Migration Survival of Juvenile Chinook Salmon and Steelhead from Wapato Dam to the Mouth of the Yakima River, Washington, 2018

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U.S. Department of the Interior
U.S. Geological Survey

Overview

- Species
  - Yearling Chinook salmon (*n* = 350)
  - Subyearling Chinook salmon (*n* = 350)
  - Steelhead (*n* = 400)
  - *Lamprey (n = 200)*
- Study area
  - Lower Yakima River: Yakima to Richland
  - *Likely to include mainstem Columbia River*
- Duration
  - 2018, 2019, 2020
  - 2018 is pilot study
  - March to July each year
- Funding and collaboration
  - Funding: Yakama Nation and Bureau of Reclamation
  - Fieldwork, analysis and reporting: U.S. Geological Survey and Yakama Nation

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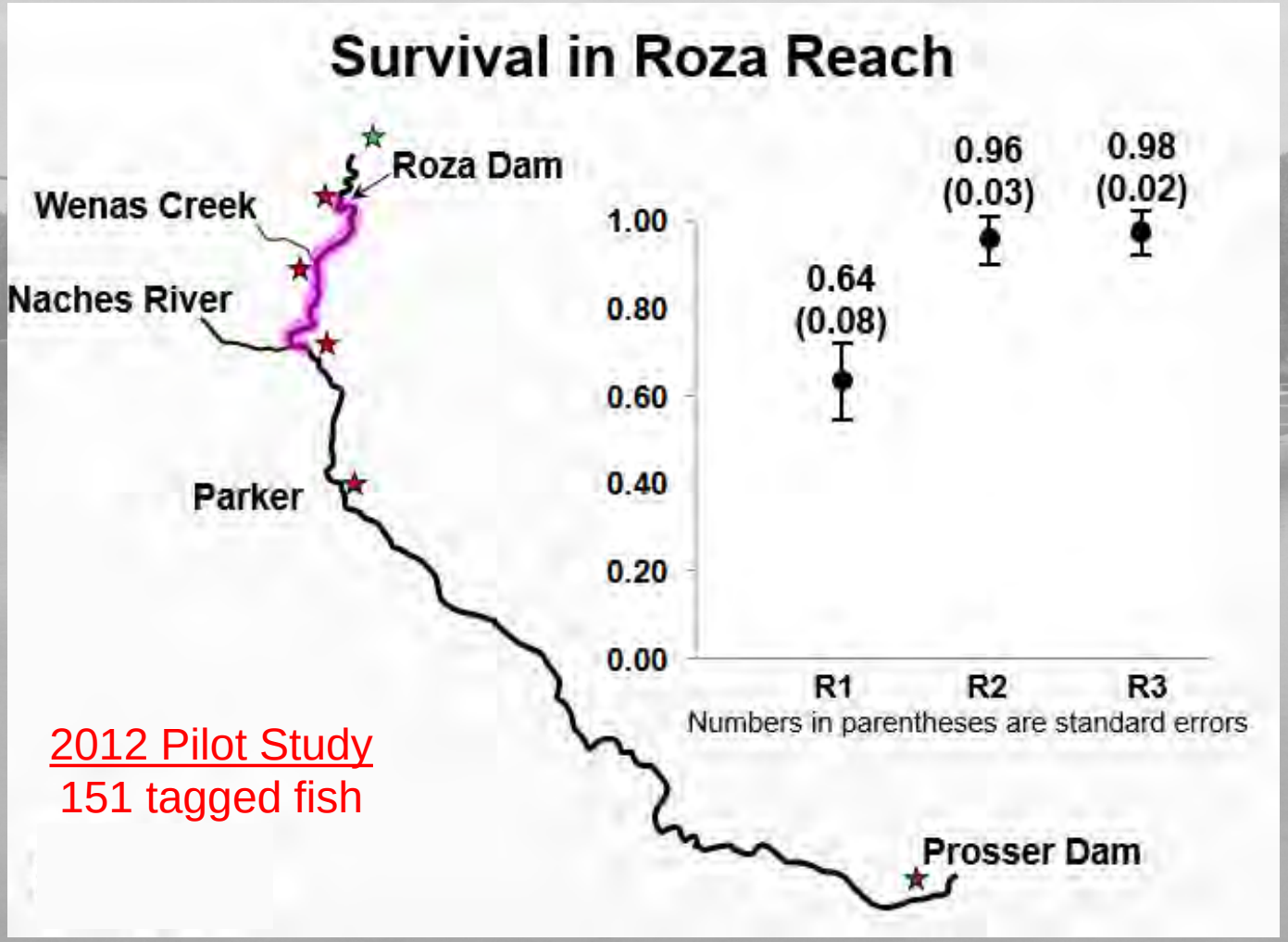
Roza Reach Studies



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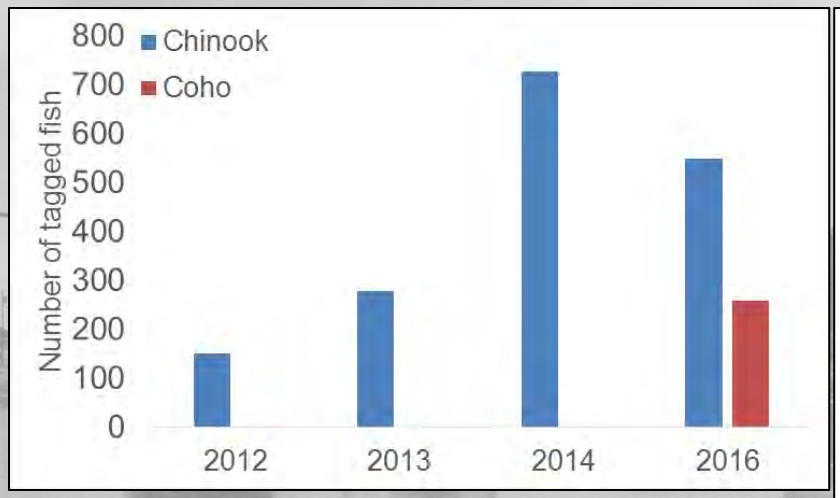

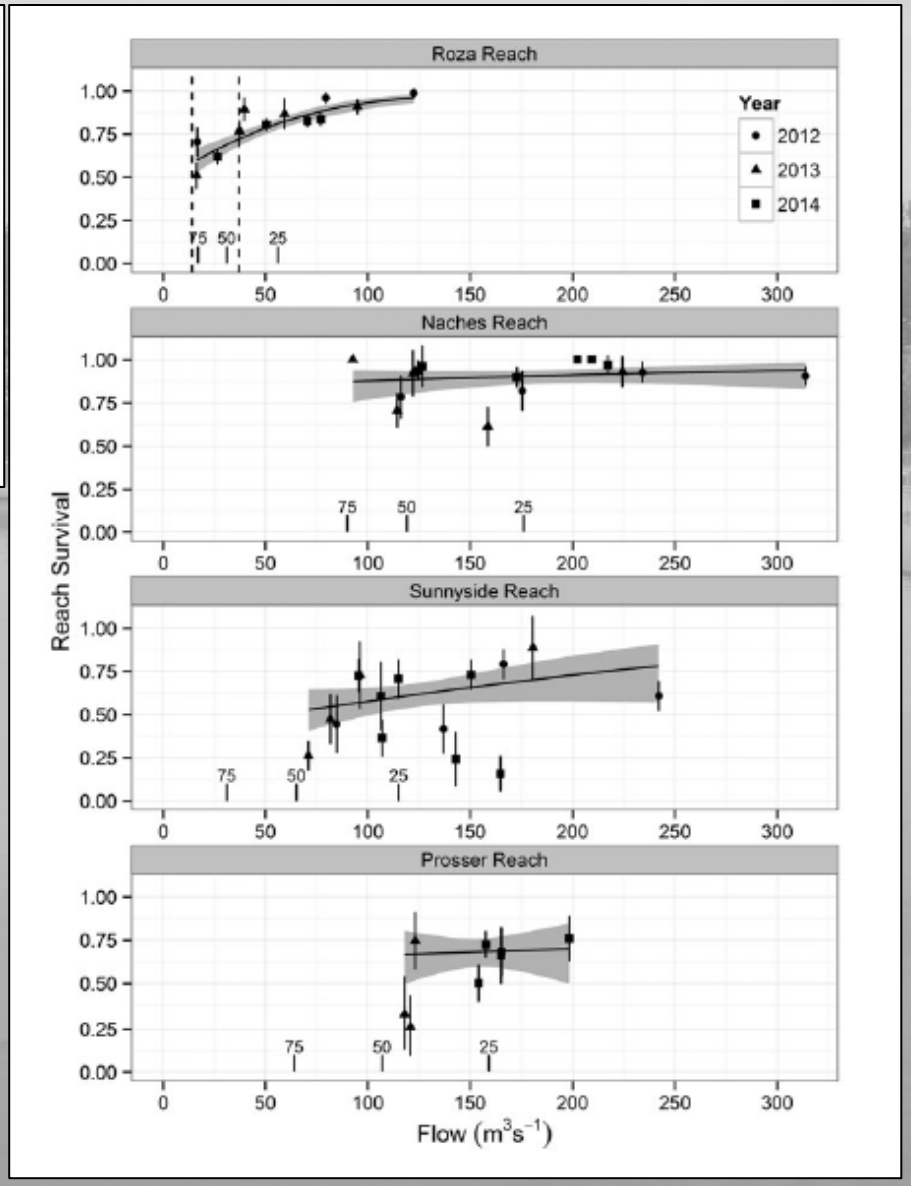

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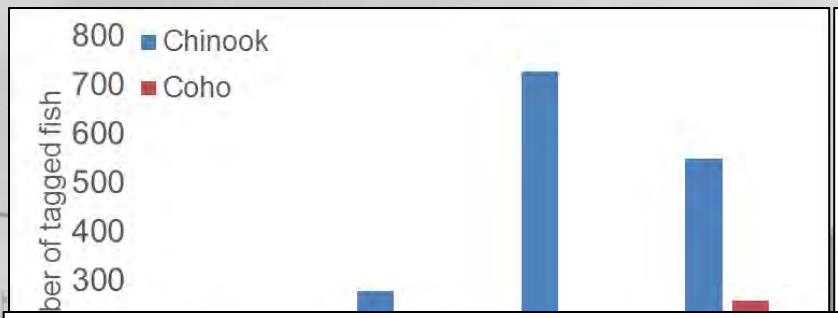

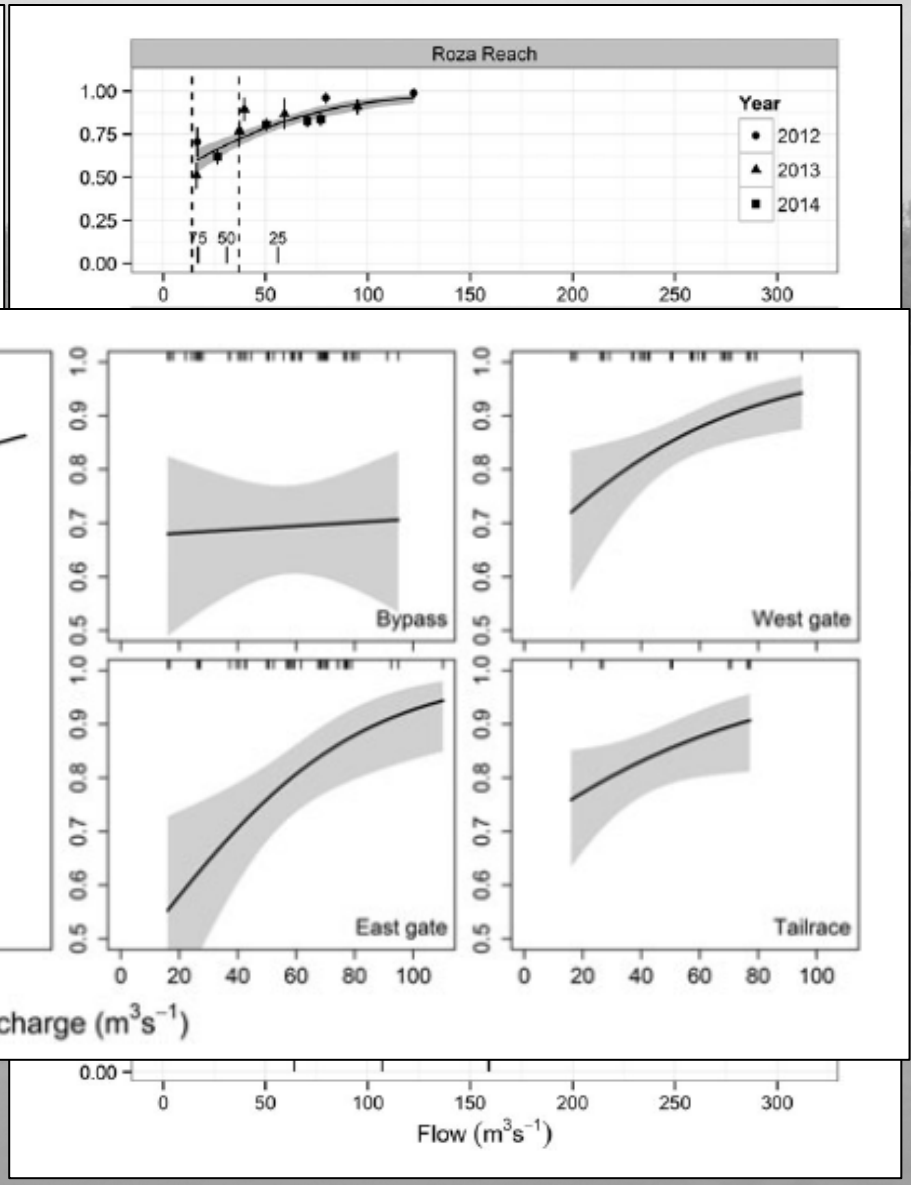

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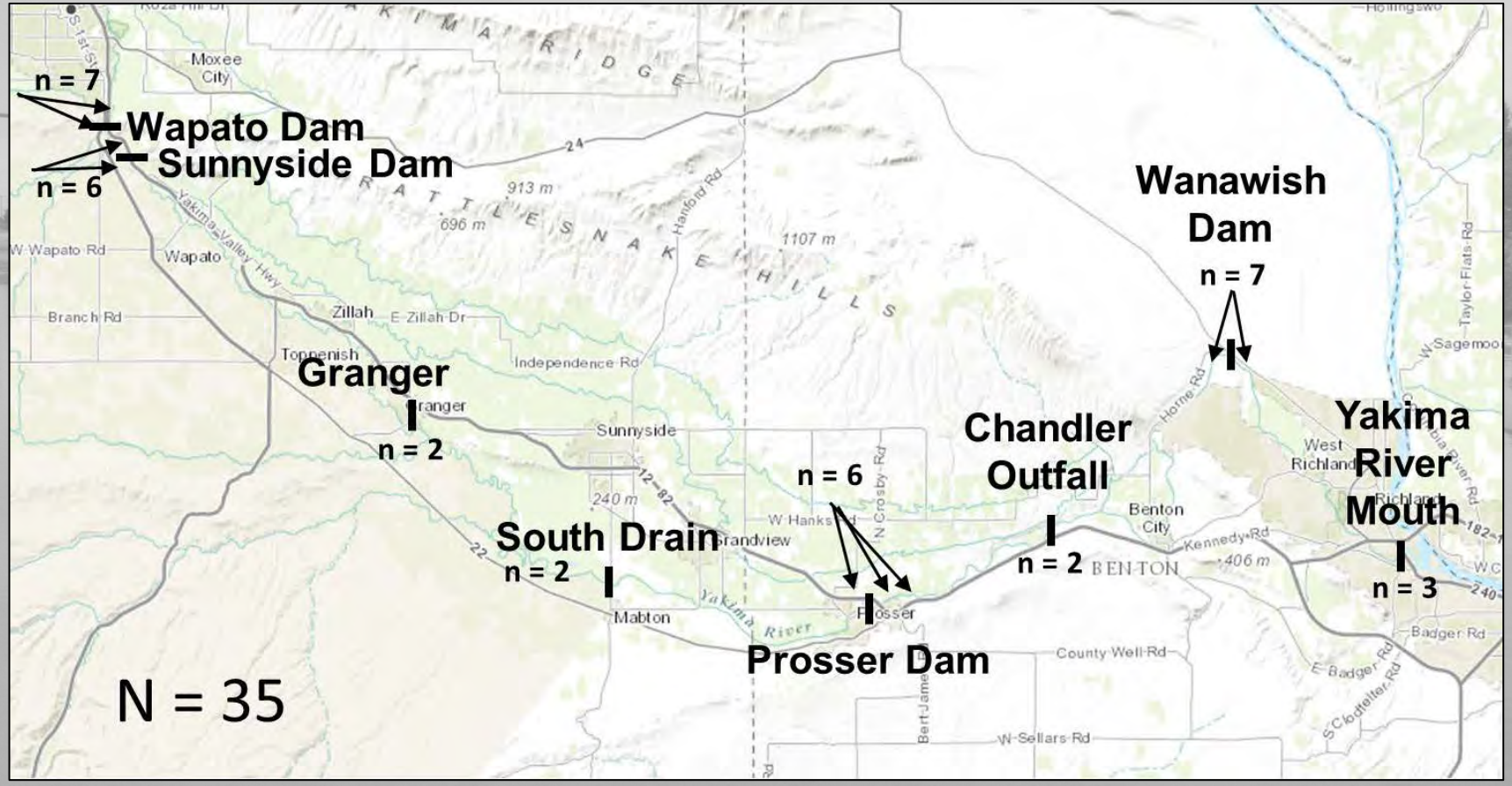
Study Area and Monitoring Sites



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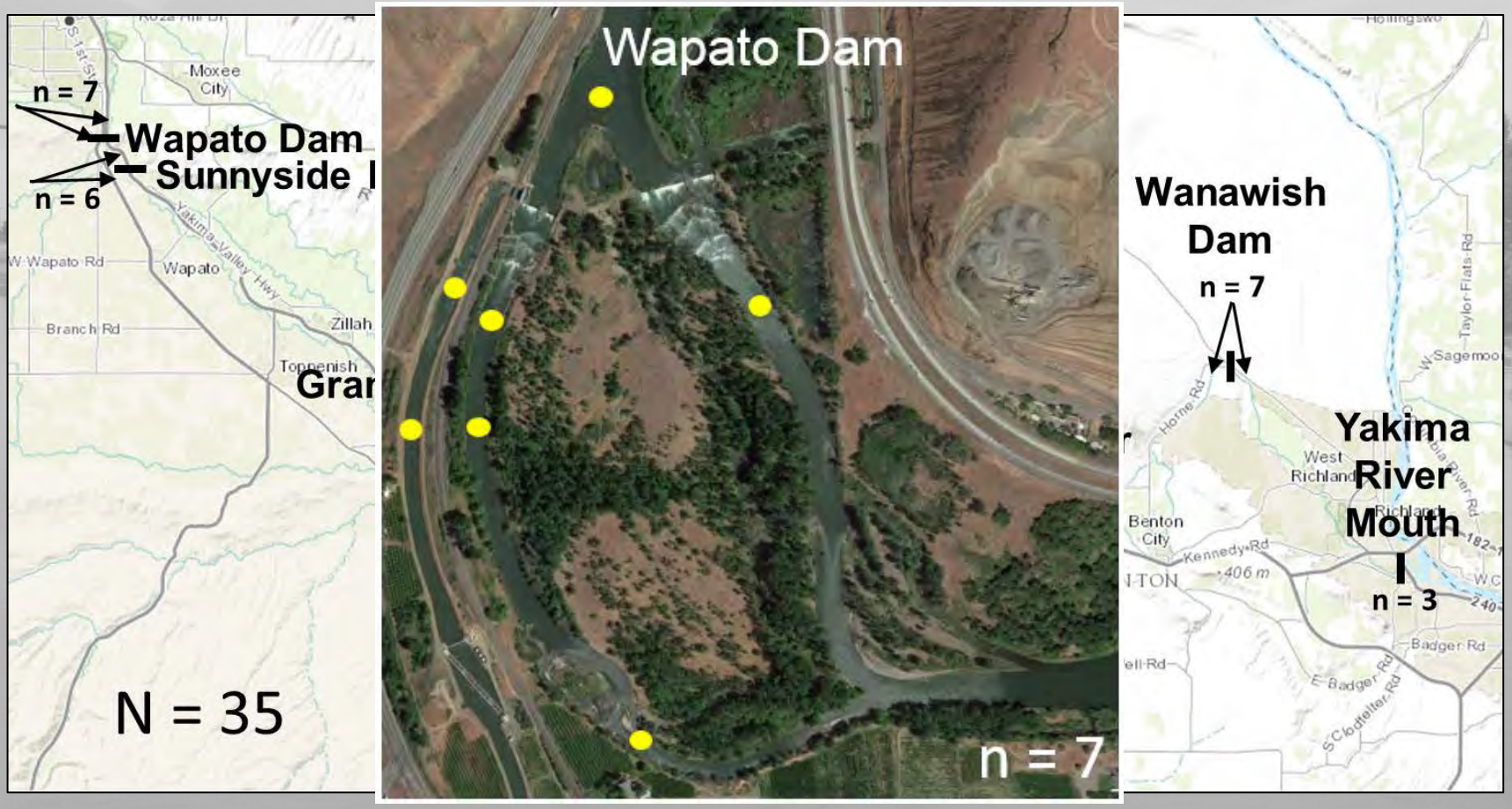

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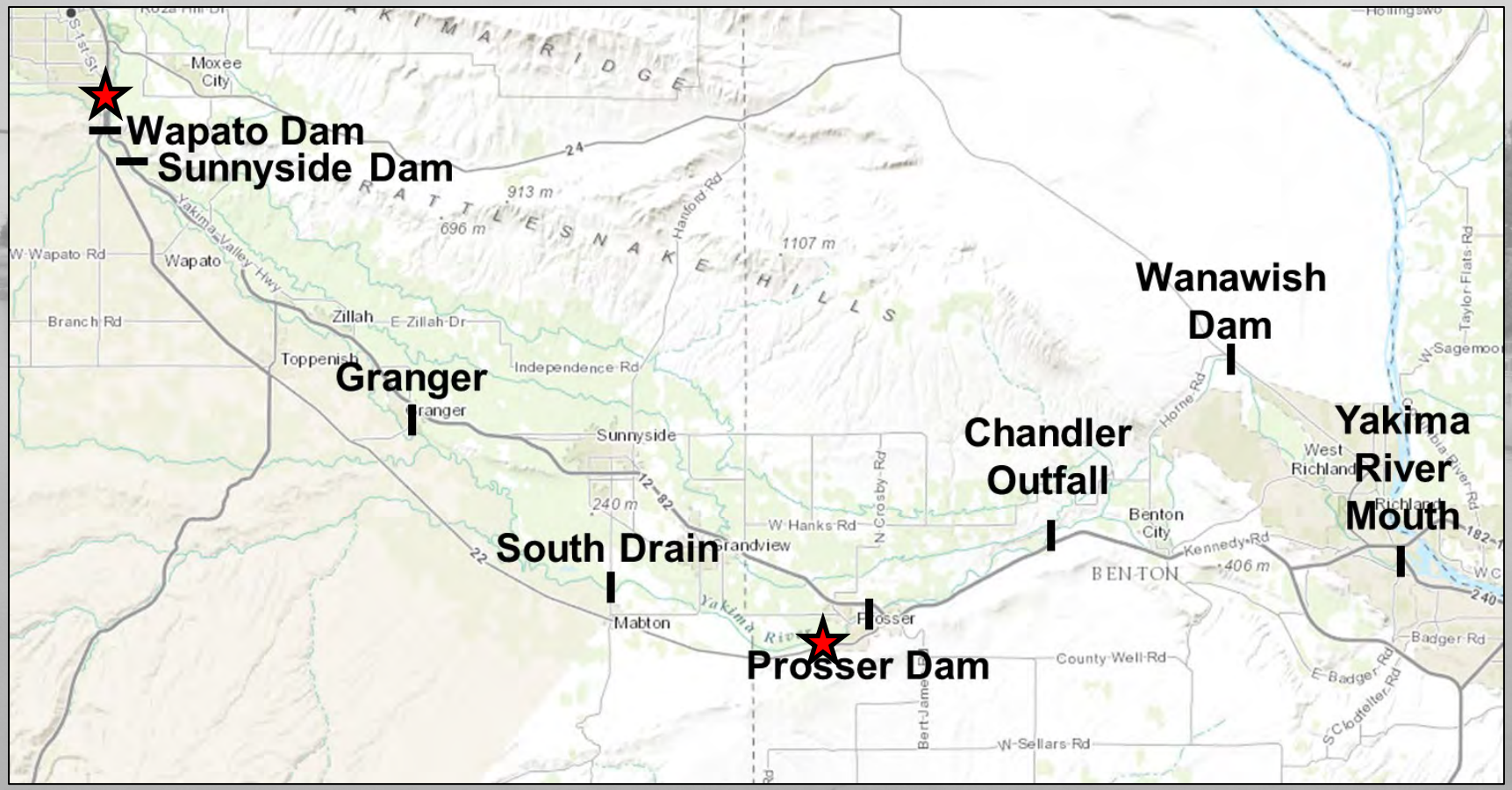
Study Area and Monitoring Sites

Fish Tagging and Release



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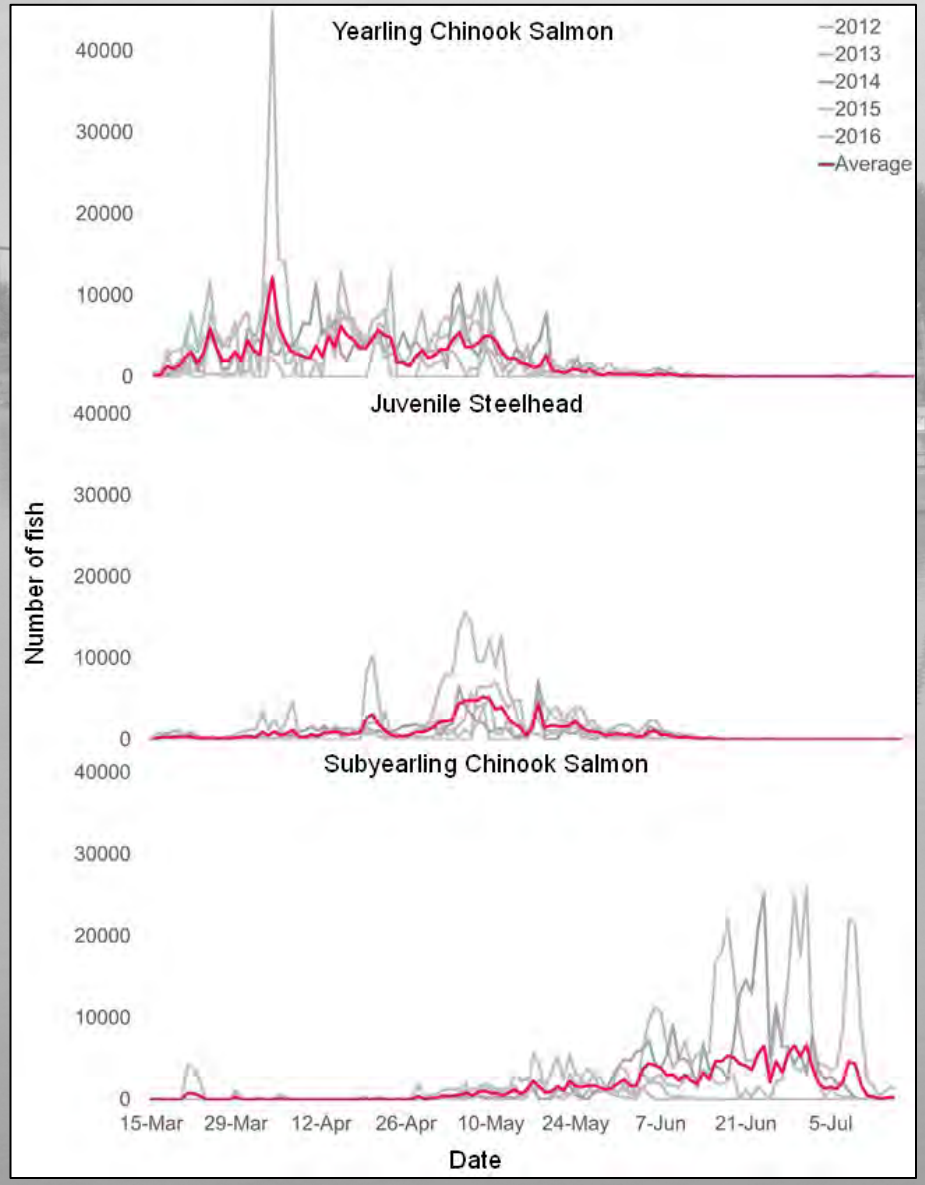
Fish Tagging and Release



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Fish Tagging and Release

Week	Yearling Chinook		Subyearling Chinook		Steelhead	
	Wapato	Prosser	Wapato	Prosser	Wapato	Prosser
Mar 26-30	30	20				
Apr 2-6	30	20				
Apr 9-13	30	20			30	20
Apr 16-20	30	20			30	20
Apr 23-27	30	20			30	20
Apr 30-May 4	30	20			30	20
May 7-11	30	20			30	20
May 14-18			30	20	30	20
May 21-25			30	20	30	20
May 28-Jun 1			30	20		
Jun 4-8			30	20		
Jun 11-15			30	20		
Jun 18-22			30	20		
Jun 25-29			30	20		
Jul 2-6			30	20		
Totals	210	140	240	160	210	140
		350		400		350

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Other Data Collection

Covariate	Source
Fish size	Fork length and weight measurements collected at tagging.
Release date	Release date recorded at time of release.
Discharge	Obtained from in-river flow gages: (1) Wapato Dam to Sunnyside Dam reach: data from Parker gage (PARW) + data from diversion at Sunnyside Canal. (2) Sunnyside Dam to Granger reach: data from PARW gage. (3) Granger to South Drain reach: data from the PARW gage + tributary input flow data. (4) South Drain to Prosser Dam reach: data from the Euclid Bridge gage (YGVW). (5) Prosser Dam to Chandler Outfall reach: data from the Prosser gage (YRPW). (6) Chandler Outfall to Wanawish Dam reach: data from the Kiona gage (KIOW). (7) Wanawish Dam to Yakima River Mouth reach: data from KIOW – data from diversion at Wanawish Dam.
Water Temperature	Hourly data from thermographs located in each reach; supplemented with instantaneous measurements by predator sampling crews.
Turbidity	Instantaneous measurements by predator sampling crews.
Predator index	(1) Weekly reach-specific counts of juvenile and adult piscivorous predators within reference reaches of each reach. (2) Weekly reach-specific counts of avian predators collected when possible.

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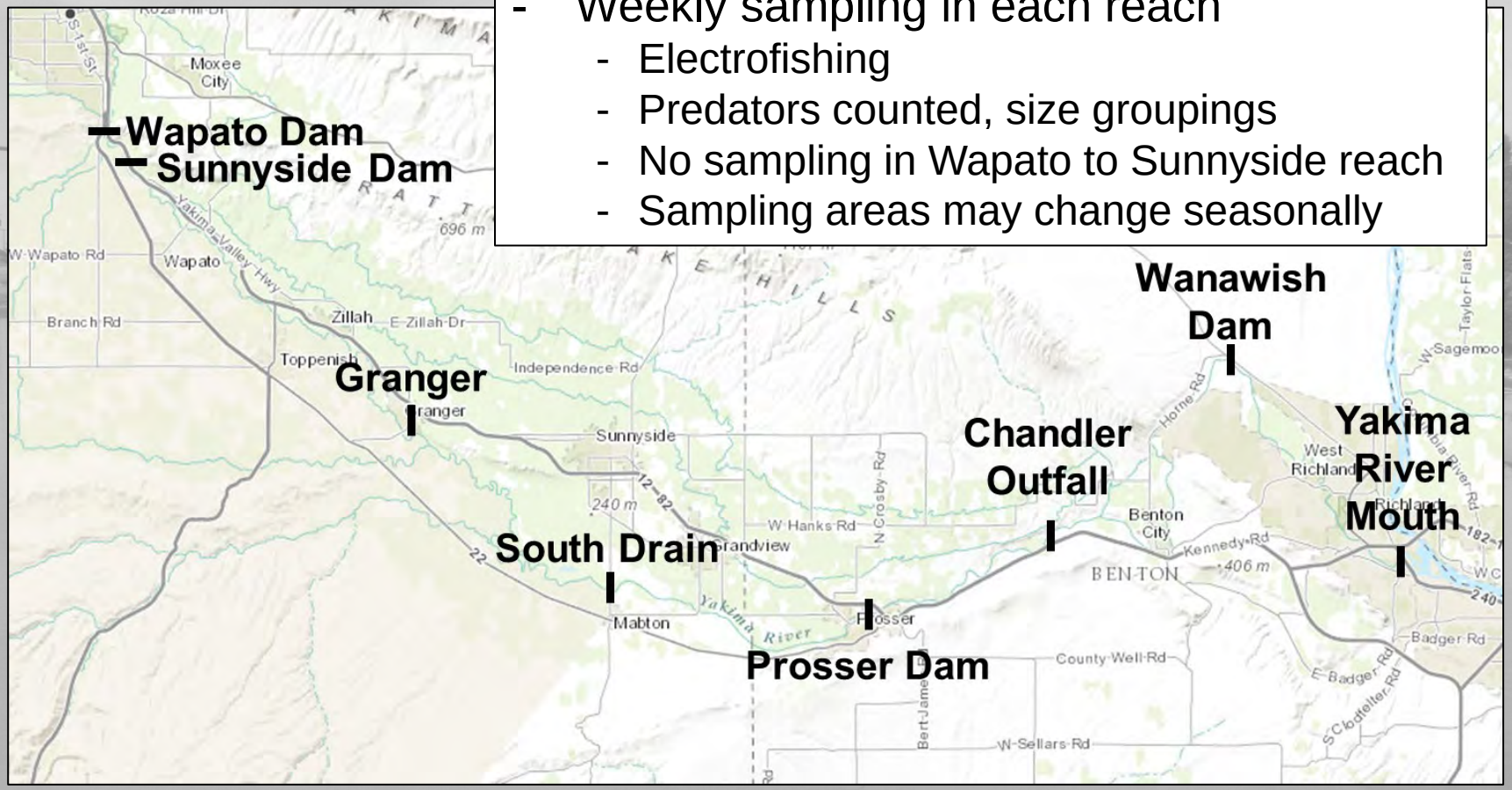
Predator Index

- Weekly sampling in each reach
  - Electrofishing
  - Predators counted, size groupings
  - No sampling in Wapato to Sunnyside reach
  - Sampling areas may change seasonally



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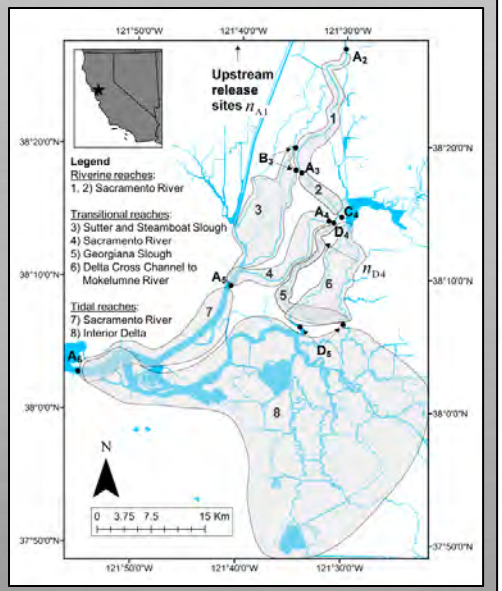
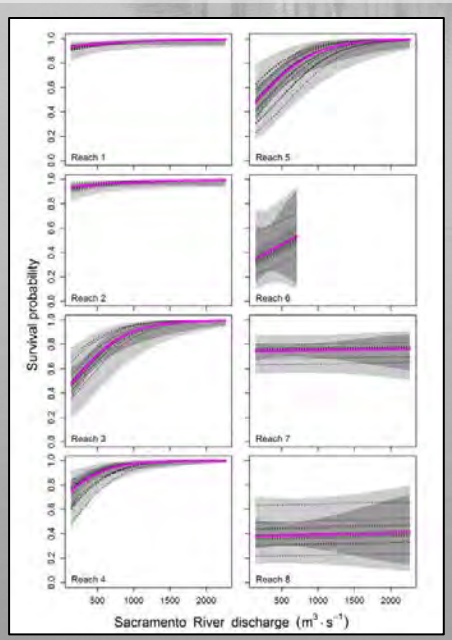
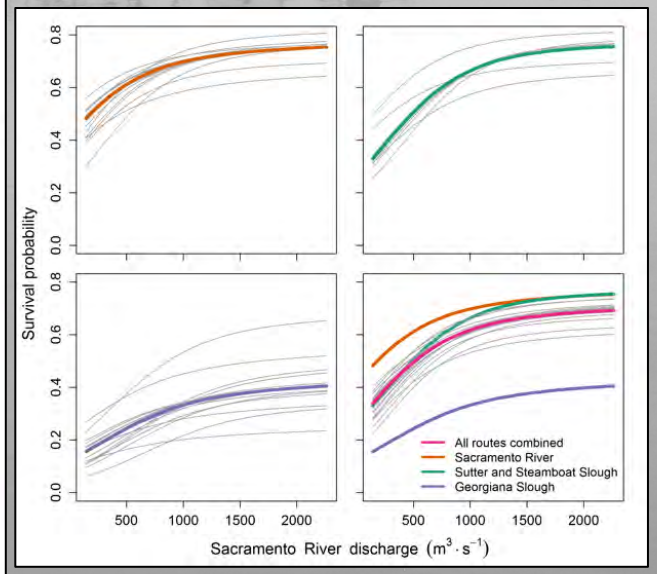
Data Analysis

- Limitations of 2012-2016 studies
  - Sample size (in lower Yakima reaches)
  - Model limitations (fish grouped into cohorts)
- 2018-2020 analysis plan
  - Model survival in relation to individual time-varying covariates
  - Bayesian framework (Perry et al. *In press*)
  - Annual estimates of migration survival
  - Multi-year analysis to develop decision support tool







Refining the Study Design

- Several factors to consider
  - Predator sampling surveys
    - Seasonal changes within reaches
    - Avian predators
  - Other studies
  - Lamprey
  - Additional input welcomed

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