PACIFIC LAMPREY CONSERVATION INITIATIVE AND IMPLEMENTATION AT HYDROELECTRIC PROJECTS

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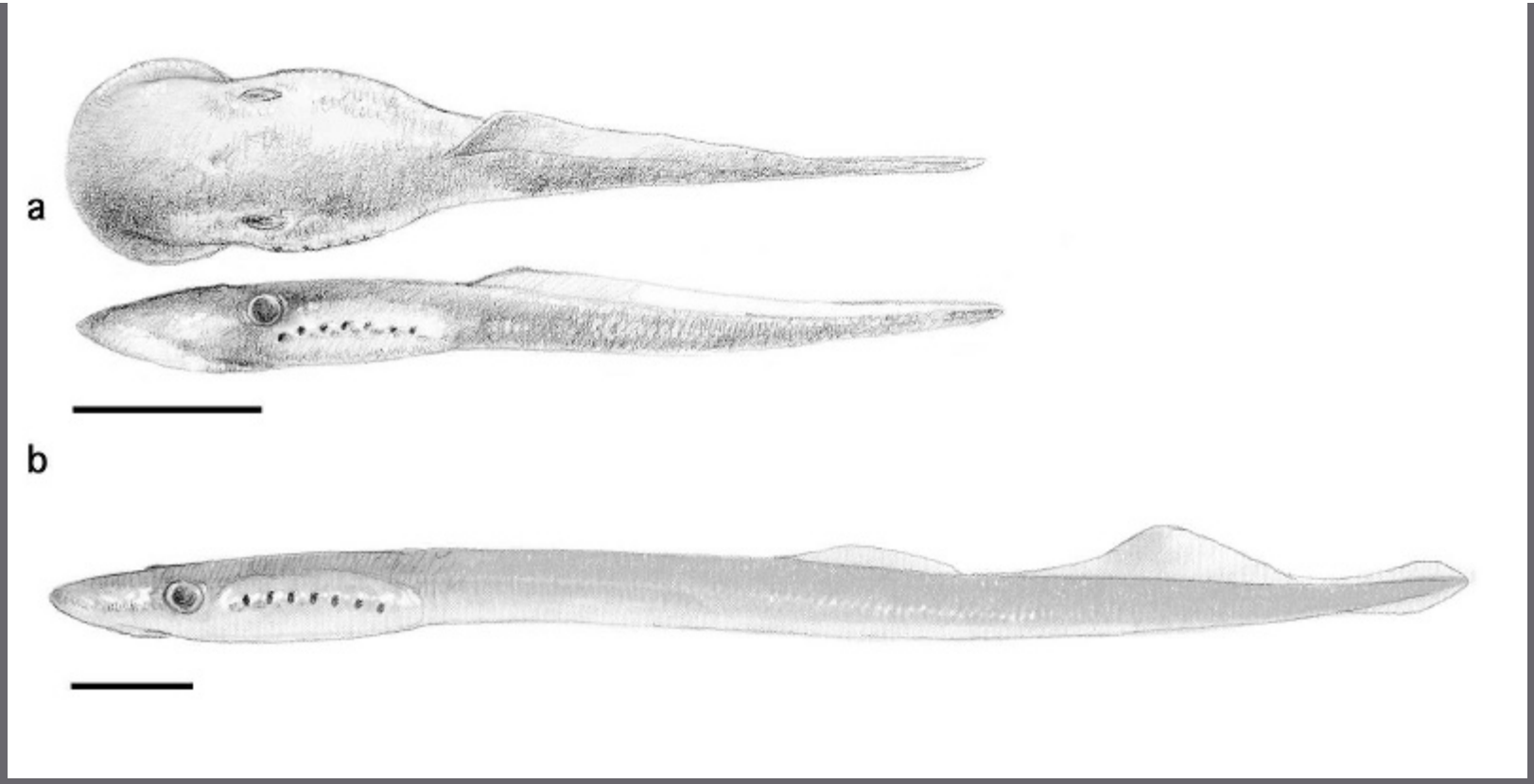
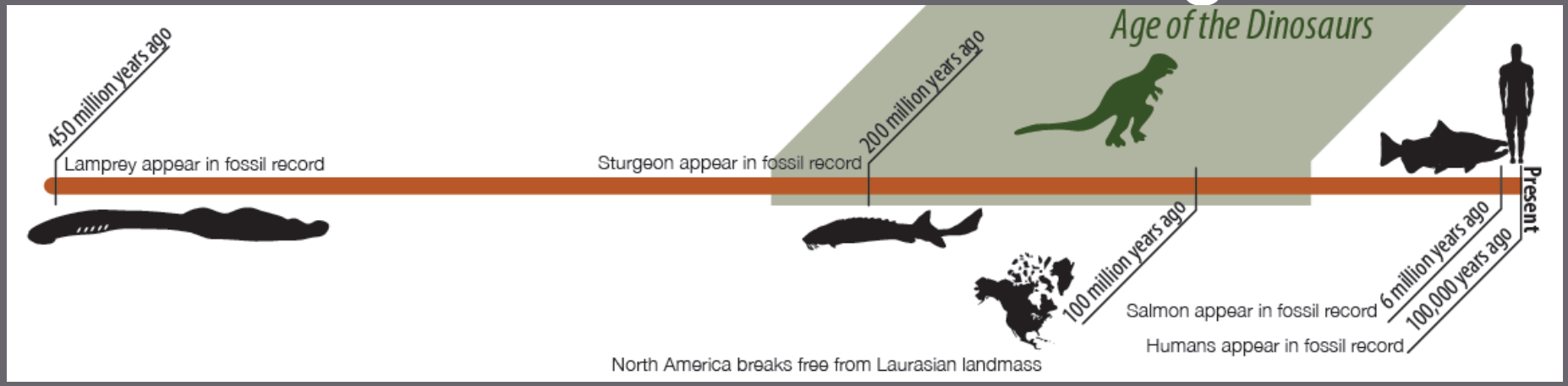


450 Million Years Ago

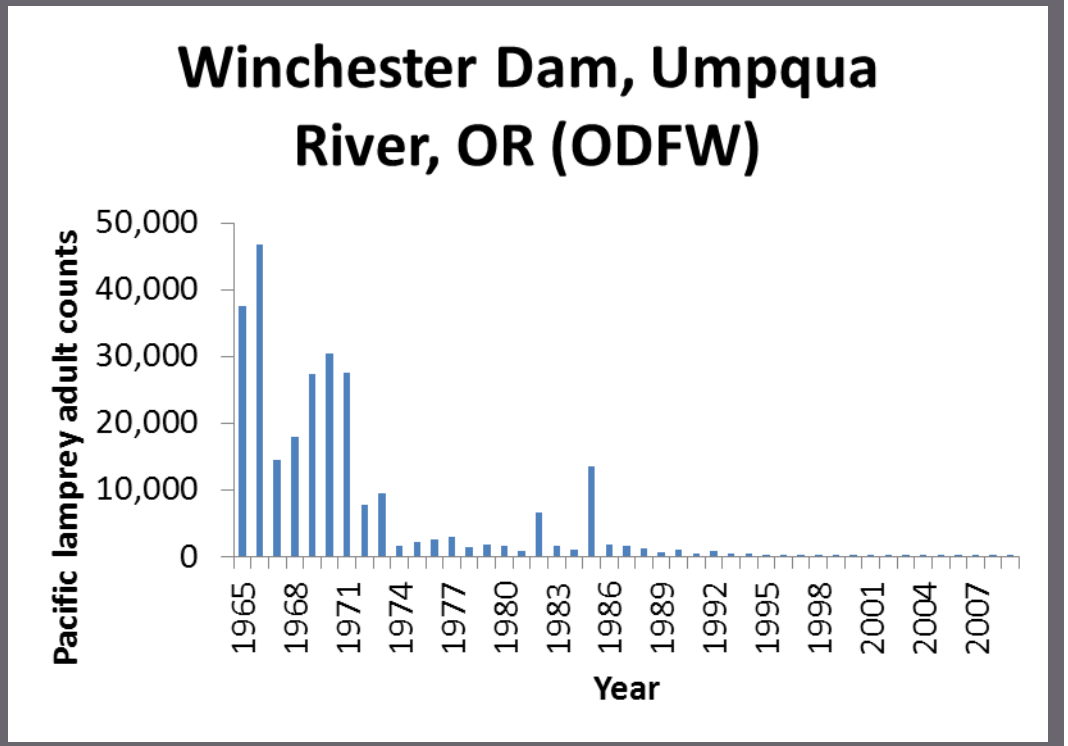


Pacific Lamprey: Global Distribution

Historically lampreys were widely distributed from Mexico to north along the Pacific Rim to Japan

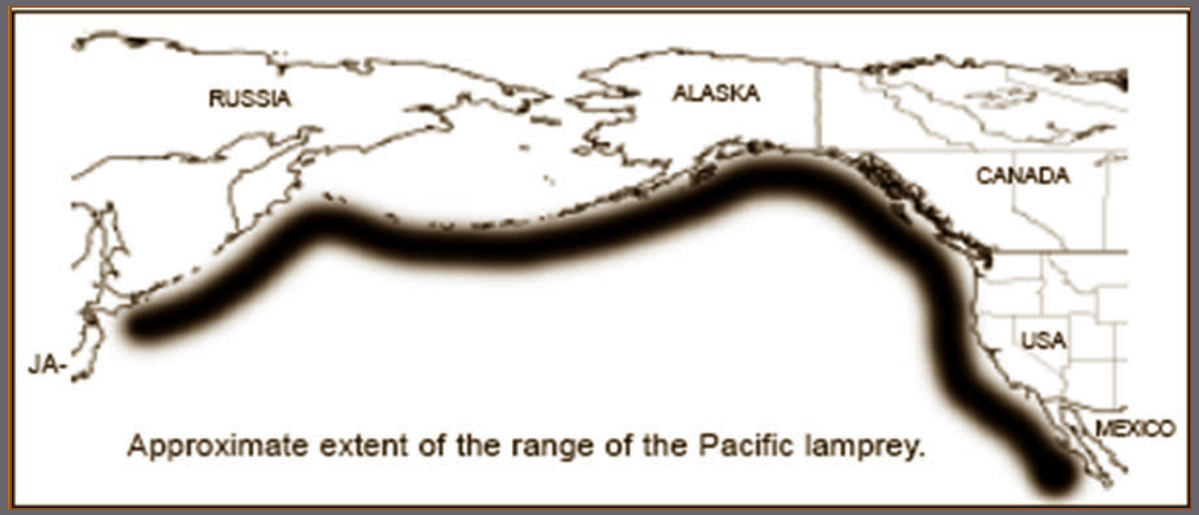
Abundance and Distribution

- Distribution has been reduced in many river drainages
- Decline in abundance throughout the Columbia River basin and many west coast streams



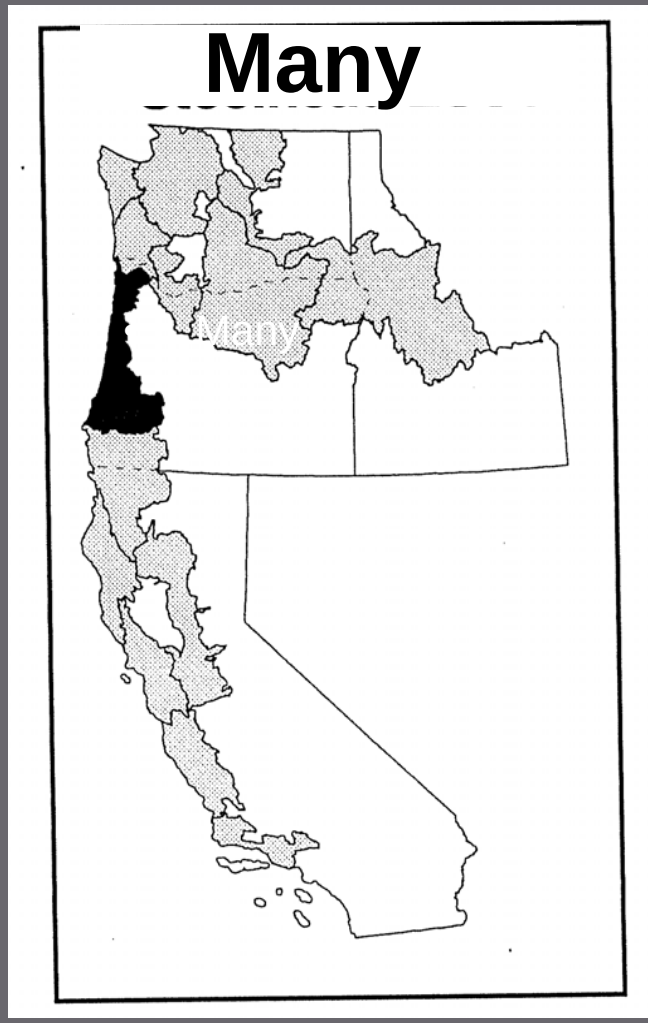
- Extirpated above impassable barriers and in the Southern extent of their range

Population Structure – Hypothetical possibilities?



One (few)

- Current studies point to few versus many
- May need to be managed on regional scales

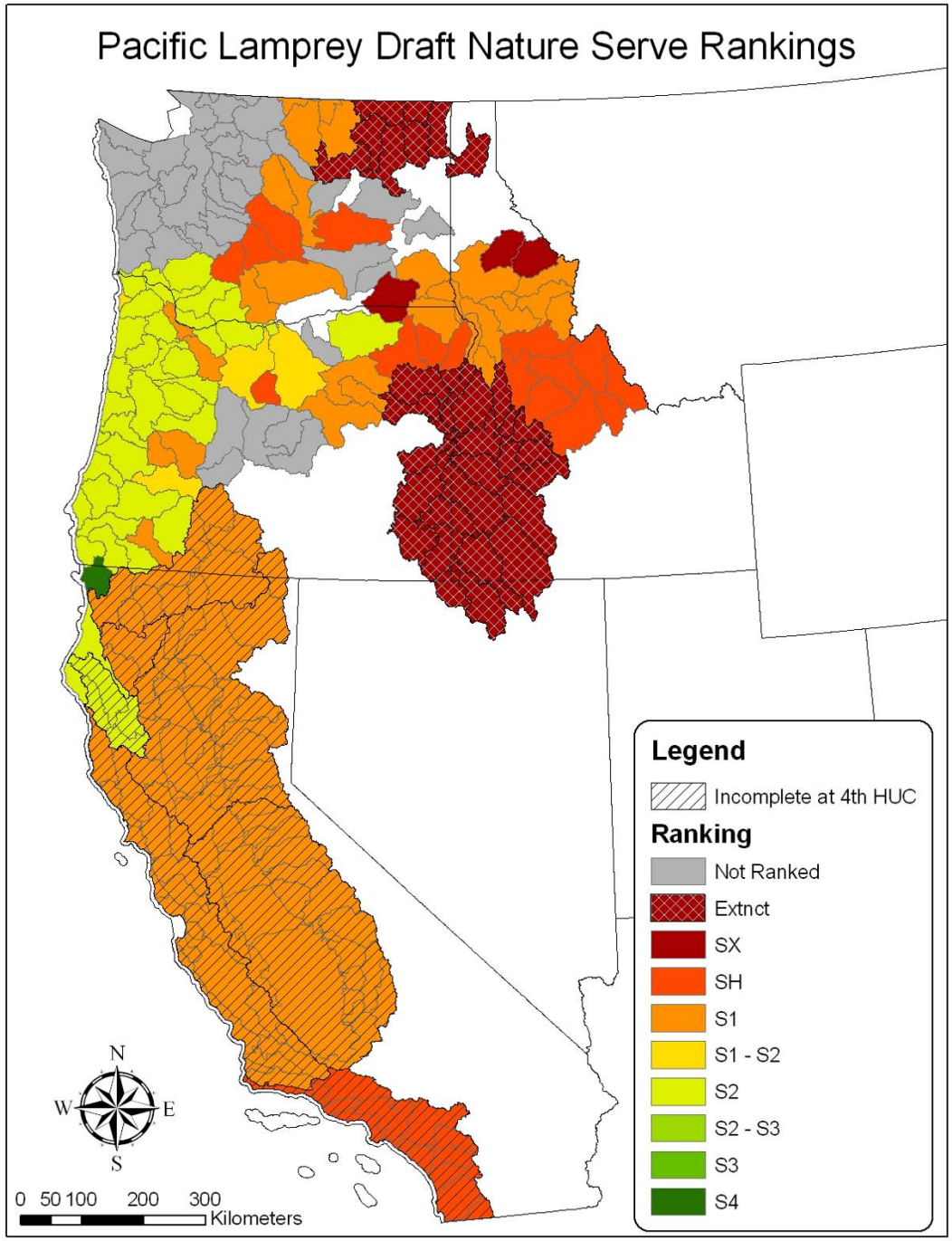


General Threats

- Passage both upstream & downstream
- Dewatering and flow management
- Poor water quality
- Dredging (channel maintenance and mining)
- Stream and floodplain degradation
- Changing ocean conditions
- Predation

USFWS Pacific Lamprey Conservation Initiative

- Apparent widespread decline throughout the range
- Uncertain information on
  - Abundance & distribution
  - Population structure
  - Threats
- Interest by a diversity of groups to conserve lamprey populations and to develop and implement management plans

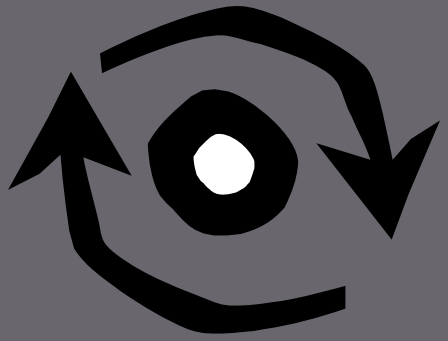

Pacific Lamprey Draft Nature Serve Rankings
Legend
Incomplete at 4th HUC
Ranking
Not Ranked
Extnct
SX
SH
S1
S1 - S2
S2
S2 - S3
S3
S4
N
W
E
S
0 50 100 200 300
Kilometers

Pacific Lamprey Life Cycle

Adults live in ocean 1-3 years and feed on host fish

Adults migrate to freshwater and reside there about a year

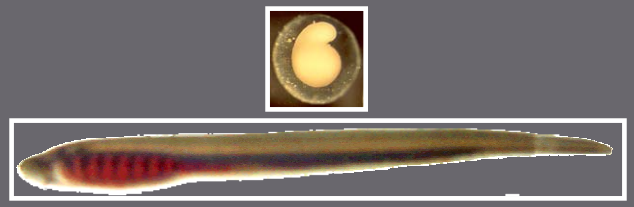
Adults develop teeth on sucking disk for parasitic feeding



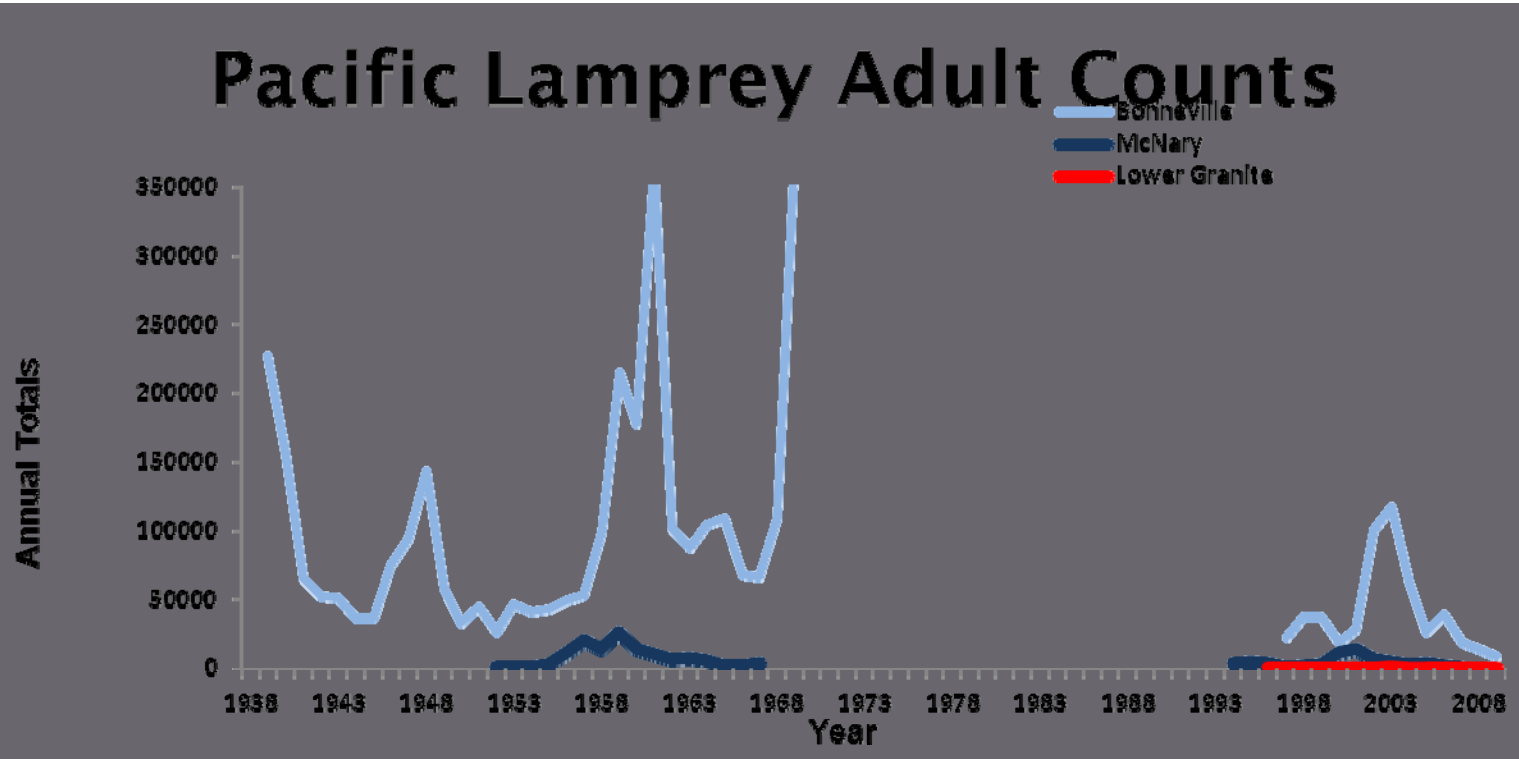
Adults spawn in gravel nest then die

Larvae transform to juveniles (macropthalmia) and migrate to the ocean

Ammocoetes live in silt/sand substrates and filter feed for 3 - 7 years



Eggs hatch into larvae (ammocoetes) and drift downstream to slow velocity area



- Adult Passage Radio Tag Studies
  - ~40% of adults successfully pass Bonneville
- Swim speeds for Pacific Lamprey 2.8 ft/s vs. adult salmon that use fishways 4.8-5.5 ft/s
- Need resting & holding structures

Critical Passage Needs for Adult Lamprey

- Working with USACE to systematically inspect entrances & fish ladders to identify passage improvements priorities
- Continue to evaluate modifications to entrances
- Provide resting & holding structures
- Install adult passage improvements at upstream dams

Lamprey Passage on Umatilla and Umpqua Rivers

Critical Passage Needs for Adult Lamprey

- Working with USACE to systematically inspect entrances & fish ladders to identify passage improvements priorities
- Continue to evaluate modifications to entrances
- Provide resting & holding structures
- Install adult passage improvements at upstream dams
- Evaluate effects of river environment on adult behavior and migration success

BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY

(*Entosphenus tridentatus*)

(Photo courtesy of U.S. Fish and Wildlife Service)

U.S. Fish and Wildlife Service

March 2010

Juvenile Passage at Dams

- Juvenile lamprey are poor swimmers
- Swimming endurance decreased rapidly @ velocities >1.5 ft/s
- Swimming endurance of ammocoetes likely lower
- Cannot swim faster than velocities found at screen face
- Macropthalmia may require attachment surfaces to rest between bouts of movement
- 70-90% of lamprey impinged on bar screens at velocities of 1.5ft/s

- Especially vulnerable to entrainment and impingement at dams & associated structures

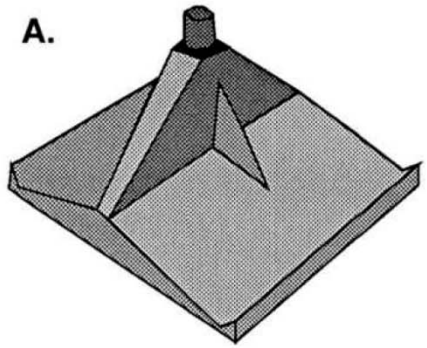
Critical Needs for Juvenile Lamprey

- Spatial and temporal distribution of juveniles and larvae at dams
- Route specific passage use and survival by larval, transforming and juvenile lamprey
- Screening criteria and design
- Effects of hydro system on transformation

Critical Needs for Juvenile Lamprey

- River environment on juvenile behavior and migration success
- Seasonal distribution and abundance of larval, transforming and juvenile lamprey in the reservoirs
- Use of mainstem habitats by ammocoetes and macropthalmia
- Availability of mainstem habitats

Deepwater Electrofishing for Mainstem Distribution



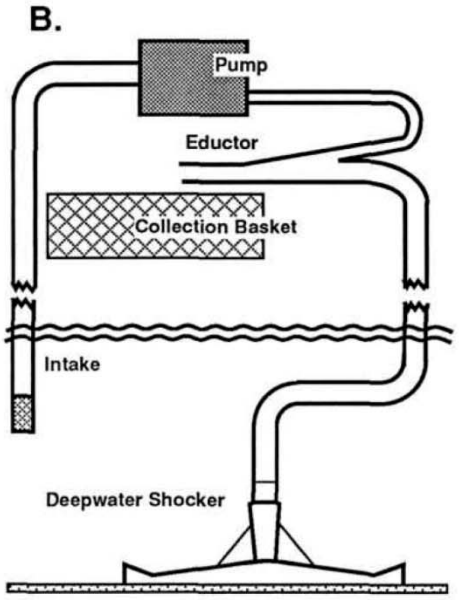


FIGURE 1.—(A) Deepwater electrofishing device for driving sea lamprey larvae from the bottom and (B) the pumping system used to move them to the surface for collection.

Bergstedt and Genovese 1994

Smolt Monitoring Program

- 2011 first year for inclusion of lamprey as target species
- Lamprey identified to species and life stage
- Condition monitoring conducted at John Day
- Will be expanded in 2012

Next Steps

- Conservation Agreement
- Continue to work with States, Tribes, USACE, PUDs on prioritizing research, actions and modifications for implementation by region
- Reduce threats in all regions
- Restore and sustain Pacific Lamprey throughout its range