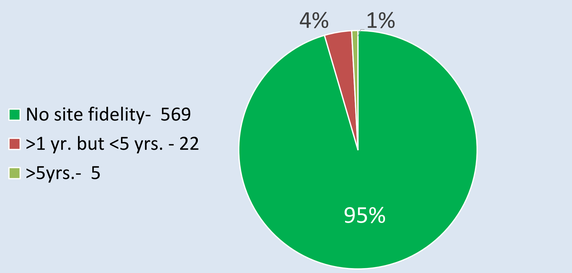
Abstract

In 2011, we installed a PIT-tag interrogation array on a sediment control structure (pile dike) in the lower Columbia River estuary investigating adult salmonid survival during upstream migration to Bonneville Dam. Since then, we have installed three additional arrays constructed to detect tagged out-migrating juvenile salmonids. Although these arrays were targeting salmonids, any PIT-tagged organism in the detection field is available for interrogation. Presented here is a summary of white sturgeon, *Acipenser transmontanus*, detected at these four autonomous arrays since project inception. To date, a total of 596 unique PIT-tagged sturgeon have been detected. Our longest operating pile dike array (PD7), installed in 2011, has contributed the most, with a total of 519 (87%) unique tags, while the three other sites, installed in 2022 and 2023, had a combined total of 67 (11%) (PD5=54, PD6=9, and PD8=14). Seasonal residency at these arrays, defined as remaining on site for more than a single day within a season, was observed in 5.4% (n=32) of the sturgeon detected. Of these 32 fish, 7 were observed on the pile dikes for more than 30 days per visit. Site fidelity is also rare with only 27 individuals returning to the same site over multiple years, and 6 individuals returning over 5 years. The longest known resident has been detected each of the 12 years that PD7 has been operating, usually arriving in the last two weeks of May and residing through October, with an average residency time of 57.8 days. During the seasonal residency at PD7, this sturgeon has been detected, near daily, on one or more antennas for the entirety of its visit.. The combination of transient and resident behaviors potentially indicates the transients are passing by on their way to a location of their own, where they potentially exhibit resident-like behavior with fidelity across years, similar to what is seen on PD7. More pile dike arrays will be needed to evaluate this theory.
Further expansion of these pile dike PIT-tag interrogation arrays for juvenile salmonid migrants will contribute additional information on sturgeon behavior in the coming years.

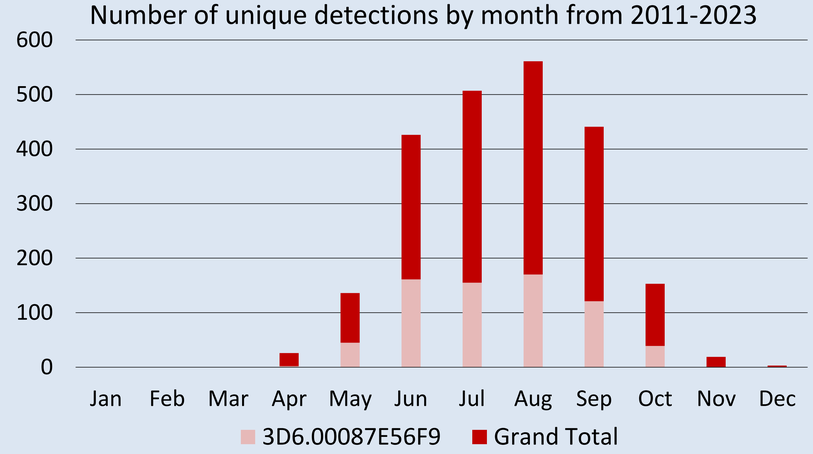
Seasonal residency of sturgeon observed at the pile dike interrogation sites



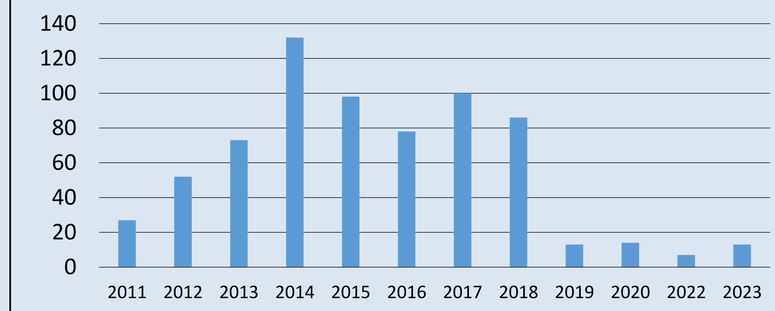
Site fidelity of sturgeon observed at the pile dike interrogation sites



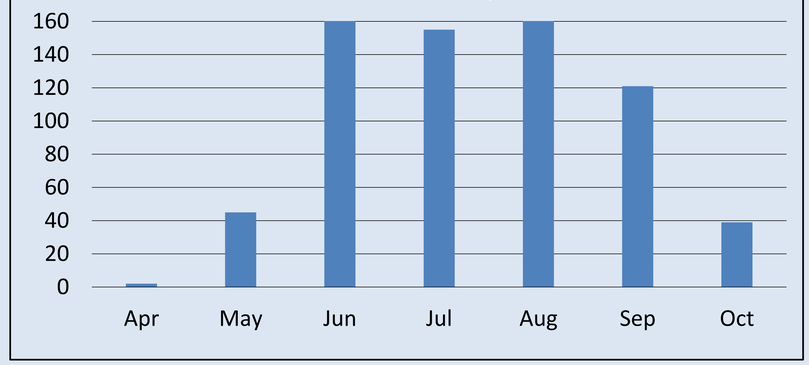
Number of unique detections by month from 2011-2023



Number of days detected each year: 3D6.00087E56F9



3D6.00087E56F9- Detection by month 2011-2023



Conclusions

- Most sturgeon detected (94.6%) at the four pile dike sites were present only momentarily, likely just passing by
- A portion of fish detected exhibited short-term or long-term residency behavior (4.2% and 1.2% respectively)
- Site fidelity was exhibited in 5.5% of individuals
- One individual exhibited consistent arrival timing across years and strong site residency and fidelity over the study period
- These residency behaviors and site preferences could be exhibited by most sturgeon, just at other locations throughout the Lower Columbia River
- Of the 12 years we have monitored tagged white sturgeon, 2023 was the first time a green sturgeon was observed