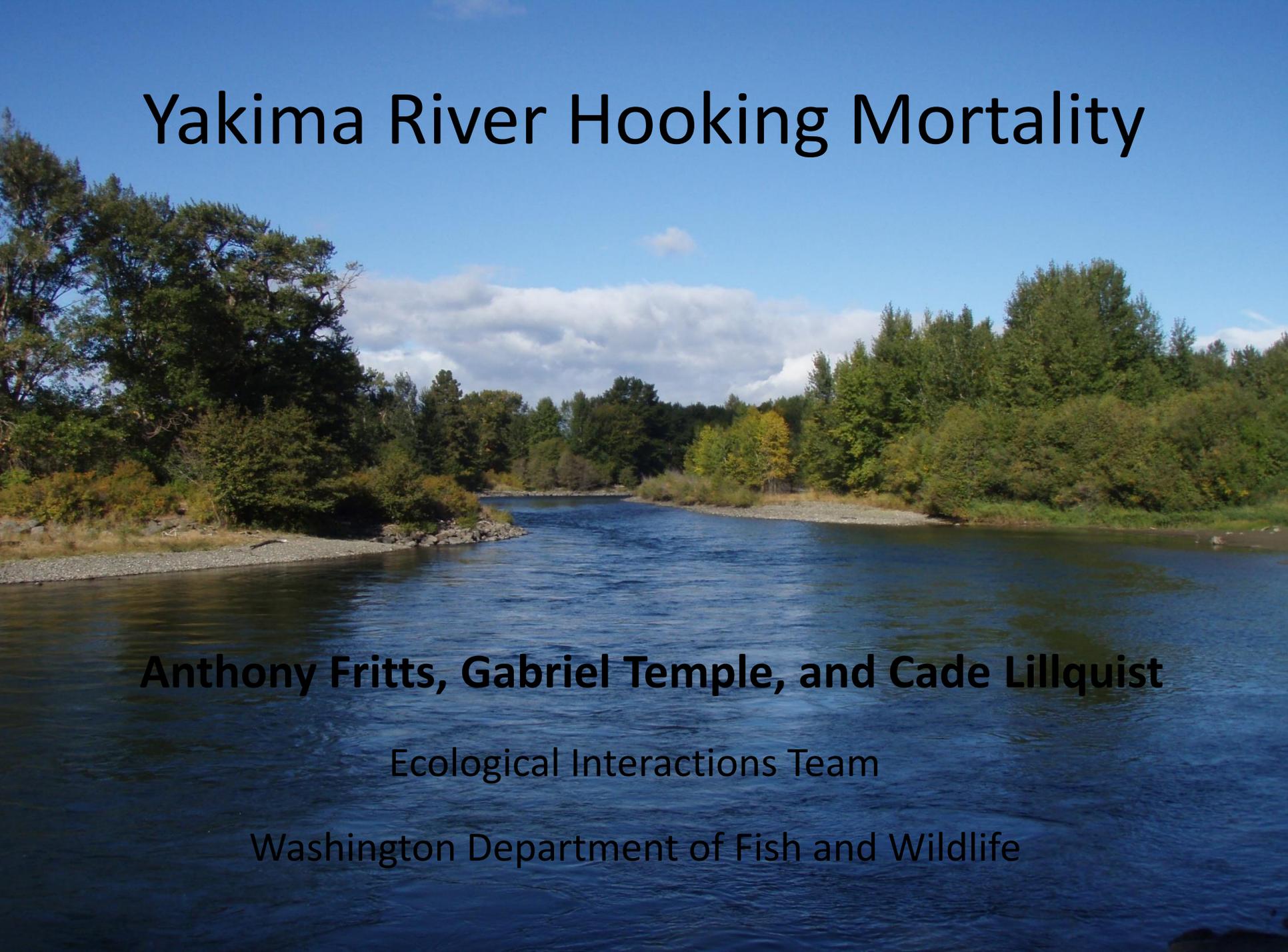


Yakima River Hooking Mortality

A scenic view of the Yakima River flowing through a forested area. The river is the central focus, with dark blue water and some whitecaps. The banks are lined with dense green trees and shrubs. The sky is a clear blue with a few white clouds. The overall scene is peaceful and natural.

Anthony Fritts, Gabriel Temple, and Cade Lillquist

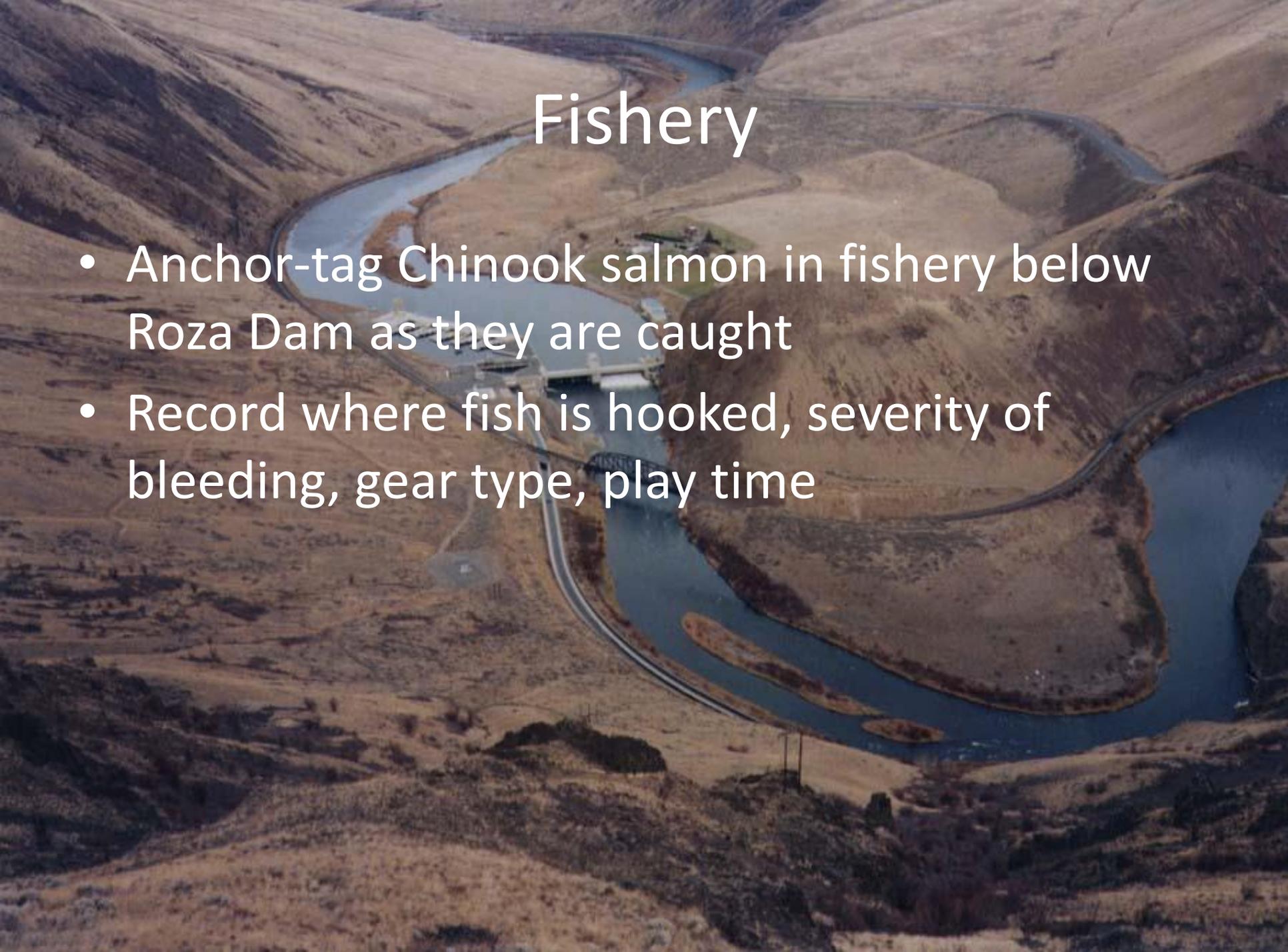
Ecological Interactions Team

Washington Department of Fish and Wildlife

Purpose

- Estimate long-term mortality of spring Chinook salmon caught and released in the fishery below Roza Dam
- Standard 10% rate currently used
- Potential use for take estimates in other fisheries with ESA considerations

Fishery

An aerial photograph of a river winding through a dry, hilly landscape. A dam is visible in the center, with a bridge crossing the river just downstream. The terrain is brown and rocky, with some sparse vegetation. The river is a deep blue color, contrasting with the surrounding land.

- Anchor-tag Chinook salmon in fishery below Roza Dam as they are caught
- Record where fish is hooked, severity of bleeding, gear type, play time

Radio-tagging

- Radio-tag treatment fish when they show up at Roza
- Radio-tag an equal number of control fish (HO)
- Both groups receive the same amount of handling at RAMF



Tracking

- Track tagged fish through spawning to determine ultimate fate
- Snorkel to determine if holding fish are alive



2012 Issues

9/23/03 N M-4 sc 9

- Only ~76% were recaptured at RAMF*
- Could not account for tag loss, fish spawning below Roza, strays



2013 - 2014 Methods

- PIT-tagged and radio tagged fish as soon as they are caught below Roza Dam using portable electronarcosis unit
- Tagged HO controls at Roza using electronarcosis



Analysis

- Used Kaplan-Meier procedure (Pollack et al. 1989) to estimate survival each week
- Censored fish that spit radio-tags, were taken out at Roza, disappeared in the upper Yakima, and all fish that were not radio-tagged in 2012
- Mortalities were fish that were found dead or dropped well downstream of historic spawning areas prior to Sept. 1
- Used logistic regression to examine the factors affecting survival (play time, handling time, hook location, bleeding severity, water temp, stream discharge, date caught)
- Hooking mortality calculated as the mean difference between T & C survival from tagging to Sept. 1

Results-Fishery

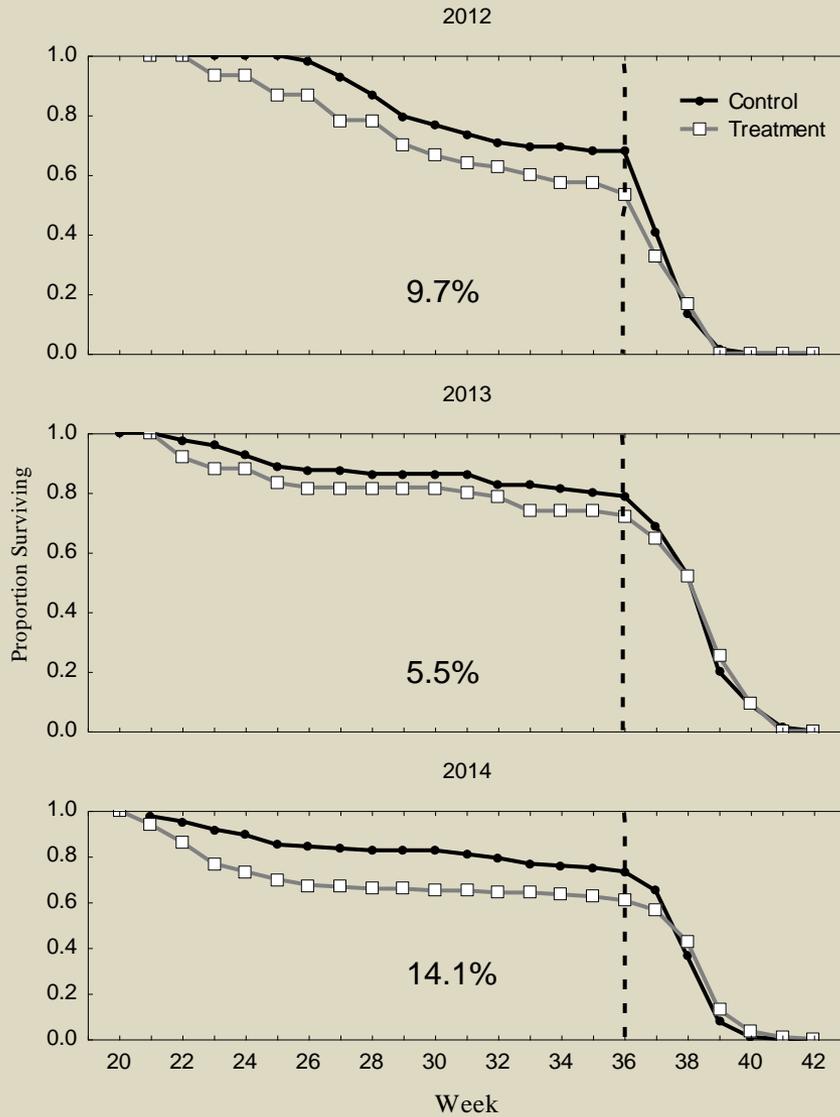
- Anglers were instrumental in effort
- 107 adults anchor tagged in fishery in 2012
- 70 adults radio tagged in 2013
- 116 adults radio tagged in 2014
- Equivalent number of control fish tagged each year



Factors Affecting Survival

- Bleeding severity and hook location were significant factors
- Highest mortality was for fish hooked in the gills followed by stomach/esophagus, tongue, jaw, and eye

Survival Estimates



Closing Time

- Average for 2013-2014 was slightly below 10%
- If we had a way to estimate 2012 mortality below Roza the 3-year average would be higher but no reliable way to do this because of the lack of controls or the ability to track the treatments

Acknowledgements

- Mark Johnston and his crew (Yakama Nation) at RAMF tagged fish at Roza and provided helpful suggestions to improve the study
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