Lampreys in Captivity:
What? Where? Why? How?

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(Photo by Larry Telles)

Lampreys in Captivity:

What? is currently happening and
What? is technically feasible?

Where? is this currently going on?

Why? might we do this?

How? do we decide to do it?

What is happening in the Columbia Basin?

- Lots of planning, discussion and proposals
- Some experimental work
- Some short-term captive rearing/holding
- No full scale captive propagation

What is Technologically Feasible?

We know we can:

- Artificially spawn lamprey by stripping eggs and milt and artificially fertilize eggs
- Rear juvenile anadromous lamprey in captivity to the macrophthalmia stage
- Hold adults in captivity from freshwater entry to spawning

We don't know if we can:

- Rear anadromous lamprey in captivity from egg to reproductive adult (captive broodstock)

What is being done now?

Captive rearing: **Lampreys are caught and reared or held in captivity during some life stage, but no artificial propagation**

Captive propagation: **Lampreys are artificially spawned and reared in captivity for part or all of their life**

What is being done now?

Captive rearing: Lampreys are reared or held in captivity during some life stage, but no artificial propagation

Where: Several examples in the Columbia Basin:

- **Juvenile lampreys are being reared in hatchery ponds, particularly earthen pollution abatement ponds**
- **Experimental rearing/holding by the USGS and USFWS under more artificial conditions**
- **Adult lamprey are being held briefly between capture and release in tribal translocation programs**

Example:

Entiat National Fish Hatchery Pollution Abatement Pond (shown at low water) successfully rears juvenile lamprey

(Photo from Nelson and Nelle 2007)

Example:

Experimental rearing of wild-caught lamprey by the USFWS:
Lamprey are captured as ammocoetes and reared to macrophthalmia

(Photo by Larry Telles)

Example:

Adult lamprey are held in hatchery ponds between capture and release as part of the Umatilla and Nez Perce translocation programs

John Day Dam
fish ladder collection site

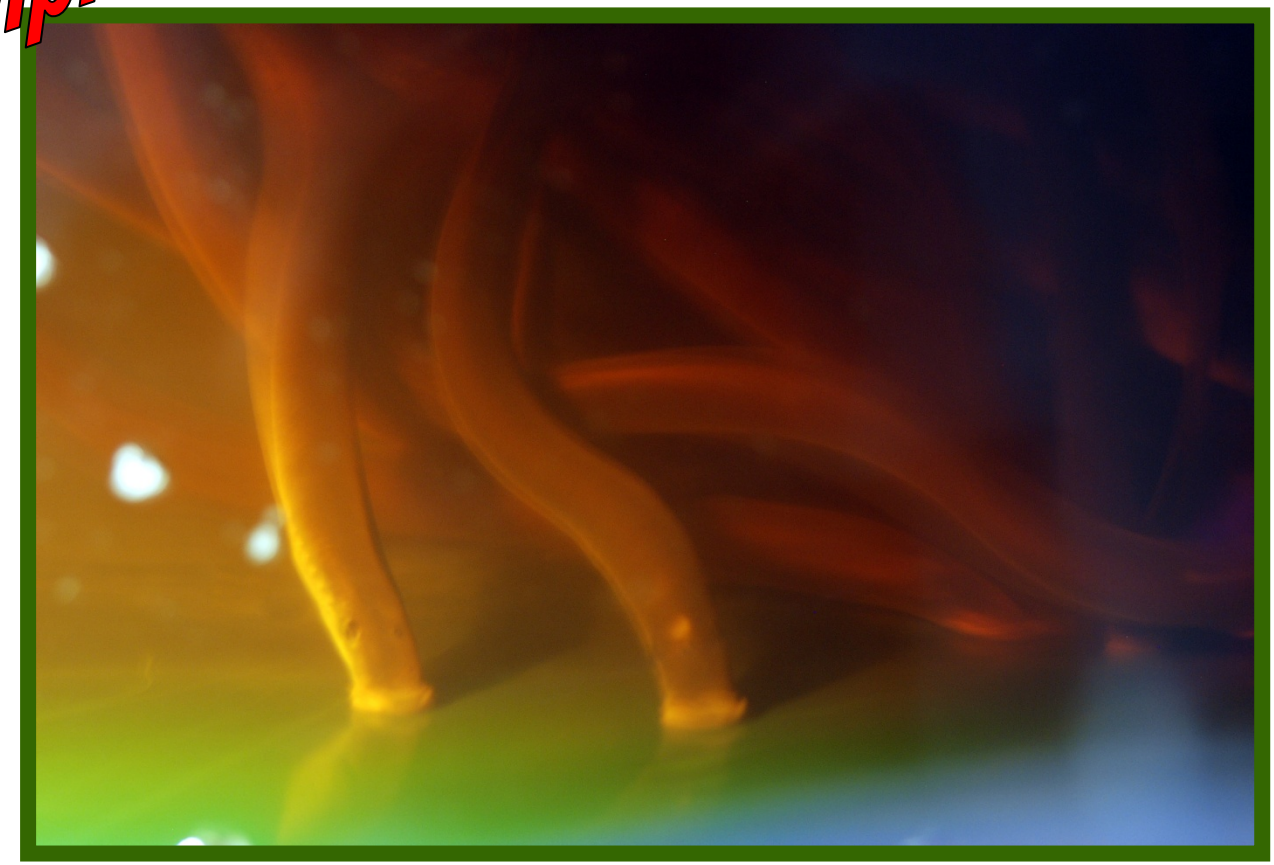
Nez Perce Tribal Hatchery
holding facility

Captive propagation: Lampreys are artificially spawned and reared in captivity for part or all of their life

Where: No examples in the Columbia Basin, but occurs elsewhere

Research
Production programs in Europe

Example:

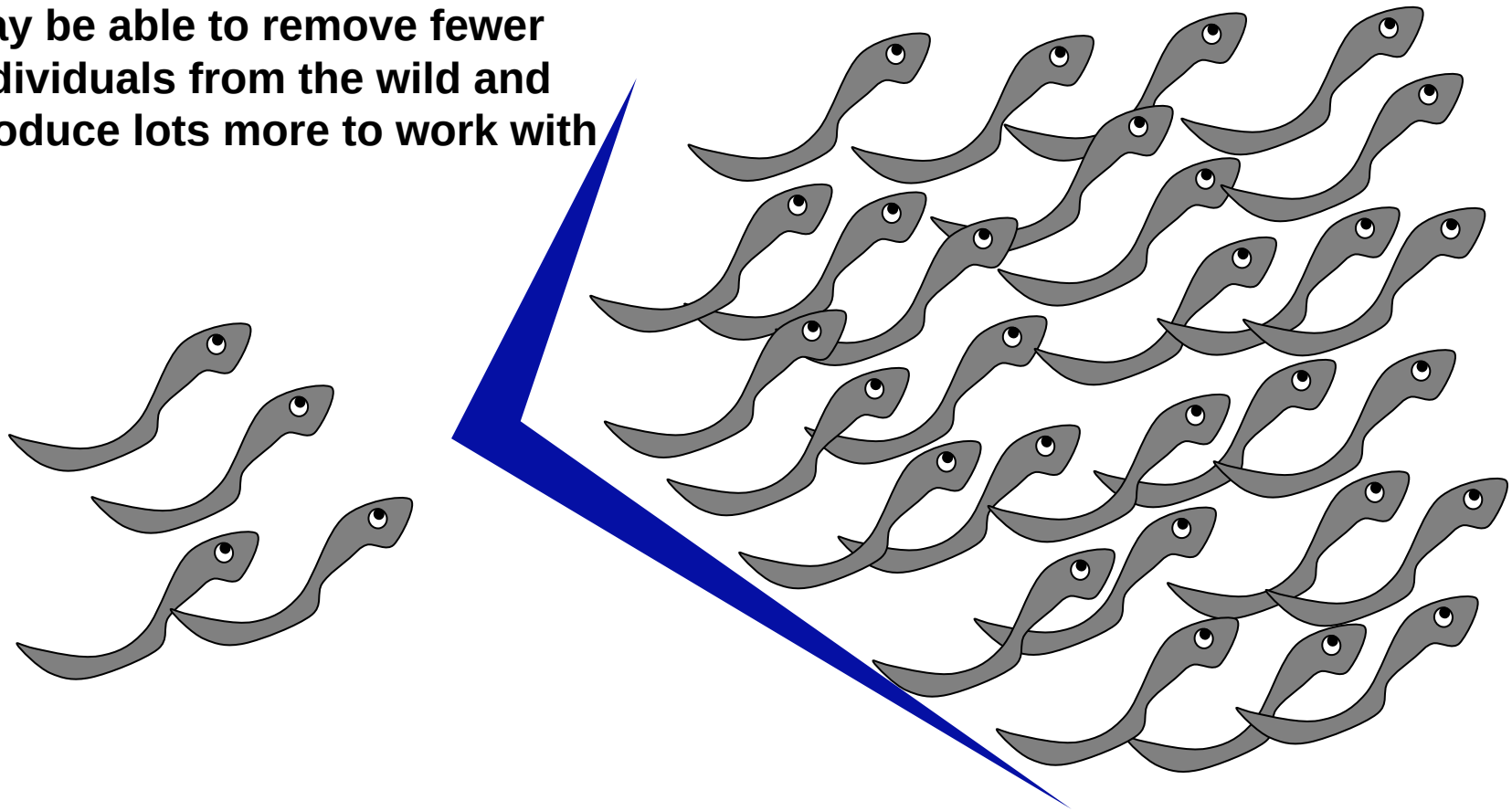


Lamprey rearing tank at a facility in Finland

(*Lampetra fluviatilis*; Photo by John G. Williams)

Why do captive propagation of Lampreys?

May be able to remove fewer individuals from the wild and produce lots more to work with



Make use of the increased reproduction and survival that can be achieved in captivity

Why?

What might artificially-produced lampreys be used for?

- **Research**
- **Reintroductions**
- **Augmentation/Supplementation**
- **Source of attraction pheromones**
- **Production for harvest**

How do we decide to do this?

How do we assess Risks and Benefits?

Guiding Principle:

“Do No Harm”

How do we assess

Risks and Benefits?

The balance of Risks and Benefits depends on 3 factors:

1. The uses of the captive lamprey

Used in research

–VS–

Reintroduced into a vacant basin

–VS–

Released into an occupied basin

How do we assess

Risks and Benefits?

The balance of Risks and Benefits depends on 3 factors:

2. The extent of captivity

Short-term holding/rearing

–VS –

Full captive propagation/rearing

How do we assess

Risks and Benefits?

The balance of Risks and Benefits depends on 3 factors:

3. The scope of the program

Small-scale

–VS–

Large-scale

Risks and Benefits?

Some potential benefits:

- **May rapidly increase numbers**
- **Increase survival at critical life stages**
- **Decreased need to remove lampreys from existing natural production areas**
- **Ready supply of lamprey for various uses**
- **“Lamprey magnets” attract wild lampreys to areas we want re-colonized**

Risks and Benefits?

Risks?

- Potential genetic and phenotypic changes due to captive conditions

- If captive lamprey are out-planted:
  - Genetic and/or ecological impacts on existing wild lamprey (if any are present)
  - Possible disruption of natural population structure (if lamprey have any)

- "Lamprey magnets" – attract wild lampreys to the wrong places

Implementation Plans

Artificial production programs for lampreys should have rigorous implementation plans that include:

- **Clearly stated goals**
- **A program-specific risk/benefit analysis**
- **A review of critical uncertainties and assumptions**
- **Protocols appropriate to minimize risks and optimize benefits**
- **An appropriate monitoring and evaluation program**

Questions or Discussion?

(photo from Nelson and Nelle 2007)