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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)

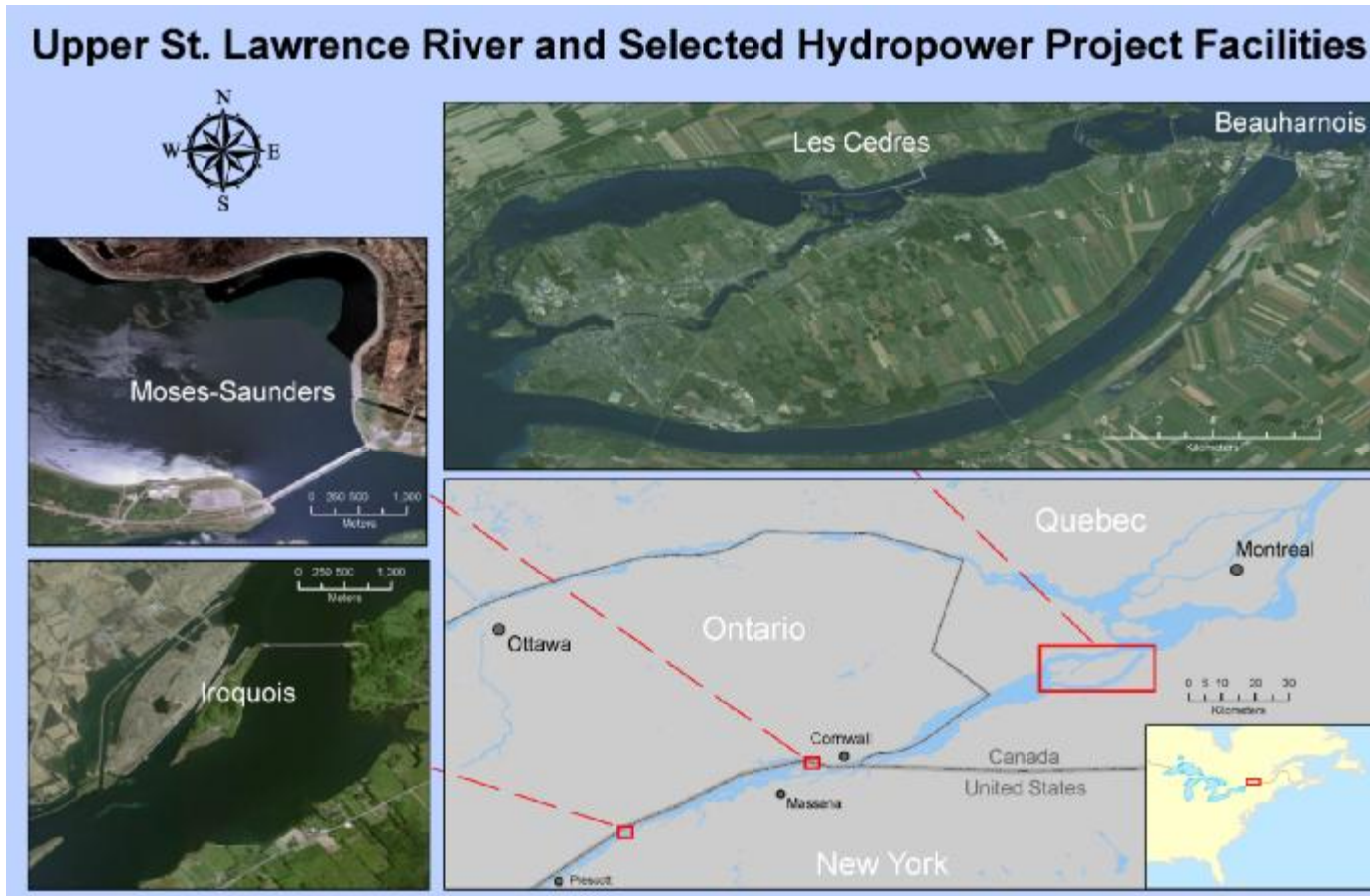


# Eel Passage Research Centre

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



# Eel Passage Research Center



# Scope and Purpose of the Eel Passage Research Center

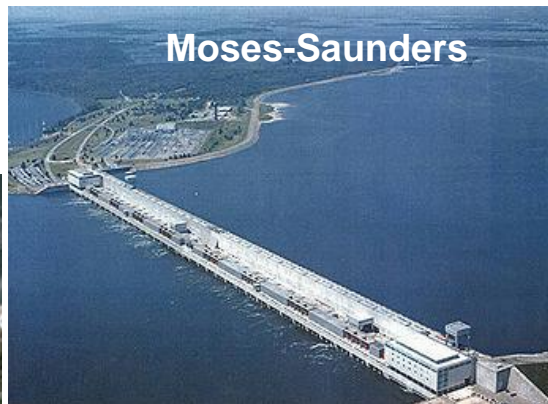
- § Identify and develop economical means that are biologically- and operationally-effective in passing downstream migrating adult eels at large- and medium-sized hydroelectric facilities
- § Conduct research in St. Lawrence River above Montreal, and elsewhere if it advances the primary purpose of providing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

## A Virtual Center



# 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.

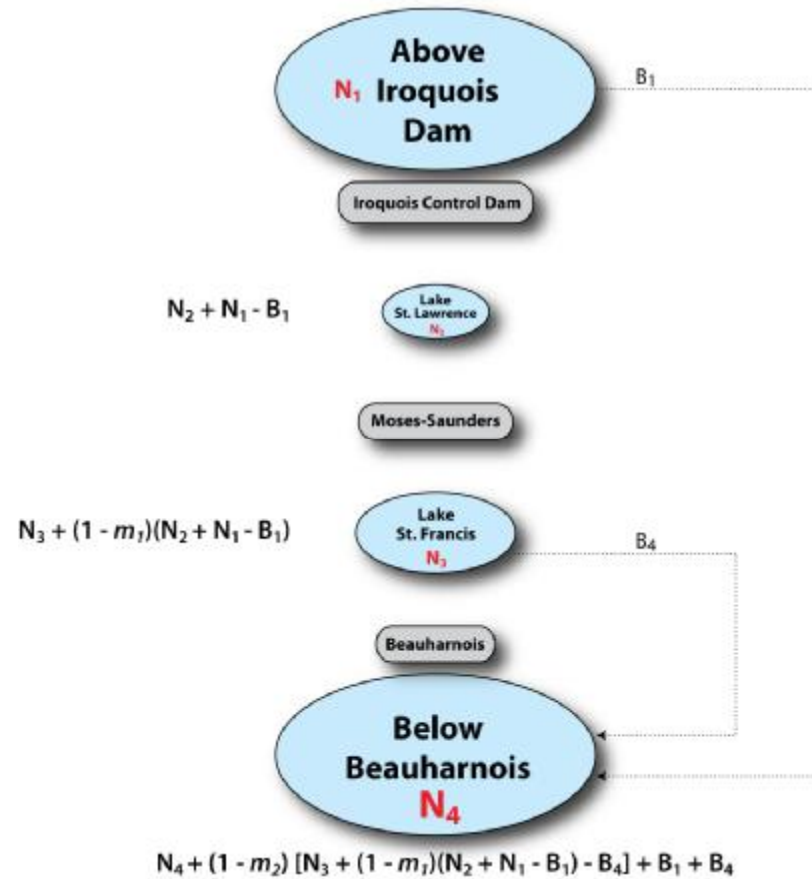


# Technical Committee – Member Affiliations

- § Electric Power Research Institute
- § Ontario Power Generation
- § Hydro-Québec
- § USFWS, FEMRF
- § 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



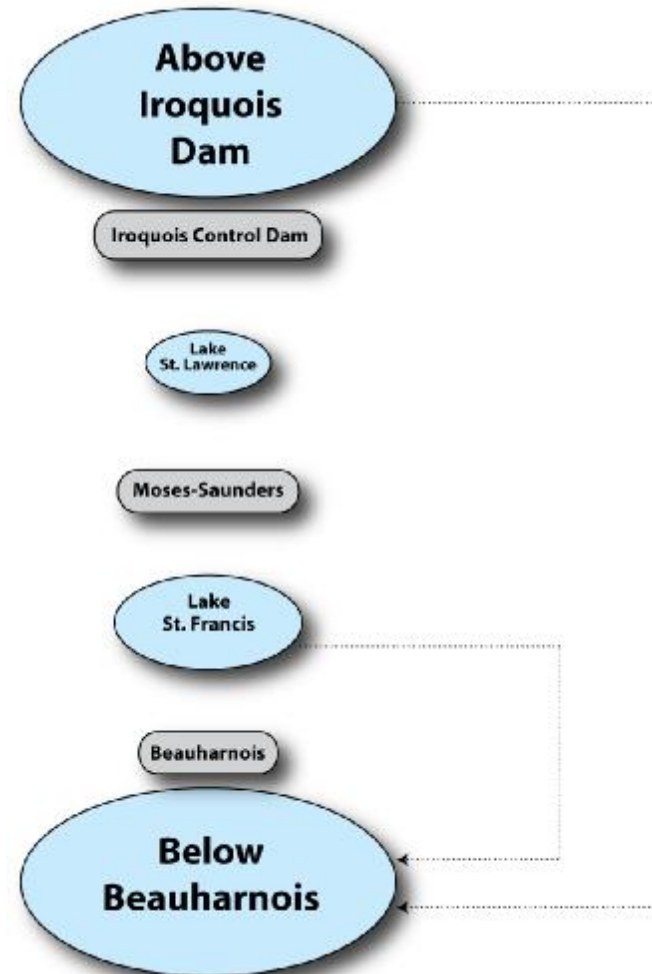
# Outmigration Conceptual Model





## 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



# 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

# 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.

# 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

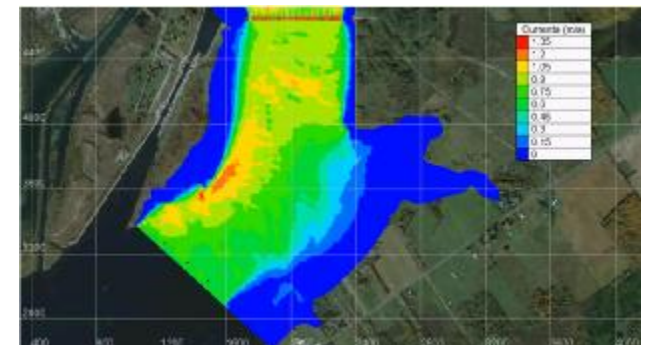
# Future Work (2018 and beyond)

## § 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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