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The Eel Passage Research Center at Age Five: What Have We Learned?

Paul T. Jacobson
Electric Power Research Institute

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The Eel Passage Research Center at Age Five

What Have We Learned?

Paul T. Jacobson
Senior Technical Leader

International Conference on Engineering and Ecohydrology for Fish Passage
June 19-21, 2017

Oregon State University, Corvallis, OR (USA)

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Eel Passage Research Centre

An EPRI-led, Bi-National Collaboration to Address Downstream Passage of Eels at Large Hydroelectric Power Stations

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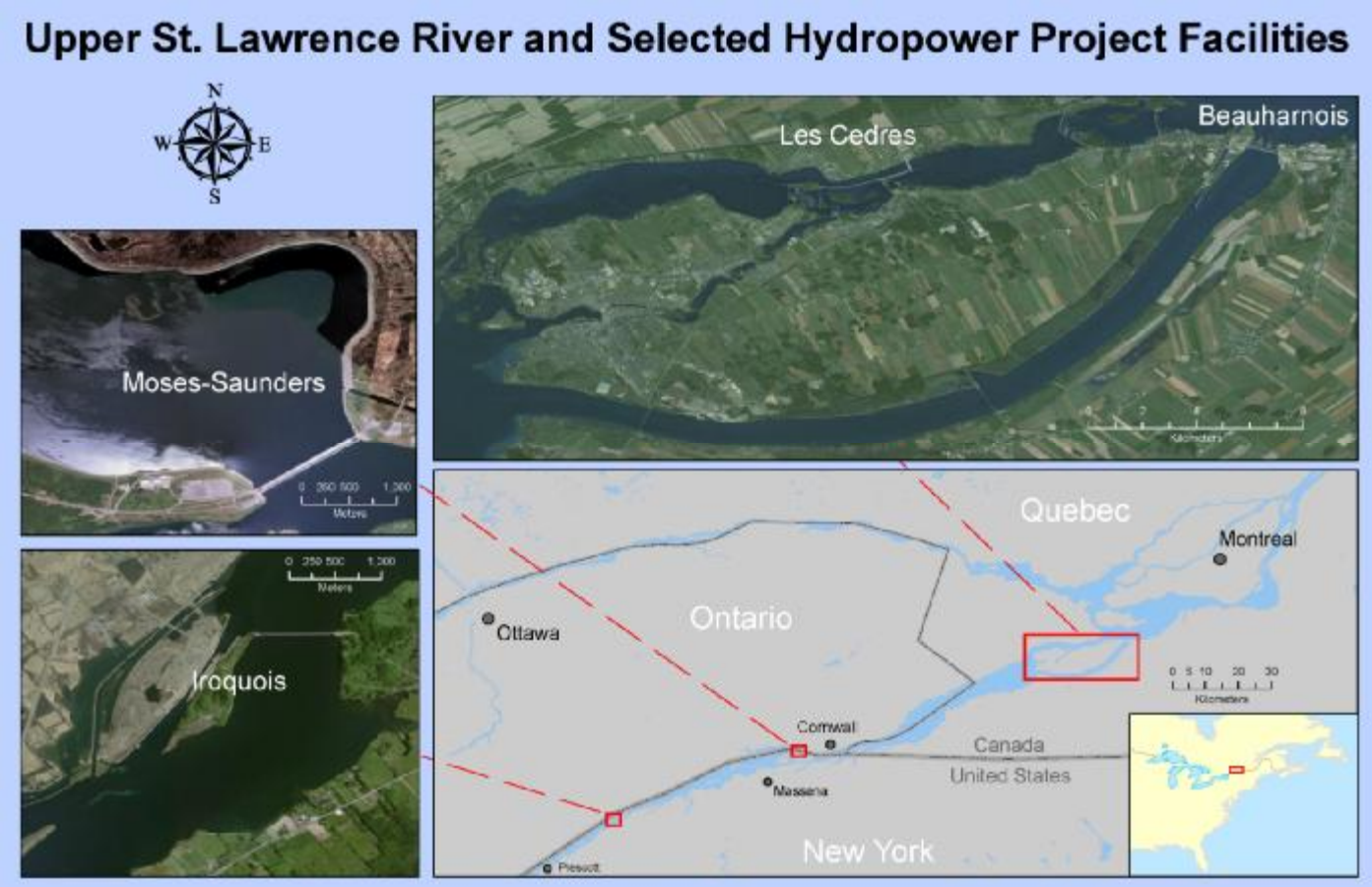
EPRI ELECTRIC POWER RESEARCH INSTITUTE

Eel Passage Research Center



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Scope and Purpose of the Eel Passage Research Center

- Identify and develop economical means that are biologically- and operationally-effective in passing downstream migrating adult eels at large- and medium-sized hydroelectric facilities
- Conduct research in St. Lawrence River above Montreal, and elsewhere if it advances the primary purpose of providing safe passage on the St. Lawrence River
  - Other rivers
  - Laboratory studies
- Initial Term: 2013- First Quarter 2018

A Virtual Center

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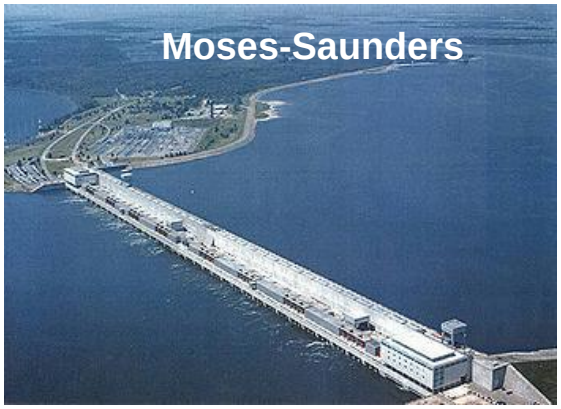
Eel Passage Research Centre

Goal: Maximize survival rate of eels that would otherwise pass through turbines at Moses-Saunders and Beauharnois without significantly reducing power production.



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- Electric Power Research Institute
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- Duke Power
- New York Power Authority
- Ontario Ministry of Natural Resources
- Fisheries and Oceans Canada
- Québec Ministry of Sustainable Development, Environment Wildlife and Parks
- NYS Department of Environmental Conservation

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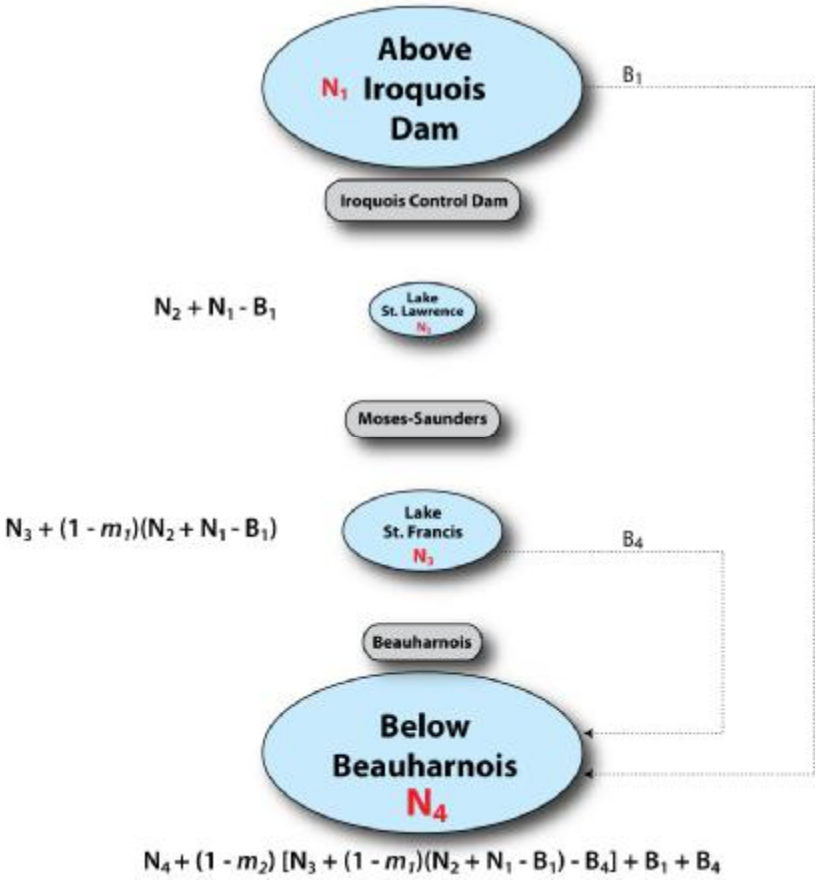
Outmigration Conceptual Model



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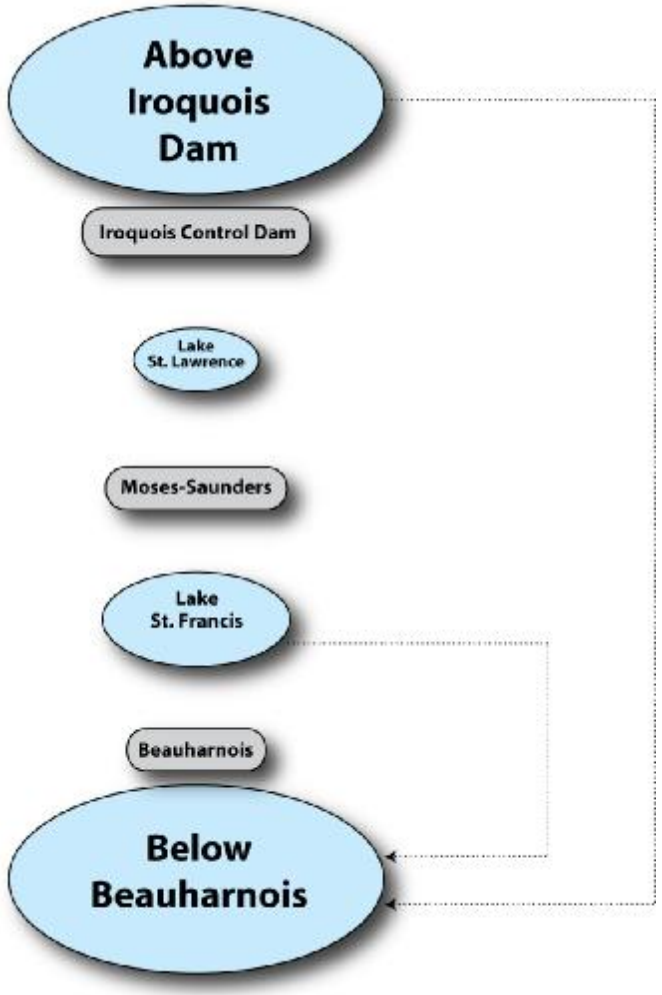
Where We Are

- Screening infeasible
- Behavioral guidance (e.g. light, electricity) to collection points
  - Above M-S (Iroquois)
  - Above Beauharnois
- Collection and Transport Below Beauharnois



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Findings to Date

- Light shows promise for guidance in the St. Lawrence
  - LEDs (recent) provide many advantages over prior technology
- Sound and electricity merit further investigation
- EMF is unlikely to be useful for guidance in the river
- Velocity plume may be useful for near-field guidance at collection structure

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Publications

- Jacobson, P. T. 2016. Collaborating to Address Downstream Passage of American Eel at Hydro Plants. *Hydro Review: 64-70. July 2016.*
- Eel Passage Research Center – 2015 Update. 3002009376. December 2016.
- Laboratory Studies of Eel Behavior in Response to Various Behavioral Cues. 3002009405. December 2016.
- Assessment of Three Sonar Technologies to Study Downstream Migrating American Eel Approach and Behavior at Iroquois Dam and Beauharnois Power Canal. 3002009406. February 2017.
- Recent Research on the Effect of Light on Outmigrating Eels and Recent Advancements in Lighting Technology. 3002009407. February 2017.
- CFD Model Development for Iroquois Control Dam and Beauharnois Approach Channel. 3002009408. February 2017.
- Eel Passage Research Center – 2016 Update. 3002009864. February 2017.

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Ongoing Work (completed by Q1 2018)

- **Investigation of the Use of Electricity to Guide Outmigrating Eels**
  - USGS Conte Anadromous Fish Research Laboratory (Alex Haro)
  - University of Southampton – International Centre for Ecohydraulics Research (Paul Kemp et al.)

- **White Paper Investigation of the Use of Sound to Guide Outmigrating American Eels**
  - AKRF
  - Art Popper (Univ. Maryland – emeritus)
  - Tony Hawkins
  - Peter Johnson (LGL)

- **3D Acoustic Tracking in Guidance and Collection Reaches**

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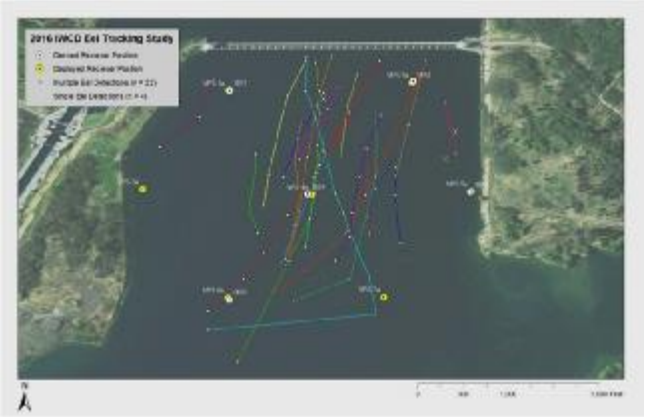
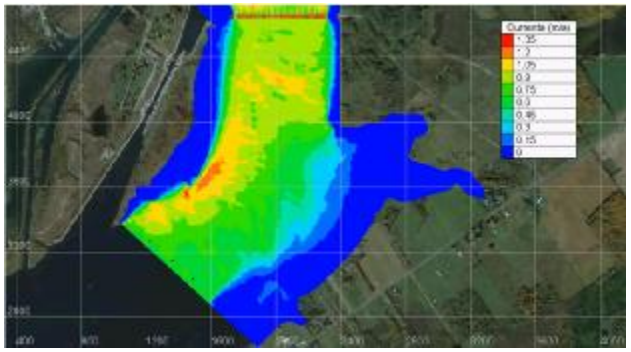
Future Work (2018 and beyond)

- Multi-stimulus field study
  - Light
  - Other
- State-space modeling of tracking data
- Integration of CFD output, tracking data, behavioral model of taxis (e.g., ELAM)





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