



# Using Harm Reduction in the Conservation of Protected Lampreys

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Fundy Aqua Services

# Species in BC



**Pacific lamprey (*Entosphenus tridentatus*)**  
Parasitic, Anadromous



**River lamprey (*Lampetra ayresii*)**  
Parasitic, Anadromous



**Cowichan Lake lamprey (*E. macrostomus*)**  
Parasitic, FW



**Western brook lamprey (*Lampetra richardsoni*)**  
Non-parasitic, FW  
\*Morrison Creek lamprey (*L. richardsoni marifuga*)  
Parasitic, FW [silver one]

# Cowichan Lake Lamprey

- Freshwater parasitic
- Only found in Cowichan and Mesachie lakes
- 1992 was described as a distinct species
- Protected by SARA (**Threatened**)
- Glacial history indicates that a species of lamprey probably evolved since the last glaciation, in a relatively short period of time
- Maximum size approximately 270mm





# What is known

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- Handful of studies conducted since the species was discovered in the 1980s
- 2017 first observation of spawning and nest building
- Indications of a spawning window (May-end of August)
- Parasitic and have a preference for cutthroat trout

## What we don't know

- Duration of each life stage, total life span
- Extent of use of tributaries
- Feeding requirements
- How long they stay attached to an individual fish
- Population size
- Effects of changing environment
- ...



# Threats

- Climate change
- Urbanization
- Water extraction
- Foreshore development
- Deforestation
- Intentional harm





Is it Hopeless?

# Harm Reduction

- 1) Focus on the harm.
  - Actions to decrease the negative consequence of the hazard.
- 2) Pragmatic.
  - May not be able to eliminate the hazard but what are the options to cope.
- 3) Solution oriented.
  - The discovery of the proximate cause is not the goal but rather the strengths, possibilities and opportunities to reduce the negative impacts.
- 4) Multi-pronged approach.
- 5) Prioritize achievable goals.
  - Incremental gains which can be built on over time based on feasibility and current knowledge.
- 6) Actively engage diverse players.
  - Not blame based. System based drivers of harm to find strength, possibilities and opportunities.

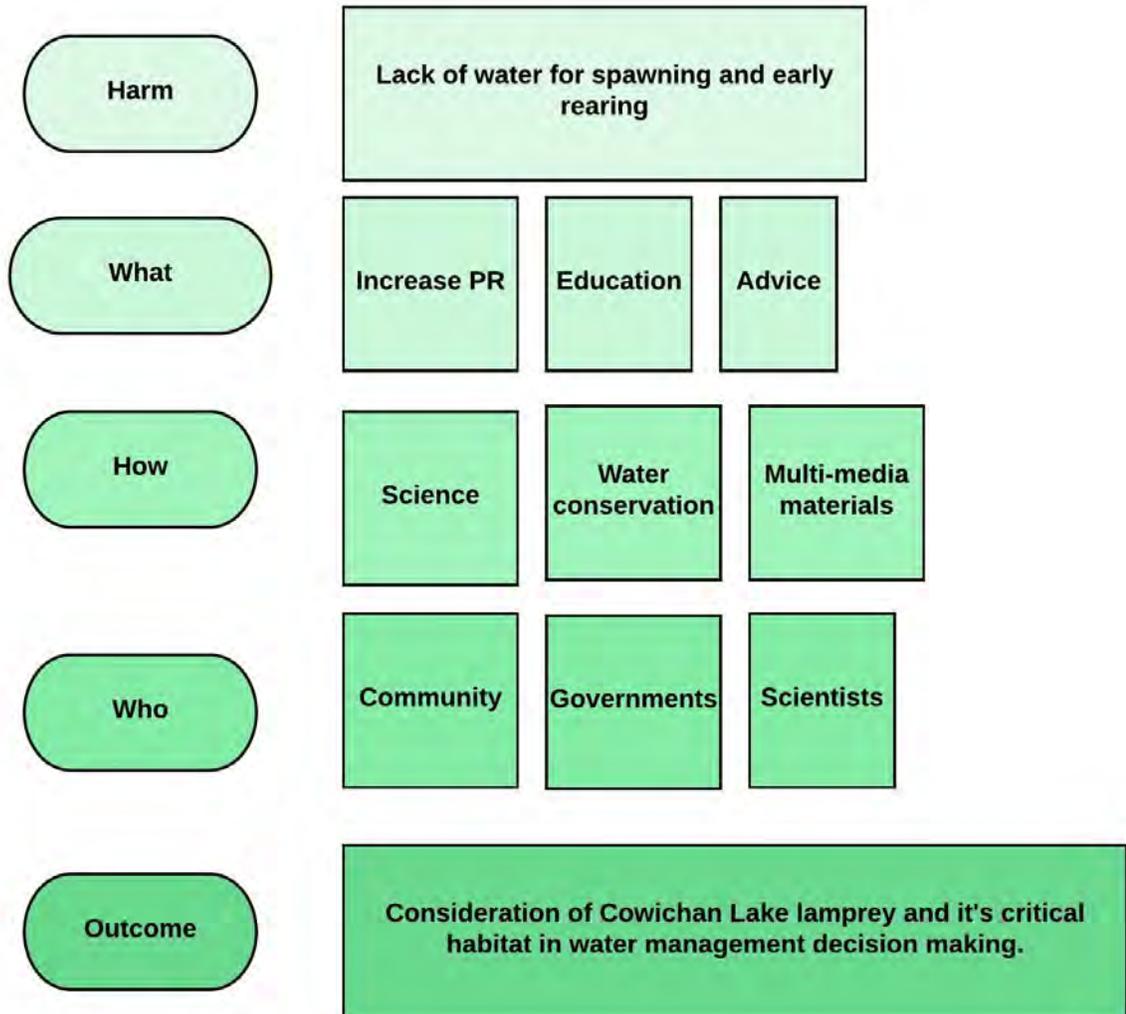
## Harm Reduction Adapted for Environmental Challenges

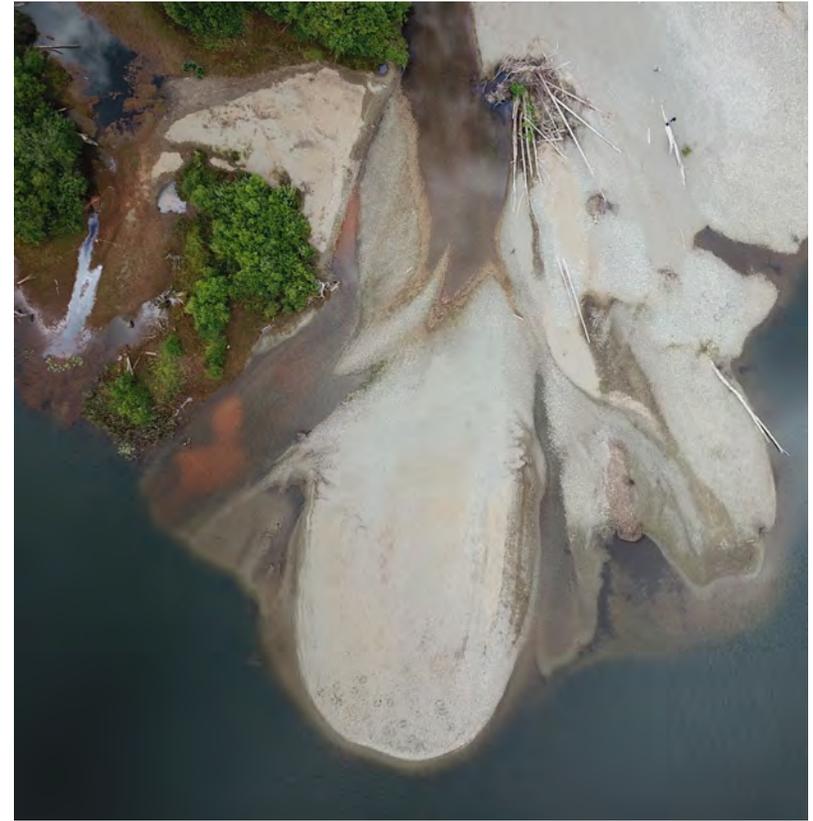
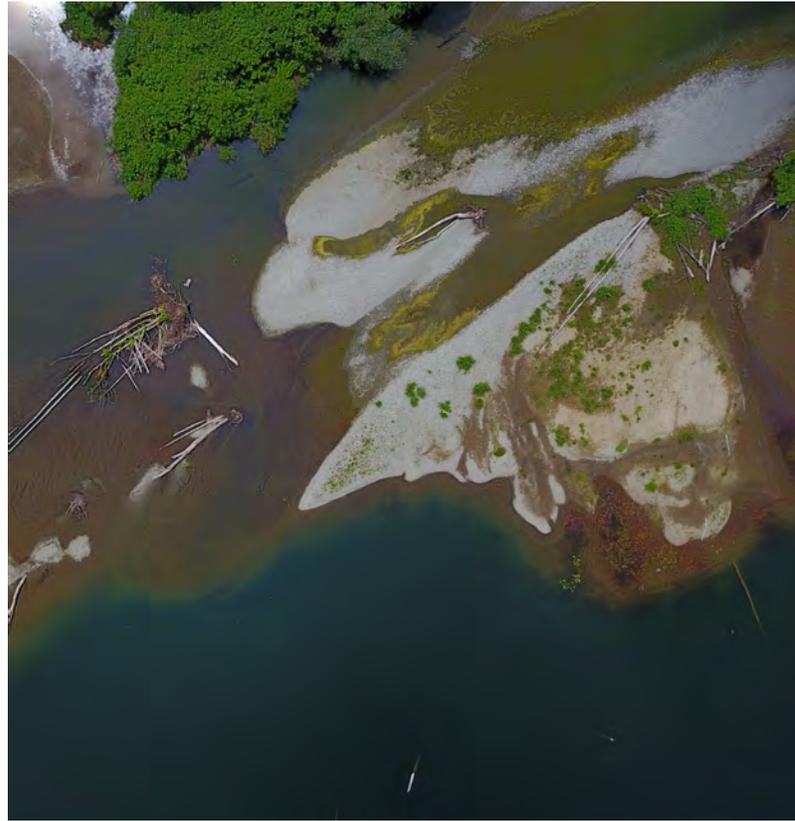
TOTAL AMOUNT OF HARM		TOTAL IMPACT OF HARMS	
EXPOSURE	SENSITIVITY	COPING & ADAPTING	CUMULATIVE EFFECTS
<ul style="list-style-type: none"><li>• Routes of exposure</li><li>• Amount of exposure</li></ul>	<ul style="list-style-type: none"><li>• Susceptibility</li><li>• Concurrent stressors</li><li>• Anthropogenic modifiers</li></ul>	<ul style="list-style-type: none"><li>• Biological barriers</li><li>• Management barriers</li><li>• Social barriers</li><li>• Shared drivers of resilience</li></ul>	<ul style="list-style-type: none"><li>• Shared drivers of harm</li><li>• Zero-sum management options</li></ul>

From: Stephen and Wade (2018). Using a harm reduction approach in an environmental case study of fish and wildlife health.

# Hazard-climate change

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# Lack of Water for Spawning and Early Rearing

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June 25<sup>th</sup>-2017, 2018, 2019

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Harm

What

How

Who

Outcome

Lack of water for spawning and early rearing

Increase PR

Education

Advice

Science

Water conservation

Multi-media materials

Community

Governments

Scientists

Consideration of Cowichan Lake lamprey and it's critical habitat in water management decision making.

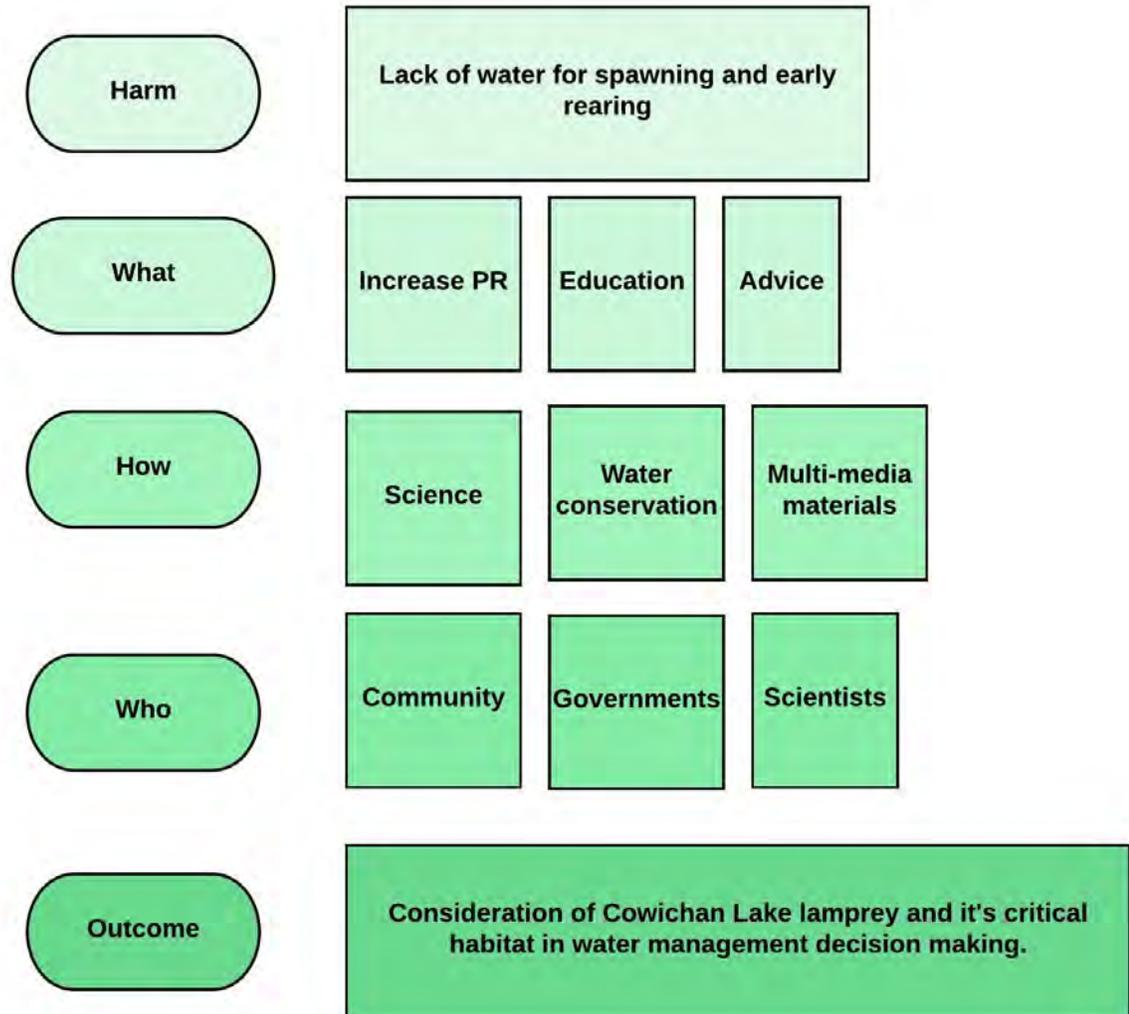


- Secured for funding to install signage at docks (returned it!)
- Creating information posters for community groups
- Give public talks
- Participate in public events
- Provide information and advice to local governments and boards
- Briefing MLAs

What

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# How

- Science.
  - Conducting aerial habitat surveys to develop models of spawning and rearing habitat at various lake levels to provide advice on weir management.
  - Trapping experiments to determine habitat usage.
  - Citizen science activities.
  - Dissemination of information through scientific papers.

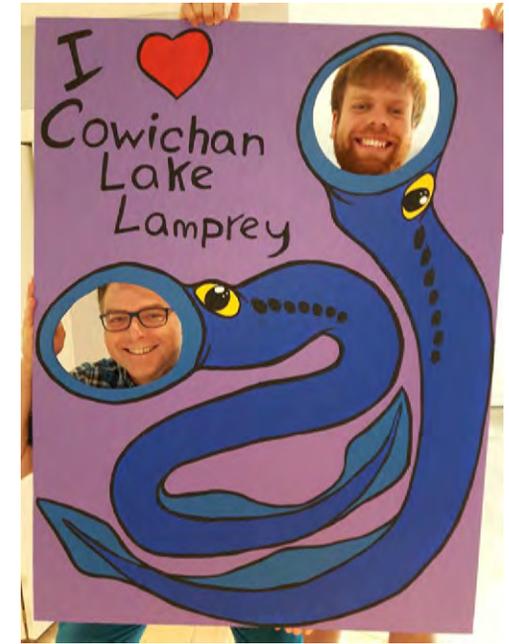


# Recent Publications

- Chaudhuri, C., Wade, J., & Robertson, C. (IN REVIEW). Anthropogenic and natural drivers of fluctuating spawning habitat of Cowichan Lake Lamprey. FACETS.
- Wade, J. (2019). Can we learn from other freshwater parasitic lampreys to help manage Cowichan Lake Lamprey (*Entosphenus macrostomus*)? Canadian Manuscript Report of Fisheries and Aquatic Sciences 3184: v + 29 p.
- Wade, J., Dealy, L. & MacConnachie, S. (2019) Discovering the mysterious spawning habits of the threatened Cowichan Lake Lamprey. Frontiers for Young Minds <https://doi.org/10.3389/frym.2019.00125>
- Wade, J., Dealy, L. & MacConnachie, S. (2018) First record of nest building, spawning and sexual dimorphism in the threatened Cowichan Lake lamprey *Entosphenus macrostomus*. Endangered Species Research 35:39-45
- Wade, J., Dealy, L., Hodes, V. & Grant, P. (2018) Identifying factors contributing to the successful spawning and early rearing of Cowichan Lake Lamprey (*Entosphenus macrostomus*). Canadian Manuscript Report of Fisheries and Aquatic Sciences 3169 v + 13 p.
- Stephen, C. & Wade, J. (2018) Wildlife population welfare as coherence between adapted capacities and environmental realities: A case study of Threatened Lamprey on Vancouver Island. Frontiers in Veterinary Science <https://doi.org/10.3389/fvets.2018.00227>

# How

- Promotion of water conservation through education.
- Multi-media materials to disseminate conservation messages and science.

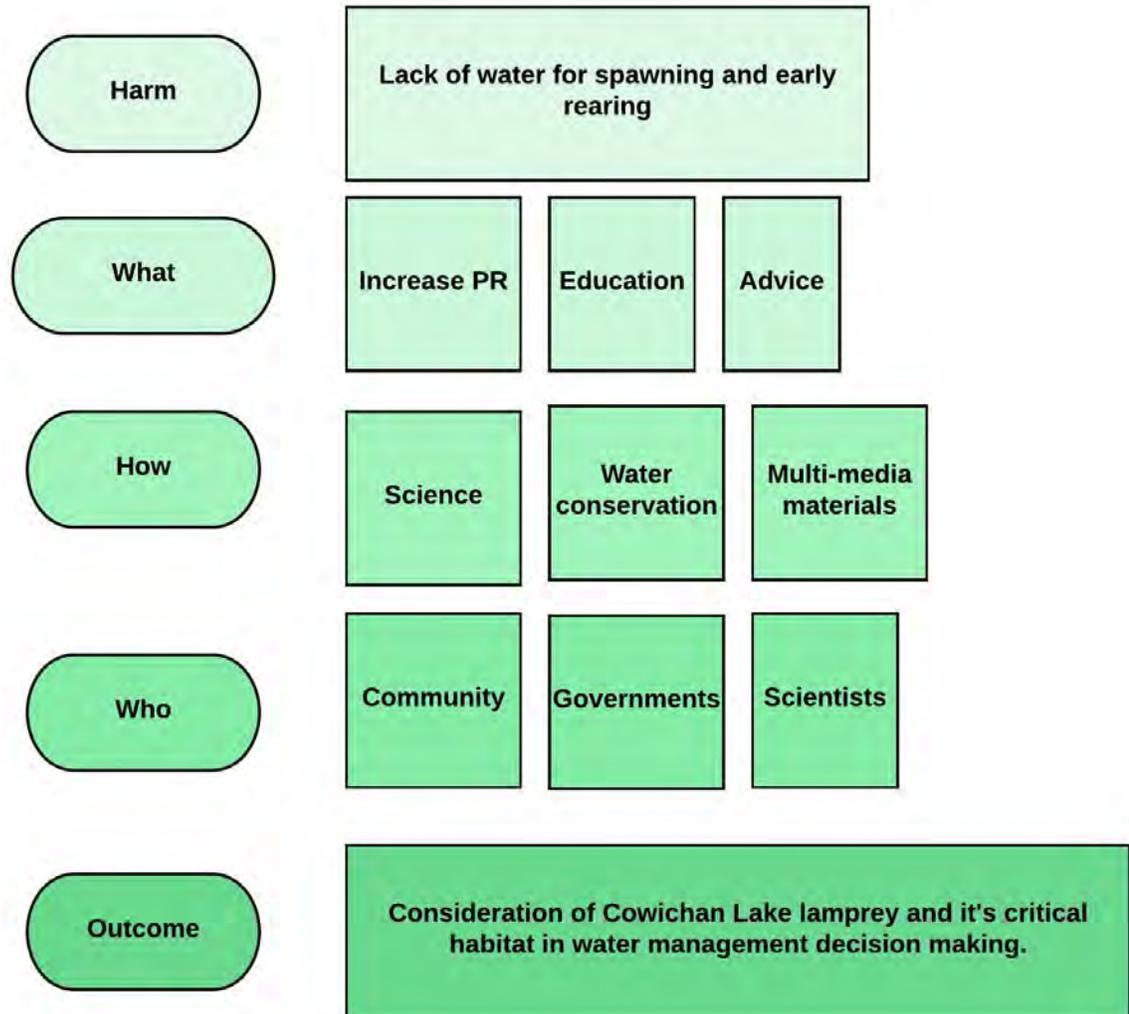


HINTERLAND  
WHO'S WHO

Discovering the mysterious spawning habits  
of the threatened Cowichan Lake Lamprey  
(Frontiers for Young Minds)

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# Who



Fisheries  
and Oceans

Pêches  
et Océans

# Outcome (so far!)

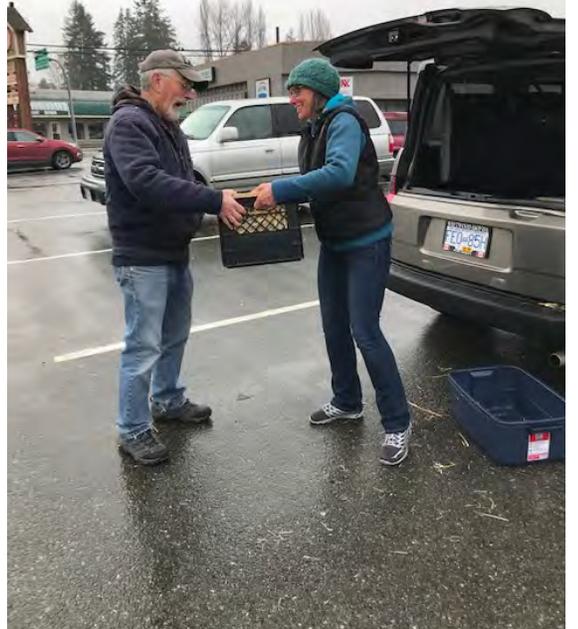
- **Do not have to fix the issues, just try to make things better**
- Cowichan Lake lamprey are a consideration in the plans to increase the height of the weir.
- There has been more effort in recent years to undertake scientific studies, including citizen science.
- Water management board is now looking at the lake ecosystem not just river ecosystem.



# Am I Hopeful?

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Fisheries  
and Oceans

Pêches  
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# Acknowledgements

Fisheries and Oceans Canada Species at Risk Science Program has supported most of the scientific research.

None of the work presented could have occurred without dedicated volunteers.

**THANK YOU**