

# Environmental Compliance for the Hydro Green Energy Hydrokinetic System at Hastings, MN

Presented by

Mark Stover, Hydro Green Energy  
Jen Stone, Normandeau Associates

# Environmental Components

- Water Quality Monitoring
- Fish Entrainment and Survival
- Bird Monitoring
- Mussel Survey and Relocation
- Zebra Mussel Control and Monitoring



# Water Quality

- 3 year program
- 2 locations: 1 upstream and 1 downstream of unit
- 1 time per week from April – November
- 1 time per month from December – March
- Dissolved oxygen, water temperature, turbidity
- Hydrolab MS5 Water Quality Sonde
- *Trigger: Downstream dissolved oxygen reduced below 5.0 mg/l two times within a quarter as a result of turbine operation*



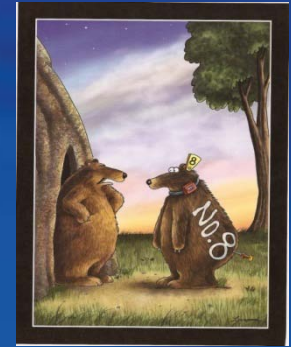
# Fish Entrainment and Survival

- *The plan is still under development!*
- Includes 3 components
  - Estimating survival / injury
  - Estimating predation
  - Desktop analysis to characterize entrainment risk



# Survival / Injury

- Using patented “Hi-Z Turb N’ Tag” (i.e., balloon tag) methodology
  - Control and treatment groups
  - Treatment group marked with a deflated balloon tag, radio tag, and a VI or Floy tag
  - Treatment group passes through turbine, control group released into tailrace
  - Balloon inflates, fish are recovered downstream



# Estimating Predation

- Direct observations of predation
- Behaviors indicative of predation



# Possible Entrainment

Requested by FERC to perform a desktop analysis

- Use existing data
- Use survival estimates from balloon tag study



# Bird Monitoring

- *FERC approval pending*
- Survey 2 times per month for 12 months
- 2 extended seasonal surveys
- Data to be collected:
  - number and species of birds present
  - bird activity (e.g., fly-over, resting, feeding)
  - proximity to the hydrokinetic turbine array
  - operational status of the hydrokinetic turbines and conventional station discharge
  - weather





# Native Mussel Survey and Relocation

- Remove and relocate mussels if found during installation
  - Requires immediate Agency consultation
- Ponar sampling
- Results: No mussels found
  - Habitat in this area limited or non-existent



# Zebra Mussel Control and Monitoring

- Installation program and ongoing program – prevent spread
- *Ongoing program is still under development!*
  - Education
  - Monitoring and Inspection
  - Removal and Notification
  - Disposal
  - Drain
  - Disinfection



**Questions or Comments?**

**Thank you**