Monitoring the movements of juvenile lamprey in the Yakima River using acoustic telemetry

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1: USGS
2: Yakama Nation Fisheries
3: PNNL
New Acoustic Transmitter

- Developed by PNNL for juvenile eels & lamprey
- Not yet commercially available
  - Testing and patent processes ongoing
- 12.0 mm x 2.0 mm
  - Comparable to 12 mm PIT tag
- Dry weight: 80 mg
- 30 days tag life at 5-s pulse rate

Partnerships

- USGS-YN-BOR salmon survival study
  - Monitoring arrays in Yakima R.
- PNNL monitoring arrays in Columbia R.
Tagging and Release

- 97 lamprey macrophthalmia tagged and released
  - 3 dates in mid-May

Collection sites
- Ahtanum Creek $n = 5$
- Toppenish Creek $n = 5$
- Prosser Dam/Chandler Canal $n = 25$
- McNary Dam $n=48$
- John Day Dam $n = 14$

Release sites
- Upstream of Wapato Dam: 48 lamprey
- Lower River: 49 lamprey

Photo credit: Yakima Nation Fisheries

Incision - Insertion

Lamprey Acoustic Tag

Photo credit: Yakima Nation Fisheries
Study Area: Yakima River

- Wapato Dam \((n=8)\)
- Sunnyside Dam \((n=7)\)
- Granger \((n=2)\)
- South Drain \((n=2)\)
- Yakima River Mouth \((n=2)\)
- Wanawish Dam \((n=8)\)
- Chandler Outfall \((n=2)\)
- Prosser Dam \((n=7)\)

\(\star\) = Lamprey release sites

Monitoring in Columbia River at McNary and Bonneville Dams
Detection Summary

Upper Release Site

Lower Release Site
Lamprey detected at McNary arrived within ~ 7 d

Lamprey detected at Bonneville arrived within ~ 10 d

300 river miles

193 river miles

20%

36%
Migration Rates

Mean migration rates 30 - 35 river miles per day
2019 Plans

- Ongoing analyses and reporting
- New field effort
- Modified transmitter
  - Faster burst rate
  - Improve detection probability
- Modified monitoring array
- Increased sample size (~ 200 tags)
Acknowledgements

- Bureau of Reclamation
  - Funding for monitoring array and analyses
- McNary Mitigation Fund
  - Funding for lamprey study
- Yakama Nation
  - In-kind contributions, field and laboratory efforts
- Pacific Norwest National Laboratory
  - Prototype lamprey transmitters
  - Columbia River detection data
- USGS salmon survival study crew
Tank Study

- Held tagged and untagged (control) macrophthalmia for 30 d
- Array of aquaria at Yakima Nation facility
- Some fungus issues, but treatments tested and applied
Tagging Methods


- MS-222 100 mg/L buffered with sodium bicarbonate
- ~ 3 mm incision made about 20 mm posterior from most posterior gill pore opening
- Tag inserted anteriorly, incision not sutured