

Washington's Native Lampreys

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Understanding Lampreys

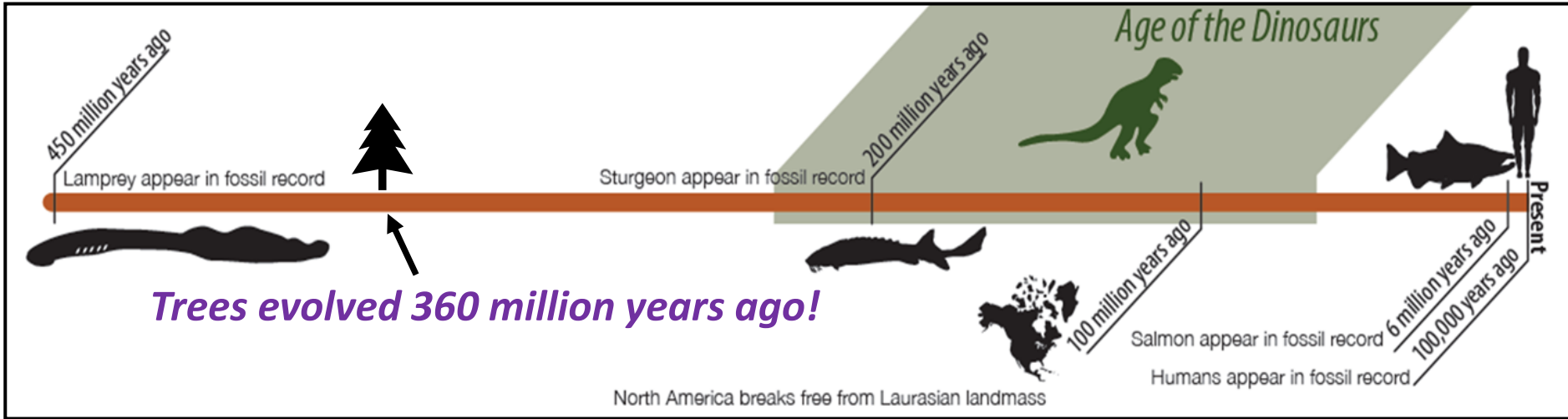
- Lamprey biology and species diversity
- Conservation history and actions
- Aquatic biodiversity study



Jeremy Monroe- Freshwaters Illustrated



Lamprey Biology: Ancient Jawless Fish



CRITFC



Clackamas County Historic Society



National Park Service



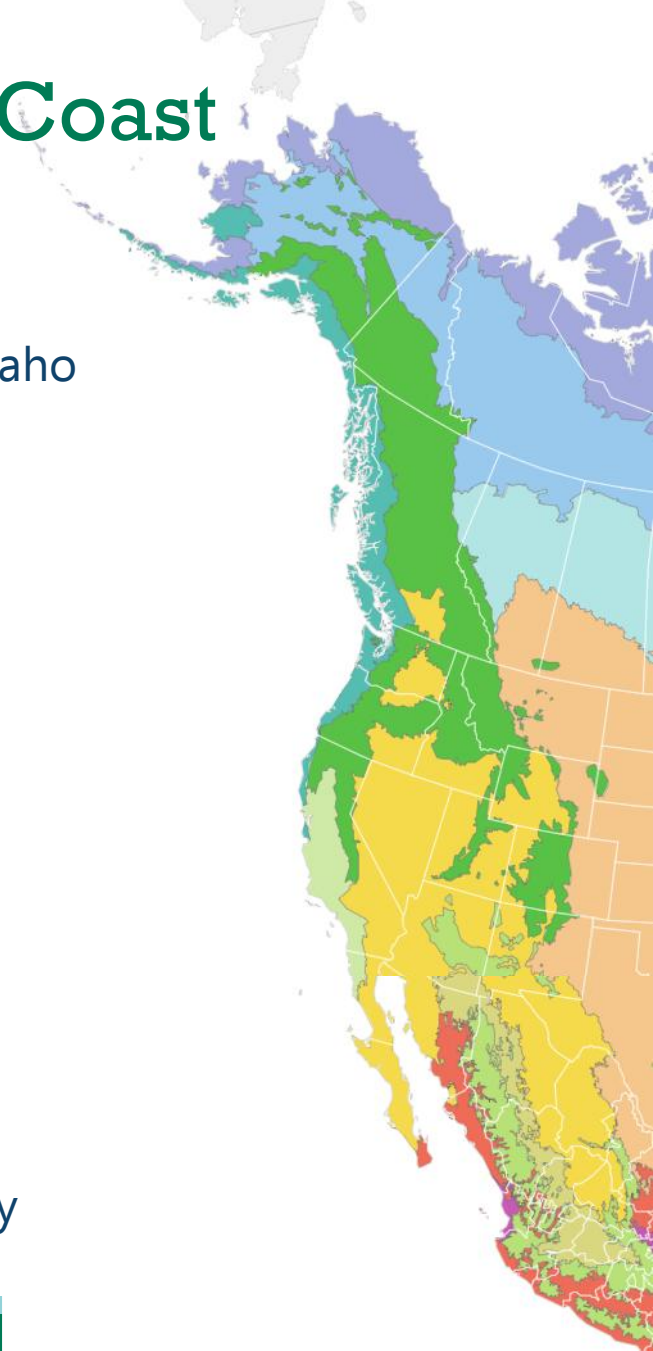
Lamprey Diversity on the West Coast

~ 15 species of native Lampreys

- 2 wide ranging from California to Alaska, inland to Idaho
- 2 Alaska and Northern Canada
- 1 Vancouver Island
- 1 Clackamas/Willamette Oregon
- 6 Klamath River/Pit River Basins
- 1 (possibly more) California
- 2 Mexico

Multiple life history strategies

- Resident – not parasitic, freshwater
- Parasitic – anadromous, adfluvial, lacustrine
- Predatory – anadromous, adfluvial
- Single species – both resident and parasitic/predatory



Lamprey Biology: Washington Lampreys – Species of Greatest Conservation Need

Anadromous and Parasitic



Yakama Nation Fisheries

Pacific Lamprey (> 13")
Entosphenus tridentatus

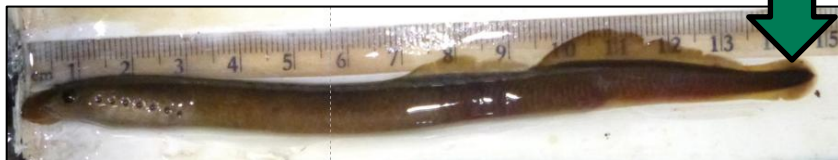
Anadromous/
Adfluvial and
Parasitic



WDFW

Western River Lamprey (< 13")
Lampetra Occidentis ayresii

Resident and
Non-parasitic



WDFW

Western Brook Lamprey (≤ 7")
Lampetra richardsoni Occidentis ayresii

New genus for 3
West Coast Lampreys
species previously
described as
Lampetra

Carim et al. 2023, Carim et al. 2024

Lamprey Biology: Unique Characteristics

No jaws, scales, bones, swim bladder, or paired fins

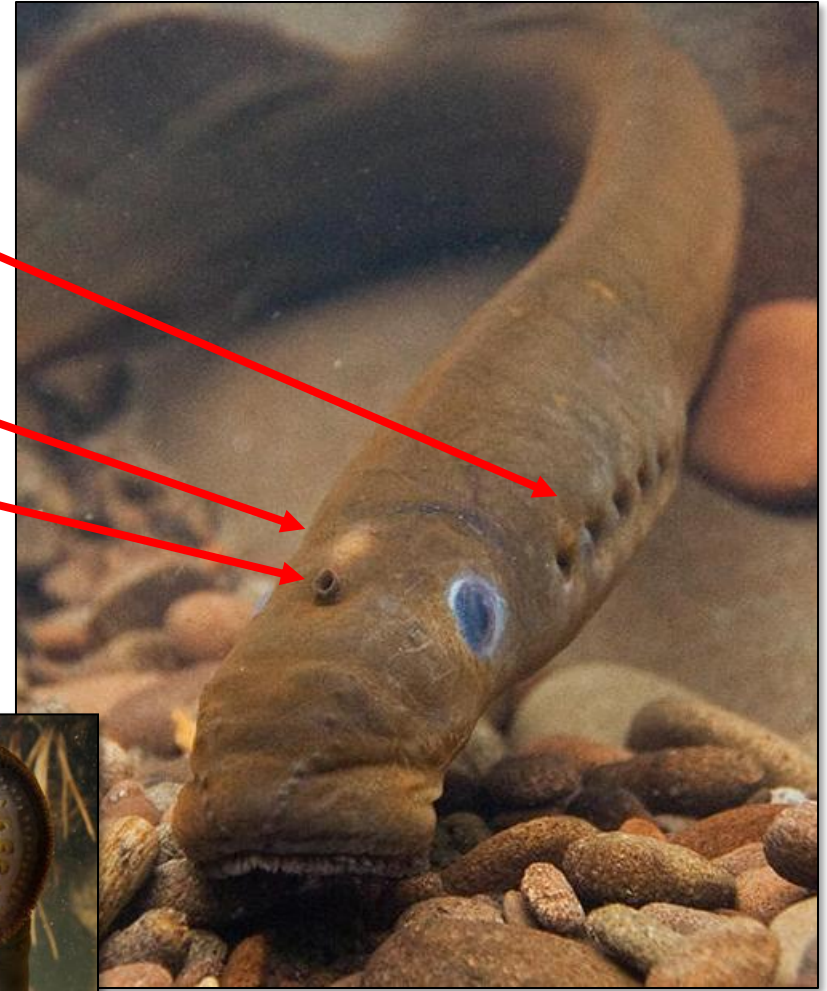
7 gill pores for gas exchange

Lamprey have a third eye – senses light and dark

Super good sense of smell – single nostril

Efficient swimmers - slow and steady

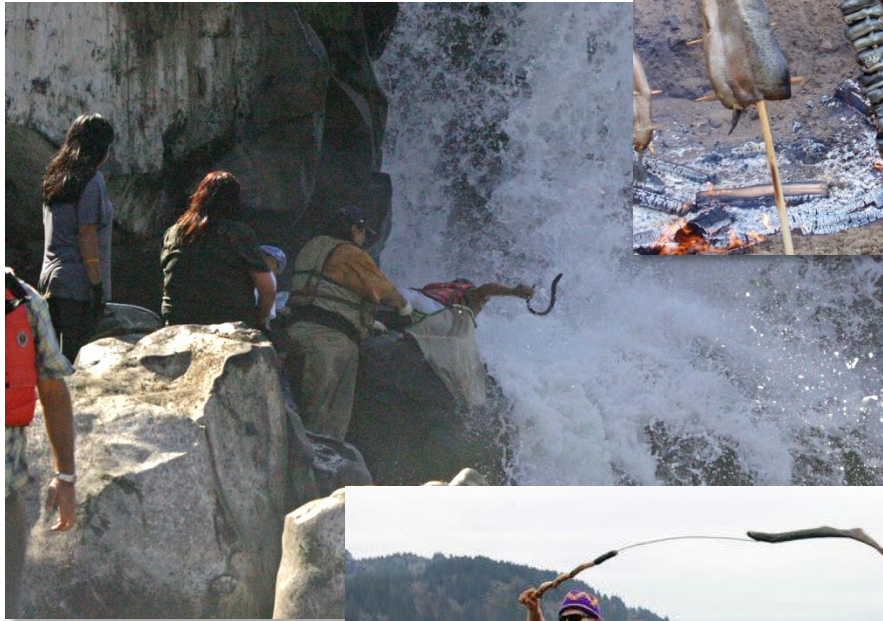
Can't jump but Pacific Lamprey can climb vertical surfaces



Lamprey Biology: Pacific Lamprey Climbing



Conservation Actions: Tribal Cultural Significance



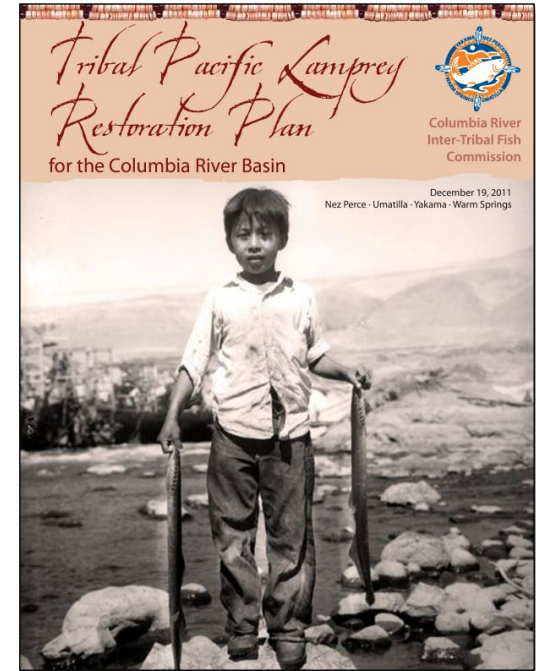
CRITFC



Tom Banse/NW News Network



Jim Wilson/New York Times



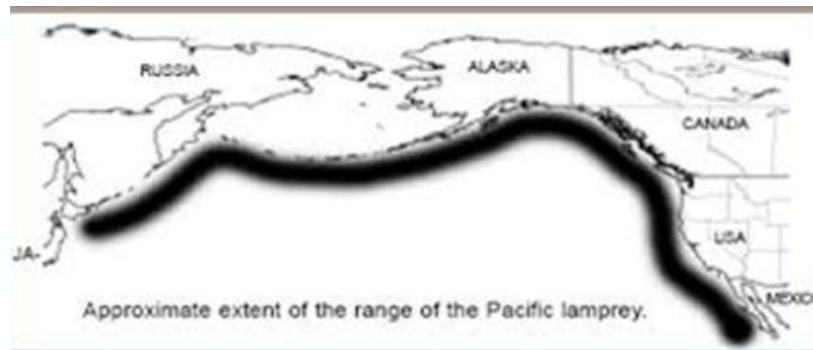
Conservation Actions: ESA Petition



2003 – Four Species of Lamprey petitioned for ESA listing: Pacific, Western Brook, Western River, Kern Brook Lampreys

2004 – “Not Warranted” listing decision

- » Insufficient information
- » **Rapidly Declining Populations**
- » No defined listable entity (DPS/ESU)

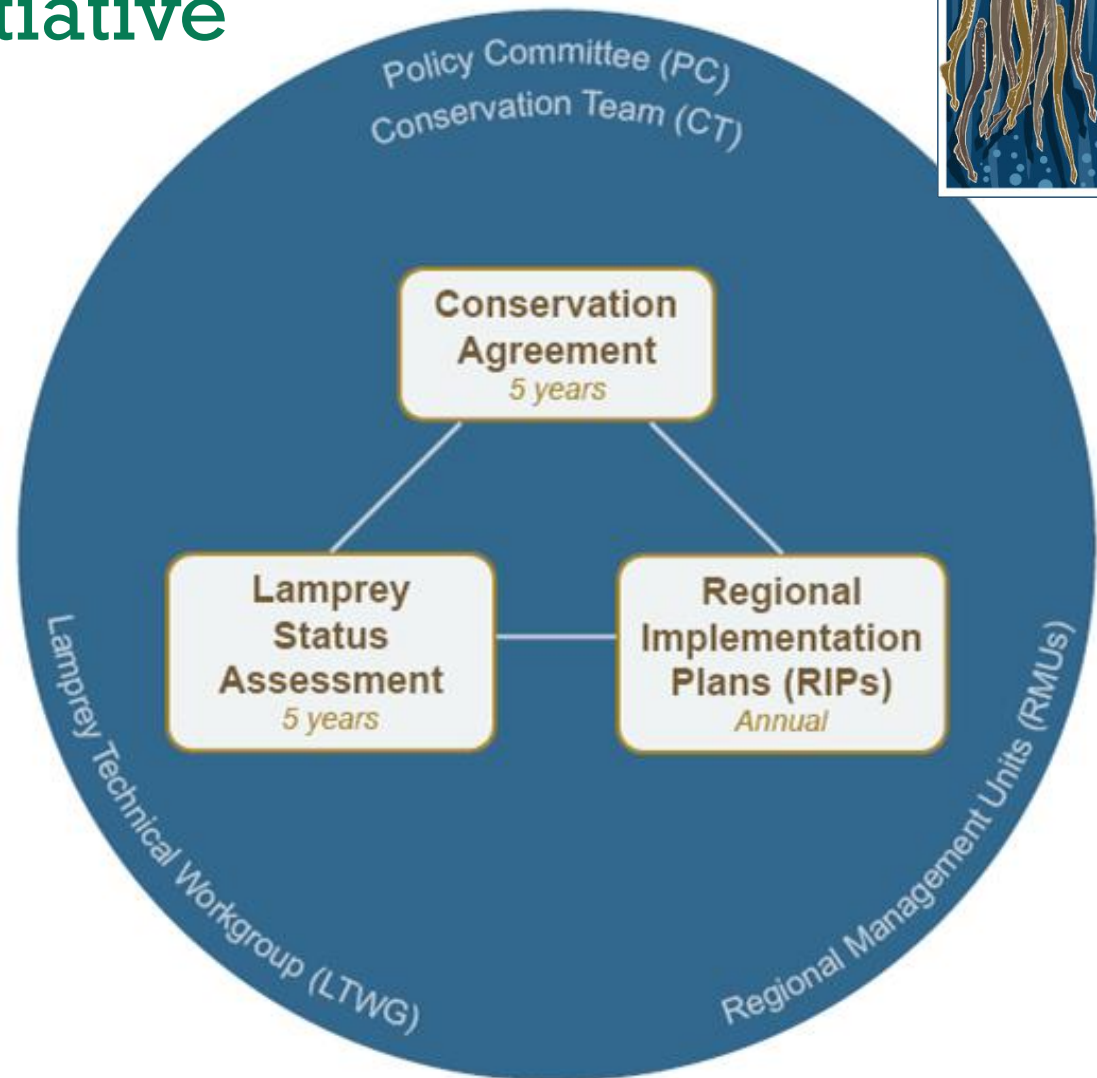


Conservation Actions: Pacific Lamprey Conservation Initiative



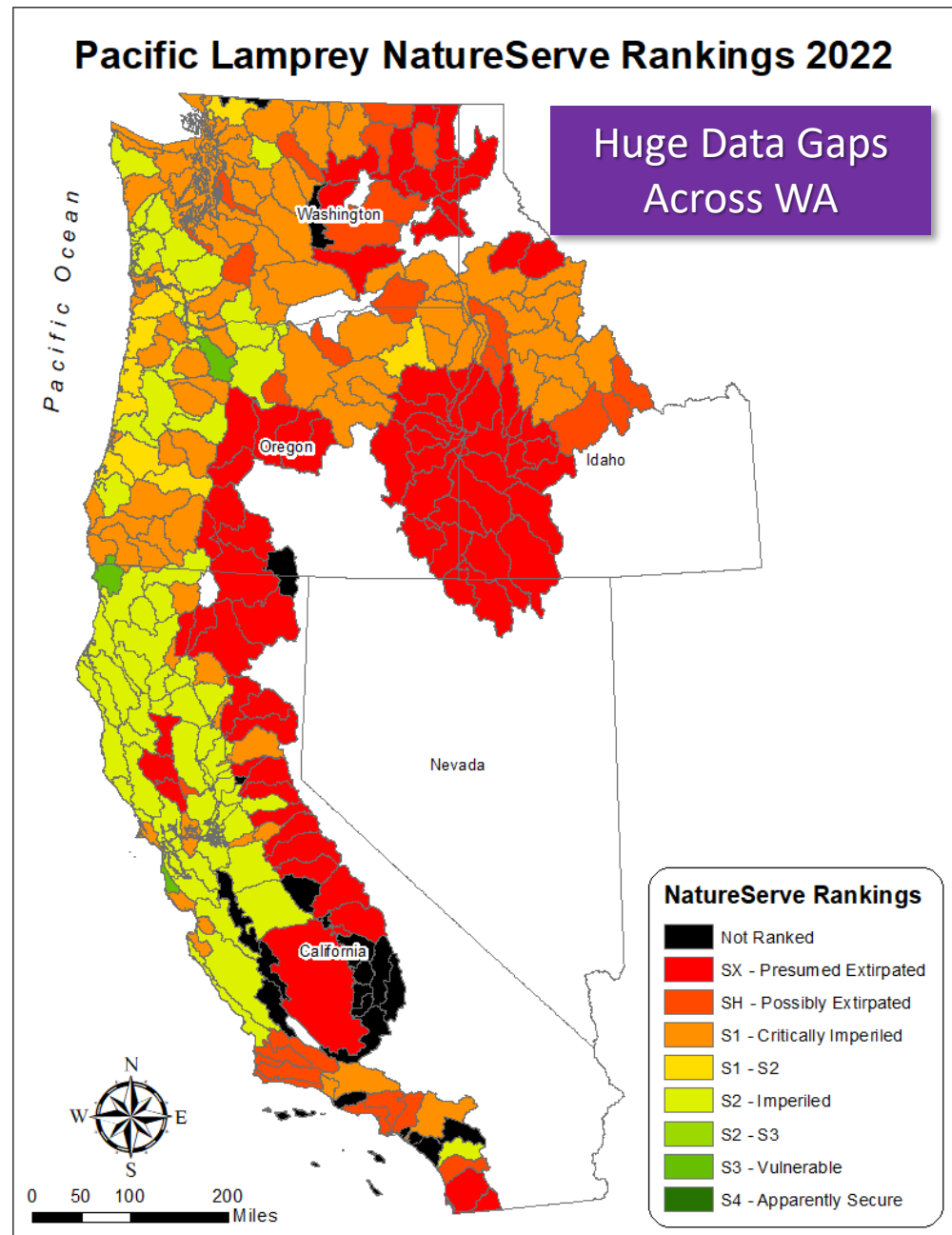
2008 Conservation Agreement:

- 53 signatories and supporters
- Tribes, agencies, non-profits
- Voluntary actions to conserve and protect lampreys



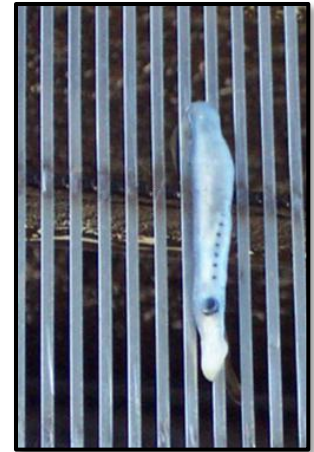
Conservation Action: Pacific Lamprey Assessment

- Characterizes conservation risk
- Flexible for **data poor** species and includes **demographic** and **threat** parameters
- Used to guide **identification** and **prioritization** of **conservation actions**

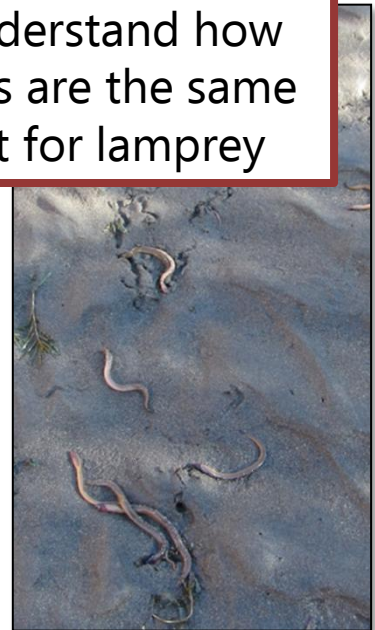


Conservation Actions: Threats to Lampreys

- Stream and Floodplain Degradation
- Passage Barriers
- Dewatering and Flow Management
- Water Quality
- Predation
- *Climate Change*
- Lack of Awareness!



Need to understand how these threats are the same or different for lamprey



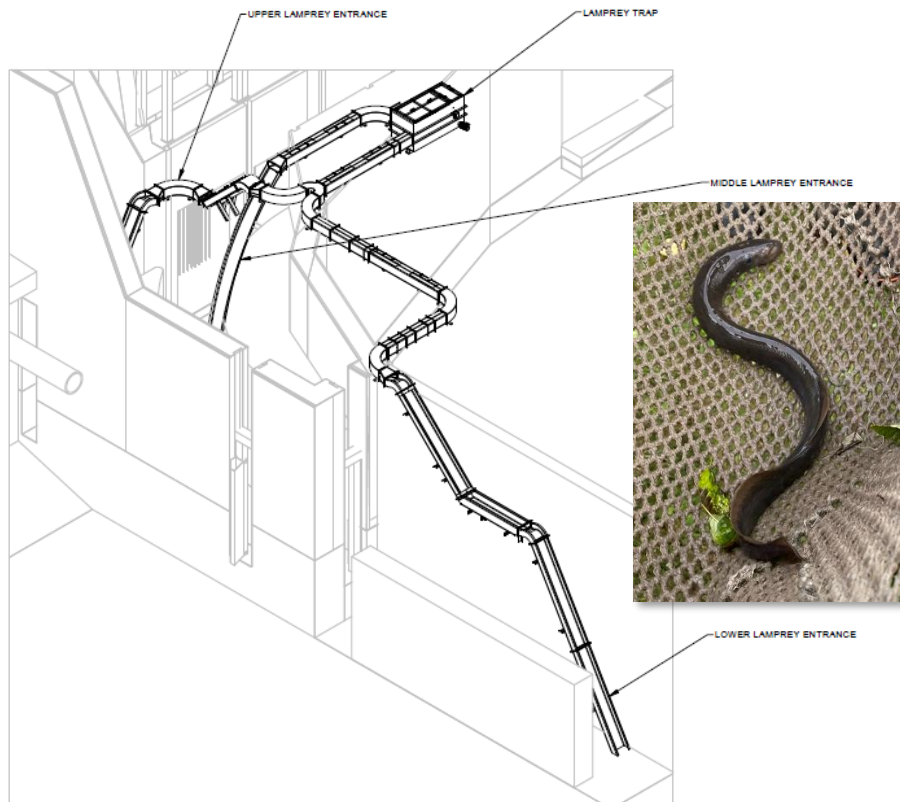
Conservation Actions: Identify Challenging Infrastructure



Ralph
Lampman –
Yakama
Nation

Conservation Action: Restoration and Passage

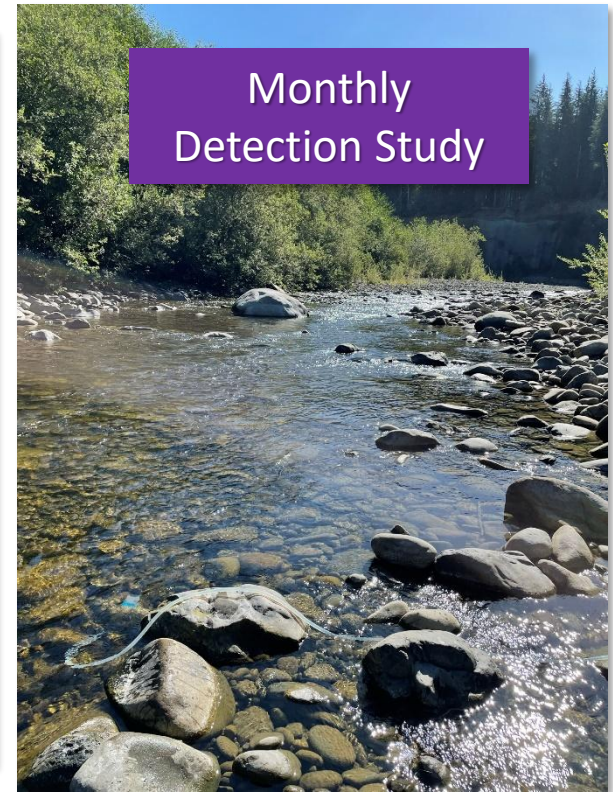
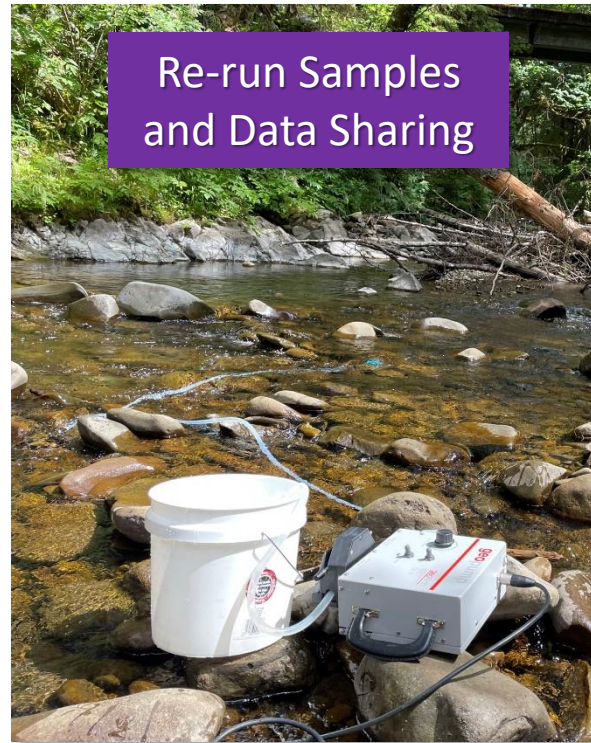
WDFW Habitat Biologists and Engineers work with restoration practitioners to include lampreys in project planning, design, and implementation



USACE 10% schematic conceptual drawing

Conservation Action: Environmental DNA Surveys

Extensive data collection and collaboration with USFS and many local partners



Aquatic Biodiversity Study

- Rerunning previously collected eDNA samples for all aquatic species, including lamprey
- Collecting new eDNA samples systematically across the state
- Creating statewide atlas for fish and shellfish distributions, abundance, and habitat use



Pacific Lamprey



Reticulate Sculpin



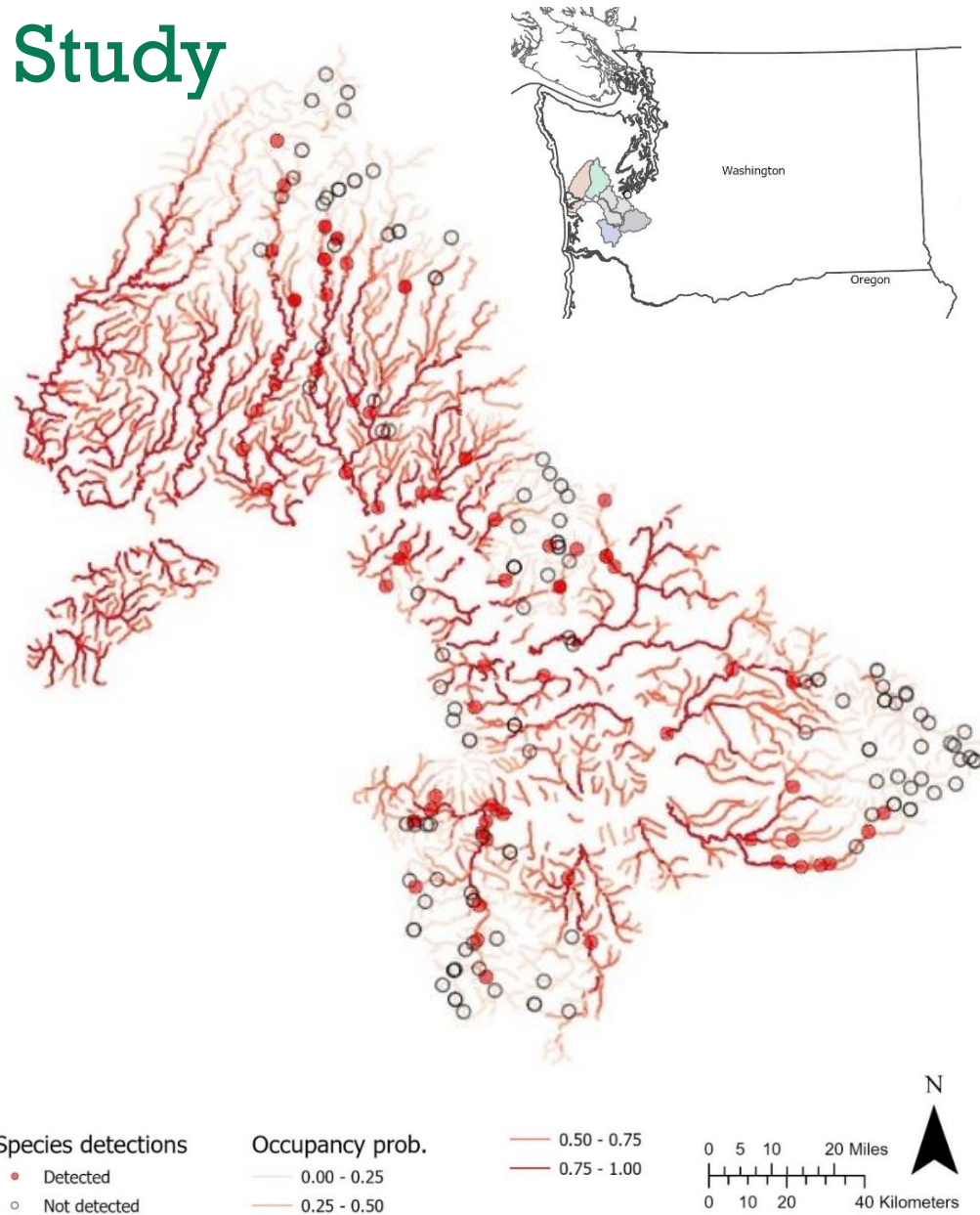
Largescale Sucker



Aquatic Biodiversity Study

Developing easily accessible tool (WDFW online database) to inform and prioritize conservation plans, restoration planning, in-water work permitting (e.g., HPAs)

Distribution and spatially continuous probability of occupancy maps



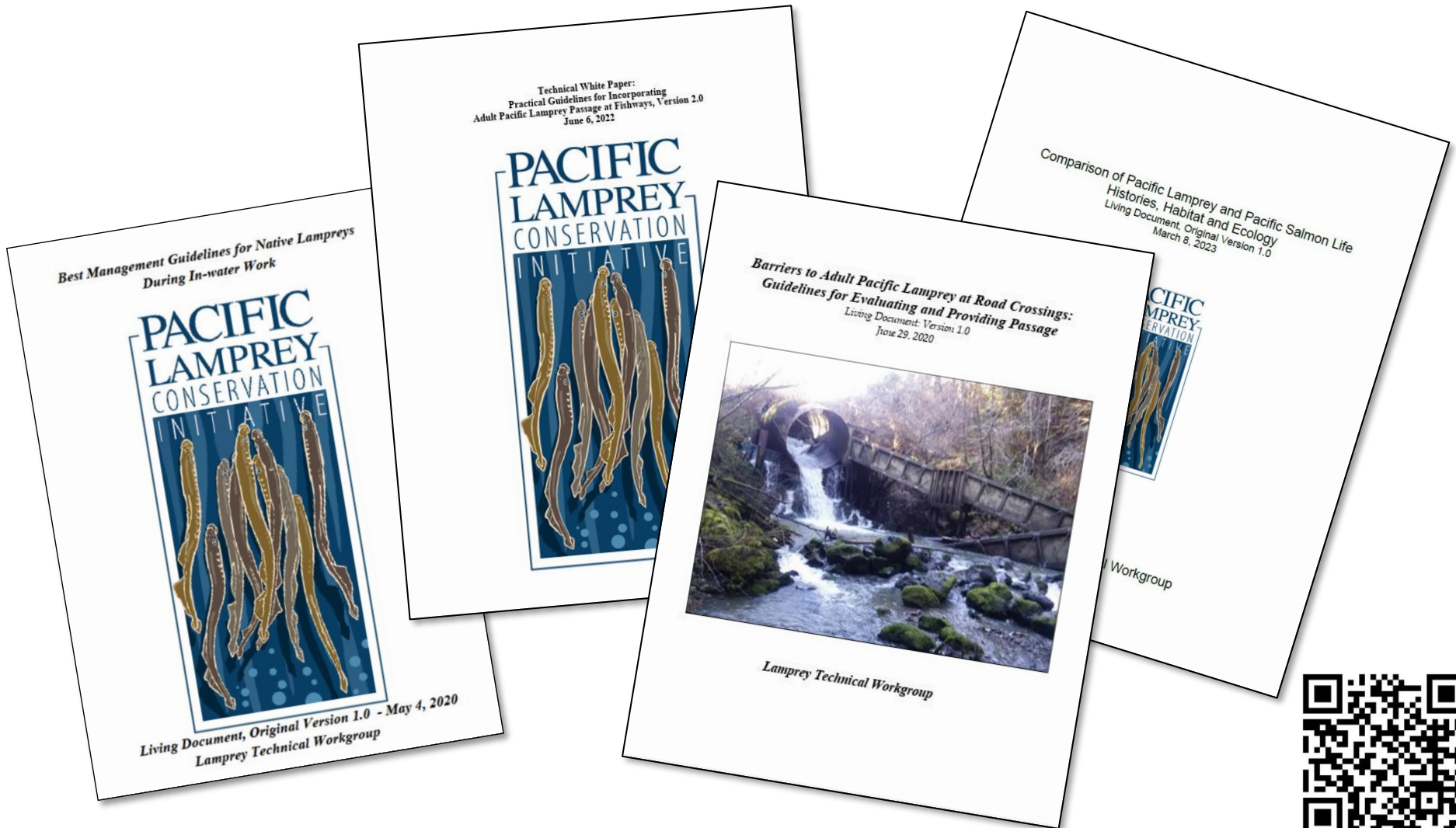
Looking Towards the Future

So much more to learn about these fascinating species!

- Expand our understanding of WA aquatic biodiversity
 - Expand monitoring of lampreys and other under studied aquatic species
 - Expand conservation efforts targeted towards lamprey, freshwater mussels, and other species



Online Resources: PacificLamprey.org Lamprey Technical Workgroup

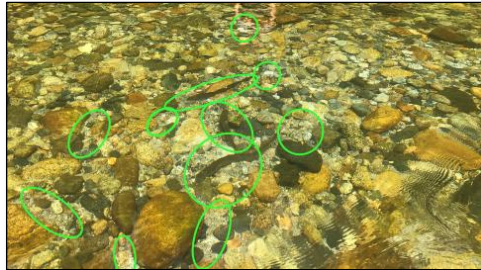


Questions?

Contact your Communications Manager
for help and review of your PowerPoint.



Lamprey Biology: Life Cycle



Eggs
~2 weeks



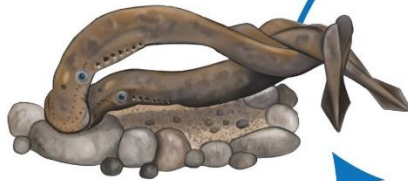
Prolarva
~2 weeks



Larva
Filter feeder
3 - 10+ years



Spawning
Spring - summer,
die after spawning



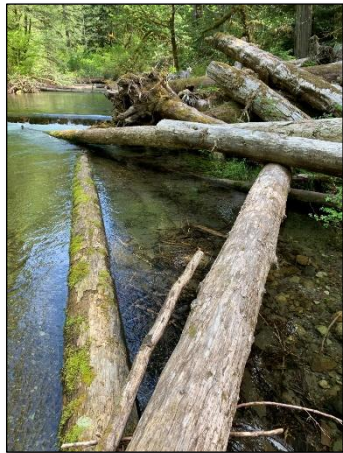
Transformer
Begins summer - fall,
develops oral disc and eyes
~6 - 9 months



Non-parasitic Adult
Migration and holding
~3-6 months



Parasitic Adult
Migration and holding
~3 months - 2 years



Migration to
stream

Juvenile
Ecoparasite
~6 months - 7 years



Migration to lake
or ocean



Illustrations by Monica Blanchard

Sea Lamprey PR Challenge

Pacific Lamprey are native on the West Coast and co-evolved with the ecosystems here

- Sea Lampreys are not native to the Great Lakes – impacted fish including 4 native lamprey species
- Human-made issue connecting the Atlantic Ocean to the Great Lakes

Lampreys: Friends or Foes?

That toothy mouth may look troubling, but most lampreys are not harmful. Let's look at the facts!

- 1 There are **40 known species** of lampreys living worldwide! Lampreys can be found in fresh and salt waters from the Arctic to just offshore of Antarctica. Most lampreys are valued ecologically and culturally.
- 2 Of all the lamprey species, only sea lamprey have established outside their native range, which is the Atlantic Ocean and its tributaries. **Their non-native range is restricted to the Great Lakes basin and Lake Champlain.**
- 3 **Lampreys help their native ecosystems** while burrowing as larvae by aerating sediments and creating small-scale habitats for aquatic insects. Some lampreys also infuse lake- or ocean-derived nutrients into river ecosystems when they die after spawning.
- 4 Only about half of the lamprey species worldwide are parasites of fish. **None of the parasitic lampreys living in their native ranges are harmful to fish populations** due to long periods of coexistence and co-adaptions with their fish hosts.
- 5 Because they have not co-existed, **non-native sea lamprey in the Great Lakes basin and Lake Champlain often kill their fish hosts.** Each sea lamprey is capable of destroying up to 40 pounds of fish during its lifetime. Fishery managers control these sea lamprey.
- 6 **So, are lampreys friends or foes?** All are friends except for non-native sea lamprey in the Great Lakes basin and Lake Champlain. Conservation efforts for lampreys in their native ranges are critical for the survival of these incredible creatures!

Help protect lampreys in their native ranges and control non-native sea lamprey in the Great Lakes basin and Lake Champlain by sharing what you've learned.

Learn more about lampreys:
SeaLamprey.org
PacificLamprey.org

Great Lakes Fishery Commission

PACIFIC LAMPREY CONSERVATION INITIATIVE

Sea Grant NEW YORK

Photos: Pacific lamprey (top) - David Hrazimovitch/Freshwaters Illustrated; Northern brook lamprey (center) - Great Lakes Fishery Commission; Five lampreys in the Great Lakes (top-down, left-right): Sea lamprey, American brook, Chestnut, Silver, Northern brook - Great Lakes Fishery Commission



Native Lampreys - Ecosystem Engineers

Lampreys are native on the West Coast and co-evolved with the ecosystems

Larval Lamprey Impacts:

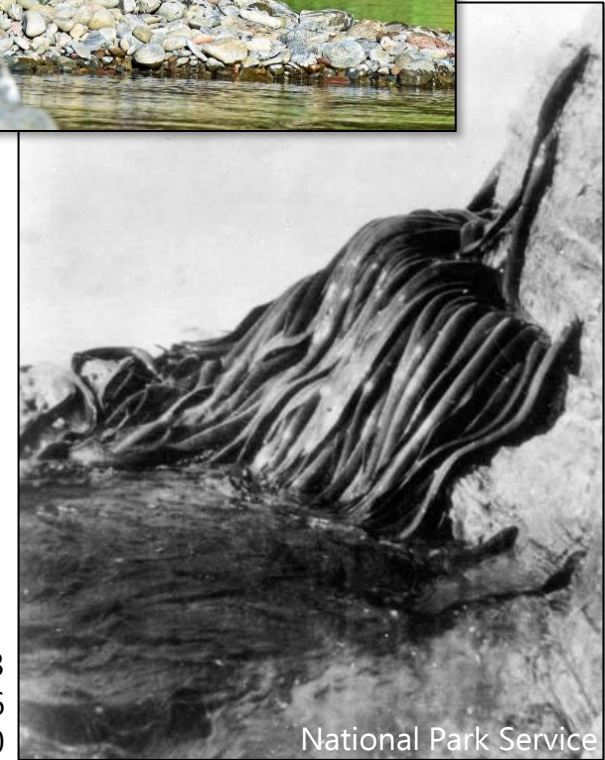
- Oxygenation of Bed Material
- Decrease Sediment Hardness
- Nutrient Cycling

Adult Lamprey Impacts:

- Bioturbation
- Increased drift forage
- Lower velocity areas
 - Salmonid fry use
 - Amphibian egg mass
- Marine Derived Nutrients – late season

All lampreys - nutrient and calorie dense food resource

Predation buffer



Shirakawa et al., 2013
Boeker and Geist, 2016
Georgakakos, dissertation UC Berkley, 2020

National Park Service

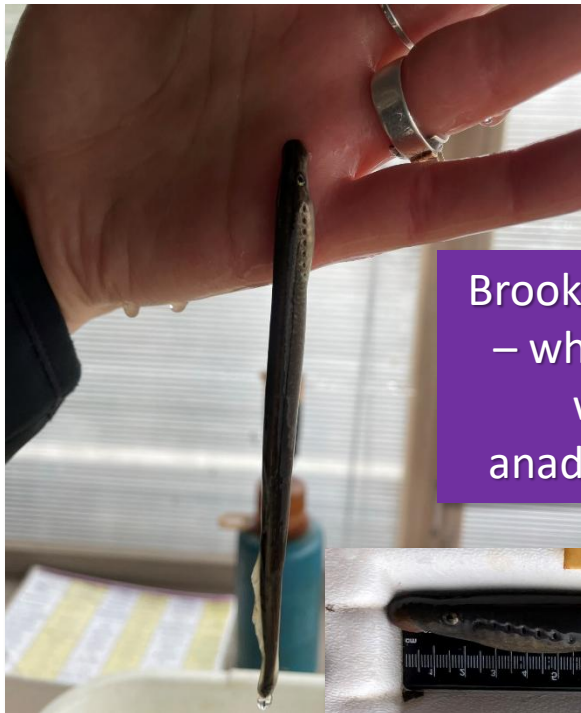
Native Lamprey Workshops

Funded 7 WA workshops along with 3 future AK workshops
Additional outreach to City, County, PUDs, RFEGs, and
WDFW staff



DNA Samples

Partnering with CRITFC and USFS to understand lamprey ecotypes



Brook vs. River Lamprey
– where are they and
what triggers
anadromy/migration?

WDFW



WDFW

Ocean vs. Stream
maturing Pacific
Lamprey – when are
they migrating?



A. Voloshin – Stillaguamish Tribe

