

# Eels – Understanding their importance and enabling safe downstream passage through hydropower sites

Part 1: The role of freshwater eels in river ecosystems and the status of eels & hydropower – Monitoring & Assessment

Drew Trested  
Normandeau Associates, Inc.  
25 Nashua Road  
Bedford NH, 03110  
[www.normandeau.com](http://www.normandeau.com)



**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • WATERPOWERWEEK.COM

# Biological Testing to Measure Downstream Passage Effects

- **Biotelemetry Evaluations – radio or acoustic techniques**
- General approach
  - Tagged individuals released upstream of Project
    - Target release US of impoundment to permit volitional movement and approach to the dam
  - Detection array to inform on approach, passage, and downstream movement
  - What's being measured?
    - Impoundment movement rates and residence duration
    - Upstream residence duration (“delay”)
    - Route of passage
    - Rates of rejection or passage success
    - Downstream movement rates
    - Passage survival (?)



**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • WATERPOWERWEEK.COM

# Biological Testing to Measure Downstream Passage Effects

- **HI-Z Tag-Recapture Studies for Survival and Injuries**
- Reliable method allows for direct injection of live eels through specific passage route(s) at a project (turbines, spillways, bypasses)
  - Release of control group downstream of project
- Physical recapture immediately after release and passage allows for visual inspection of injuries and abnormal swimming behavior
- What's being measured?
  - Control-corrected immediate (1-h) and latent (48 to 96-h) survival estimates
  - Malady-free estimate: a metric to examine injury rates
  - Detailed injury information



# Biological Testing to Measure Downstream Passage Effects

- Precision goals drive sample sizes: resources can be minimized to achieve target precision of survival/injury estimates
- Eels are injected into an area within the passage route where they are committed to passage



**WATER.POWER.WEEK.**  
WASHINGTON, D.C. • MARCH 13-15, 2024  
CAPITAL HILTON • WATERPOWERWEEK.COM

# Biological Testing to Measure Downstream Passage Effects

- Physical recapture after dam passage allows researchers to detect injuries and behavioral anomalies that might otherwise go undetected via telemetry studies
- Observations show that eels are resilient and can survive severe injuries and continue downstream movement:
  - Amputations
  - Spinal damage
  - Internal bleeding

Eels classified as "functionally dead"

