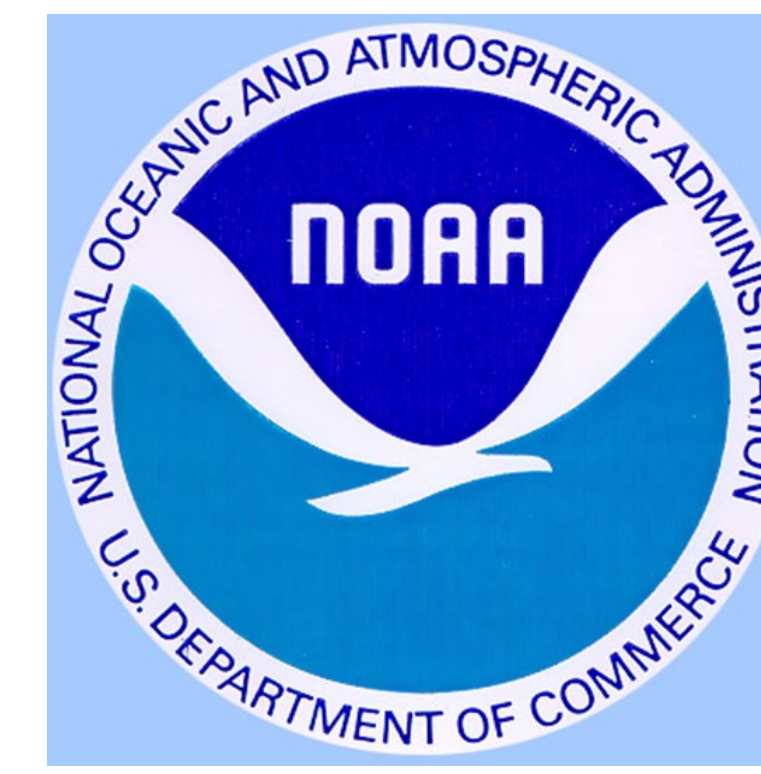




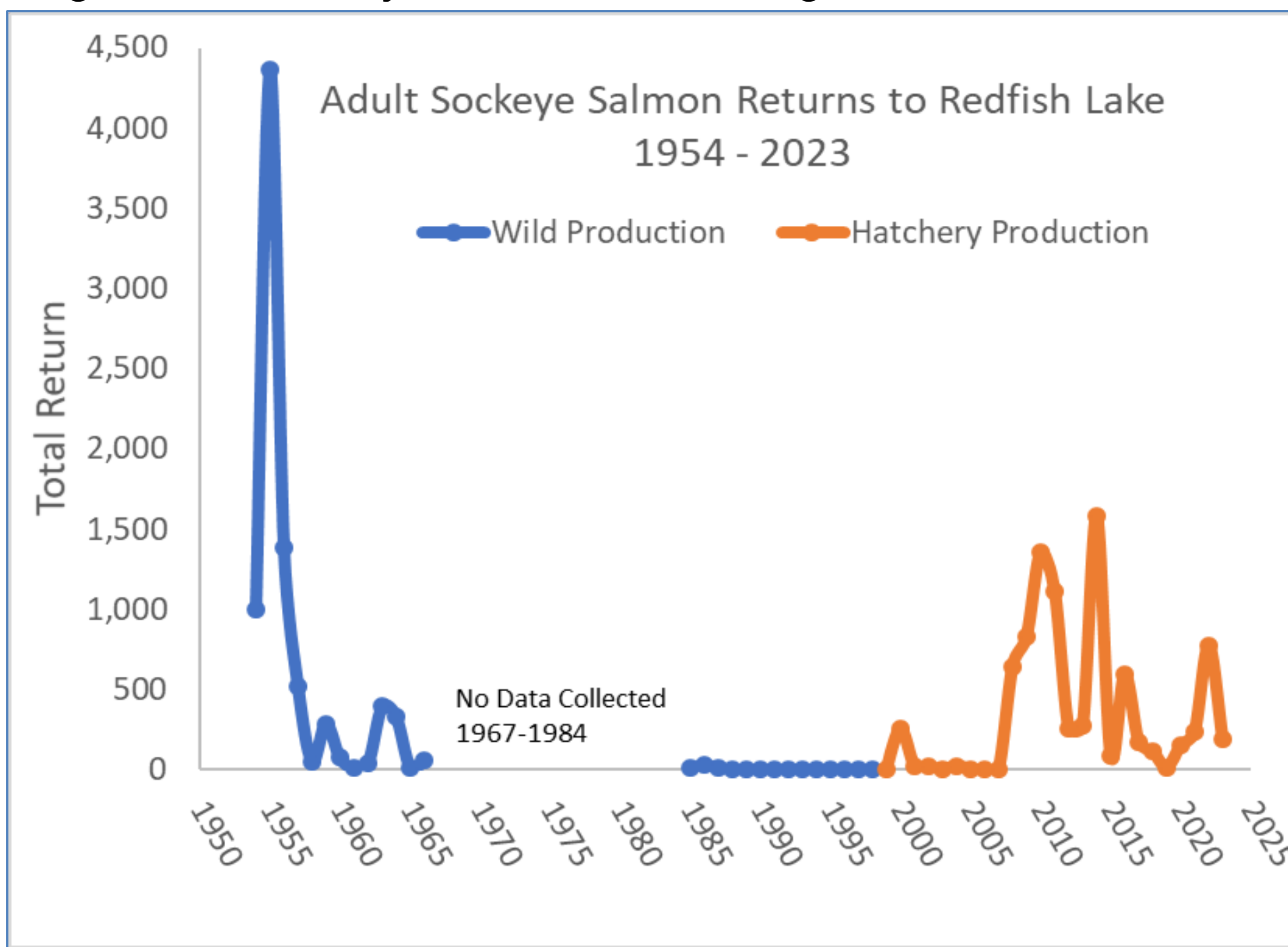
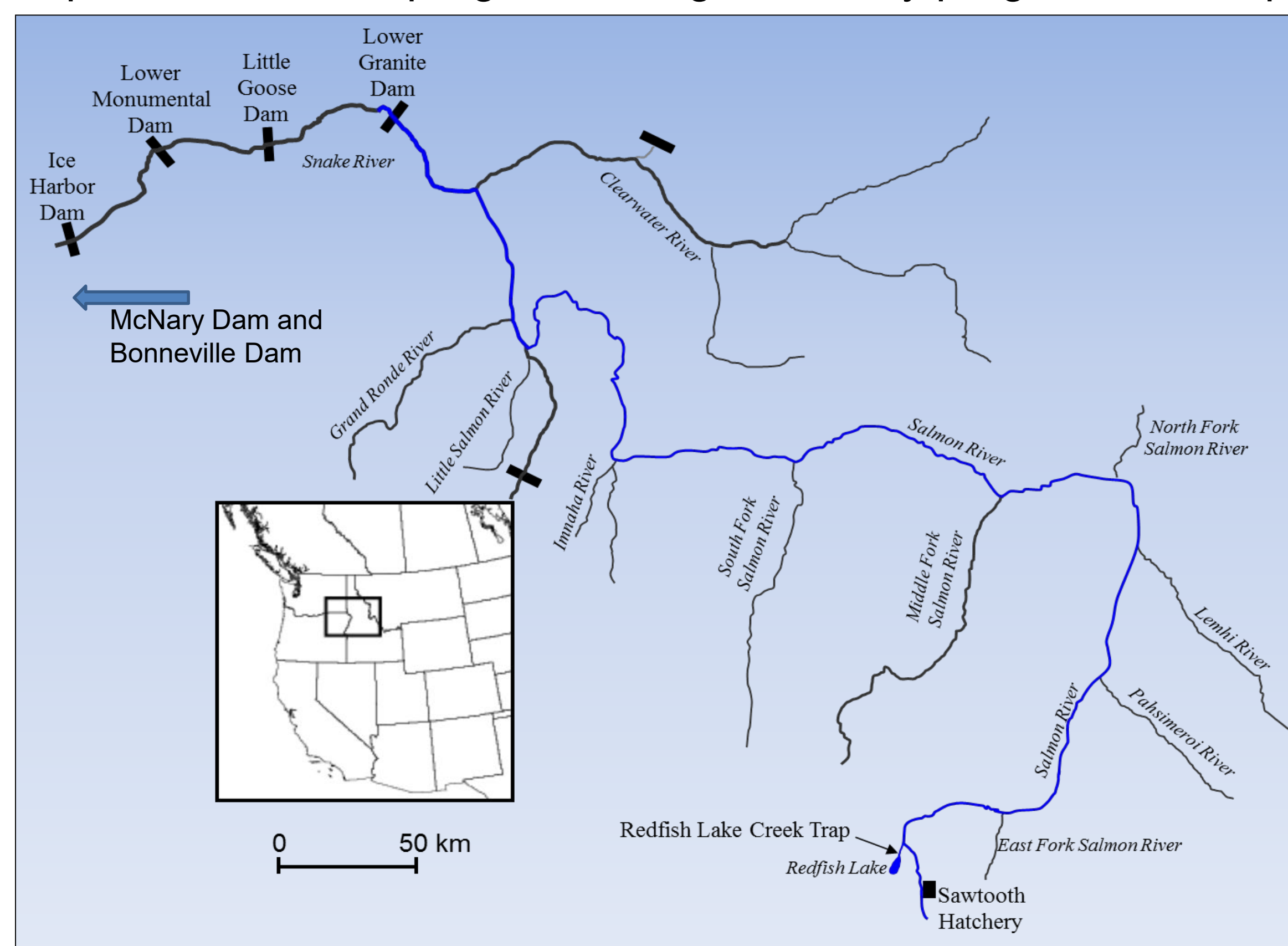
Effects of juvenile barge transportation on Snake River sockeye salmon survival



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History

The range of sockeye salmon, *Oncorhynchus nerka*, in the Columbia River system includes the southernmost population of the species in the Stanley Basin, Idaho. Due to a dramatic decline in adult returns to near extinction, they were listed as endangered under the ESA in 1991. Recovery efforts have focused on implementation of a captive broodstock program, a large hatchery program, and improving conditions for juvenile and adult migration.



The Challenge

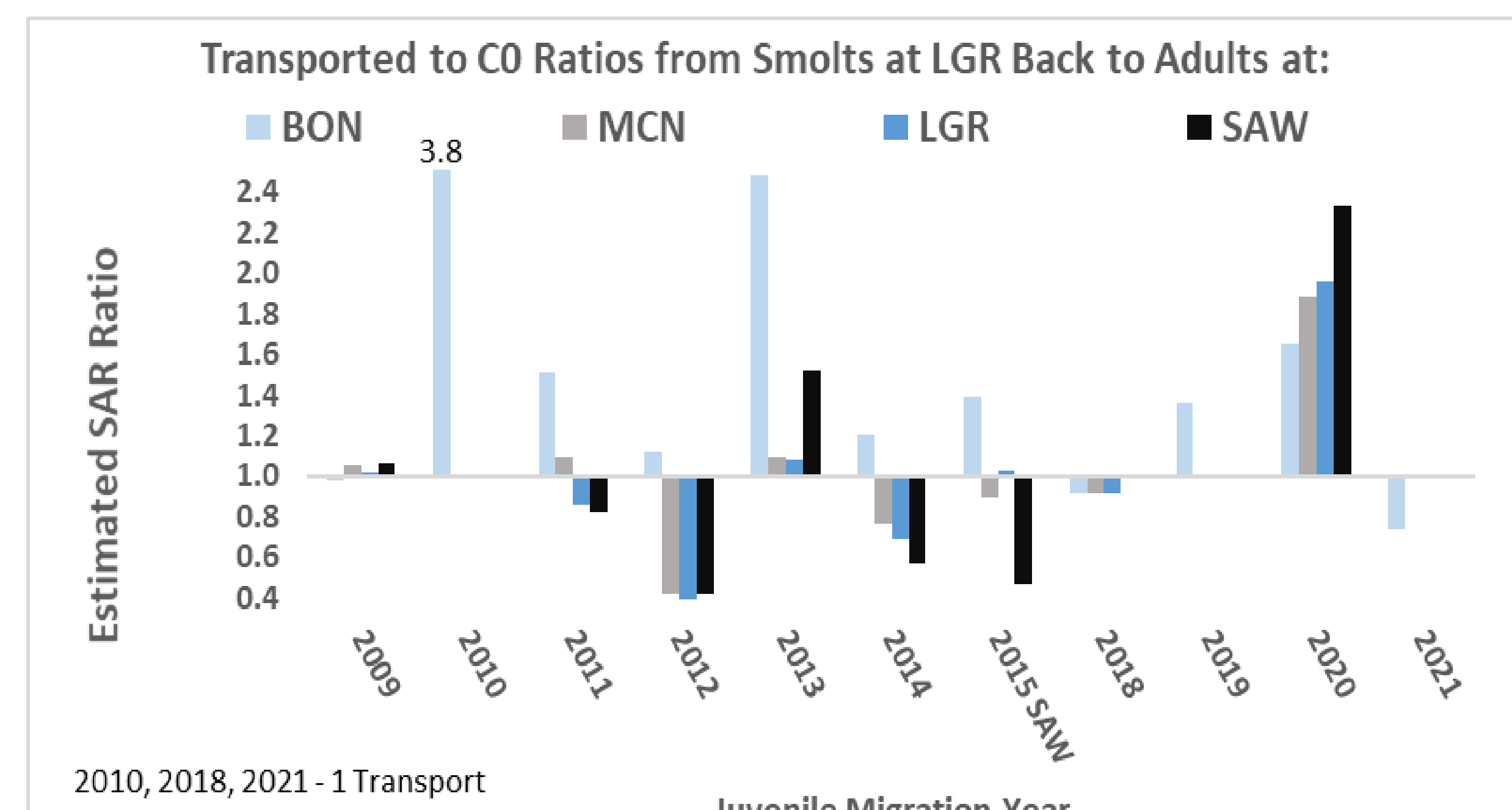
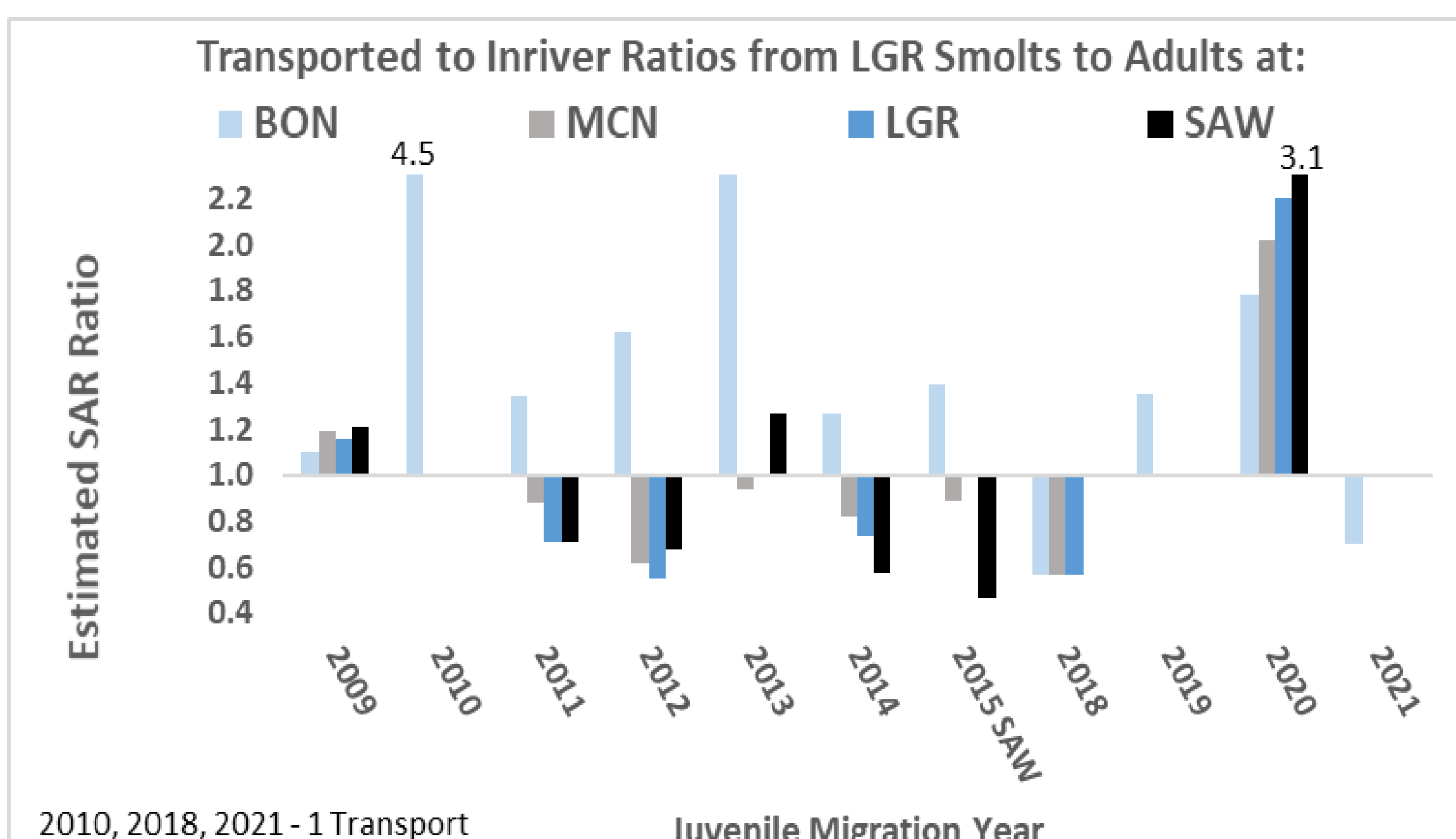
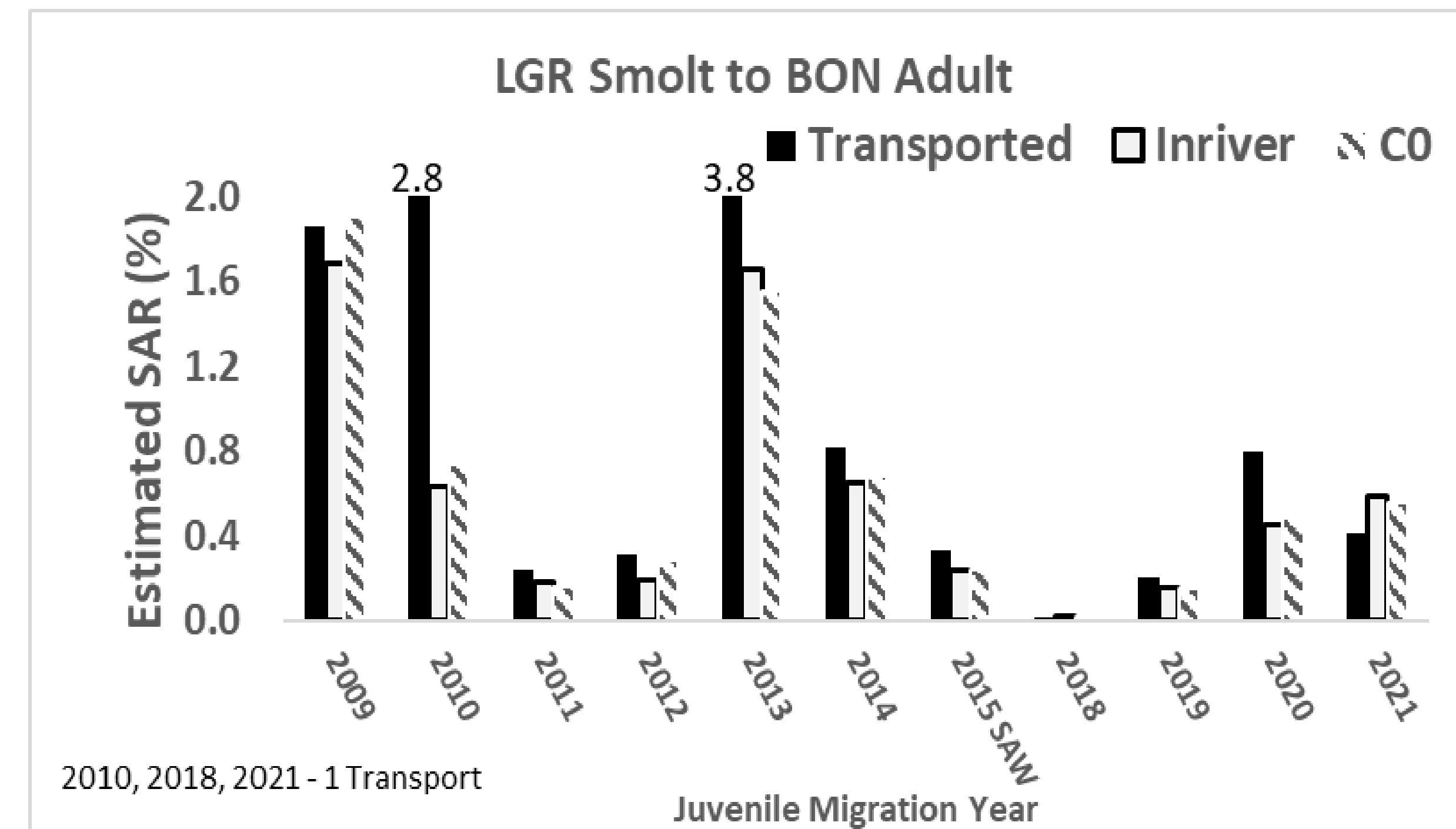
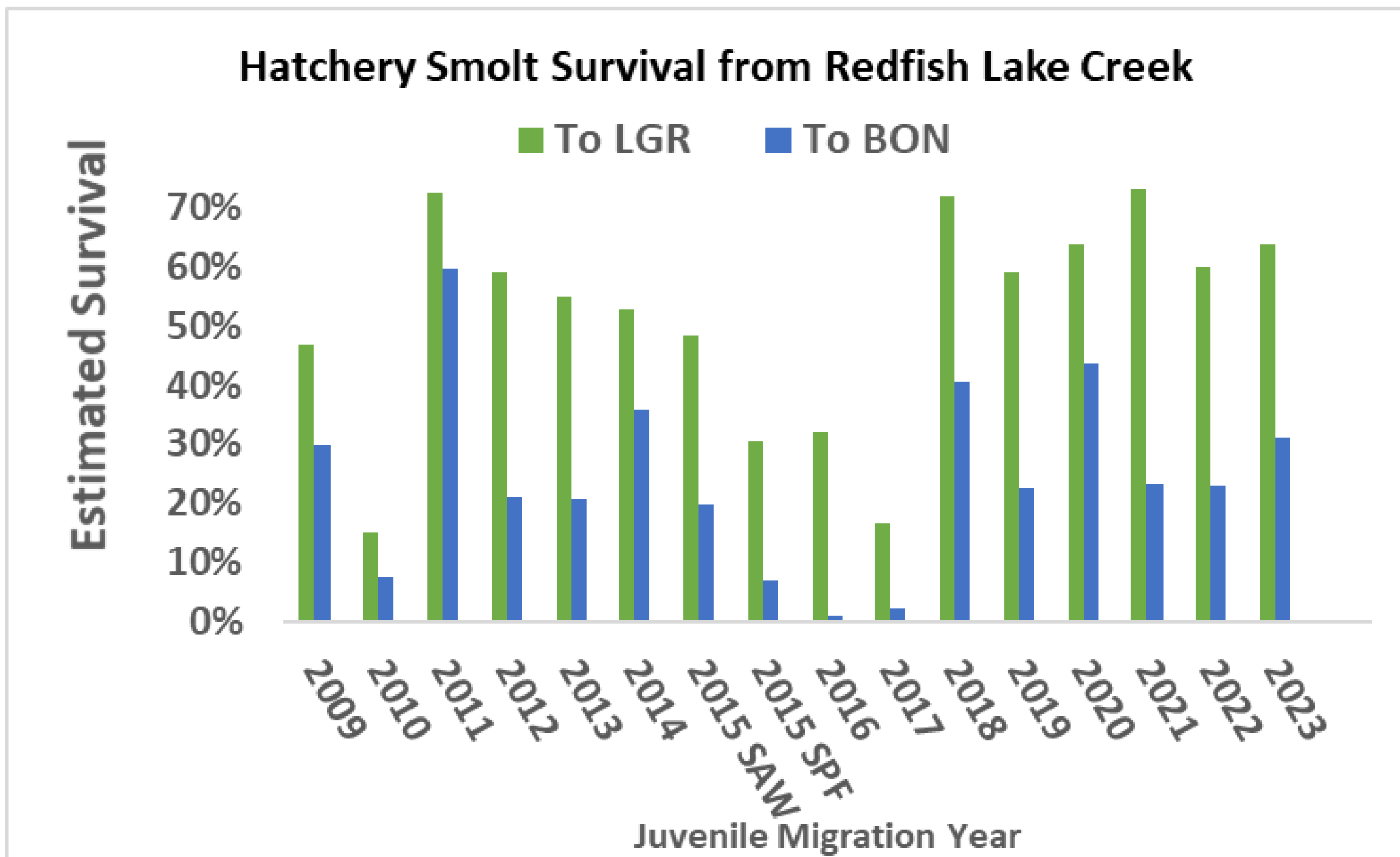
Significant losses of Snake River sockeye salmon occur each year during both the juvenile downstream and adult upstream migration periods. Until recently we lacked knowledge of temporal patterns in survival and effects of management (like juvenile transportation), but several years of PIT-tag data are now available.

Data and Analysis

- 806,256 juvenile sockeye salmon PIT-tagged at Sawtooth (Migration 2009-15) or Springfield Hatcheries (2015-23)
- 1977 adult returns to Bonneville Dam (BON) (Return Years 2010-23)
- Cormack-Jolly-Seber mark-recapture
- Data available at ptagis.org

Migration Year	PIT tagged Released	Total	BON Adults		
			Transports	Inriver	C0
2009	52551	433	188	245	162
2010	51684	50	1	49	38
2011	51672	71	17	54	23
2012	51710	77	46	31	24
2013	50063	679	388	291	179
2014	49879	181	50	131	118
2015 SAW	49772	59	7	52	50
2015 SPF	49307	0			
2016	50656	0			
2017	49937	0			
2018	45142	5	1	4	2
2019	56282	52	7	45	40
2020	49666	146	8	138	98
2021	48174	213	1	212	99
2022	49830	11	0	11	6
2023	49847	0			

Results



- Adult upstream survival worse for transported sockeye as the ratios that were beneficial (>1.0) for transportation back to BON were reversed (6 of 8 comparative years) as fish returned upstream. MY2020 big exception.

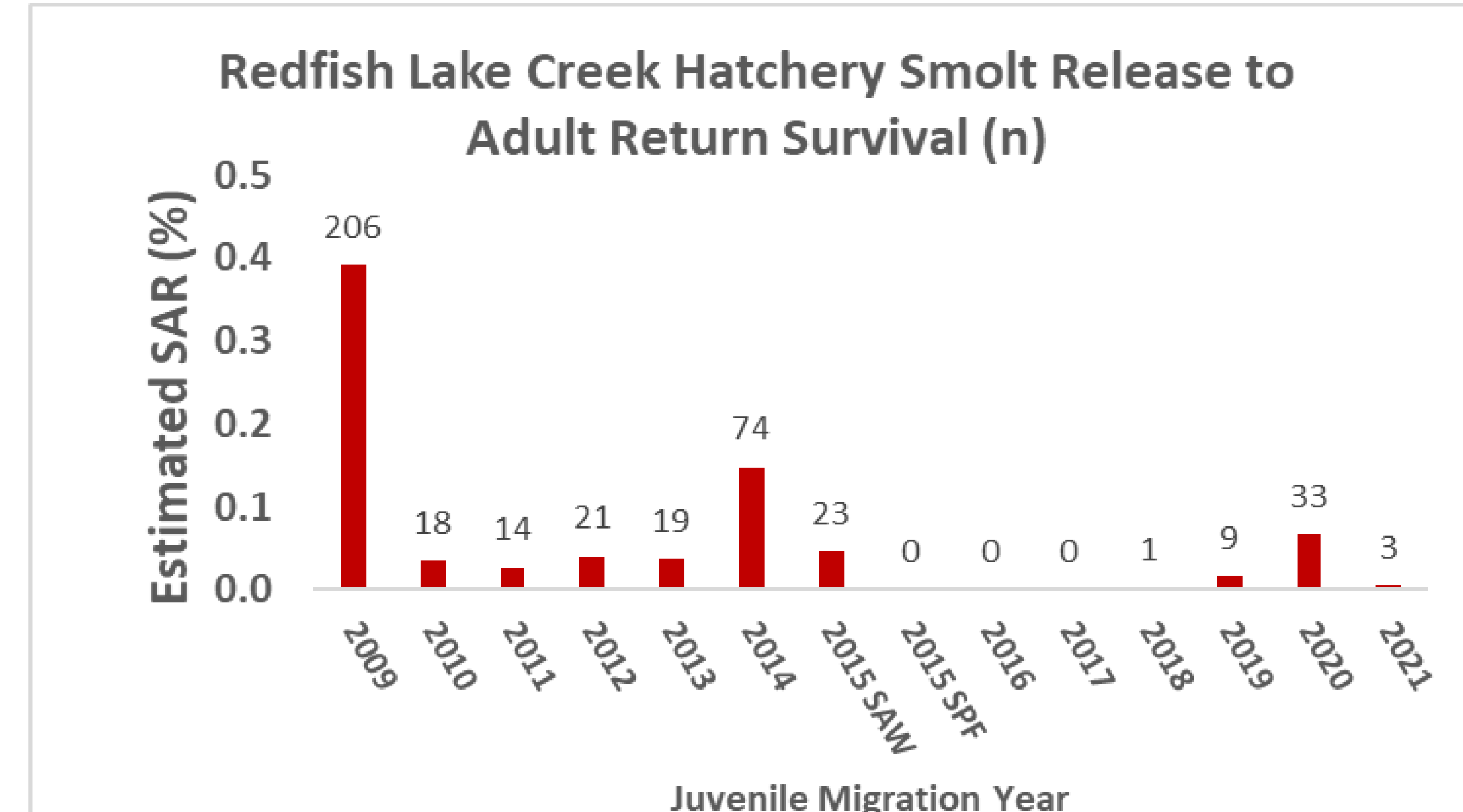
- Similar pattern for transport vs C0 instead of all inriver.

Abbreviations

BON – Bonneville Dam; MCN – McNary Dam; LGR – Lower Granite Dam; LGO – Little Goose Dam; LMN – Lower Monumental Dam; SAW – Sawtooth Hatchery; SPF – Springfield Hatchery; SAR – Smolt to Adult Return Rate; C0 – Estimated not detected at LGR, LGO, or LMN

Conclusions

- Redfish Lake sockeye salmon experience substantial annual variation in ocean survival rates possibly related to juvenile migration route (transported vs inriver).
- They also experience substantial annual variation in upriver survival rates for adults (presumably river conditions).
- Greater scrutiny should be given to the interaction between juvenile transportation and upstream-migration river conditions (possibly water temperatures) on the population dynamics of this at-risk salmon population.



- Smolt-to-adult survival from/to SAW generally very low for PIT-tag cohorts. Not quite 100% detection.

Acknowledgements

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