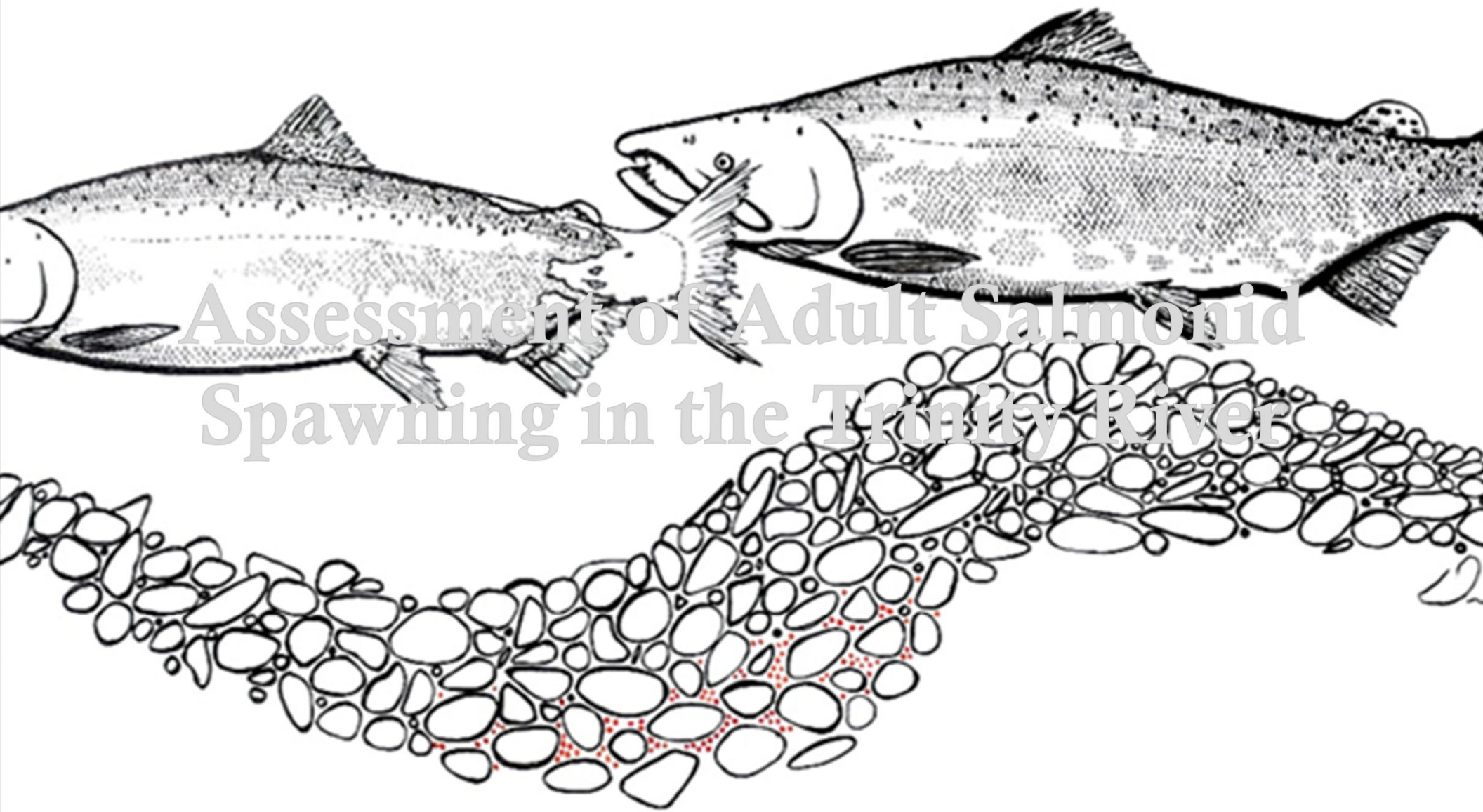
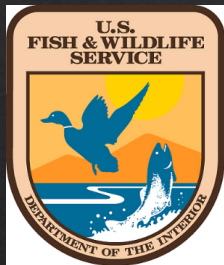




Assessment of Adult Salmonid Spawning in the Trinity River

Assessment of Adult Salmonid Spawning in the Trinity River

Principal Investigators



◆ USFWS

- ◆ Steve Gough
- ◆ Nick Som

◆ CDFW

- ◆ Ken Lindke



◆ YTFP

- ◆ Kyle DeJulio
- ◆ Chris Laskodi

◆ HVT

- ◆ George Kautsky
- ◆ Billy Matilton



Report Structure

1. Introduction
2. Adult Salmon Monitoring and Escapement
3. Spawning Ground Surveys
4. Syntheses and New Analyses
5. Discussion and Next Steps

2. Adult Salmon Monitoring and Escapement (CDFW, HVT)

2.1 Data Sources and Methods

2.2 Annual Escapement Estimates

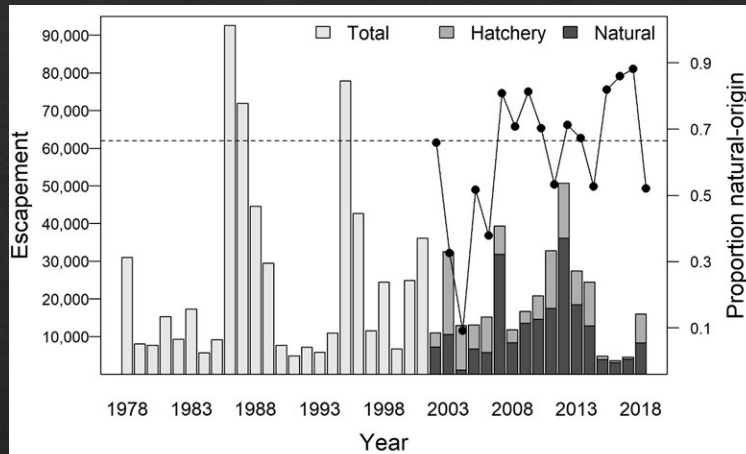
2.3 Natural Area Escapement

2.4 Hatchery Return Composition of Natural- and Hatchery-Produced Fish

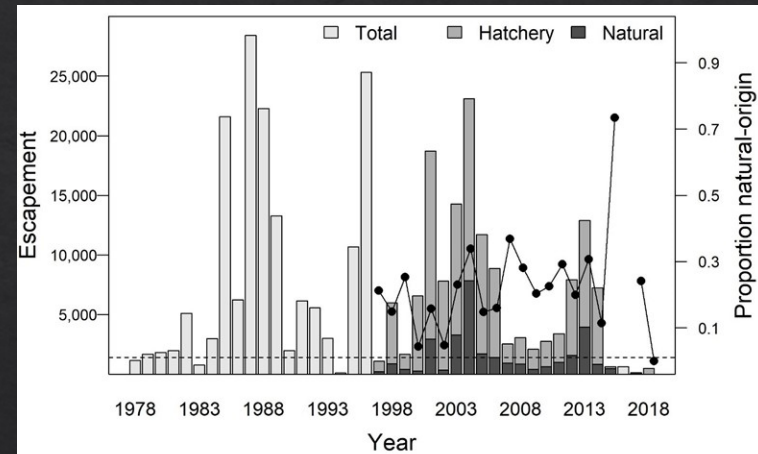
- ◇ Fall-run Chinook Salmon
- ◇ Spring-run Chinook Salmon
- ◇ Coho Salmon
- ◇ Steelhead

Natural Area Escapement

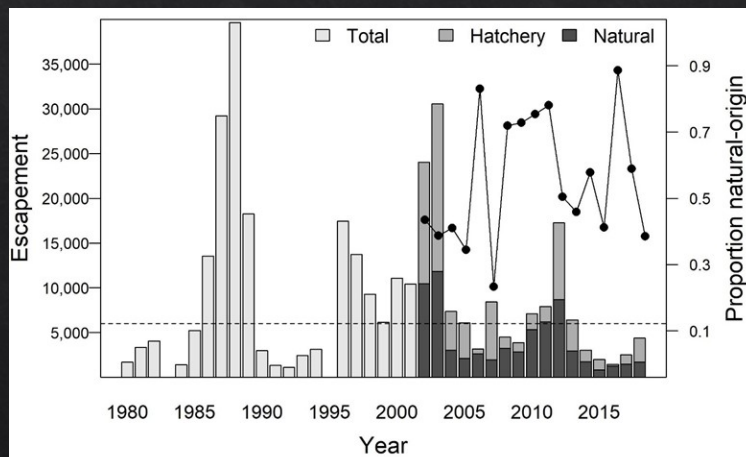
Fall-run
Chinook
Salmon



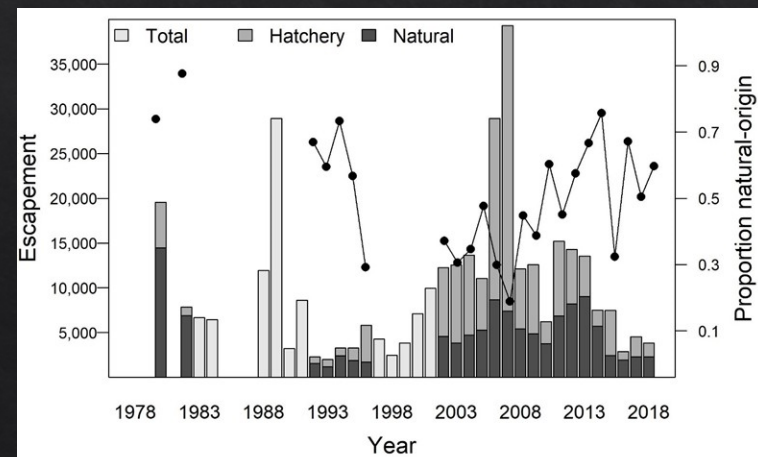
Coho
Salmon



Spring-
run
Chinook
Salmon

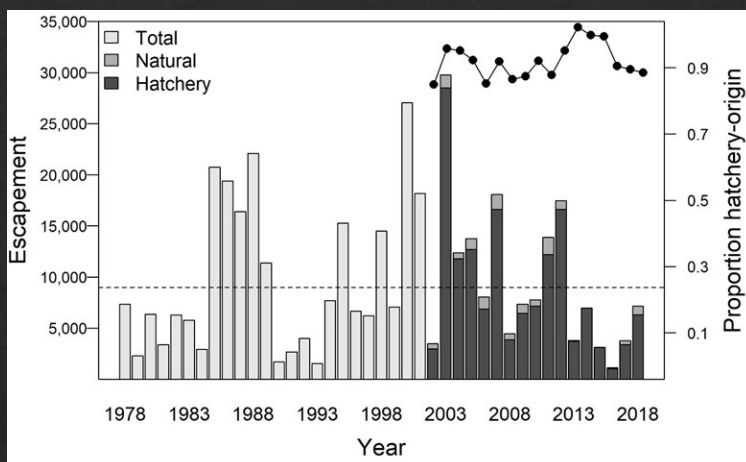


Steelhead

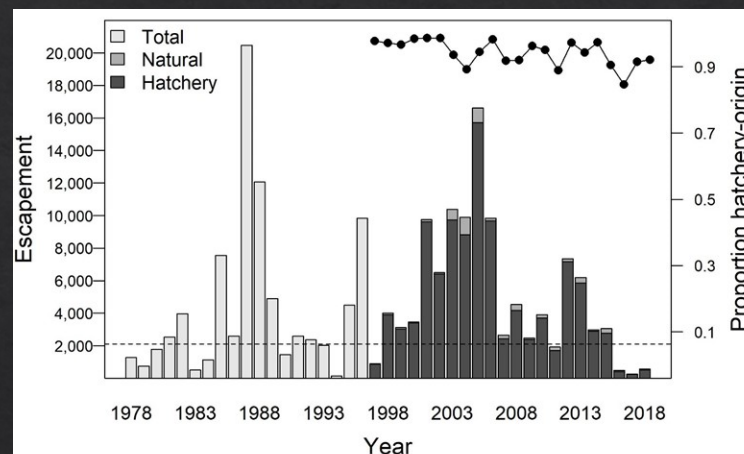


Hatchery Return Composition of Natural- and Hatchery-Produced Fish

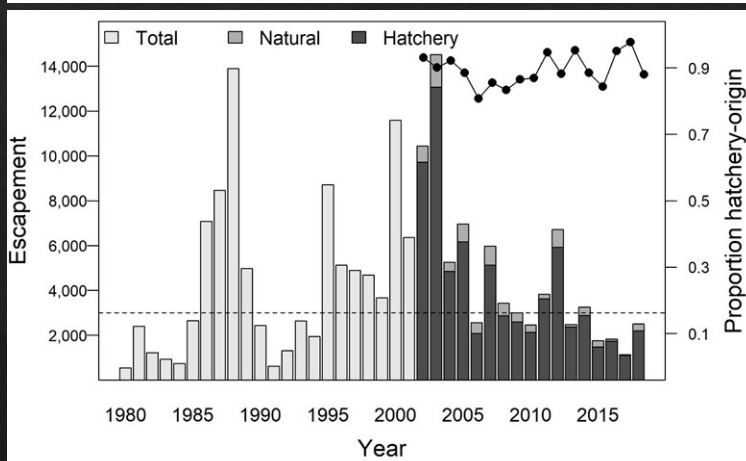
Fall-run
Chinook
Salmon



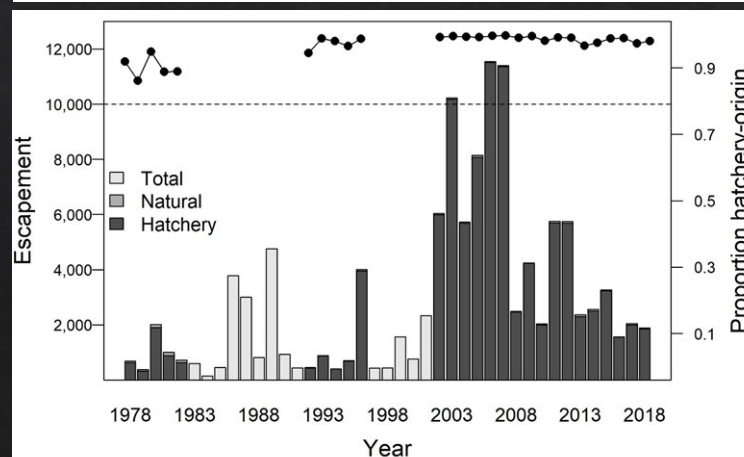
Coho
Salmon



Spring-
run
Chinook
Salmon



Steelhead



3. Spawning Ground Surveys (USFWS, YTFP)

3.1 Data Sources and Methods

3.1.1 Mainstem Spawning Ground Surveys

3.1.2 Tributary Spawning Ground Surveys

3.2 Carcass Data and Analyses

3.2.1 Distribution and Proportion of
Natural and Hatchery Spawners

3.2.2 Pre-spawn Mortality

3.2.3 Escapement Estimates

3.3 Redd Data and Analyses

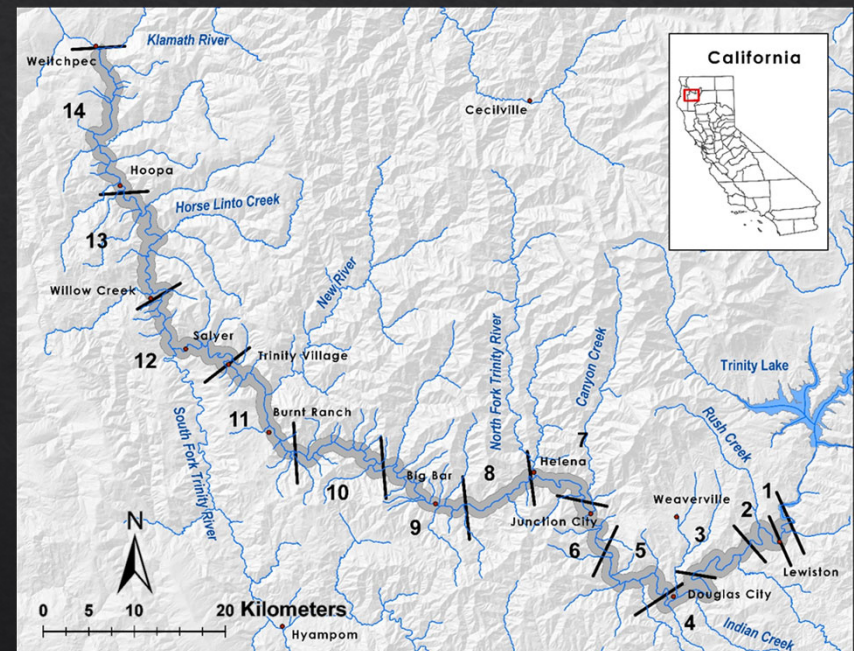
3.3.1 Redd Identification

3.3.2 Trends in Redd Abundance and
Distribution

3.3.3 Tributary Spawning

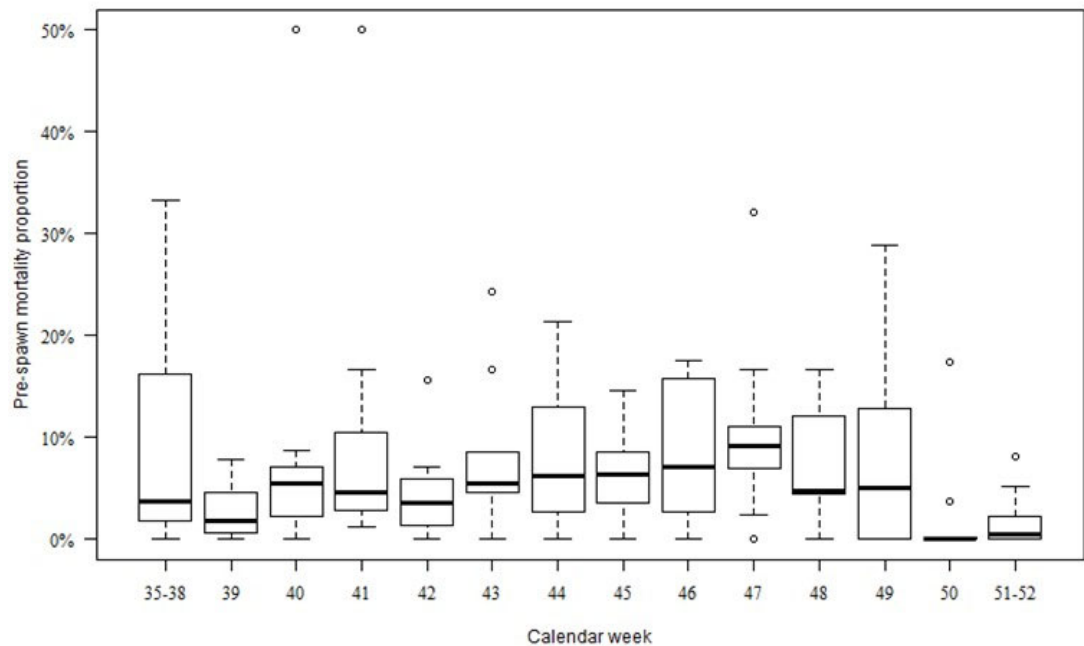
Spawning Ground Surveys

- ◆ Assess the spatial distribution of Chinook Salmon redds, particularly in relation to TRRP management actions,
- ◆ Quantify Chinook Salmon spawning in the mainstem Trinity River,
- ◆ Quantify pre-spawn mortality of female Chinook Salmon,
- ◆ Quantify and describe temporal and spatial distribution of natural- and hatchery-origin Chinook Salmon spawning, and
- ◆ Collect biological data ancillary to escapement (fork lengths for estimating size distribution and jack proportion, scales for age composition, sex ratio, etc.).

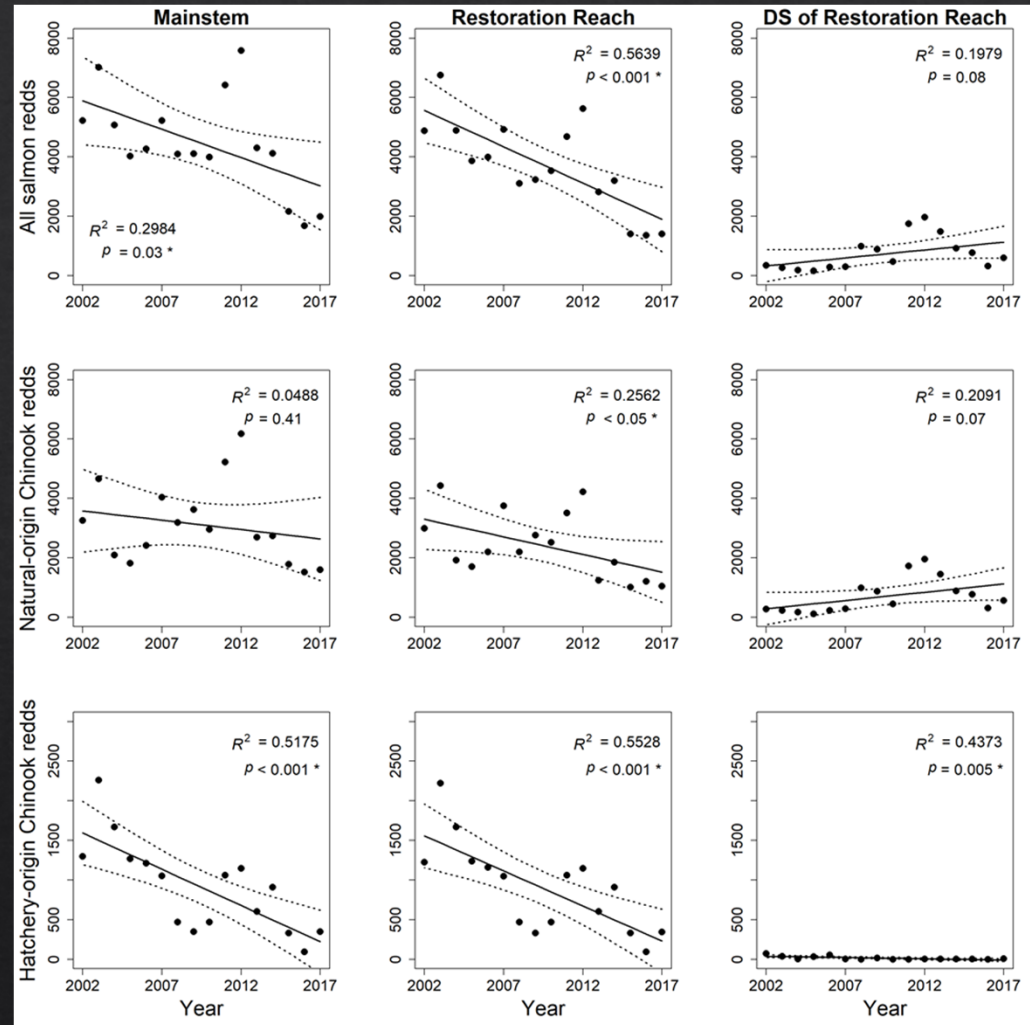


Pre-spawn Mortality

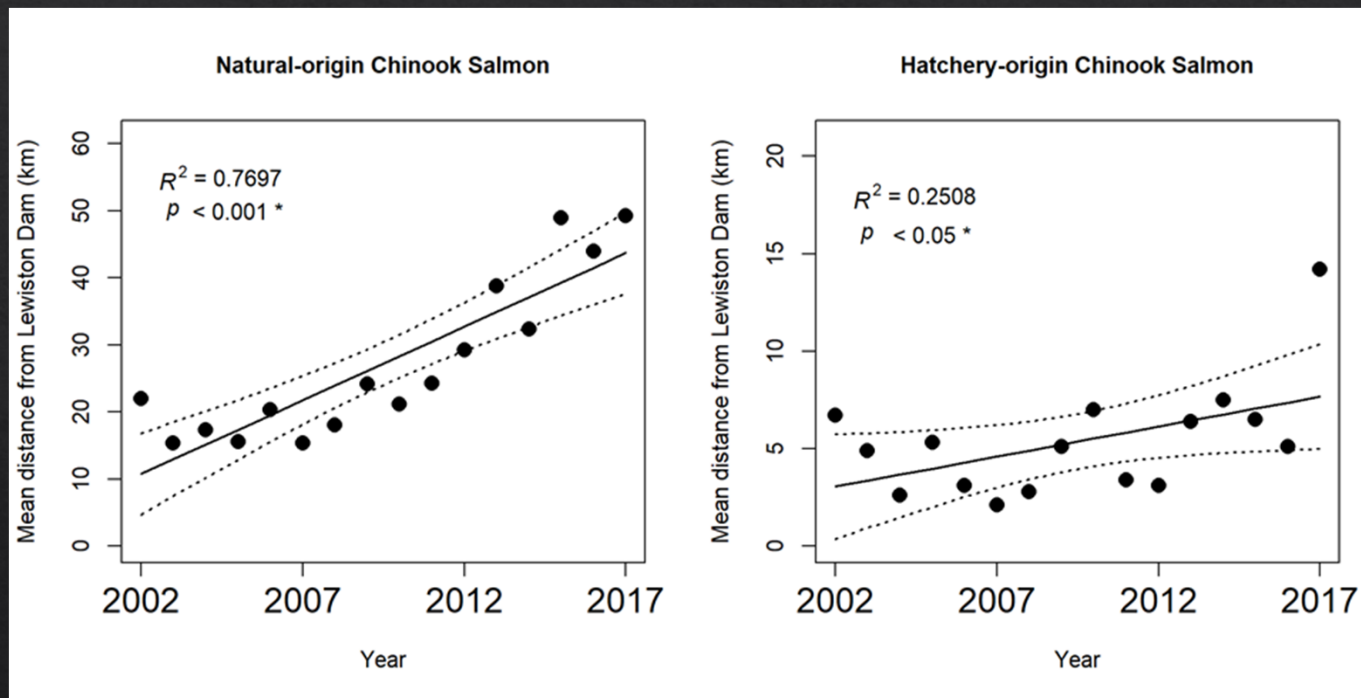
Temporal distribution
of pre-spawn mortality
fresh female Chinook
Salmon carcasses,
Trinity River surveys
2009–2017



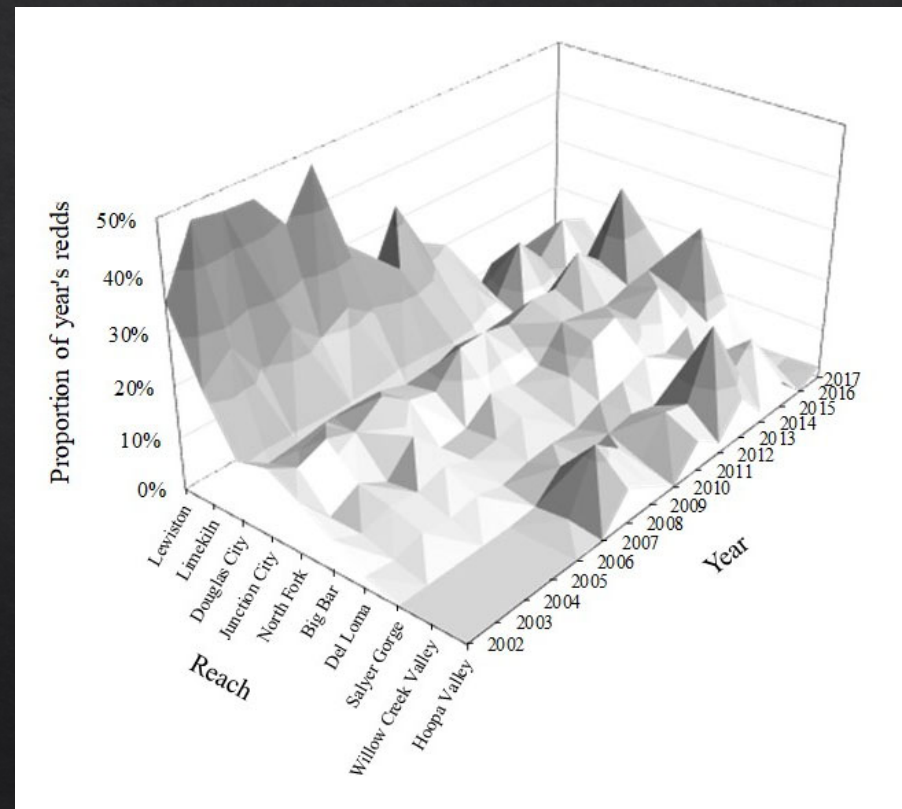
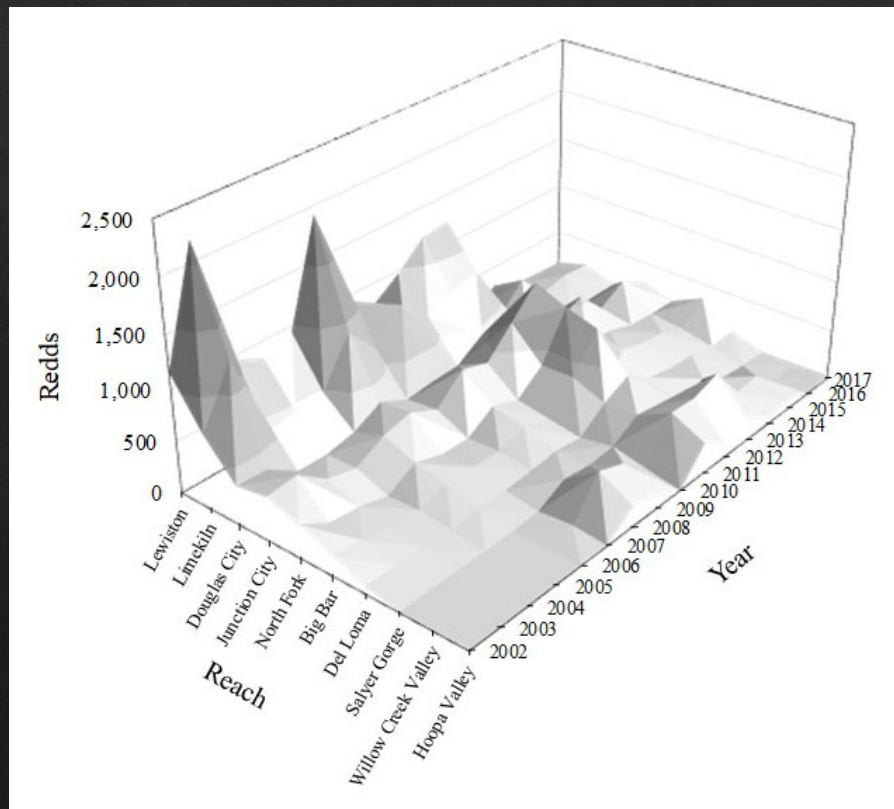
Redd Abundance and Distribution: System Scale



Redd Abundance and Distribution: System Scale

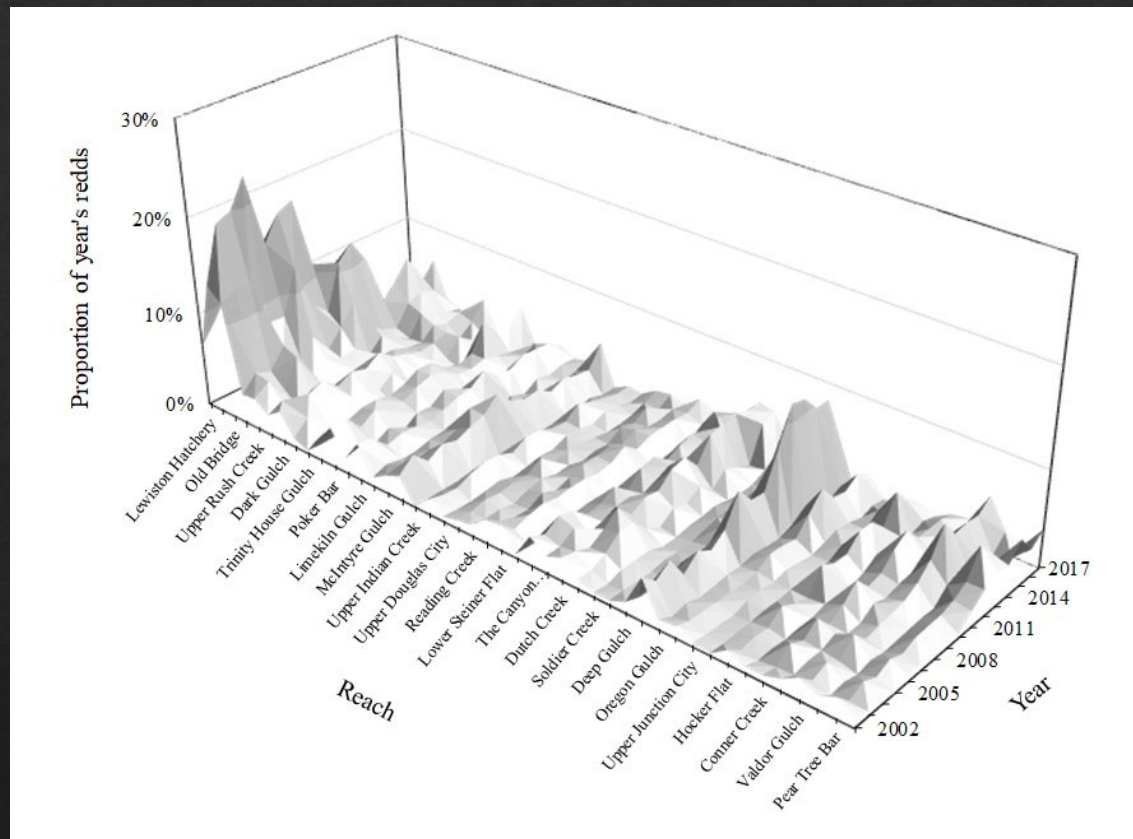


Redd Abundance and Distribution: Reach Scale



Spatiotemporal distribution of natural-origin Chinook Salmon redds in the mainstem Trinity River reach-scale sections, 2002–2017

Redd Abundance and Distribution: Site Scale



Spatiotemporal distribution of the annual proportions of natural-origin Chinook Salmon redds in the mainstem Trinity River TRRP restoration reach site-scale sections, 2002–2017

4. Syntheses and New Analyses

4.1 Species Composition of Salmonid Escapement

4.2 Pre- and Post-ROD Escapement Comparison

4.3 Causal Effects of Pre-Spawn Mortality

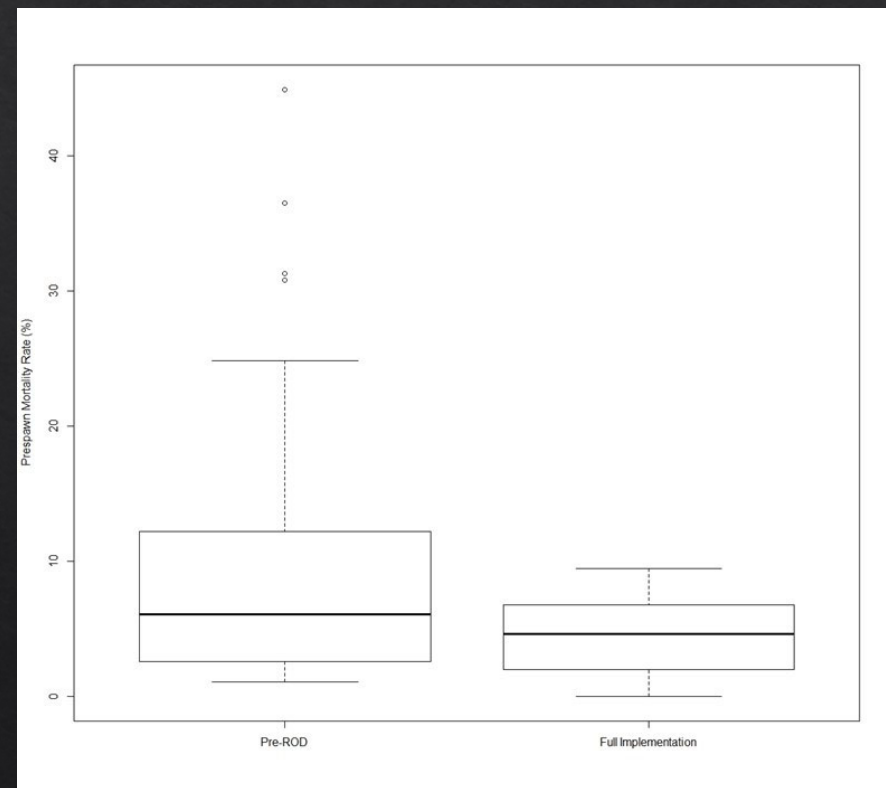
4.4 Redd Superimposition

4.5 Redd Dewatering

4.6 Distribution of redds in channel rehabilitation areas compared to unrestored areas within the restoration reach

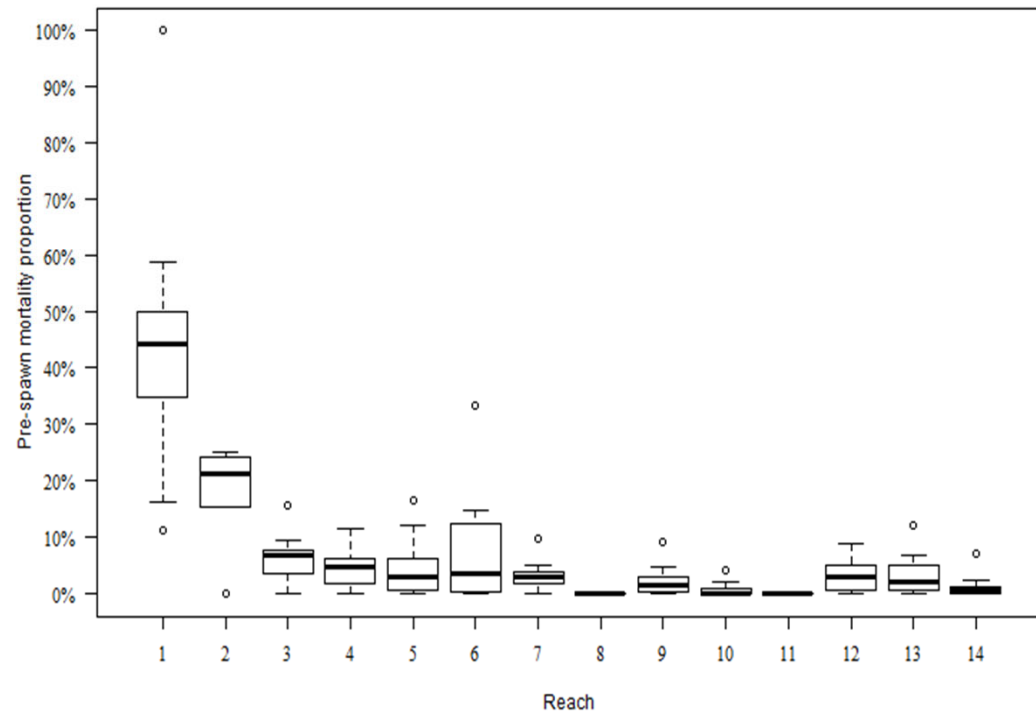
Causal Effects of Pre-spawn Mortality

Pre -spawn mortality rates for Chinook Salmon in the Trinity River during the pre-ROD (1955–1999) and full implementation (2005–present) time periods.



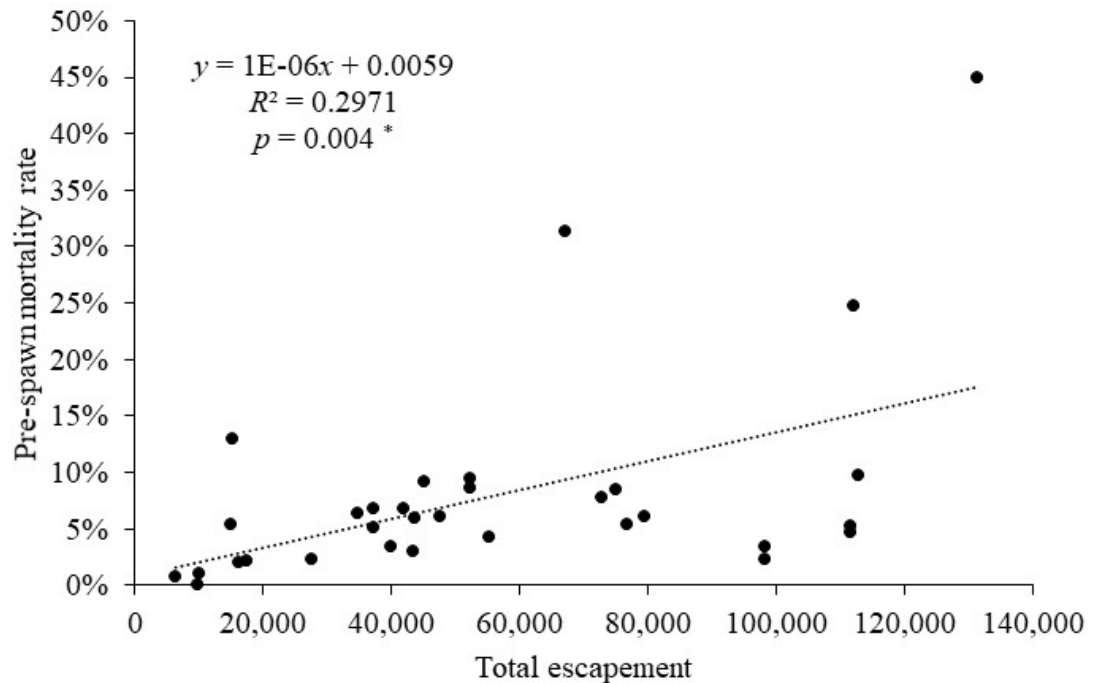
Causal Effects of Pre-spawn Mortality

Spatial distribution of pre-spawn mortality fresh (Conditions 1 and 2) female Chinook Salmon carcasses, Trinity River surveys 2009–2017



Causal Effects of Pre-spawn Mortality

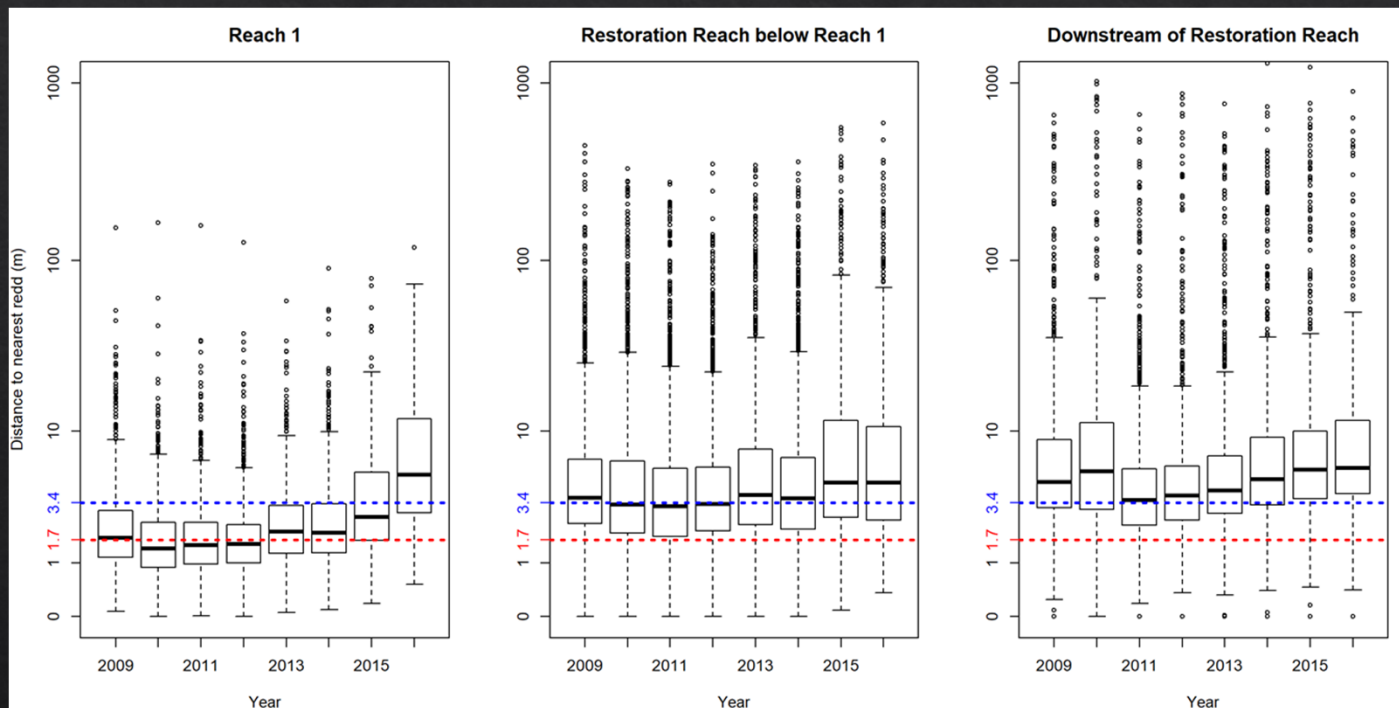
Pre-spawn mortality rates
from female Chinook
Salmon carcasses relative
to the total escapement of
Chinook Salmon in the
Trinity River from 1988 to
2017



Redd Superimposition

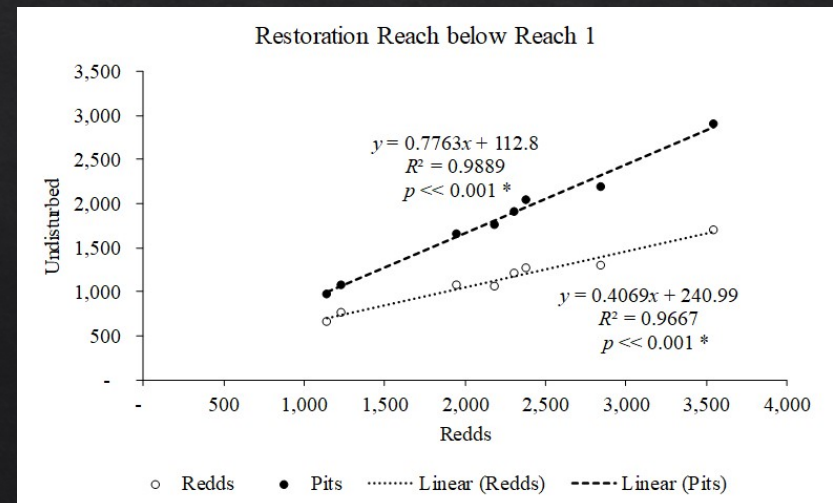
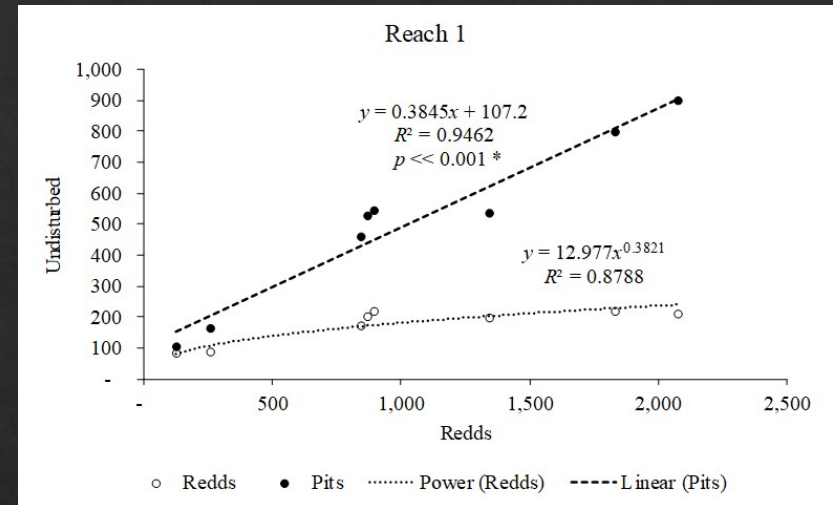
Distance between redds and their nearest neighboring redd in the mainstem Trinity River, 2009–2016.

The blue dotted line represents a distance of 3.4 m between redds, which is the estimated distance at which redds begin to overlap. The red dotted line represents a distance of 1.7 m between redds, which is the estimated distance at which egg pockets become superimposed.



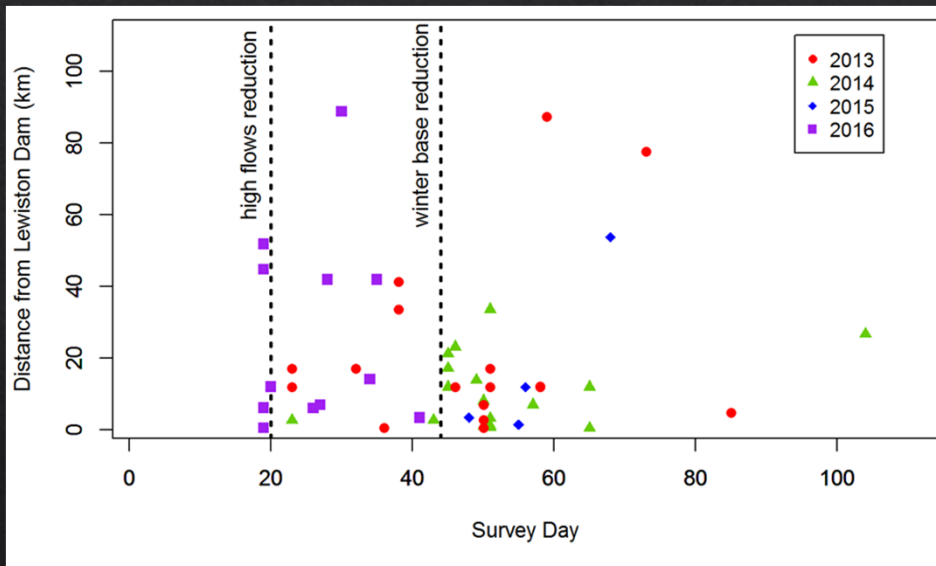
Redd Superimposition

Relationships between redd numbers and undisturbed redds and undisturbed pits in Reach 1, the restoration reach downstream of Reach 1, and downstream of the restoration reach in the Trinity River from 2009 to 2016.



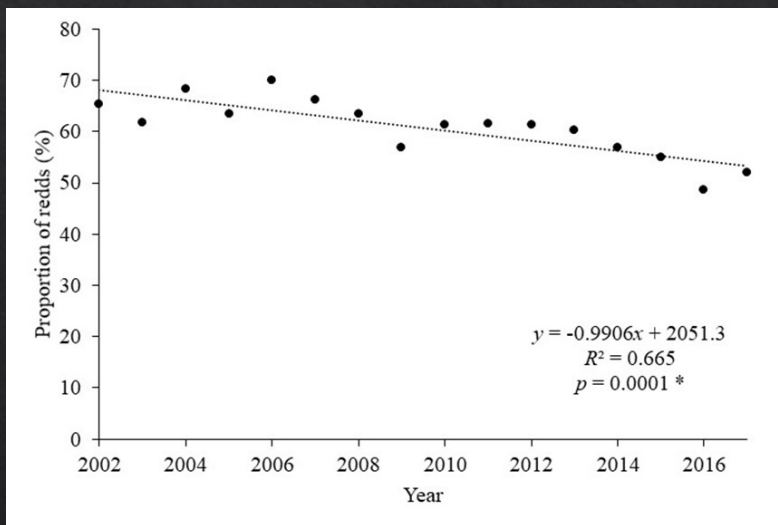
Redd Dewatering

Spatial and temporal distribution of dewatered redds in the Trinity River, 2013–2016



- ◇ 67 dewatered redds (0.3%-1.1% of total redds annually)
 - ◇ 32 after flows dropped following emergency high flow releases from Lewiston Dam
 - ◇ 35 following annual flow reduction from summer (450 cfs) to winter base flows (300 cfs)
- ◇ 46 with partially exposed mound
- ◇ 19 with fully exposed mound
- ◇ 2 with fully exposed pit

Distribution of redds in channel rehabilitation areas compared to unrestored areas within the restoration reach



Annual proportion of Chinook Salmon redds in rehab areas within the restoration reach of the Trinity River from 2002 to 2017

- ◇ Reach scale: Proportion of redds in rehab sites compared to unrestored areas
 - ◇ No change: Lewiston, Limekiln, Junction City, North Fork
 - ◇ Increase: Douglas City
- ◇ Site scale
 - ◇ Redd proportions increased at 5 of 20 sites between pre- and post-construction periods (Sven Olbertson, Indian Creek, Lorenz, Upper Junction City, Wheel Gulch)

5. Discussion and Next Steps

5.1 Escapement

5.2 Spawning

5.3 Revisiting IAP Objectives and Progress

5.4 Recommendations

Recommendations

1. Natural-origin escapement targets for adult salmonids should be re-evaluated
2. Clarification of the intent of hatchery escapement targets
3. Evaluate holding habitat
4. Increase the quality and availability of spawning habitat area
5. Achieve adult temperature objectives
6. Revisit the hypotheses addressed in the IAP
7. Consider specific metrics and, if possible, set quantifiable targets
8. Further evaluation of temperature targets and the methods of accomplishing them
9. Internal and external review to identify efficiencies in the adult monitoring and redd and carcass survey design

