Distribution of Pacific Lamprey (*Entosphenus tridentata*) in the Klickitat River Basin

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Confederated Tribes & Bands of the Yakama Nation

Fisheries Resource Management

Yakama/Klickitat Fisheries Project

Presentation Outline

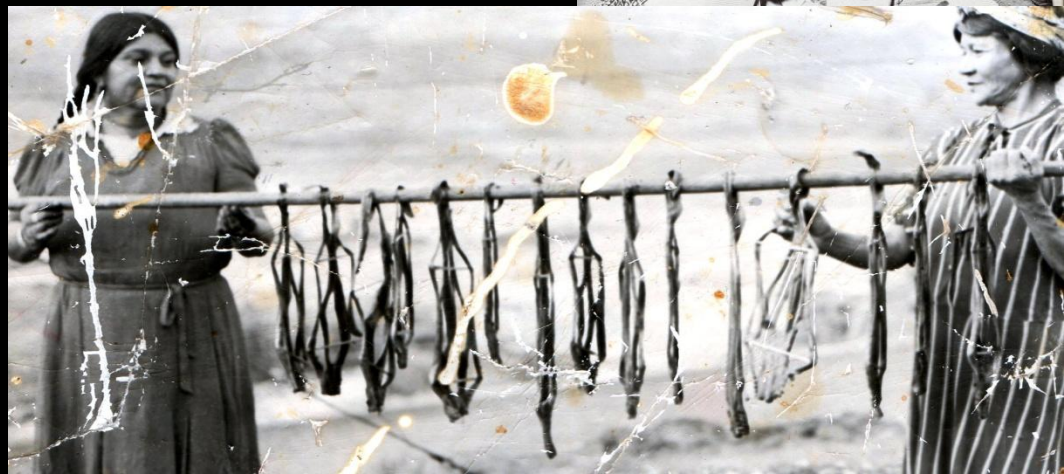
- Importance to our people
- Life history
- The decline
- Status in the Klickitat
- Where are we going in future

Traditional Foods

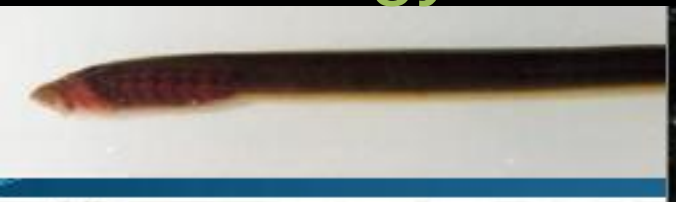
Historically, these basins produced large runs of lamprey.

These runs are of great cultural significance to the Yakama people.

To this very day, we are still living life under the unwritten laws from the Creator and carrying on Sacred ceremonies as our Ancestors had done before us.



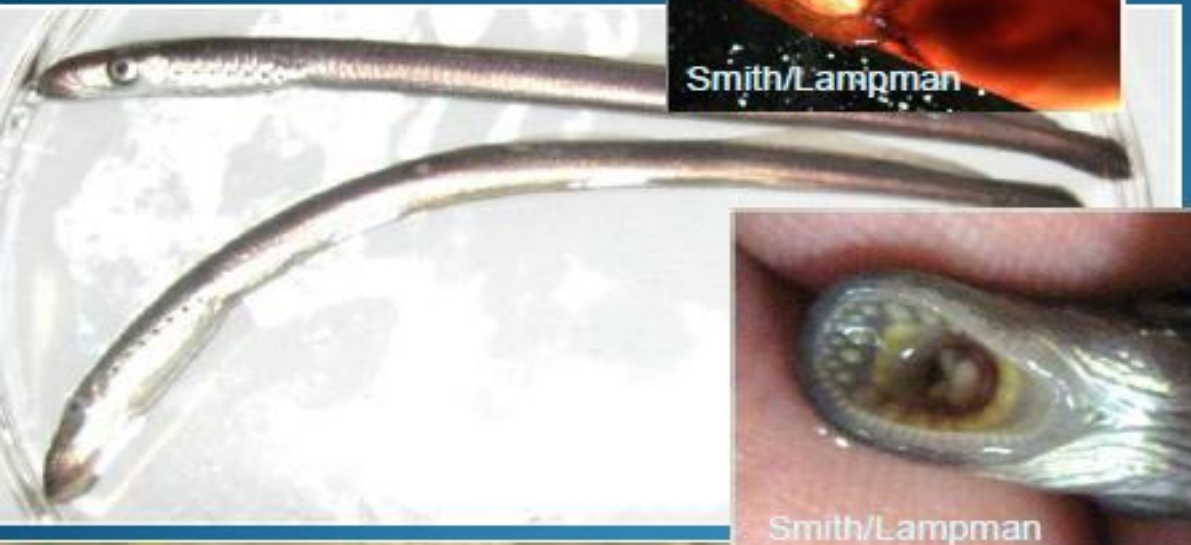
The biology of lamprey



Ammocoete

(larvae)

Freshwater



Macrothalmia

(lamprey smolt)

Heading to Ocean

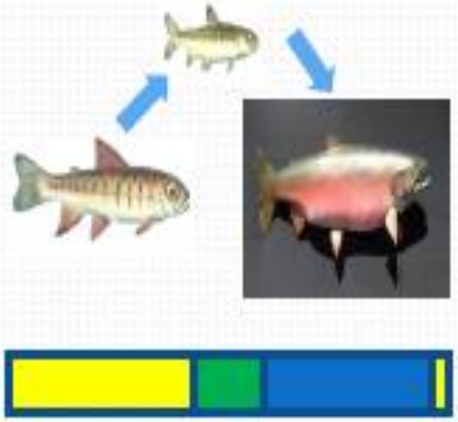
Adult

(spawning)

Return to Freshwater

Life Cycle Timeline

Coho Salmon



= Freshwater

= Transition

= Ocean

Salmon ~ 4000 eggs/female

Pacific Lamprey

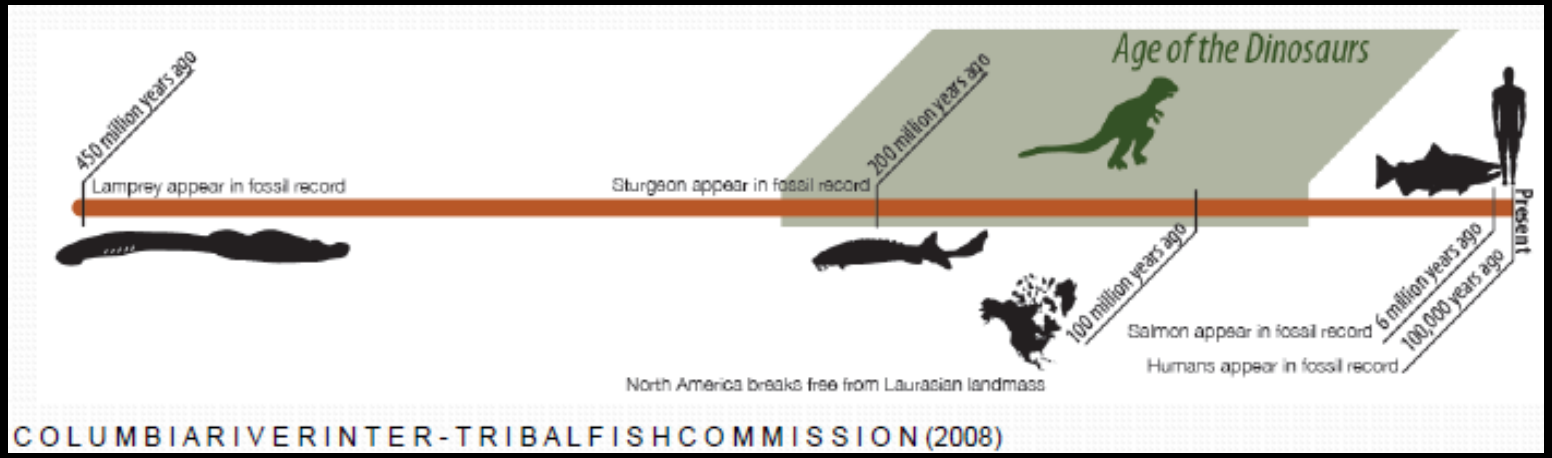
P. lamprey ~ 30,000 – 130,000 eggs/female

Year 1 2 3 4 5 6 7 8 9 10

Lampman photo

Ecological Benefits of Pacific Lamprey

Fossil records estimate lamprey appeared about 450 million years ago-- the oldest fish species on earth (Dawkins 2004).



- Pacific lampreys are excellent indicators of ecosystem health.
- Spawned out carcasses important dietary items for fish, birds, & mammals, bringing in ocean nutrients.
- Juveniles make up large amount of biomass, filter feeders (bioturbation of nutrient and sediment cycling), and buffer migrating salmon.

Columbia Basin lamprey declines

- Regulated rivers (dams) cause undue stress and impact lamprey populations; loss of 50% of lampreys at major hydroelectric projects and low head diversions in Columbia Basin

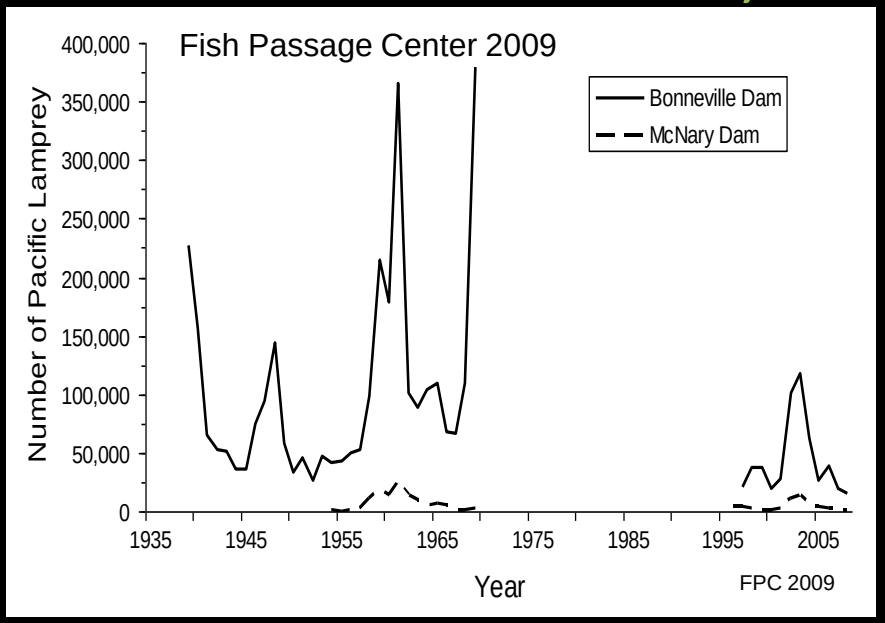
  (Moser et. al).

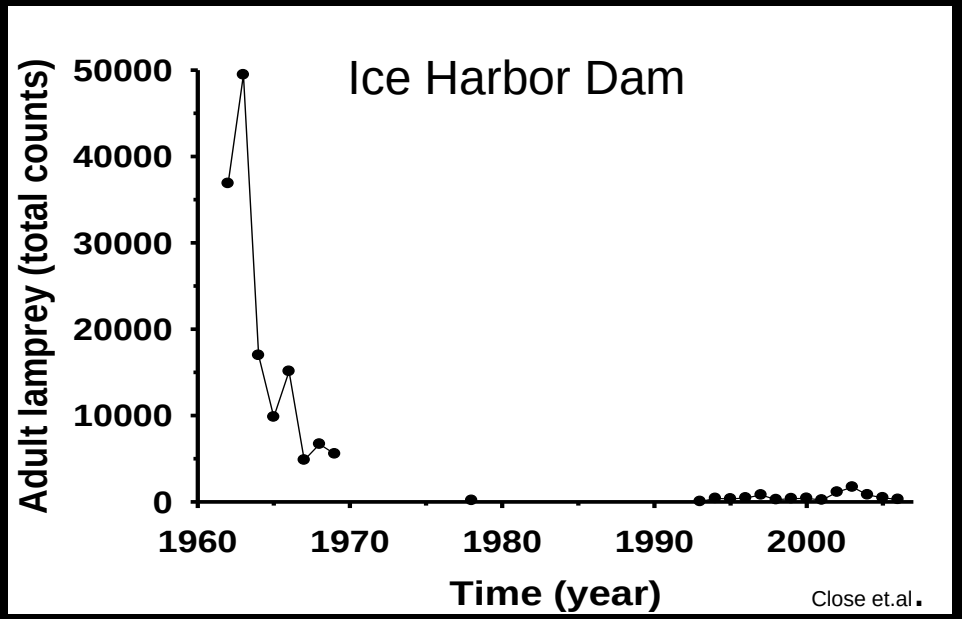
- Irrigation ditches, dredging, water pollution, and erosion.

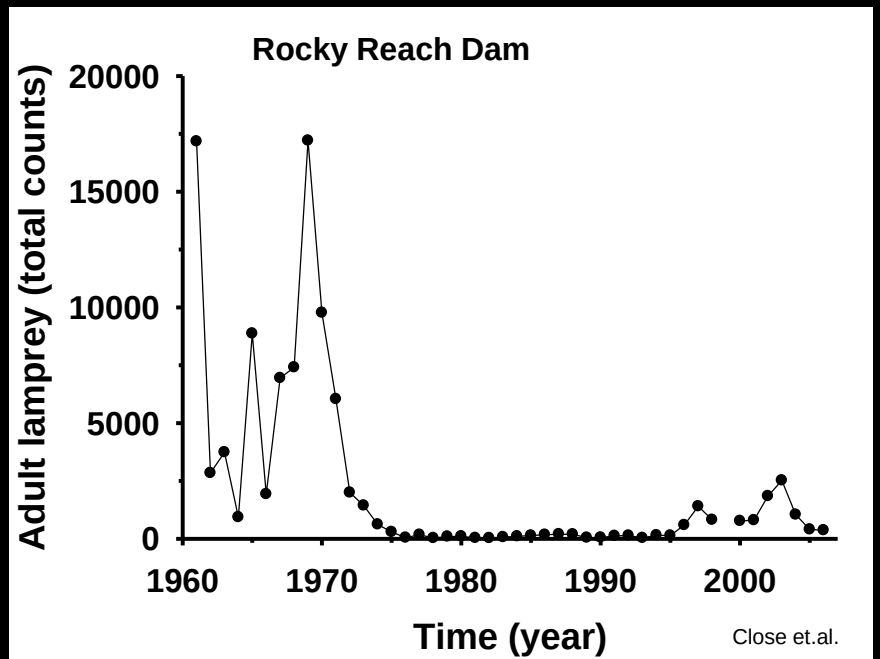
- Predation on both adults and juveniles.

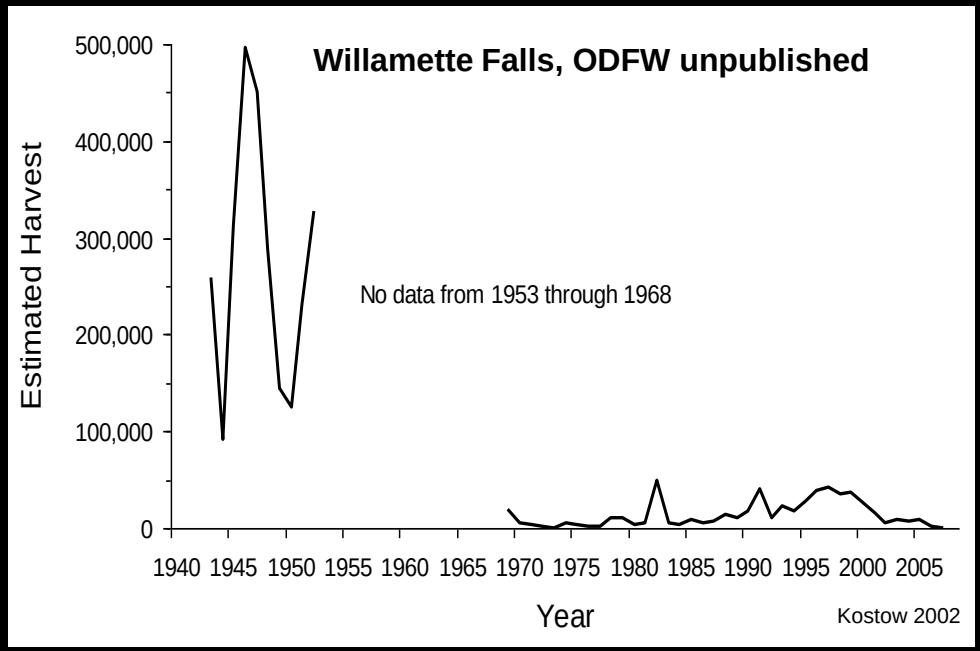
- Habitat loss

Declines in Columbia, Snake, and Willamette Basins









Management history

- Columbia Basin Tribes' hereditary history is to take care of the fish, wildlife, and the plants, which are of equal value.
- Pacific lamprey became a conservation concern in early 1990's.
- Pacific lamprey as an Oregon state Sensitive Species 1993; Washington state as "Species of Concern" status 1998.
- Petitioned for ESA listing in 2002. Results: not warranted for listing (lack of knowledge on biology, limiting factors, genetics (ESUs))?
- ODFW Status Report 2006. Results: species at risk of "extinction" (lack of data).

Goal

The goal of this program is to restore natural production of Pacific lamprey to a level that will provide robust species abundance, significant ecologic contributions, and meaningful harvest within the Yakama Nation Ceded Lands and in the Usual and Accustomed areas. The Yakama Nation intends to achieve this goal by developing long-term Management and Action Plans.

Objectives

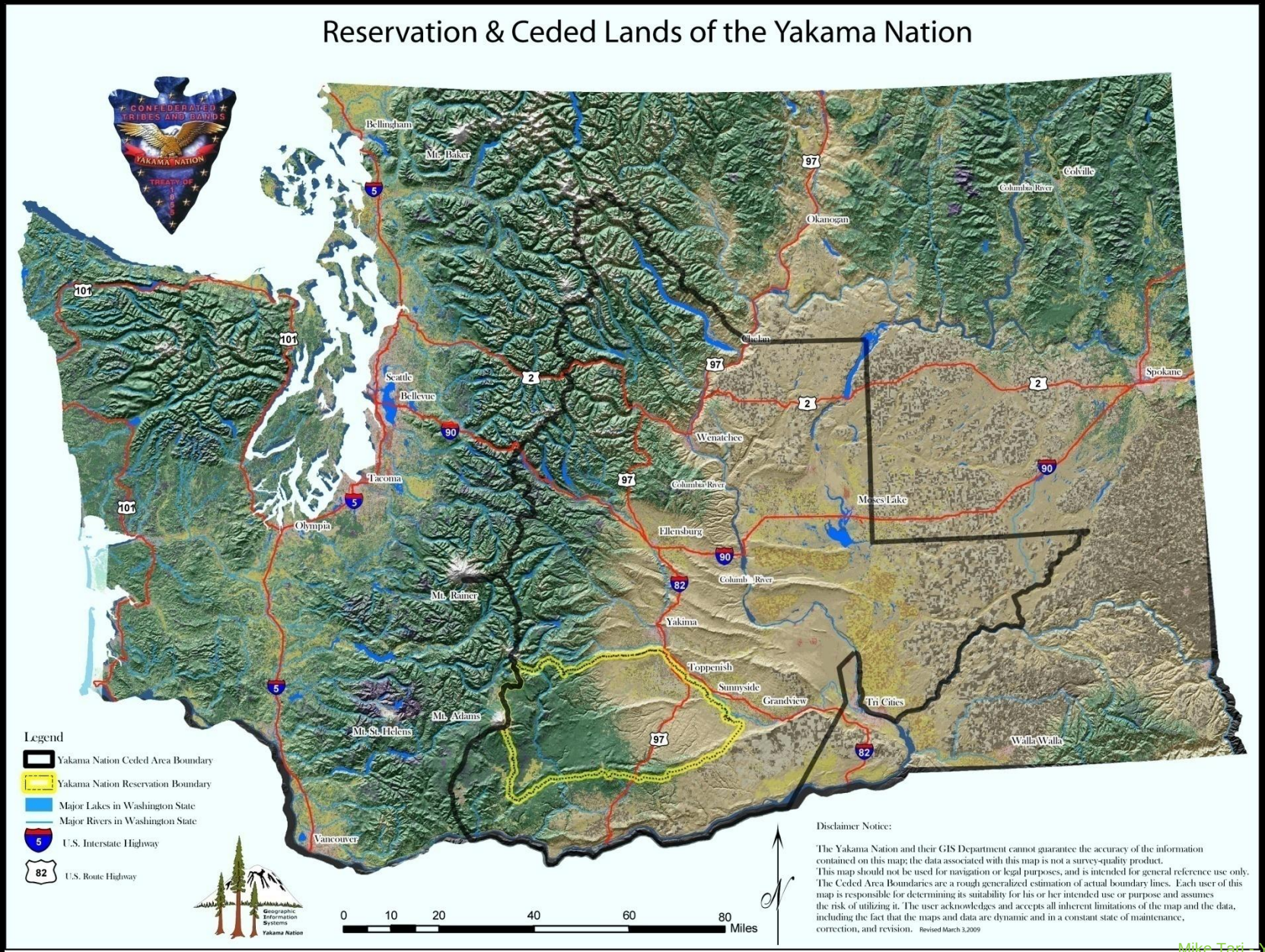
Objective # 1 – Document historic distribution of adult lamprey from records, review literature and conduct oral interviews, and compare with known current distribution.

Objective # 2 - Participate in and contribute to regional consistency in data collection, data management, analysis and reporting.

Objective # 3 - Document current status of larval Pacific lamprey with regard to distribution and relative abundance.

(we cross-referenced sampling protocols with other tribes to collect same data sets).

Project Regions

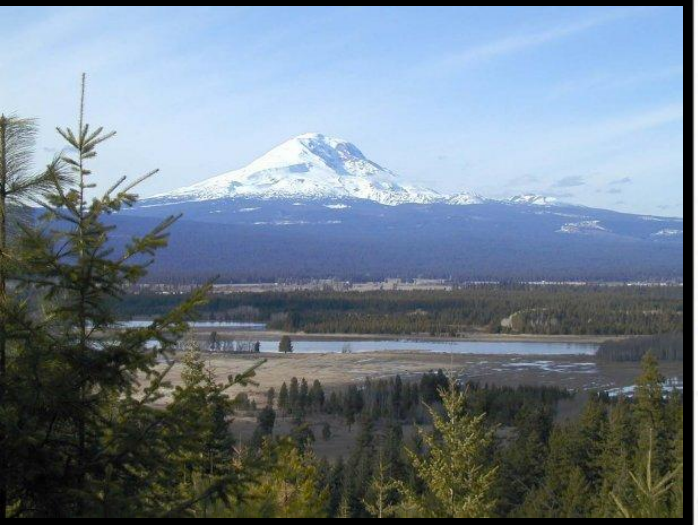


Project Area

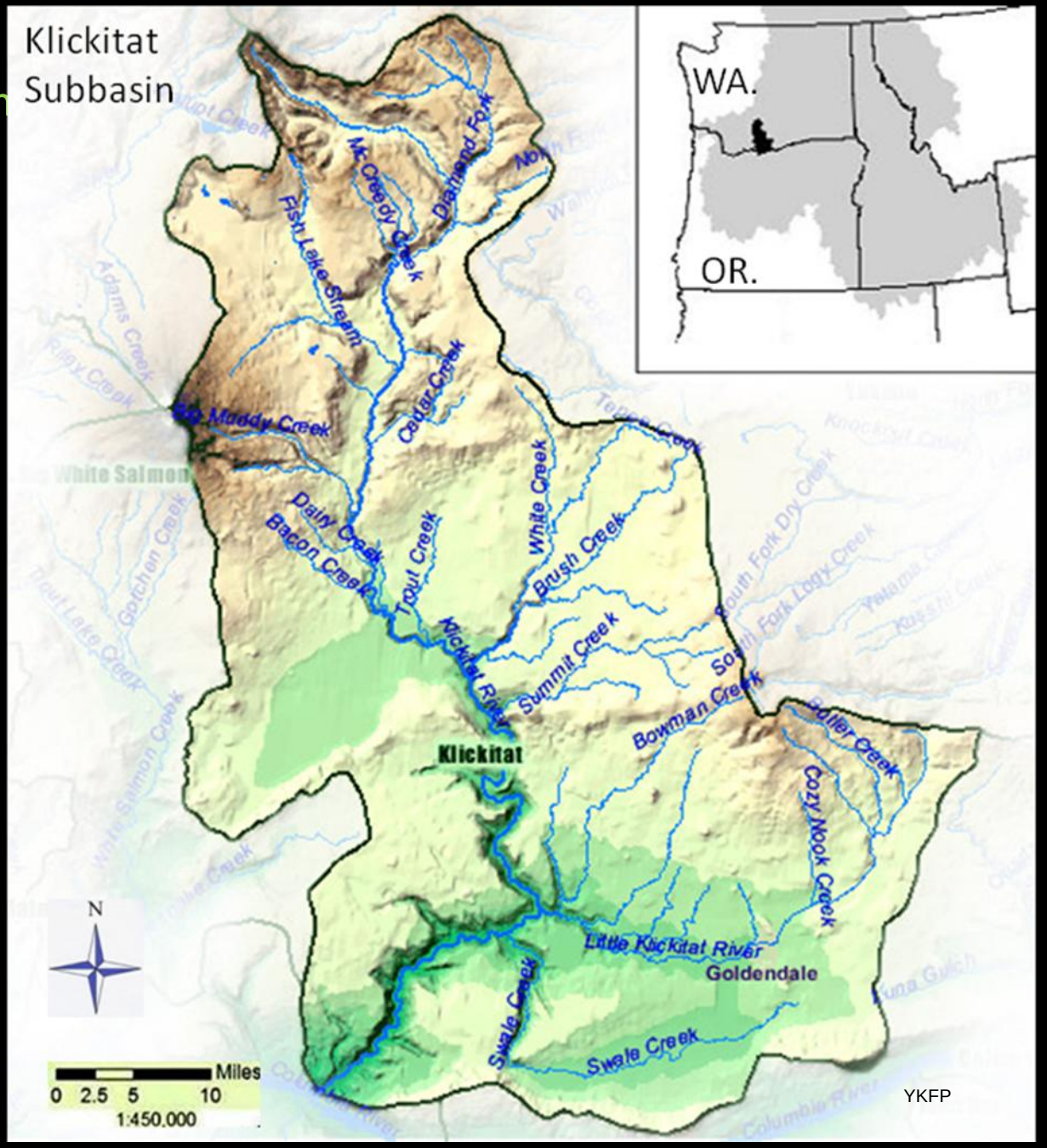
Klickitat Subbasin is located in South central Washington

~1350 sq. Miles

~ 96 miles long



Mt. Adams
12,281 feet (3,743 m)



Methods

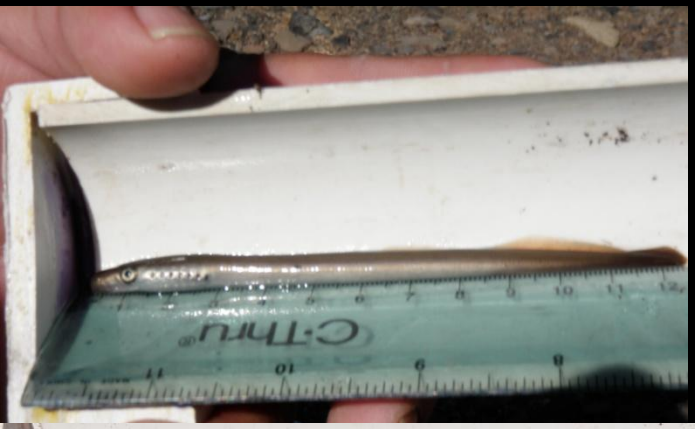
- Using aerial photographs, marked every 2 river kilo-meter (RK) to pre-define our sampling sites.
- Pre-defined sites were sampled at/near low depositional areas of Type I, II habitats.

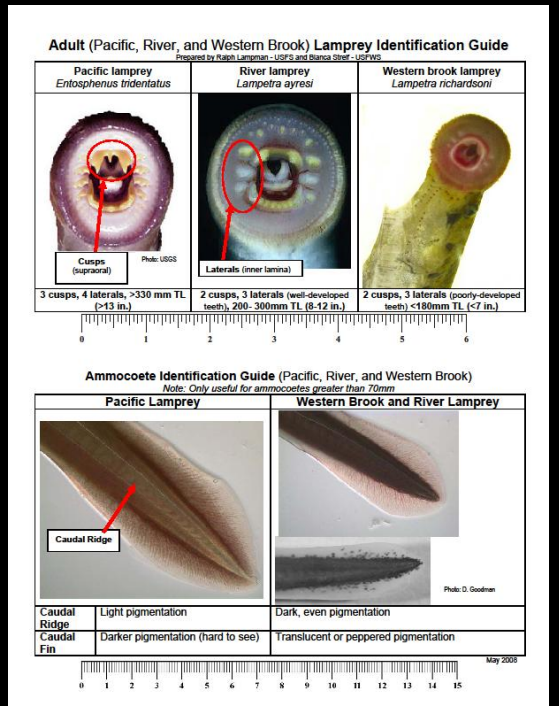
Methods

- For each sample site we measured out a 7x1m² plot. We used an ABP-2-600 dual range, 600-volt backpack electro-fishing unit (3-pass removal at 90 seconds/pass).
- Noted site locations with GPS, classified habitat, gathered water parameters, noted incidental species.

Methods

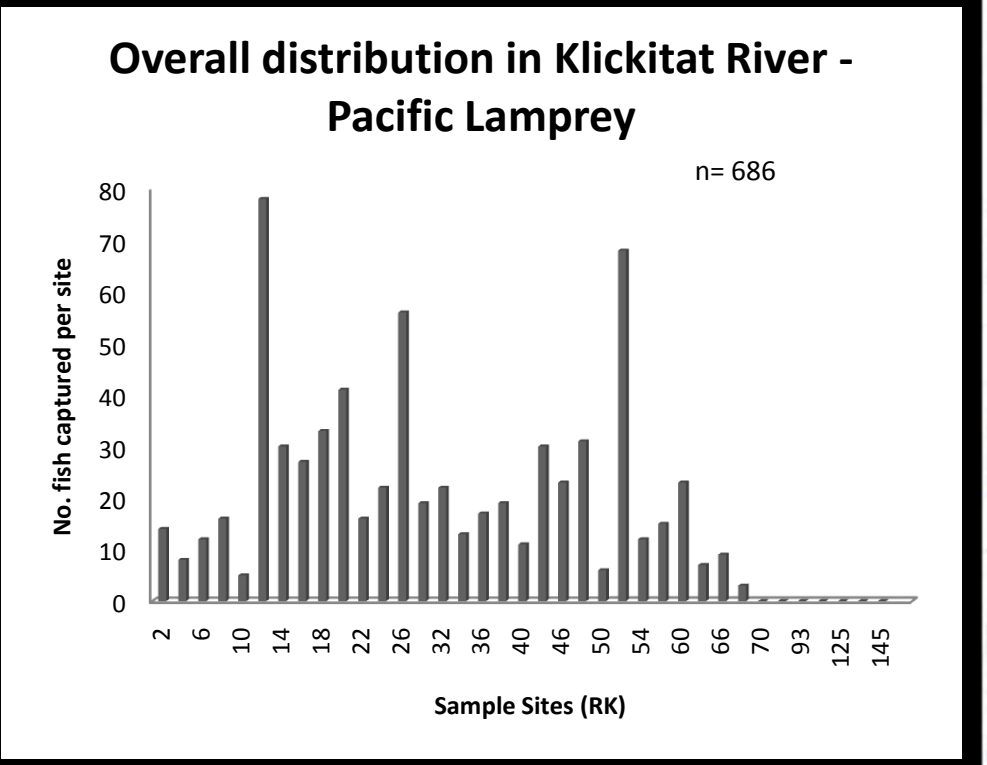
- Lamprey anaesthetized, identified, measured, weighed, then placed into recovery bucket and returned to collection area.

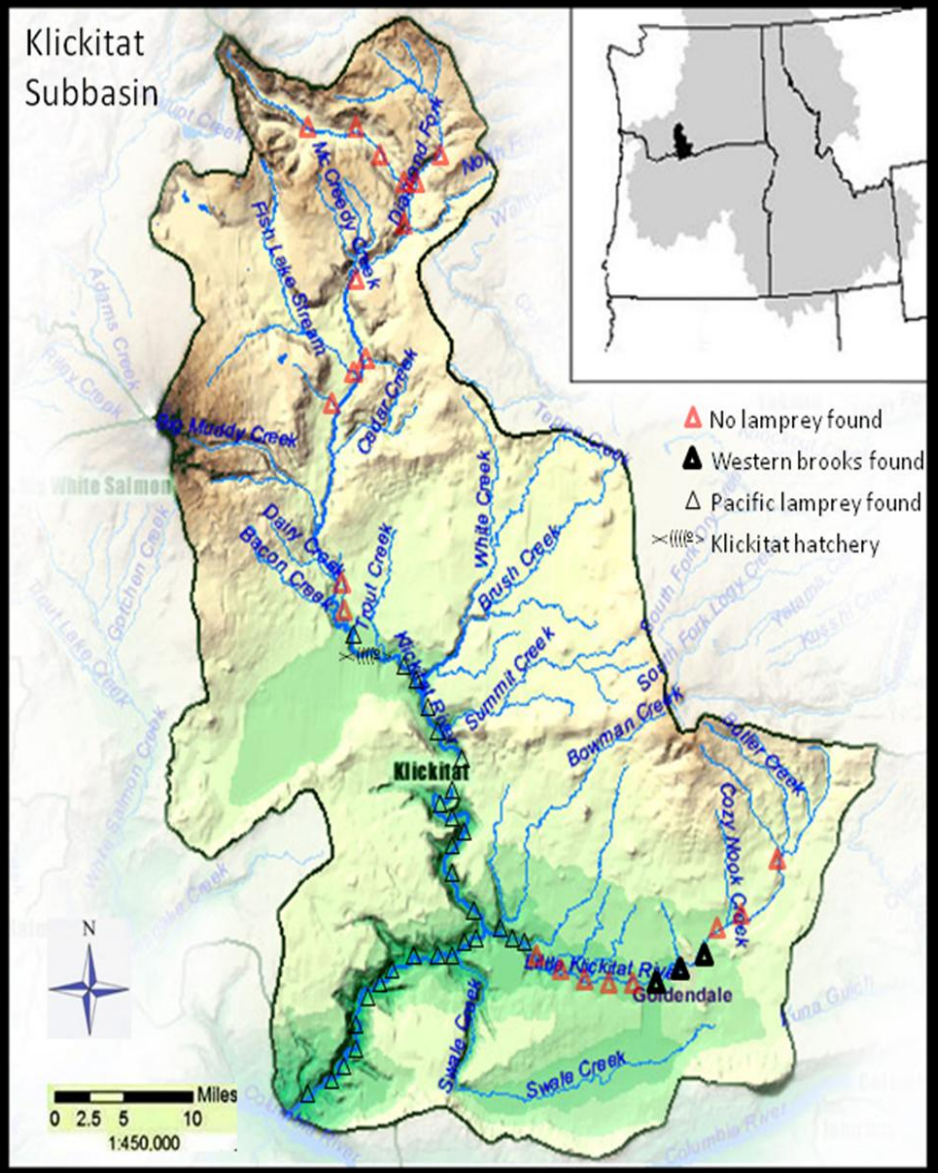




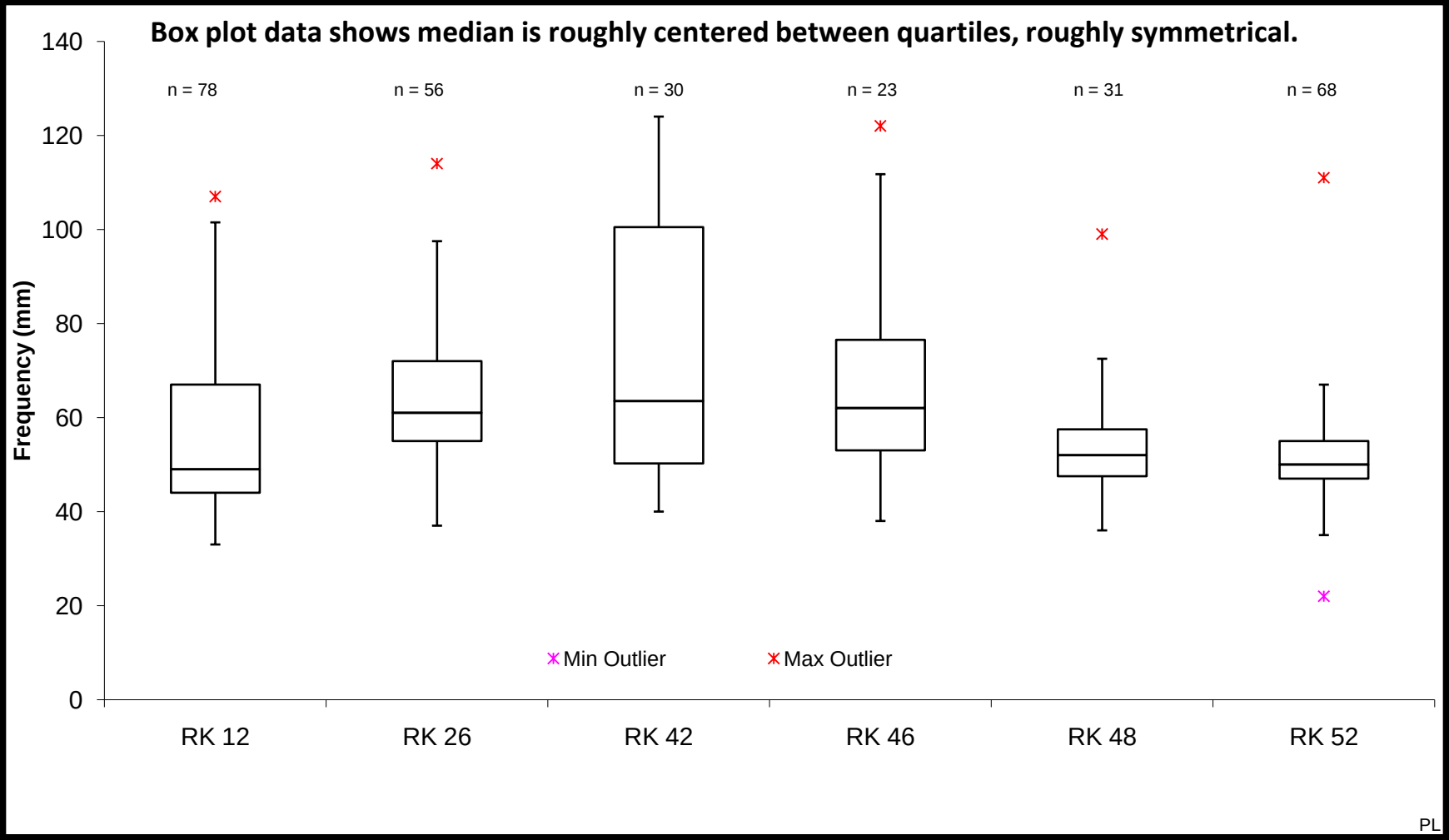
Results

- Overall distribution: we found larval lamprey up to RK 70.
- Overall sizes ranged from 20 to 125mm.

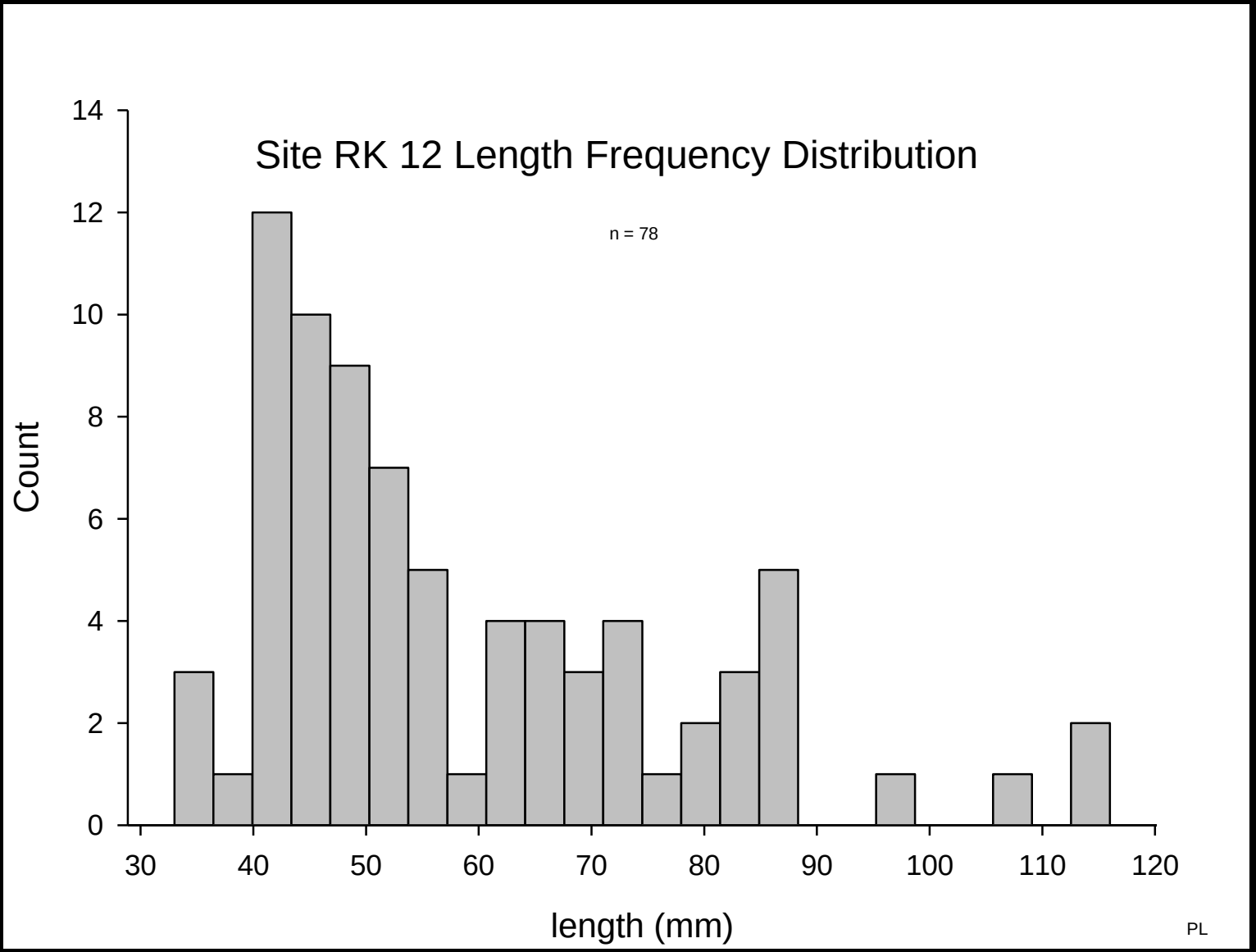




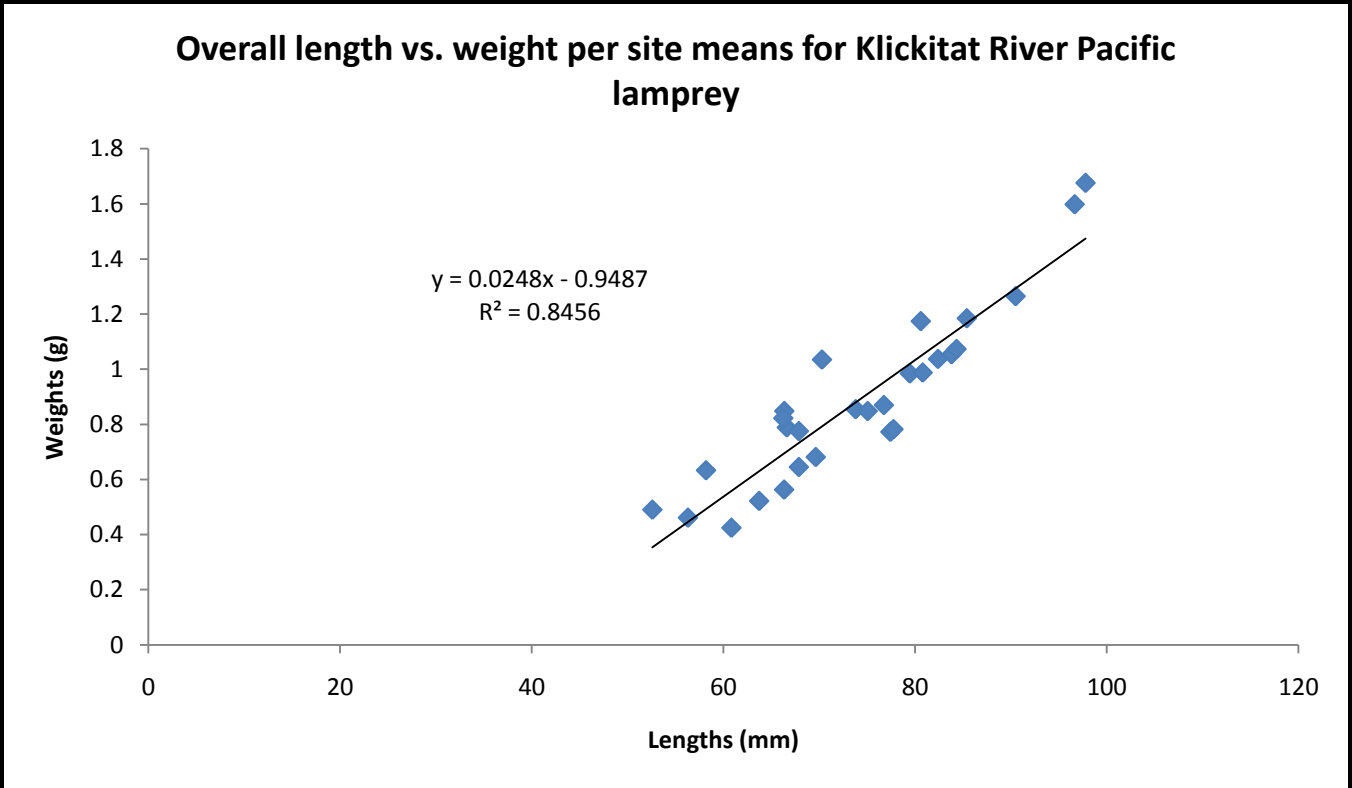
Results


Box plot data shows median is roughly centered between quartiles, roughly symmetrical.
Frequency (mm)
140
120
100
80
60
40
20
0
n = 78
n = 56
n = 30
n = 23
n = 31
n = 68
Min Outlier
Max Outlier
RK 12
RK 26
RK 42
RK 46
RK 48
RK 52
PL

Results


Site RK 12 Length Frequency Distribution
n = 78
Count
length (mm)
0
2
4
6
8
10
12
14
30
40
50
60
70
80
90
100
110
120
PL

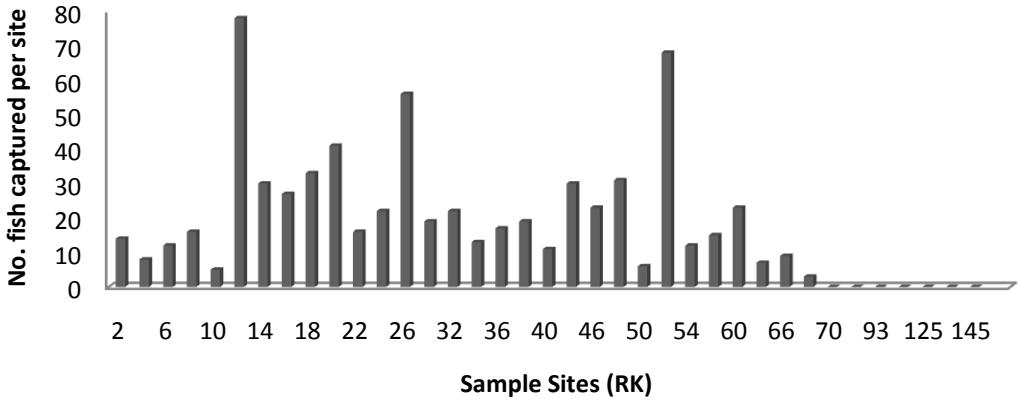
Results


Overall length vs. weight per site means for Klickitat River Pacific lamprey
y = 0.0248x - 0.9487
R² = 0.8456
Weights (g)
Lengths (mm)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
0
20
40
60
80
100
120

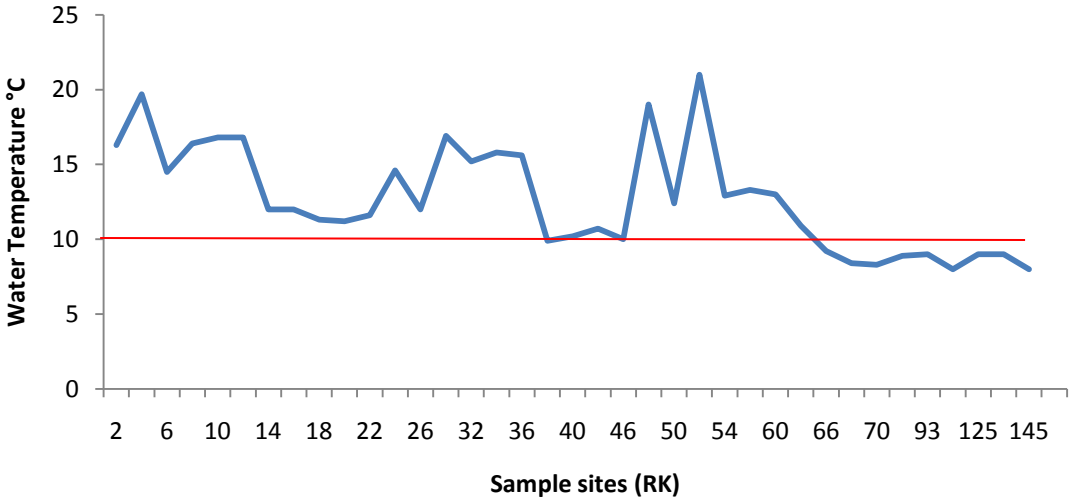
Results

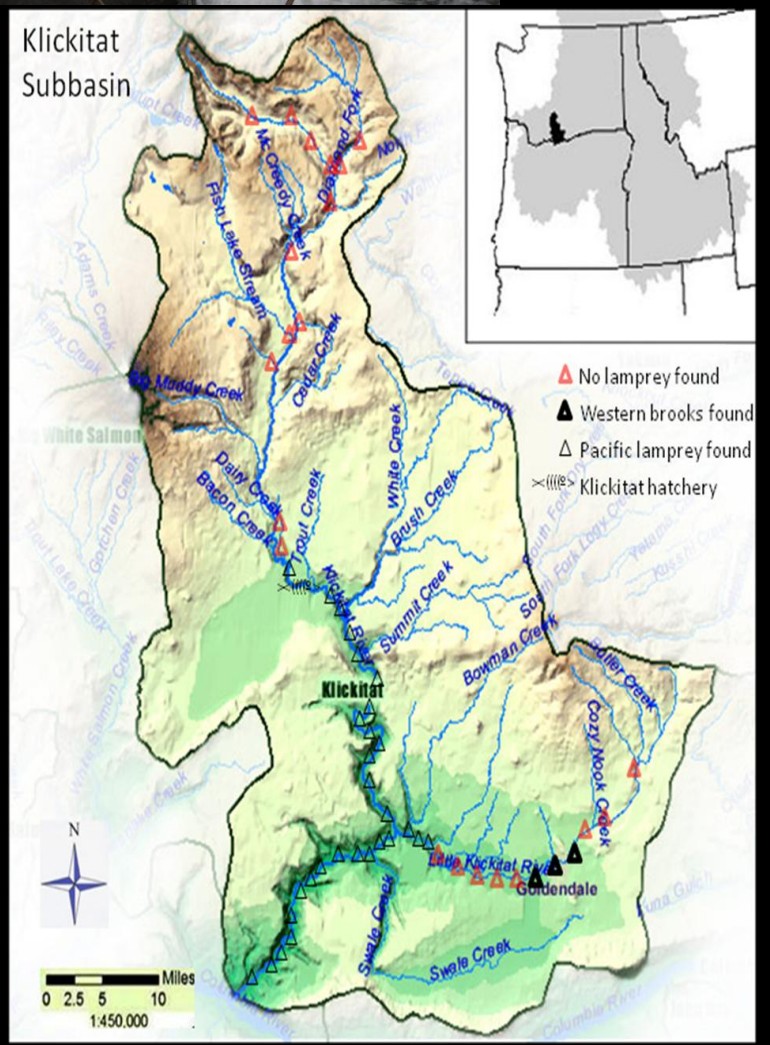
Overall distribution in Klickitat River - Pacific lamprey

n= 686



Water temperature by site, Klickitat River – Pacific lamprey





Project summary

Research objectives were met on presence, and we determined lamprey distribution.

Development of standardized, accurate subbasin assessment methods for larvae were met (sampling in rearing areas).

Confirmed habitat use: at each sampling event individuals were identified as Pacific or Western brook lampreys, we GPS'd each site, measured for lengths and weights.

Understanding how temperature affects survival of early life history stages helps in identifying critical habitat needs that influence distribution and abundance.

We hypothesize that if we remove the barrier from Klickitat Hatchery and reintroduce by translocation, our results could increase larval densities over time. As long as the Klickitat has sufficient salmon, the carrying capacity could support robust species abundance.

Future work / Questions

- Continue this work into the Yakima, Wenatchee, Entiat, and Methow rivers, and Mid-Columbia tributaries.

- Mapping of historic and current Pacific lamprey abundance in the subbasins to determine whether translocation is warranted.

- It is imperative that some actions such as adult passage and behavior study be implemented immediately to begin the recovery of this culturally important and ecologically significant species.

Acknowledgements

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WDFW Jennifer Scott

YN Lamprey Project staff Ernie Reynolds and Markeyta Pinkham