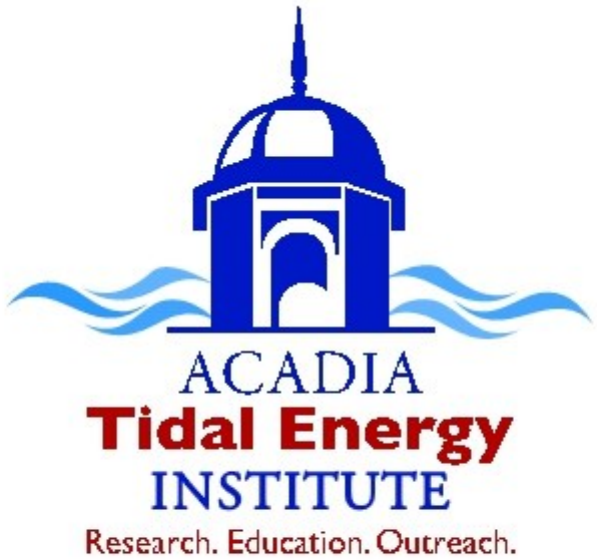
Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment.

Richard Karsten



Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment.

Press Release: May 3 2013

Harper Government Announces Energy Innovation Projects in Nova Scotia

May 3, 2013

WOLFVILLE, NOVA SCOTIA — Senator Kelvin Ogilvie announced today that the Government of Canada will invest almost $6.9 million in three innovative clean energy projects in Nova Scotia.

These projects are included among 55 new innovative clean energy projects announced today by Prime Minister Stephen Harper, representing an investment of more than $82 million through the Government of Canada's ecoENERGY Innovation Initiative. The program was created to invest in new clean energy technologies that will create jobs, generate economic opportunities and help protect the environment.

"Through the ecoENERGY Innovation Initiative, our Government is investing in innovative clean energy technologies that create jobs, generate new economic opportunities and protect the environment," said the Honourable Joe Oliver, Canada's Minister of Natural Resources. "This program demonstrates our tangible support for energy projects that drive energy innovation."

Press Release: May 3 2013

Today's announcement includes investments of:

- $4,500,000 to the Carbon Capture and Storage Research Consortium of Nova Scotia;
- $756,236 to St. Francis Xavier University for carbon capture and storage research and development; and,
- $1,630,112 to Acadia University in Wolfville for research into reducing the cost of in-stream tidal energy.

"This investment is good news for Nova Scotia as we strive to position ourselves as a clean energy leader," said Senator Ogilvie. "New innovative clean energy projects, like those announced today, stimulate our local economy while helping protect the environment."

The ecoENERGY Innovation Initiative has received $268 million in funding over five years to fund research, development and demonstration projects that produce and use energy in a more clean and efficient manner.

Team Partners

Doug Bertram, Greg Trowse, Dana Morin

Dr. Alex Hay and team (Justine McMillan)

Dynamic Systems Analysis: Dean Steinke

Dr. Tiger Jeans, Dr. Andrew Gerber

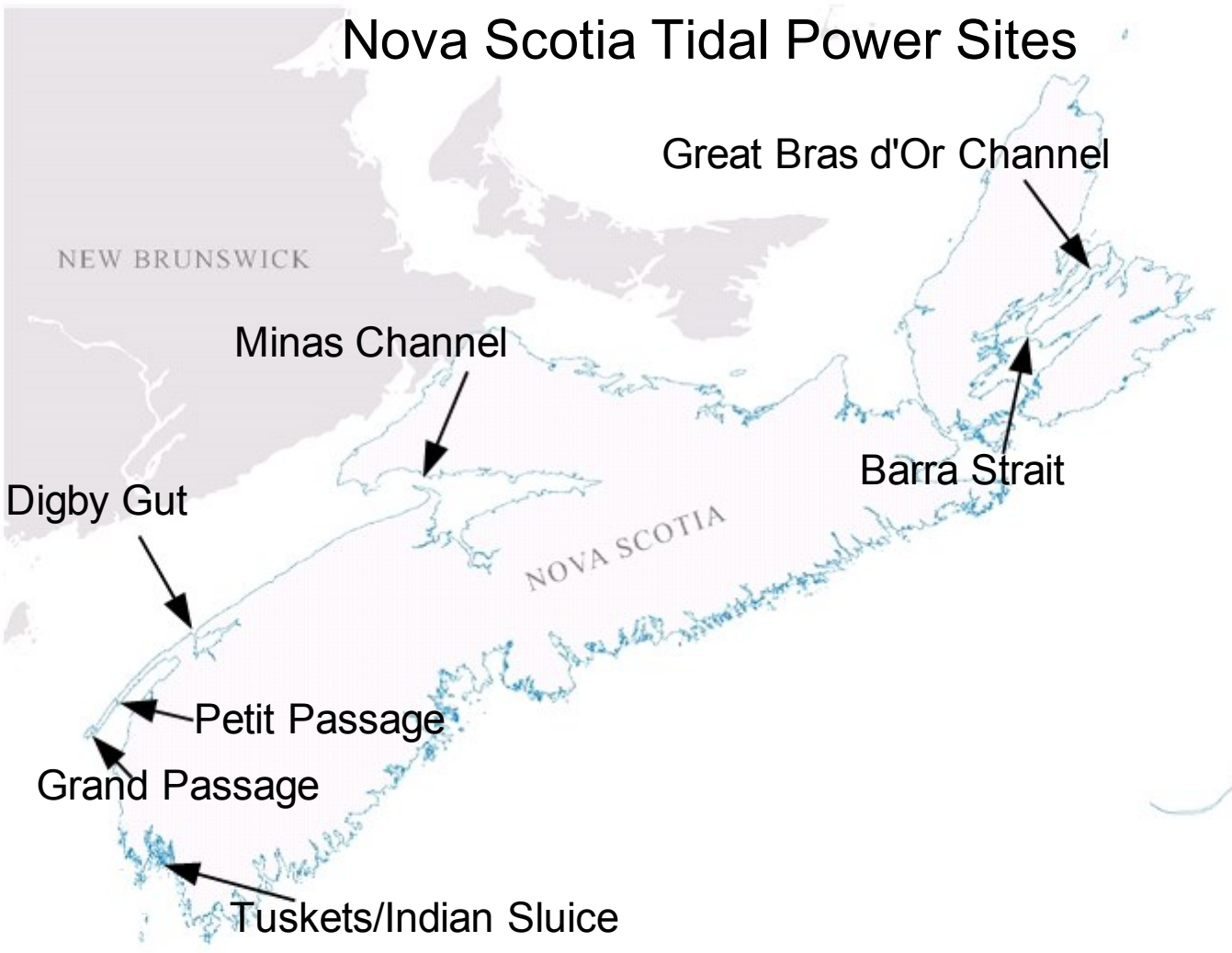
Russell Stothers

Acadia Tidal Energy Institute

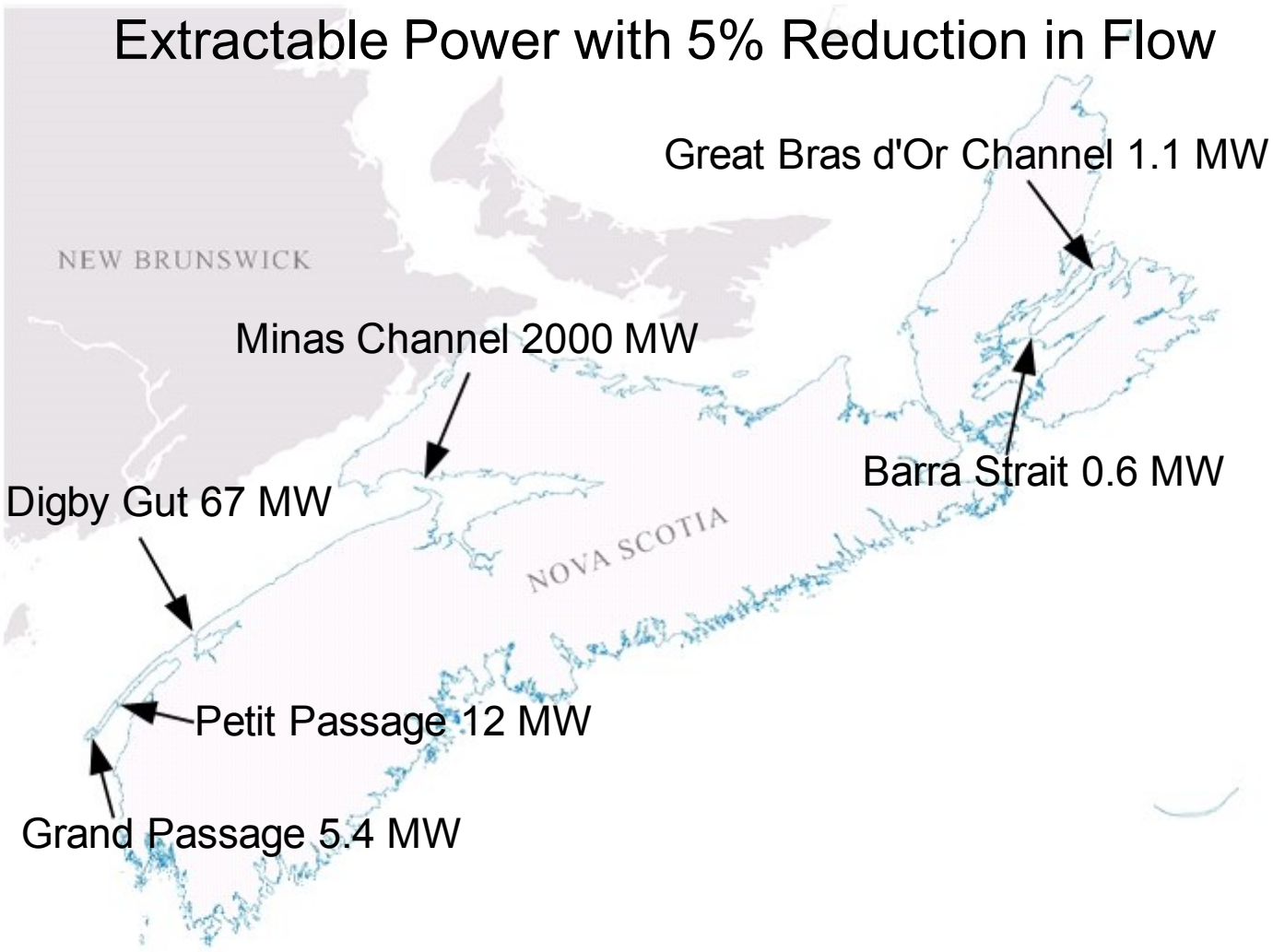
Project Phases

- Establishment of Natural Flow Conditions (2013-2014)
  - Measurements of the flow (Dalhousie, FTI)
  - Modelling of tidal flow (Acadia)
- Specific TEC Device Modelling, Estimation of Power Potential and Effects on Natural Flow Regime (2013-2014):
  - Modelling Flow-Structure interaction (Dynamic Systems Analysis)
  - Modelling of Turbulent flow/Turbine Performance (UNB, Clean Current)
- TEC Device Monitoring, Evaluation of Effects on Natural Flow Regime, Validation and Improvement of Models (2015):
  - After turbines in the water (FTI, all others)

Nova

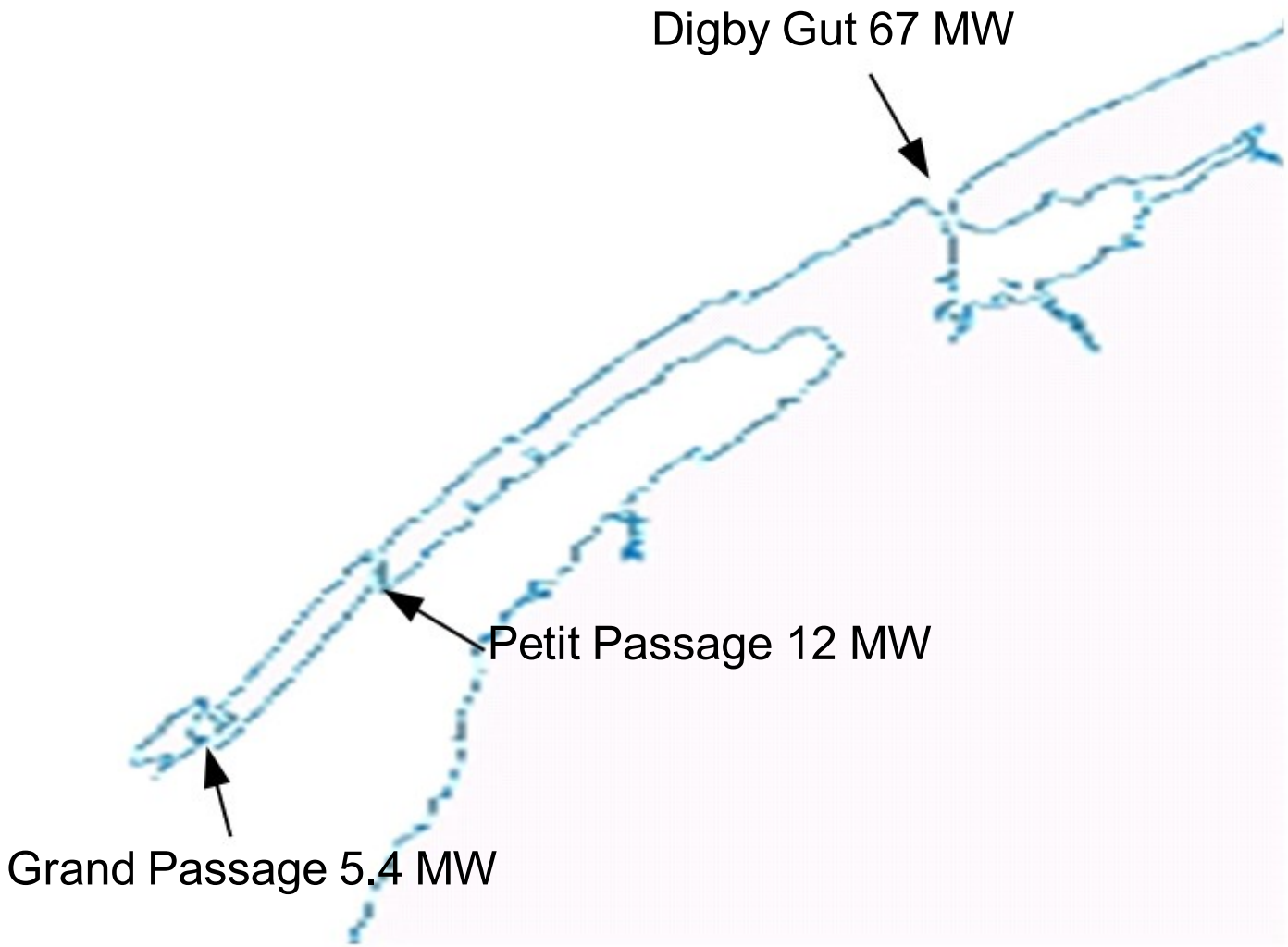

Nova Scotia Tidal Power Sites
Great Bras d'Or Channel
NEW BRUNSWICK
Minas Channel
Barra Strait
Digby Gut
NOVA SCOTIA
Petit Passage
Grand Passage
Tuskets/Indian Sluice

Nova


Extractable Power with 5% Reduction in Flow
Great Bras d'Or Channel 1.1 MW
NEW BRUNSWICK
Minas Channel 2000 MW
Barra Strait 0.6 MW
Digby Gut 67 MW
NOVA SCOTIA
Petit Passage 12 MW
Grand Passage 5.4 MW

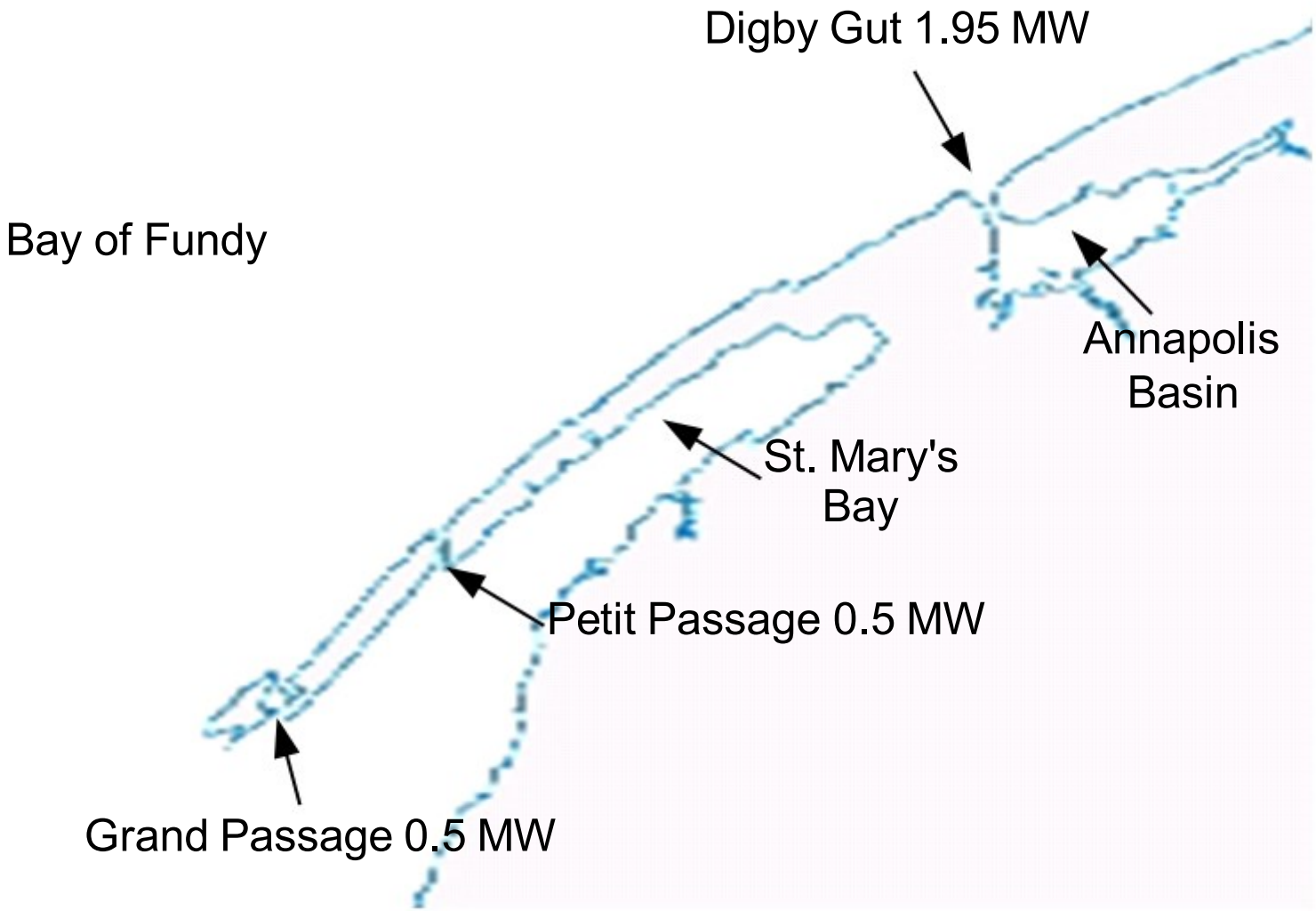
Nova Scotia Tidal Power: Potential Power

Extractable Power with 5% Reduction in Flow



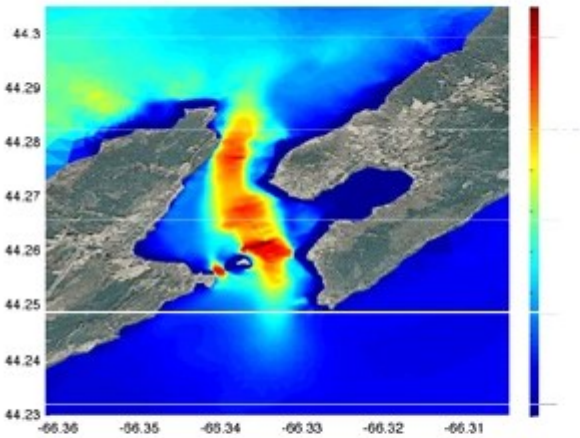
Community Feed In Tariff - 65.2¢ per kW/h

Digby Neck COMFIT Sites



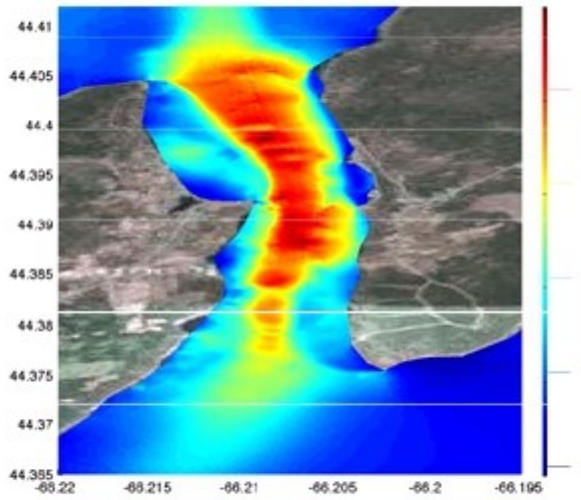
Water Speed

Grand Passage



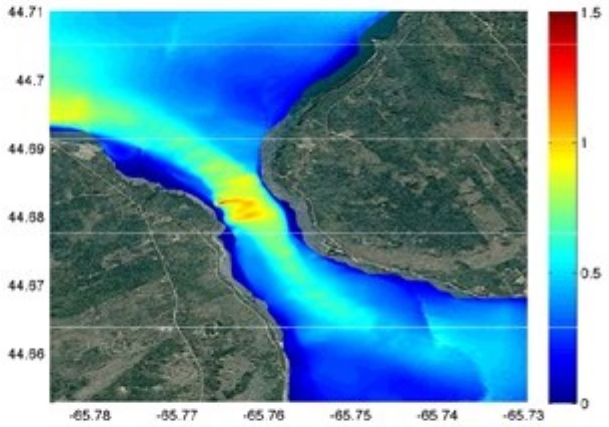
Max: 2.0 m/s

Petit Passage



Max: 2.5 m/s

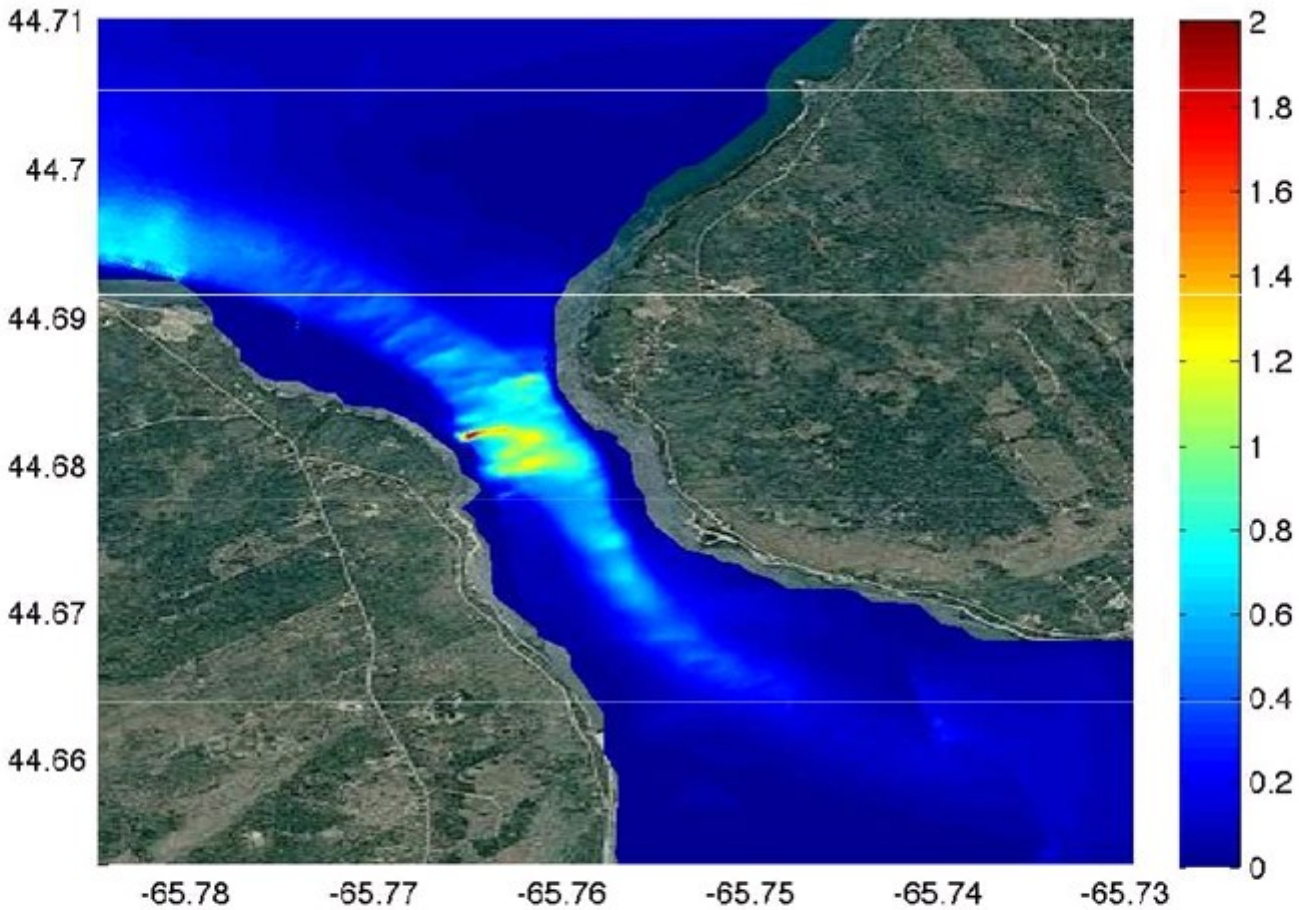
Digby Gut



Max: 1.5 m/s

Depth and Time Averaged Speed (m/s)

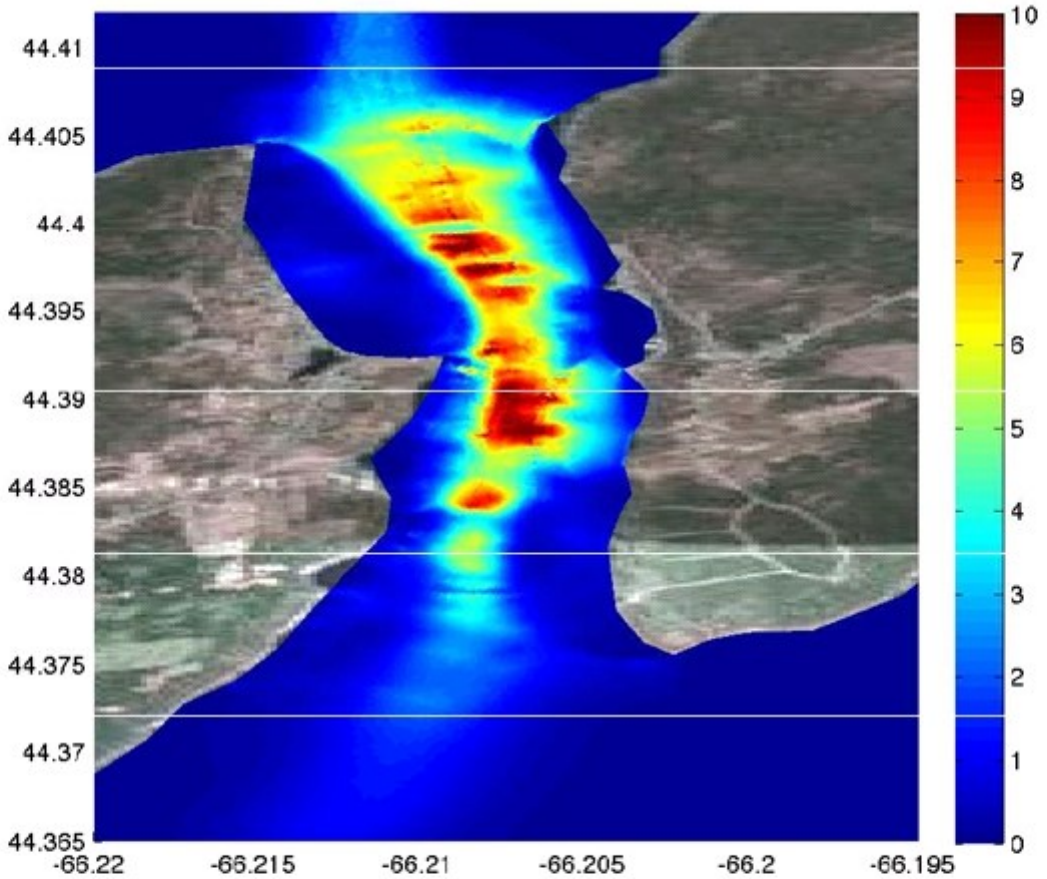
Power Density



Max: 2 kW/m2

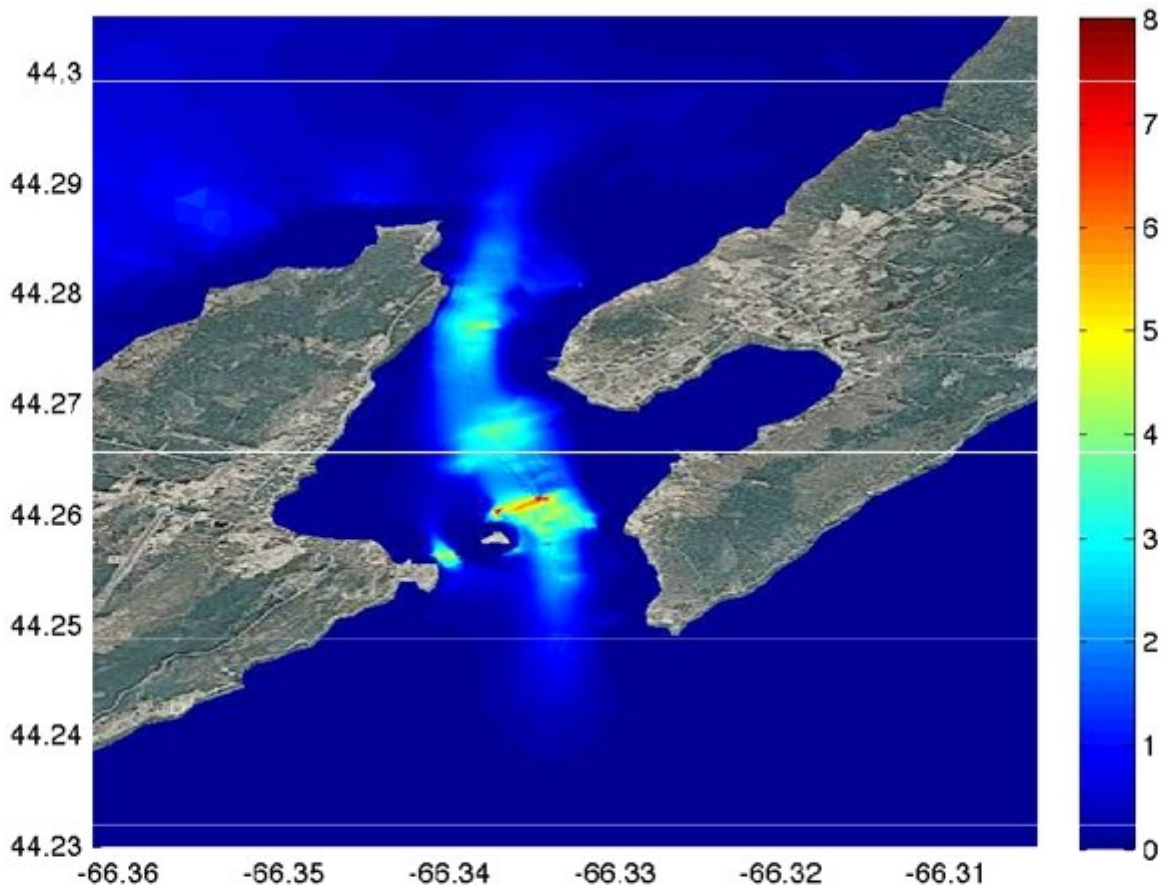
Power Density

Petit Passage



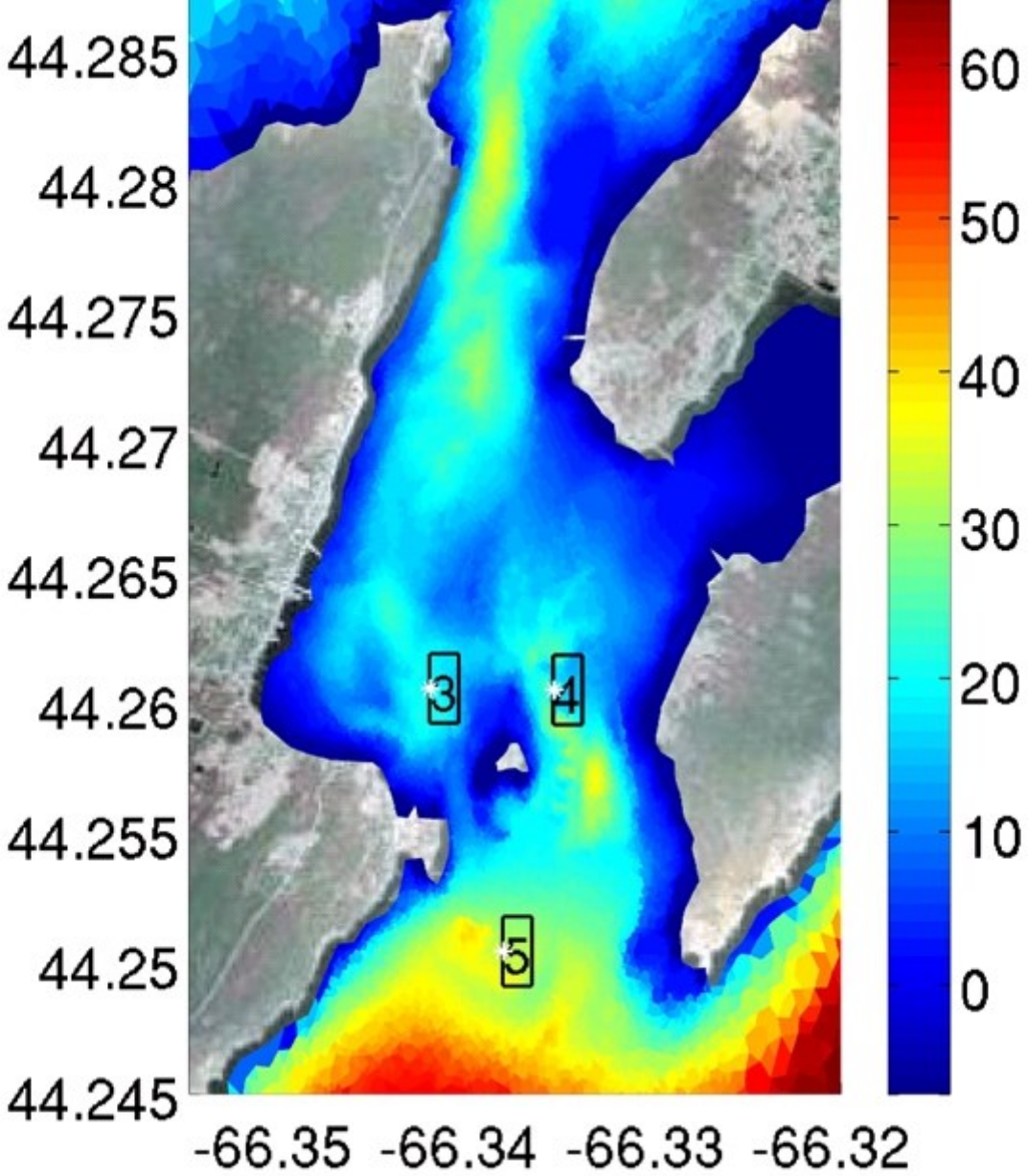
Max: 10 kW/m2

Power Density



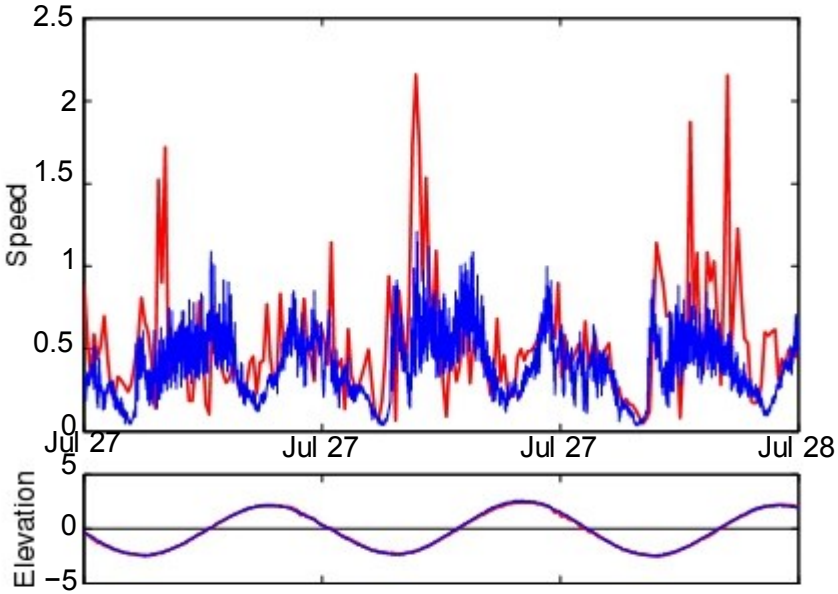
Max: 8 kW/m2

A

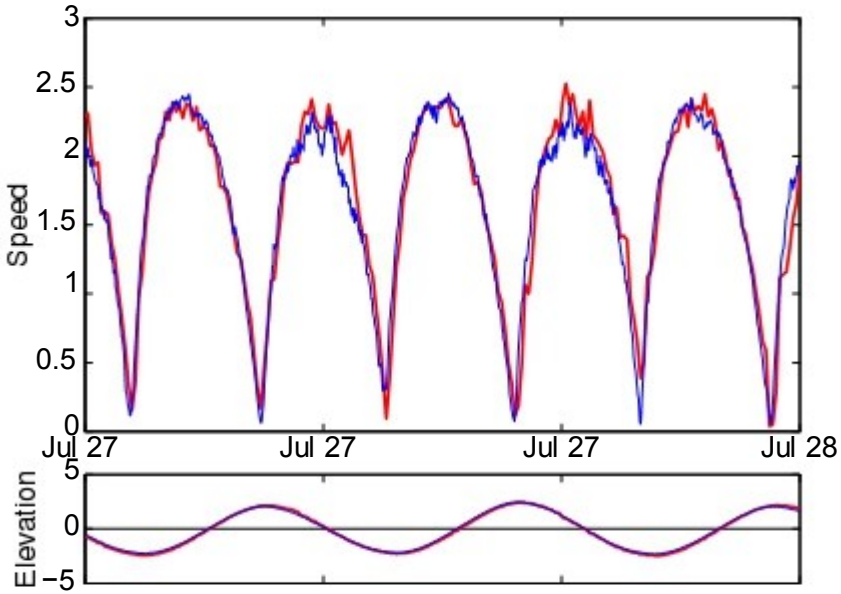


ADCP locations

Speed at ADCP Locations



Speed at ADCP locations 3

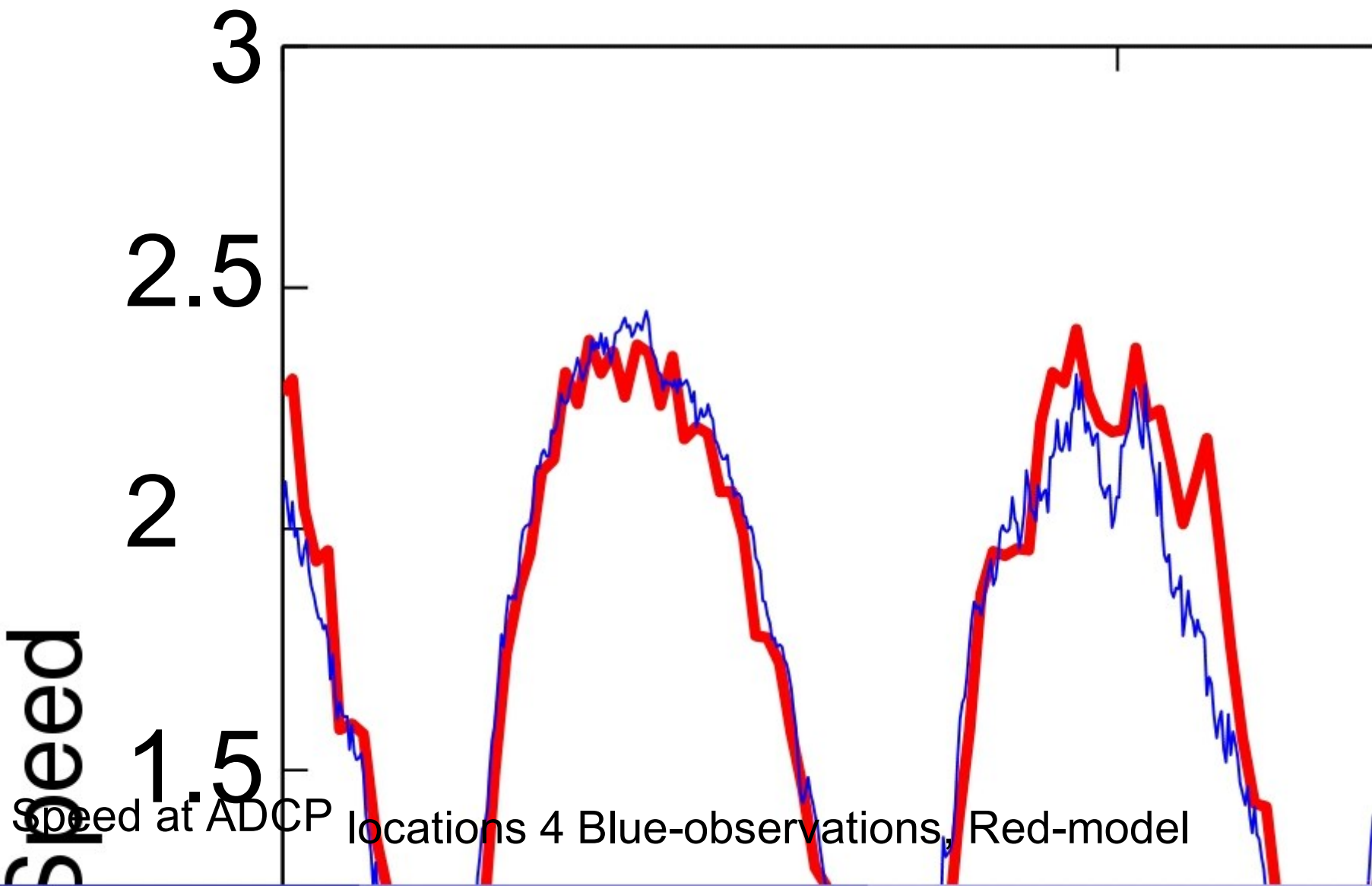


Speed at ADCP locations 4

Blue-observations, Red-model

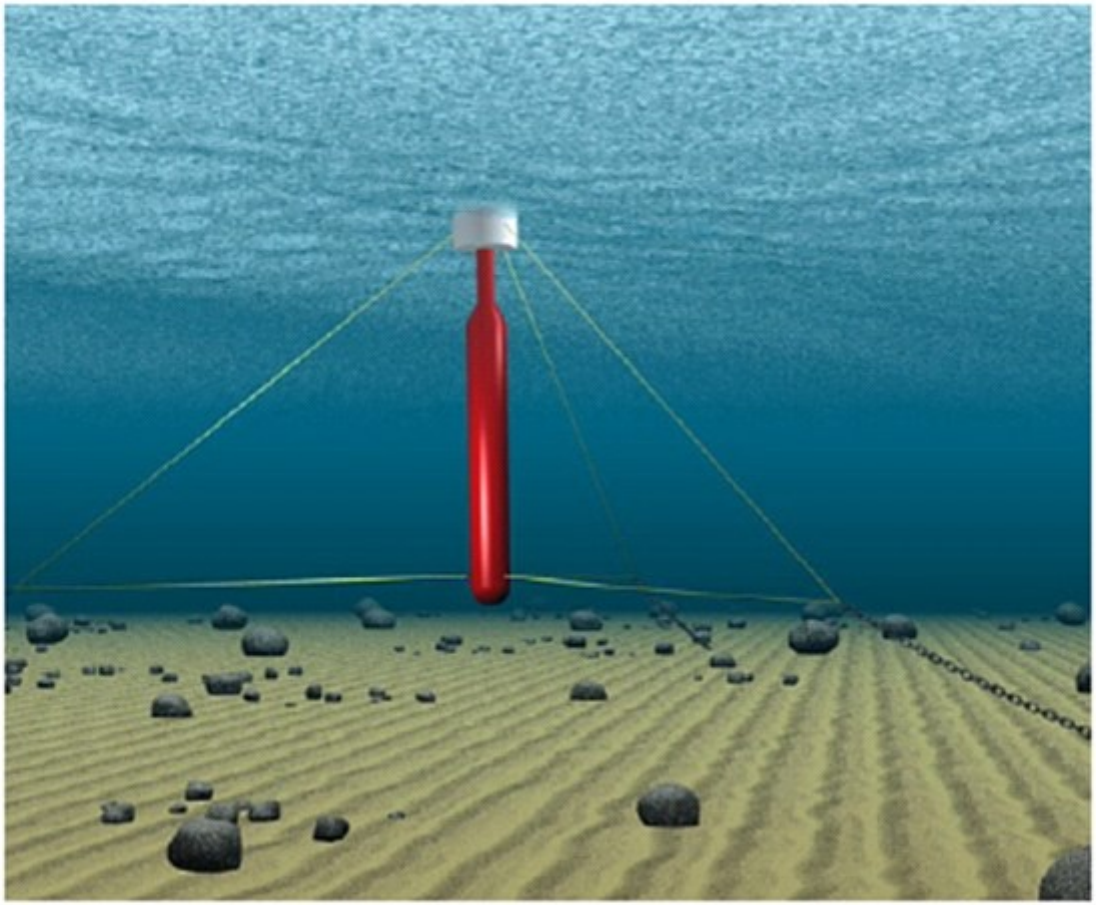
Mitchell O'Flaherty-Sproul

Speed at ADCP Location 4

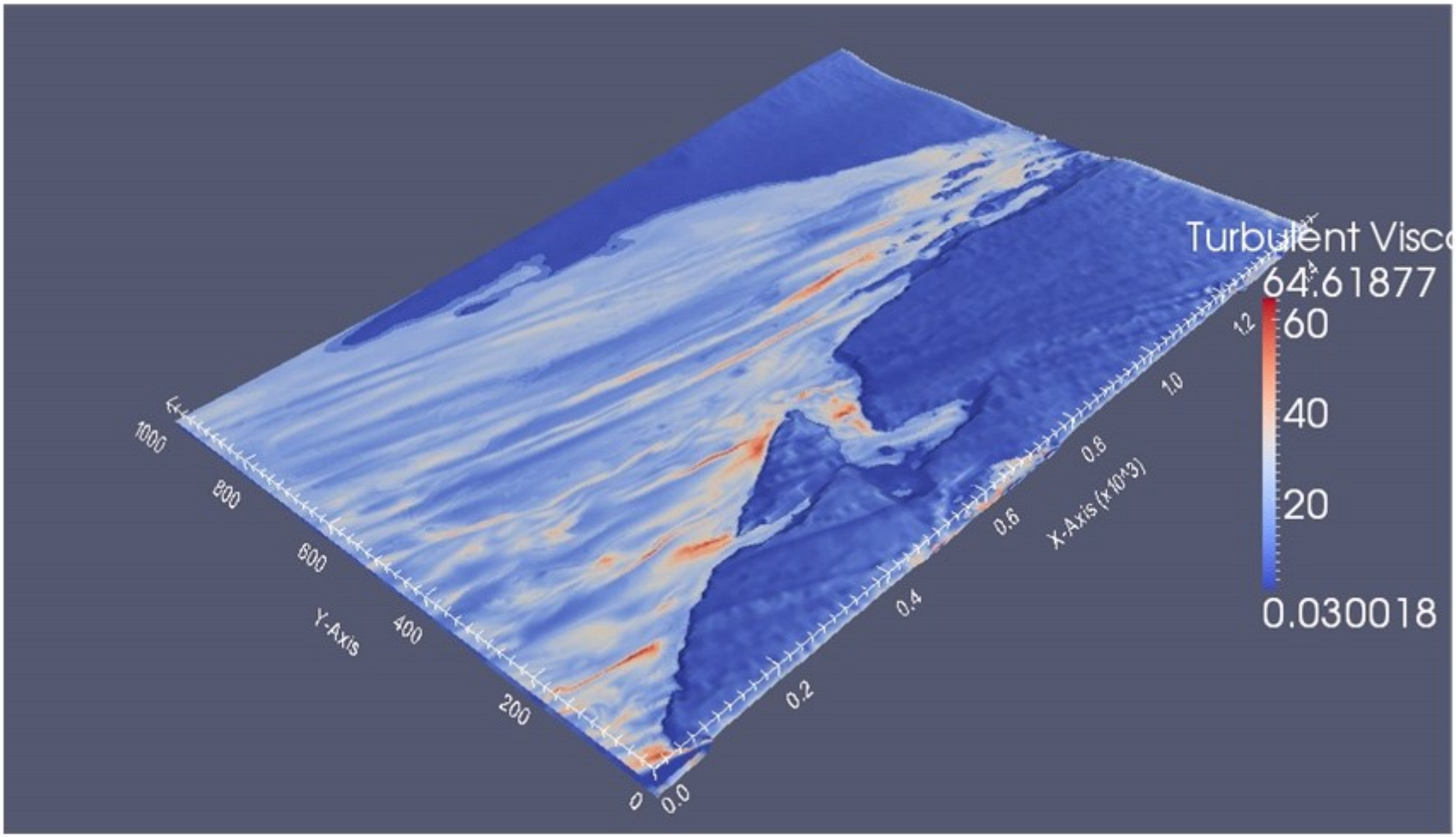


Speed at ADCP locations 4 Blue-observations, Red-model

Dynamic Systems Analysis



Flow-structure interaction



Modelling Turbulence

Clean Current

Turbines

Conclusions

- Digby Neck COMFit program/research project moving full speed ahead

- Measuring and Modelling the high energy, turbulent, unsteady flow
- Modelling the turbine/structure interaction with the flow
- Monitoring the turbines after deployment

- Thanks to OERA, NSERC, ACEnet, ACMMaC, NRCan