

# SEA Background Study Marine Renewable Energy Coastal Cape Breton and Bras d'Or Lakes

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on behalf of the  
Offshore Energy Research Association

- Cape Breton University
- Unima'ki Economic Benefits Office
- Atlantic Marine Geological Consulting
- Oceans Ltd.
- AECOM



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# SEA Background Study - Presentation

- The SEA Process
- Resource Opportunities
  - Bras d'Or Lakes
  - Coastal Cape Breton
- Resource Constraints
  - Biophysical
  - Social



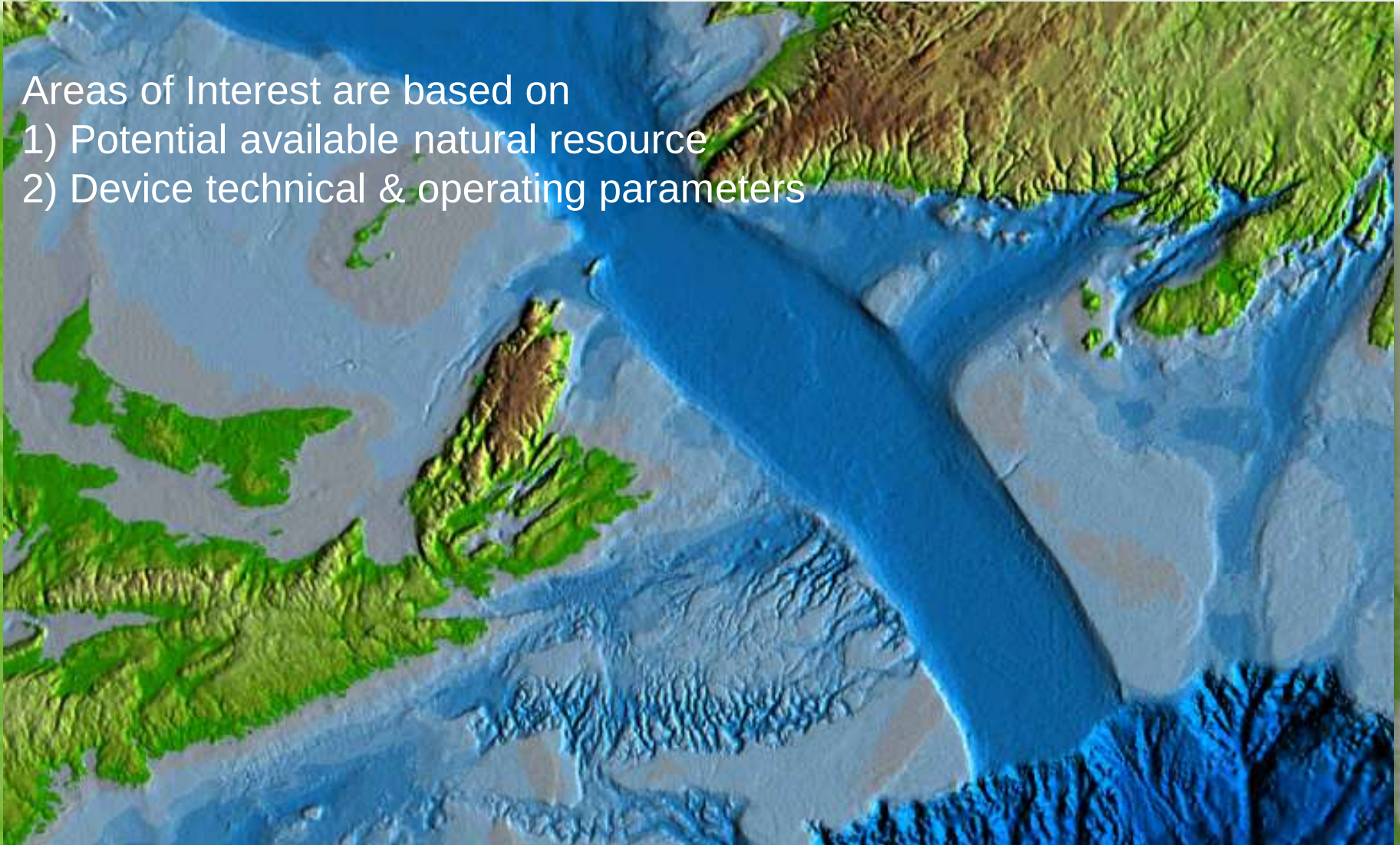
ORPC Deployment, Cobscook Bay (Maine) July 2012



# SEA Background Study – Cape Breton Island

Areas of Interest are based on

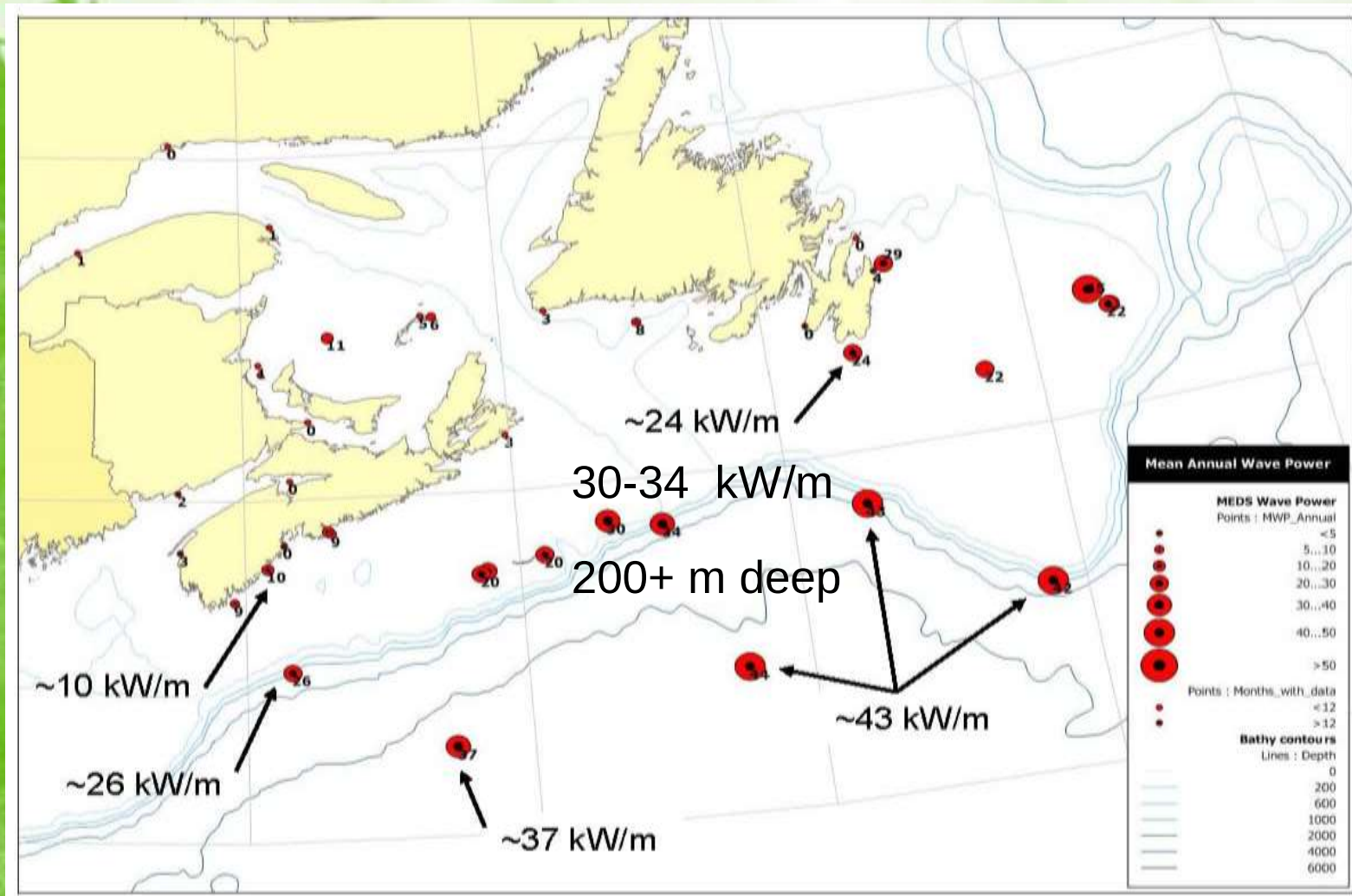
- 1) Potential available natural resource
- 2) Device technical & operating parameters





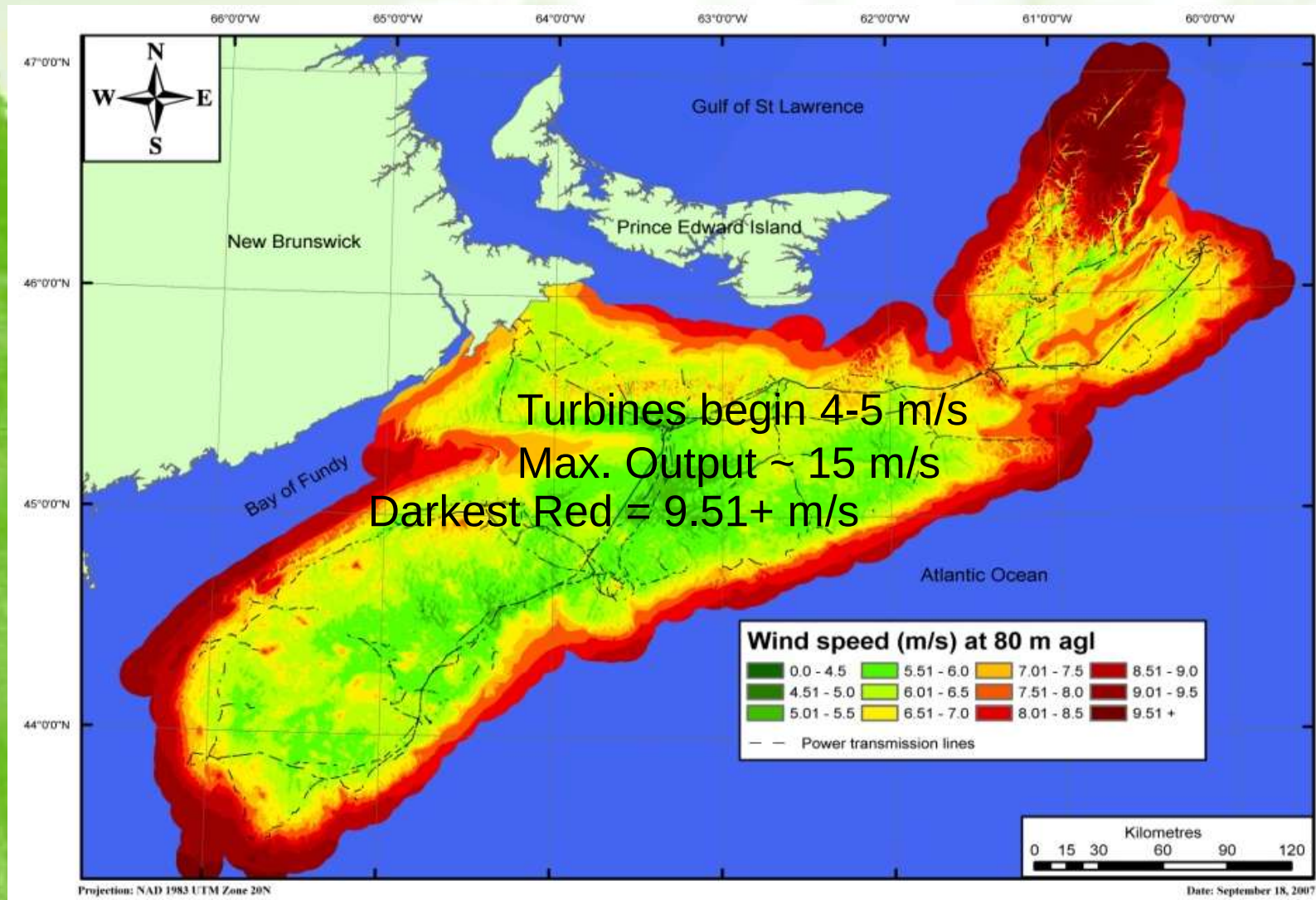
# Wave Energy Potential (Annual Mean Wave Power)

Large amplitude – long period waves



Source: Cornett 2006

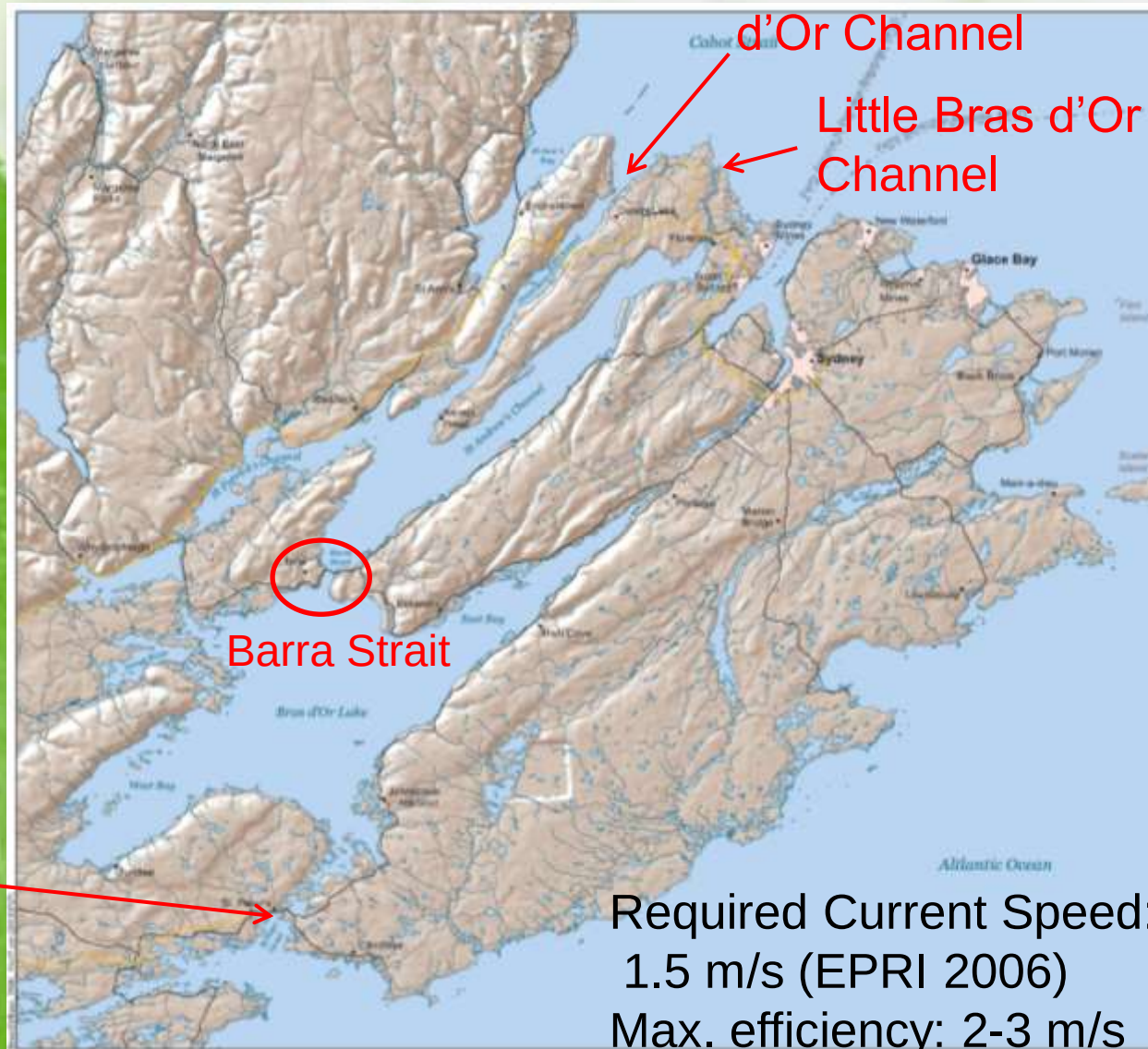
# Offshore Wind Energy Potential (80 m above ground)



Source: NSDOE and others; <http://www.gov.ns.ca/energy/renewables/explore-invest/maps.asp>



# Bras d'Or Lakes



Required Current Speed:  
1.5 m/s (EPRI 2006)  
Max. efficiency: 2-3 m/s



# Great Bras d'Or Channel



## Great Bras d'Or Channel

# Depth

8-100 m

# Currents

## Mean Max Depth Ave:

2.19 m/s (Cornett 2006)

Ave Peak Surface:

2.3 m/s (EPRI 2006)

2.8 m/s CP (OERA 2012)

1.19 m/s SIB (OERA 2012)

## Total Energy

EPRI (2006) 2.8 MW

Cornett (2006) 3.0 MW

## Mean Extractable Energy

EPRI (2006) 1.4 MW

# Great Bras d'Or Channel- Seal Island & Carey Point





# SEA Background Study

## Barra Strait (photos courtesy of CCBCVI and B. Hatcher, CBU)

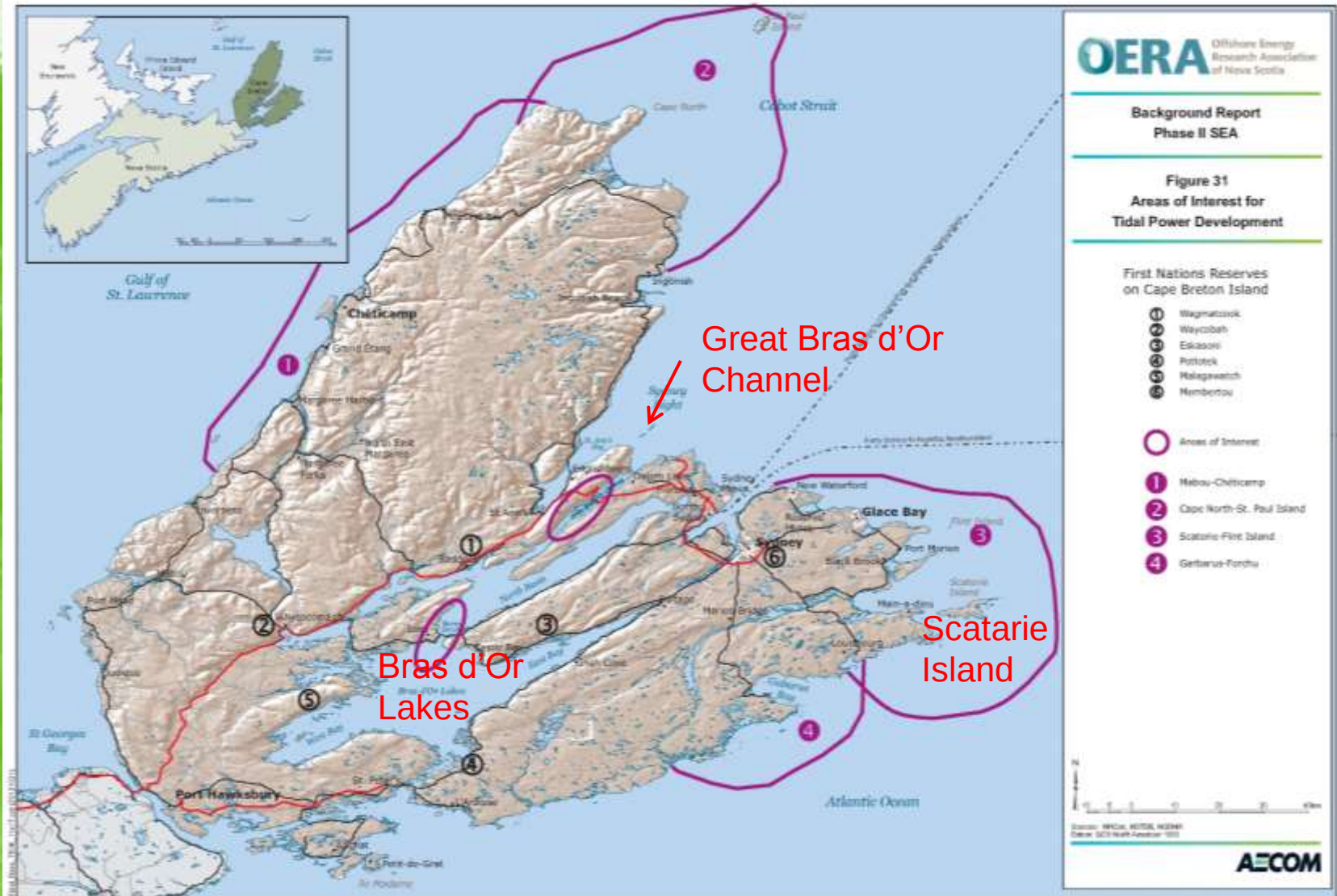
Depth  
23-50 m

Currents  
Mean Max Depth Ave  
Cornett 2006: 1.31 m/s  
1.1m/s (OERA 2012)

Total Energy  
EPRI (2006) 3.0 MW

Appro  
subm  
Cable

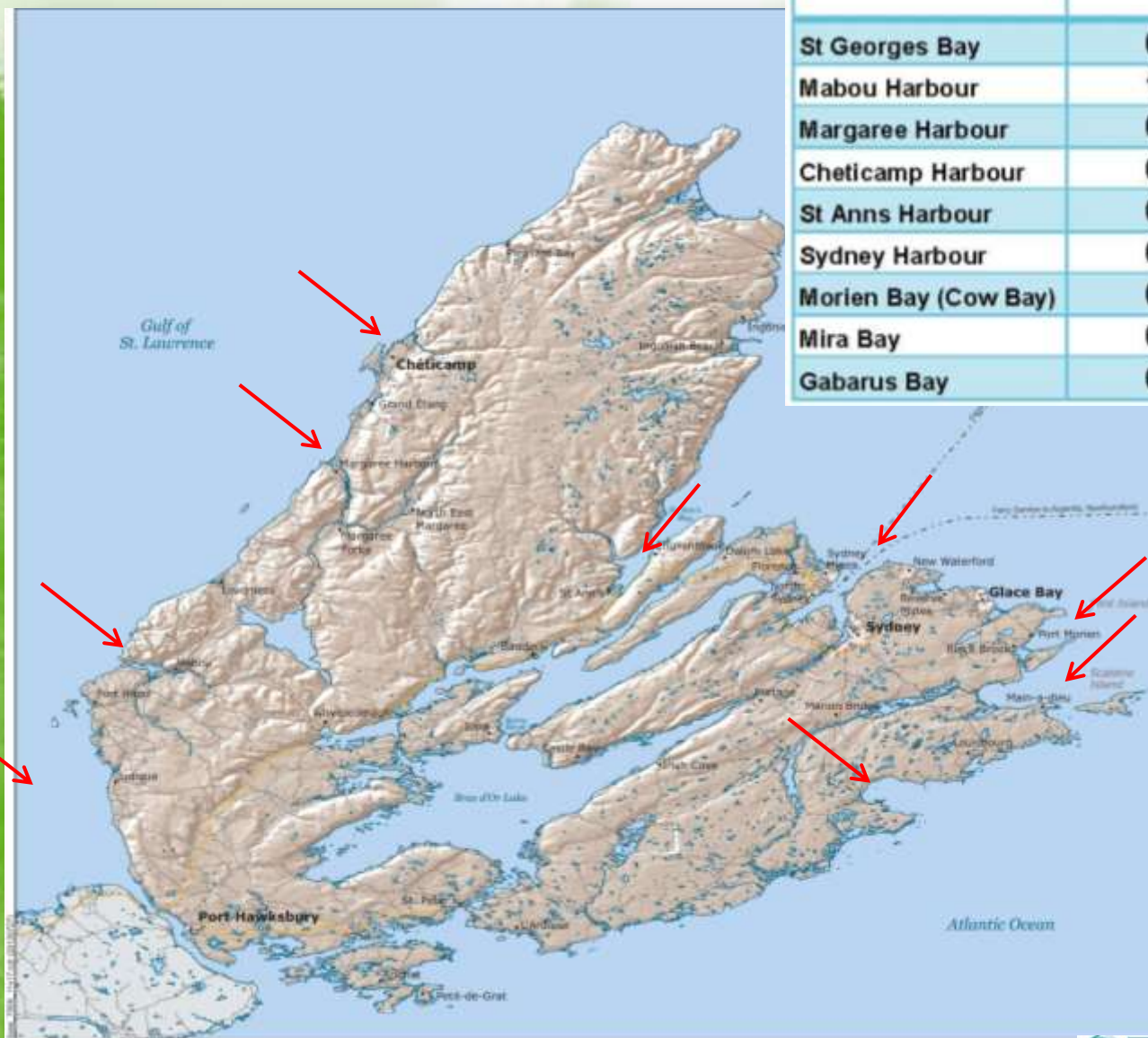
# SEA Background Study – Areas of Interest





# SEA Background Study

| Embayment            | Tides (mean / peak)<br>m/s | Volume at<br>Mean Tide<br>(m <sup>3</sup> ) |
|----------------------|----------------------------|---------------------------------------------|
| St Georges Bay       | 0.04 / 0.06                | 1036.1 x 10 <sup>6</sup>                    |
| Mabou Harbour        | 1.28 / 2.02                | 4.8 x 10 <sup>6</sup>                       |
| Margaree Harbour     | 0.25 / 0.39                | 0.9 x 10 <sup>6</sup>                       |
| Cheticamp Harbour    | 0.01 / 0.01                | 2.9 x 10 <sup>6</sup>                       |
| St Anns Harbour      | 0.02 / 0.04                | 45.0 x 10 <sup>6</sup>                      |
| Sydney Harbour       | 0.03 / 0.05                | 47.9 x 10 <sup>6</sup>                      |
| Morien Bay (Cow Bay) | 0.03 / 0.04                | 29.0 x 10 <sup>6</sup>                      |
| Mira Bay             | 0.02 / 0.02                | 78.6 x 10 <sup>6</sup>                      |
| Gabarus Bay          | 0.01 / 0.02                | 44.8 x 10 <sup>6</sup>                      |



(Gregory et al 1993)

Flint Island  
Mean Max Depth Ave  
Current  
1.20 m/s  
(Cornett 2006)

Mean Power Potential  
2 MW

# Bras d'Or Lakes – Potential Constraints

- Low Current Speeds / Low Total Energy
- Constrained passages
  - Shallow; marine transportation conflicts
  - Arrays can effectively block passages
  - Far field energy extraction effects
- UNESCO / Unique Ecosystem
- Low Flushing Rates
- Elevated Potential for Area Use Conflict
  - Recreational / Eco-Tourism Values
  - 4/5 First Nations
  - Heightened Sensitivity
- Demonstration/Research/Technology Incubator Potential?



# Coastal Cape Breton – Potential Constraints

- Current Speeds are Poorly Known
  - High Total Energy/Large Array Potential/Economies of Scale
- Distance to Electrical Grid
- Fish/Mammal Use
  - Scatarie, Bird, Paul, Margaree Islands
  - EBSAs & St. Ann's AOI (DFO)
  - Migration Pathways
  - Important Fish Habitat
  - Species at Risk
- Potential for Area Use Conflict
  - Variety of Commercial Fishing Interests/Disproportionate Value
  - Variety of Marine Transportation Interests

# Discussion / Questions – during the coffee break

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