# Larval/Juvenile Lamprey Entrainment and Dredging Updates

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**Slides Prepared by:** Tyler Beals and Ralph Lampman, Yakama Nation Fisheries

# Widespread Problem

- **Hundreds of Thousands Larval/Juvenile Lamprey**
  - Throughout the Columbia Basin
  - Die unless we are able to save them
  - From dewatering <u>or</u> dredging operations
  - **<u>Every year</u>**

- **<u>~40,000 (Laval/Juvenile Lampreys)</u>**
  - Total for Wapato <u>and</u> Sunnyside Diversions (Yakima River)
  - **<u>Salvaged</u> in the last <u>TWO YEARS</u>**

- **<u>~25,000 (Laval/Juvenile Lampreys)</u>**
  - Dryden Diversion (Wenatchee River)
  - **<u>Salvaged</u> in the last <u>TWO YEARS</u>**

- **Many Thousands of Lampreys remain after salvage**
  - We can never get all of the trapped lampreys with electrofishing.

# Dredging Impacts

- Example Dryden Diversion (Wenatchee River)

- Dredge Upstream of Headgate
  - **Every 1-3 Years**

- **> 20,000 larval lampreys** salvaged in 2016 from dredged material

- **Potentially many thousands remain in dredged material.**

# Current Tools We Have To Monitor and Understand Lamprey Entrainment

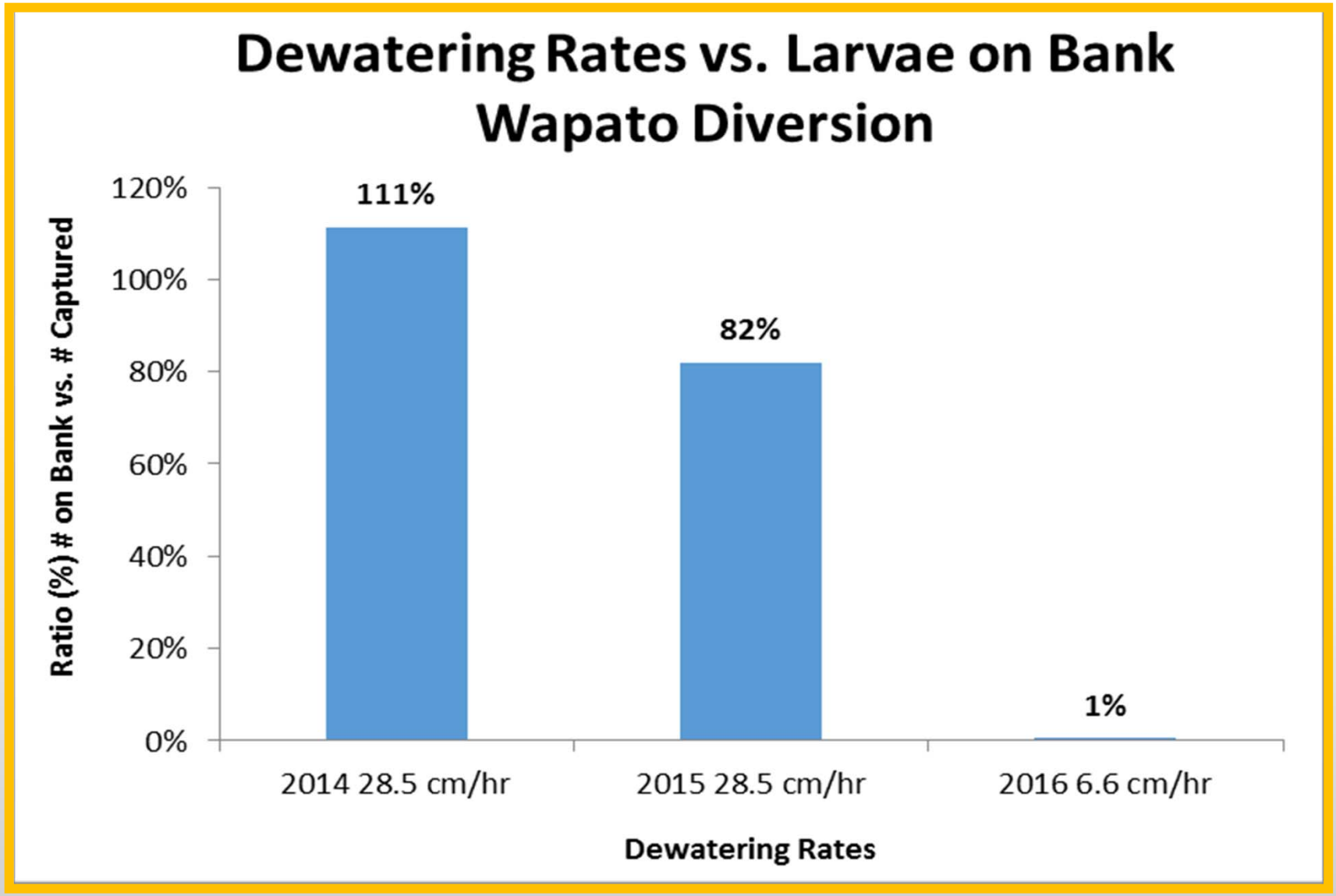
# Current Tools to Monitor Lamprey Entrainment

- **Deep Water Electrofishing Unit**
  - Pacific Northwest National Laboratory (PNNL) Richland, WA
  - Estimate #'s of lampreys in diversions throughout the irrigation season.
  - No way to capture lampreys

# Current Tools to Monitor Lamprey Entrainment

- **E-DNA (Environmental DNA Analysis) - USGS**
  - E-DNA samples collected during the spring, summer, and fall.
  - Diversions which entrain thousands of lampreys each year
  - Understand the abundance of lampreys at different points in the irrigation season
- **PIT Tagging (Larvae and Juveniles) – Many partnering agencies**
  - 8 mm FDX pit tags (tag larvae as small as 70 mm)
  - Great tool, but limited ability for detections (need a fixed pit tag array)

# Reduce Mortality = Reduce Dewatering Rate



**Slow Dewatering Rate**

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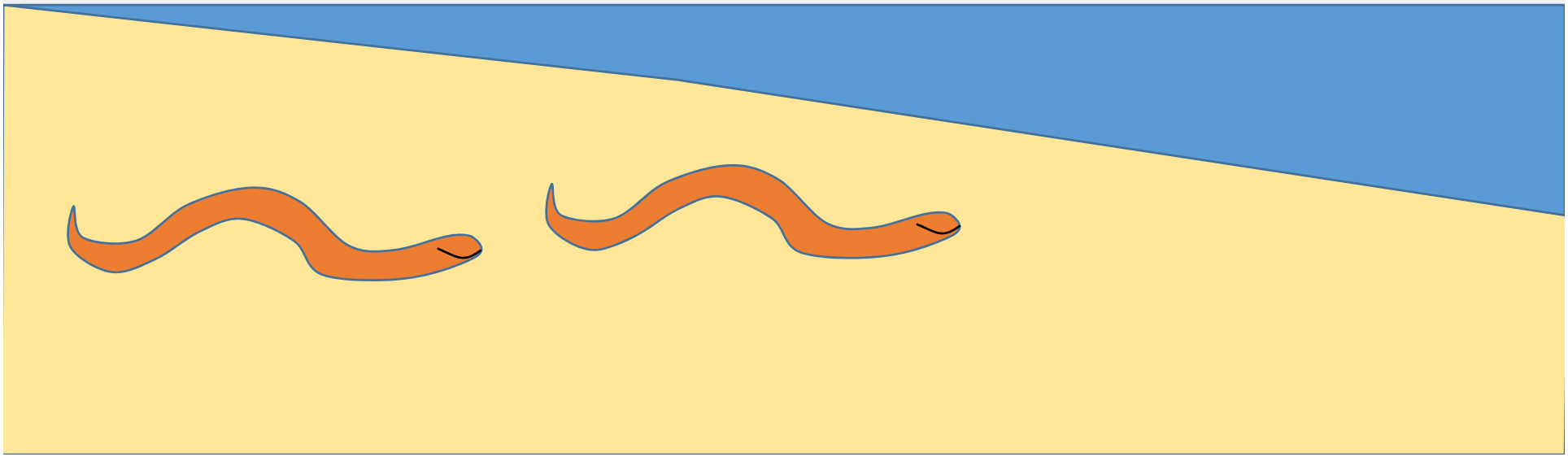
**Lamprey able to escape from dry sediment**



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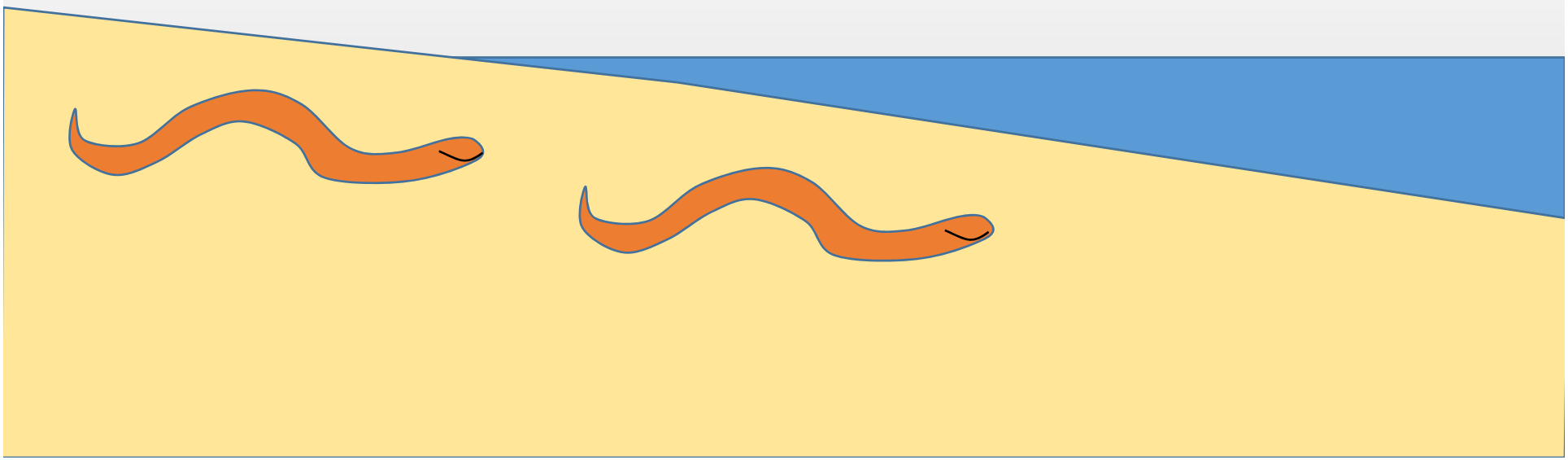

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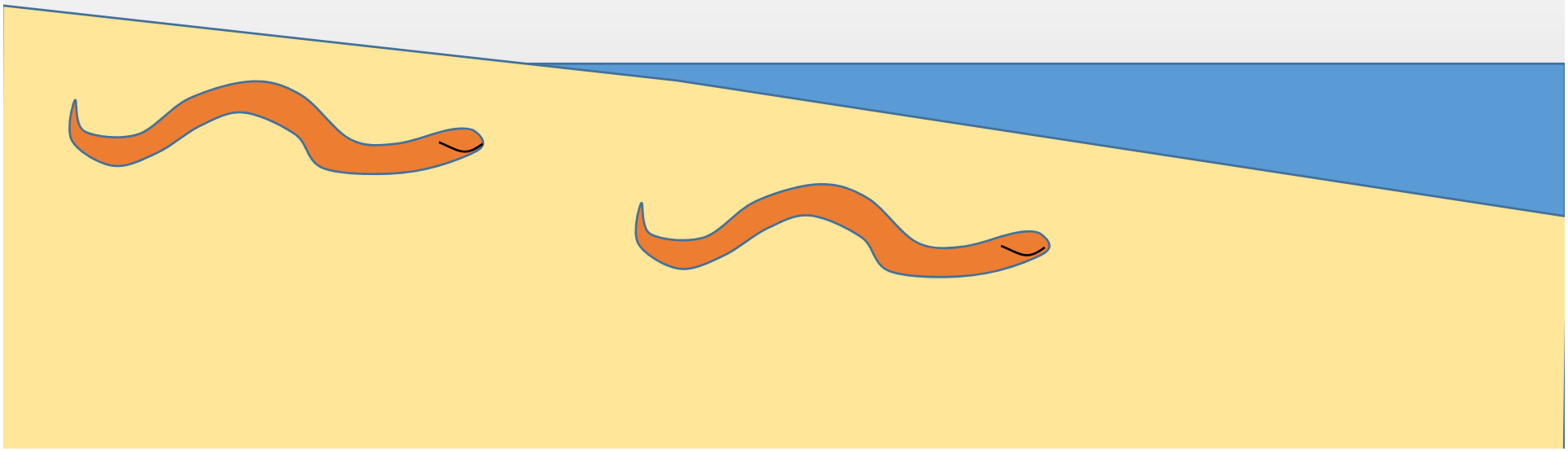

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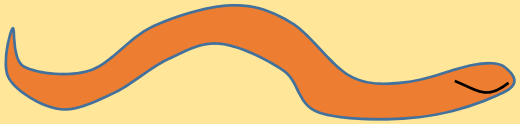

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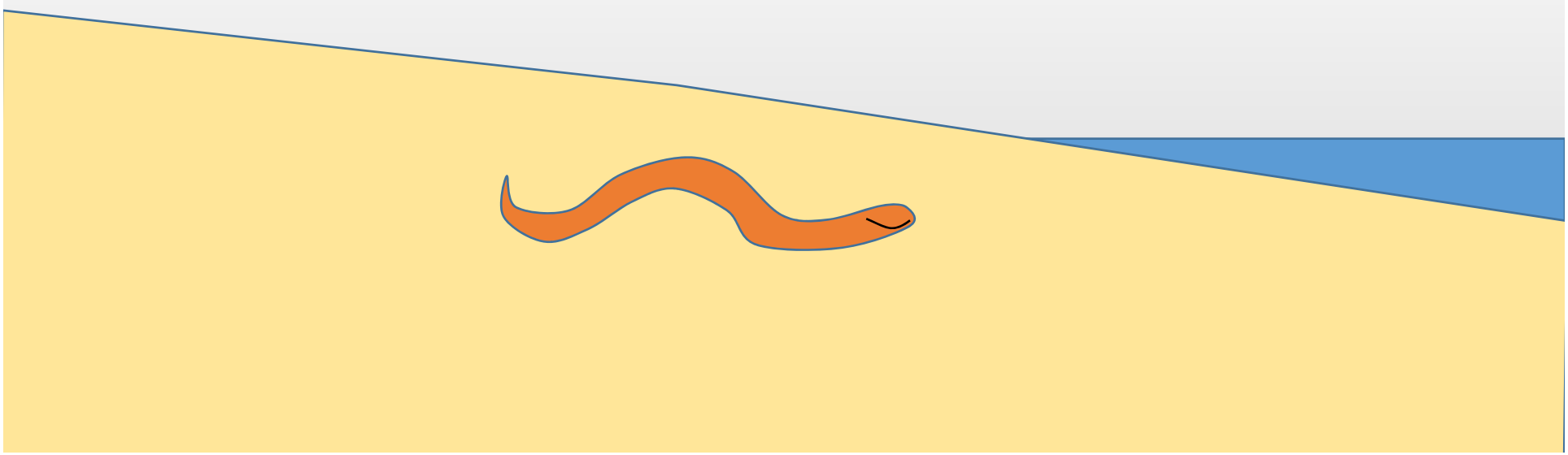

**Fast Dewatering Rate**

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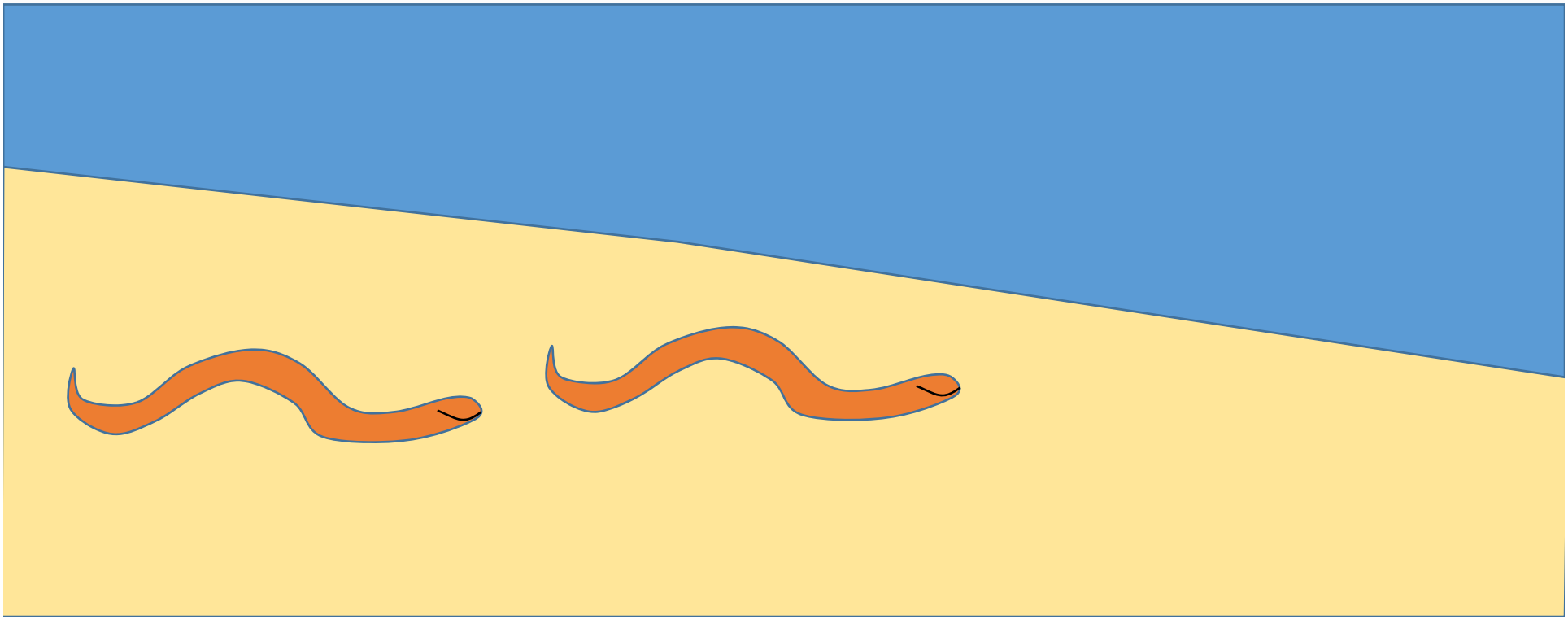
**Lamprey not able to escape from dry sediment**



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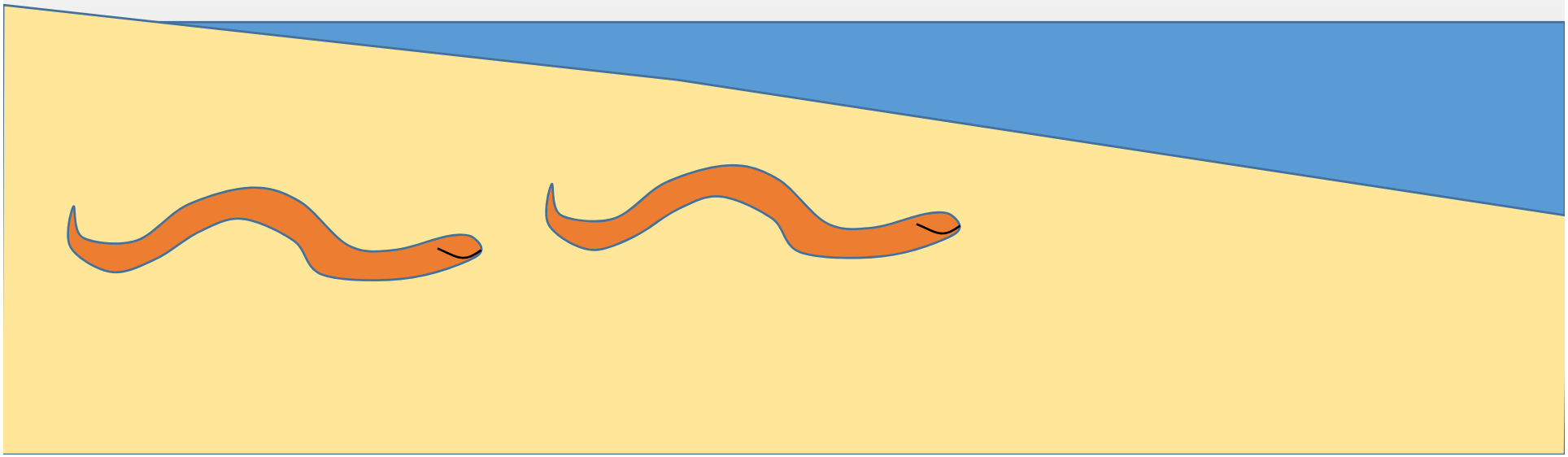

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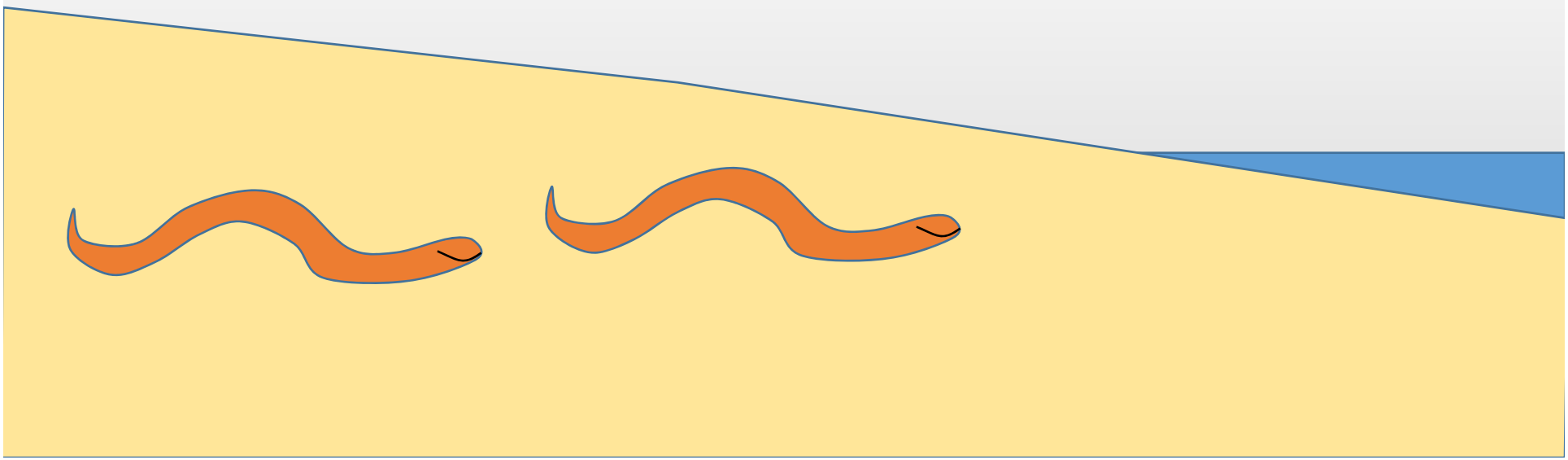

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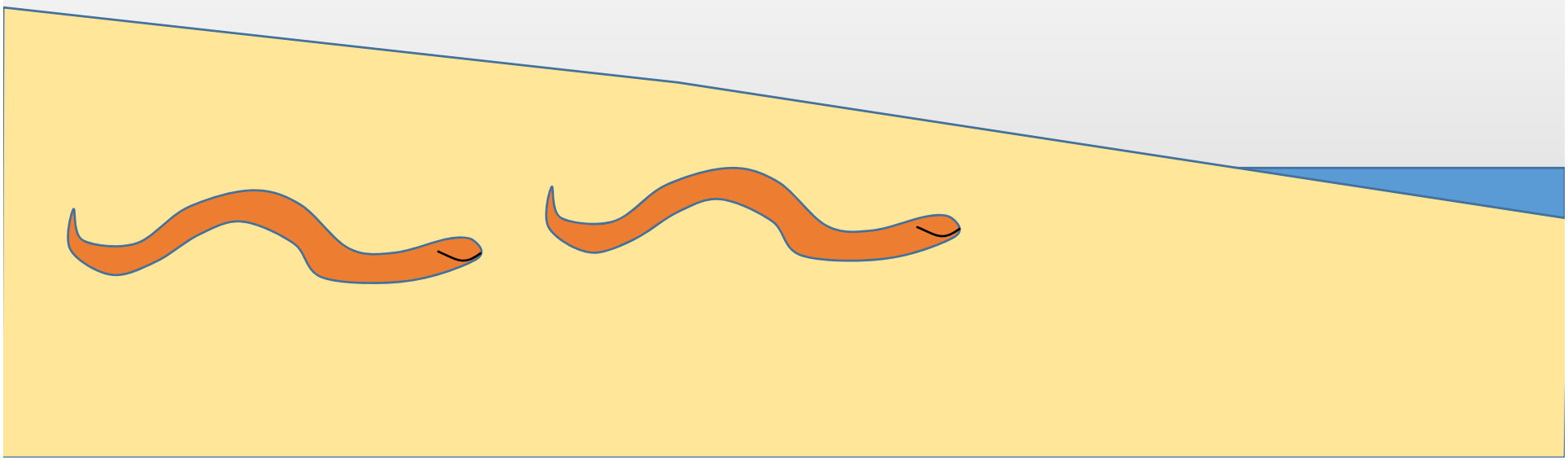

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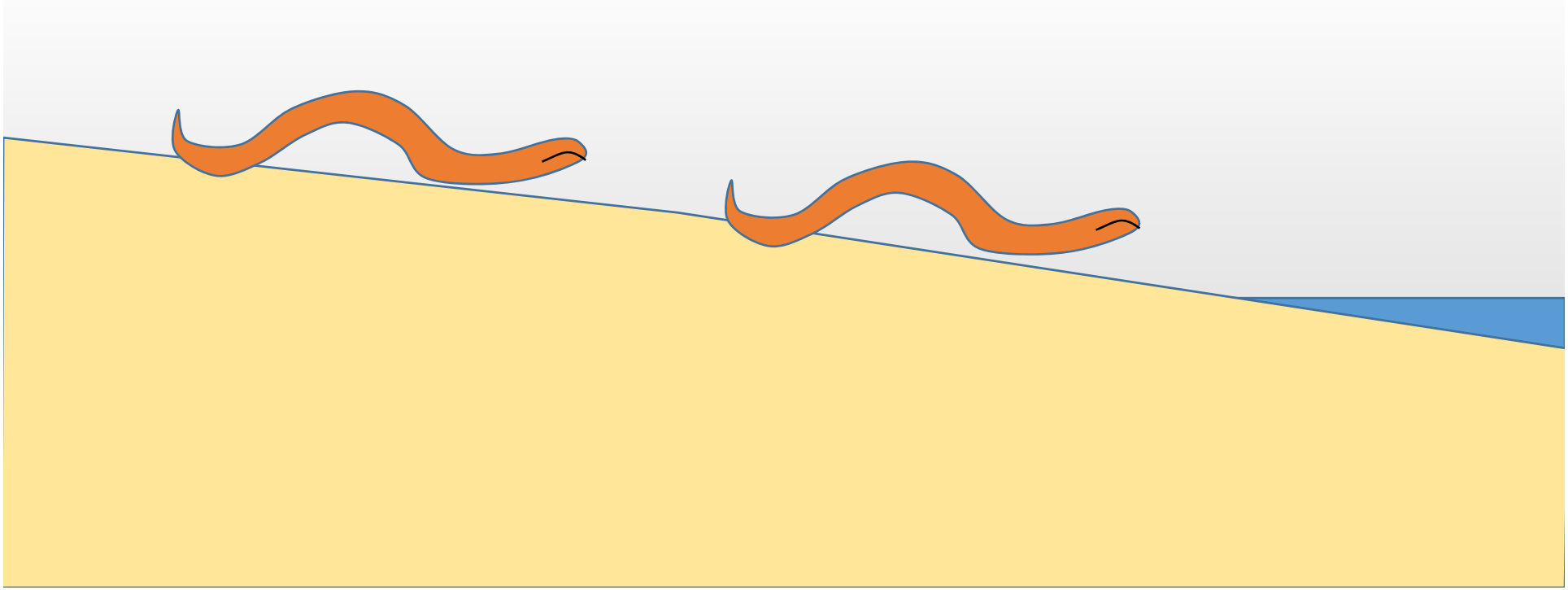

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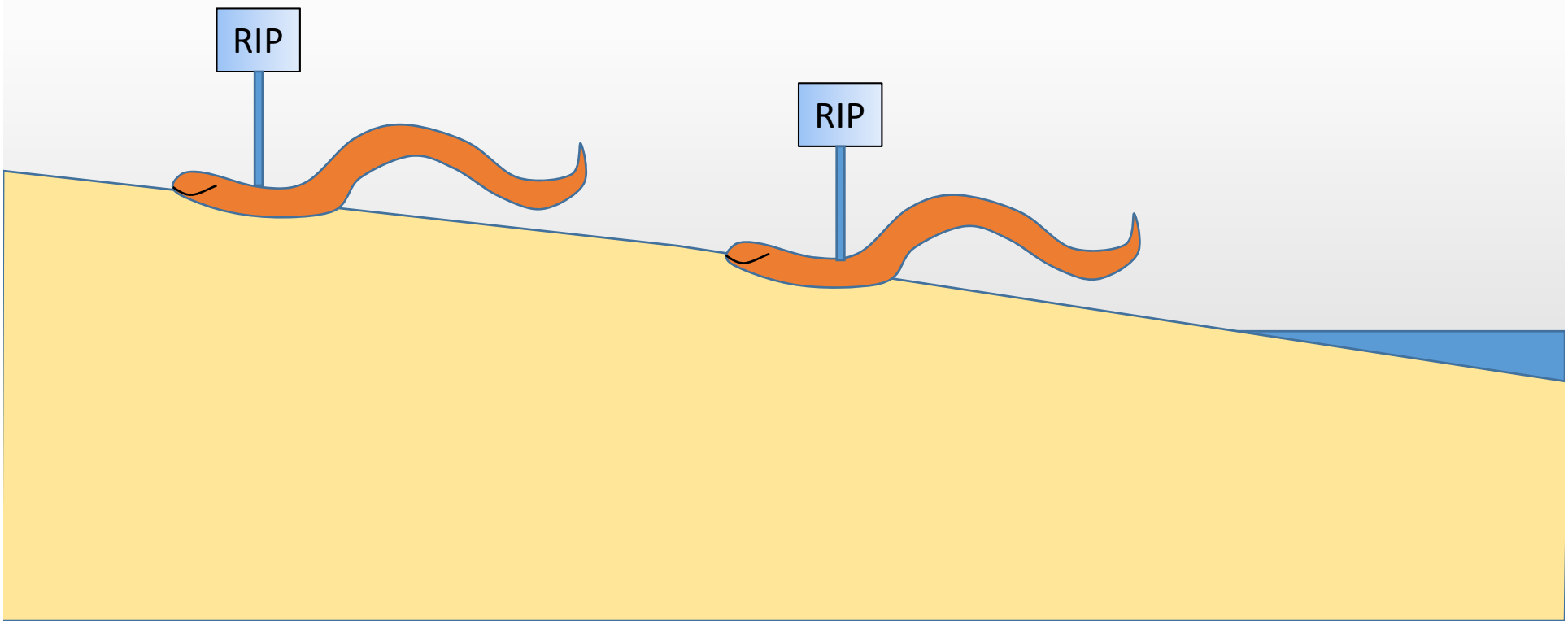

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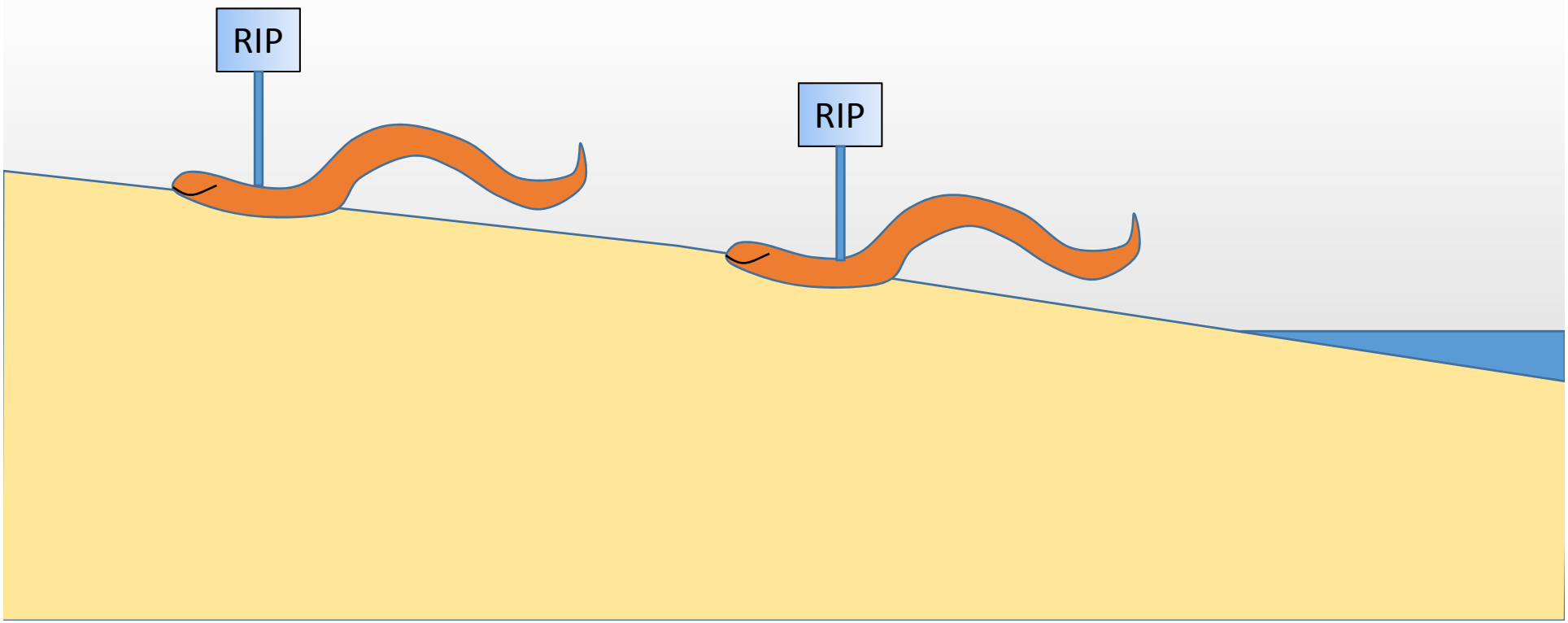


# Electrofishing (all we have right now)

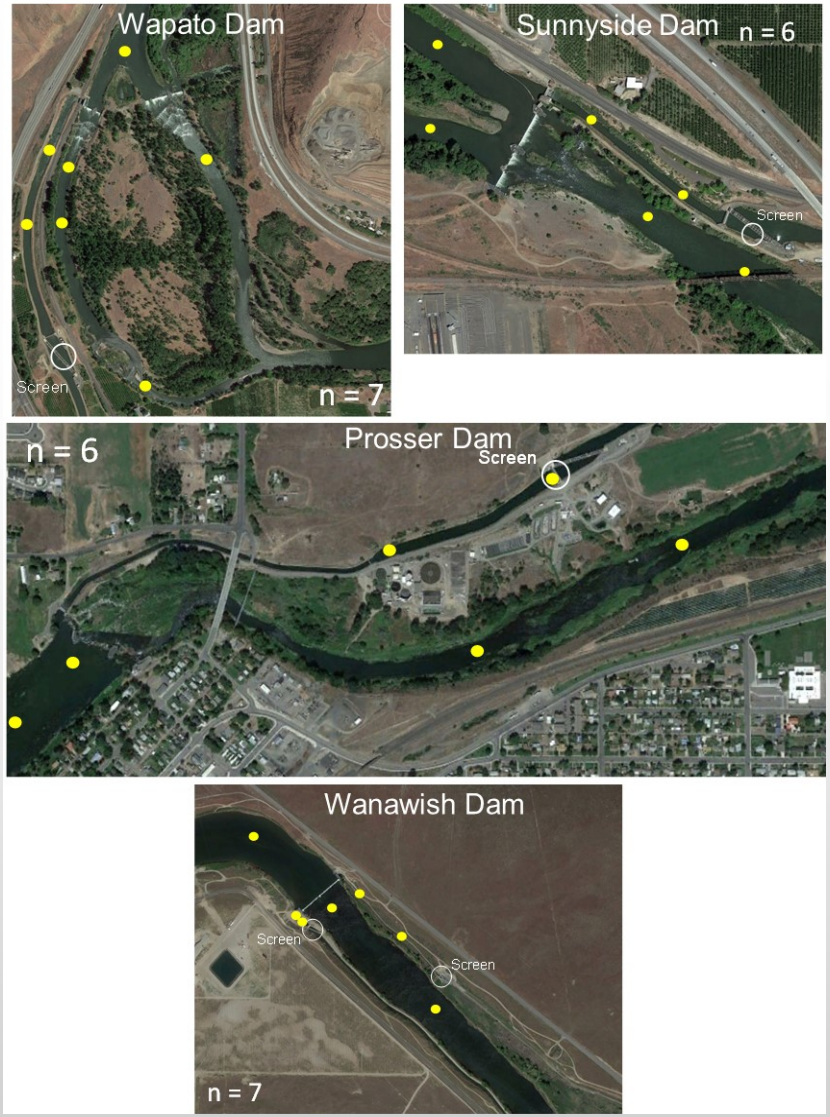
- **Difficult to capture all of the escaping lampreys**
- **Limited to shallow water only**

# Experimental Tools We Have To Monitor and Understand Lamprey Entrainment

# Experimental Tool to Improve Entrainment Monitoring

- **Acoustic Tag Study (Yakima Subbasin)**
- **Currently focusing on Salmonids**
- **Led by USGS**
- **PNNL has developed a 30-day acoustic tag designed for juvenile lamprey.**
- **Potential to learn a lot about lamprey migration, survival and entrainment on a <u>'FINE' SCALE.</u>**

Acoustic arrays being placed in many irrigation diversions



# Experimental Tool to Reduce Entrainment??

- **Sluice Box Idea!**
  - Natural Solutions, Helena Montana (Gordon Burns, rear of video)
  - Tyler Beals (left in video), Ralph Lampman (right of video)

# Experimental Tool to Reduce Entrainment??

- **Venturi Pump Gordon Burns, Natural Solutions**
  - Sunnyside Diversion (most the lampreys are found downstream of the fish screens, as well as most of the sediment)
  - **Increase Sweeping Velocity In front of the fish screens**
  - **Reduce the # of fish passing through the fish screens??**

# Summary/Discussion

- Many Hundreds of Thousands of Larval Lampreys are impacted each year by dewatering and dredging events.
- Reduce Dewatering Rates (slower the better)!!
- Need for improved salvage techniques (not relying solely on electrofishing)!!
- Increase sweeping velocity, reduce lampreys passing through fish screens?!?