



ARHC2-02E

# Arctic Regional Hydrographic Commission Arctic Pilot Project

**September 2011  
Copenhagen**

**Canadian Hydrographic Service**

**Savi Narayanan**





# Arctic Safety

**Governments, academic institutions, NGOs and Industry**

- All have important roles to play
- All have responsibility



Pêches et Océans  
Canada

Fisheries and Oceans  
Canada

Canada



# Charting challenge

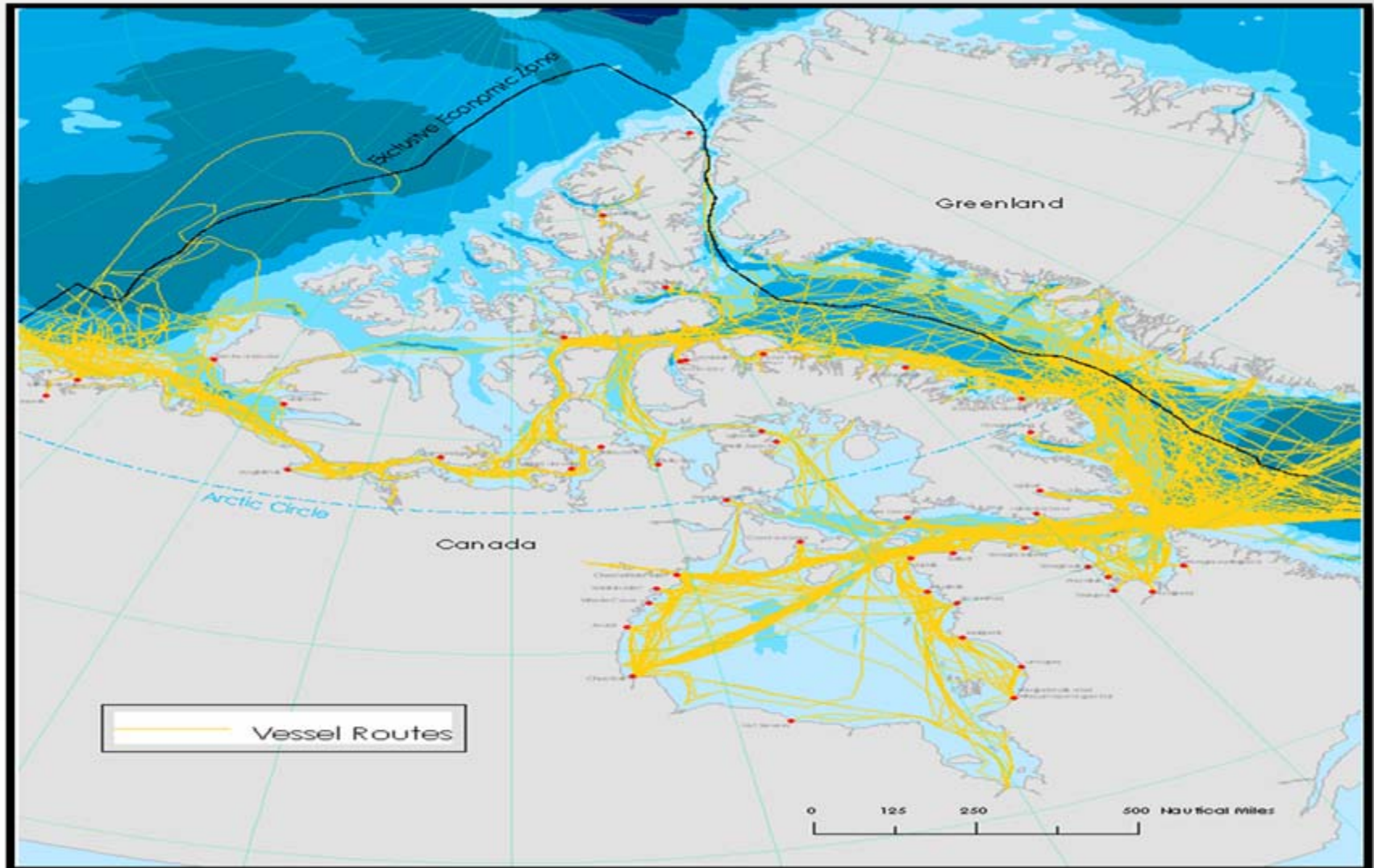
***Improving Safety, Supporting Economic Growth, Strengthening Environmental Protection and Exercising Sovereignty***

**Responsible for charting Canada's:**

- **131,650 nautical miles of coastline (longest of any country in the world),**
- **739,266 square nautical miles of shelf and territorial sea,**
- **plus inland lakes and waterways.**



# 2010 vessel traffic





# Areas of Adequate Coverage

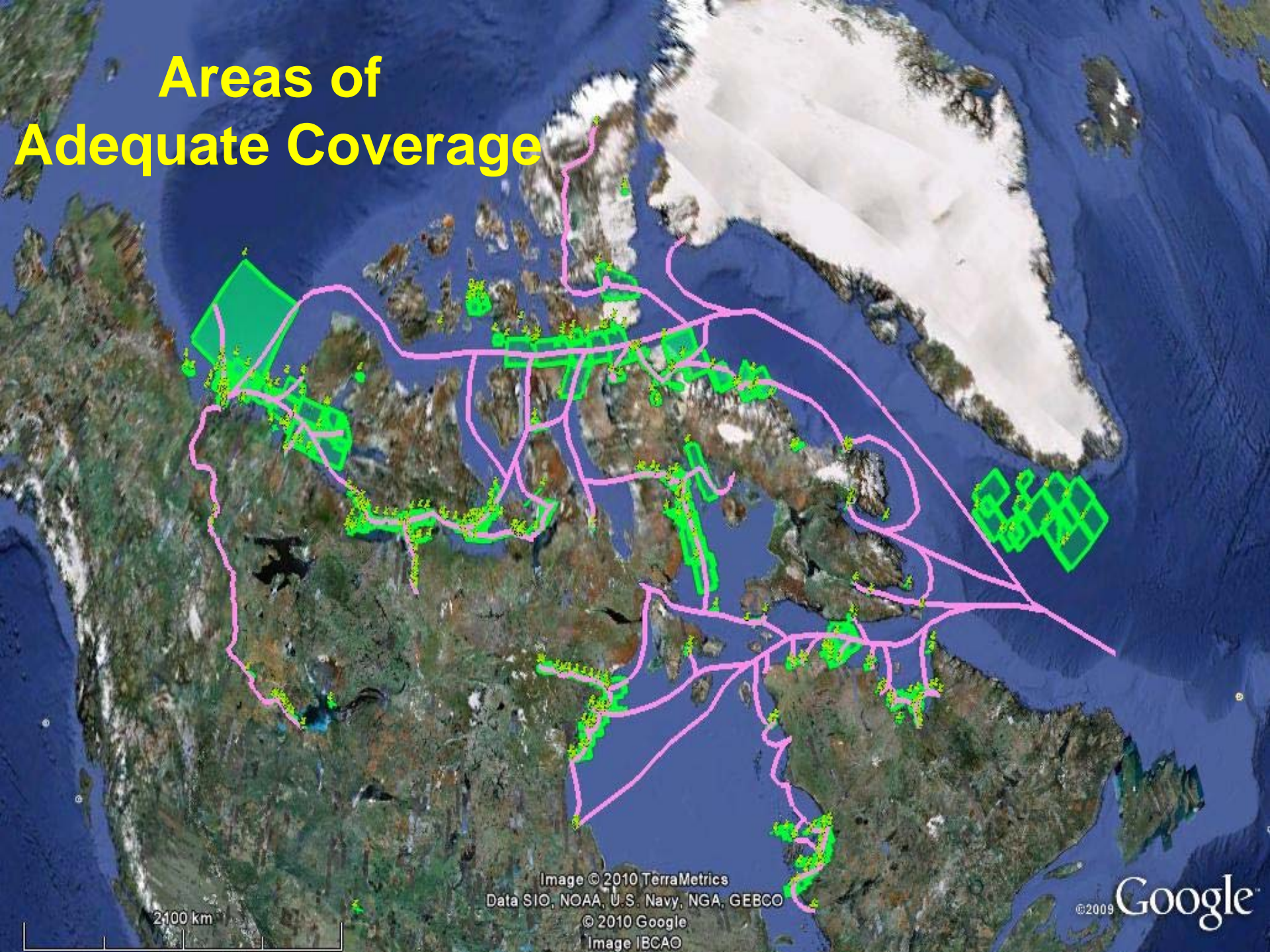


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Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
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Image IBCAO

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# Canadian Strategy

- **Nat'l approach to prioritization, survey planning, and delivery of data, products and services**
- **Support the legislative responsibilities**
- **Increased reliance on partnerships, vessels-of-opportunities,**
- **Increased focus on DM, products, services.**
- **Efficiencies through technology - multiplatform approach**





# Arctic Pilot Project

- **Partners:** Parks Canada, Canadian Ice Service, Canadian Space Agency, UVIC
- **Platforms:** Ice breakers, launches, aircrafts, ROVs, AUVs, Satellites
- **Technology:** Side scan, Single and multibeam, LiDAR, Data assimilation for site selection



# Area of Coverage



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

## Victoria Strait Pilot Project



MKV<sup>3</sup> (2km grid, ~200 km<sup>2</sup>)  
Salinity and Bottom Sampling

GPS Reference Stations<sup>1</sup>  
Hz/Vert Control Surveys<sup>1</sup>  
+ Sat Com Station<sup>4</sup>

eSPACE  
RadarSat<sup>4</sup> +  
Videography<sup>5</sup>

Terrestrial  
Archaeology +  
Ground Truthing  
for eSPACE<sup>7</sup>

Alternate

Launches<sup>1, 2</sup> (~200 km<sup>2</sup>)  
Multibeam + Side Scan Sonar  
Surveys

Seal Bay<sup>1</sup>  
56km NE

Tide Gauge Mooring(s)<sup>1</sup>

Lidar<sup>1, 6</sup> (~380 km<sup>2</sup>)  
Surveys

Proposed Lidar 12km x 32km (384 km<sup>2</sup>)

### *Project Partners*

- 1 CHS-DFO
- 2 Parks Canada- UAS
- 3 U of Victoria-OTL
- 4 CDN Space Agency
- 5 Environment Can.
- 6 National Defence
- 7 Gov't of Nunavut

Canada

Canada

Pêches et Océans  
Canada

Fisheries and Oceans  
Canada





# Vessel-based surveys

- Single beam on the vessel
- MB on the survey launches, "Gannet" and "Kinglett"
- Survey plans considered output from satellite data assimilation
- High speed data transfer via satellite



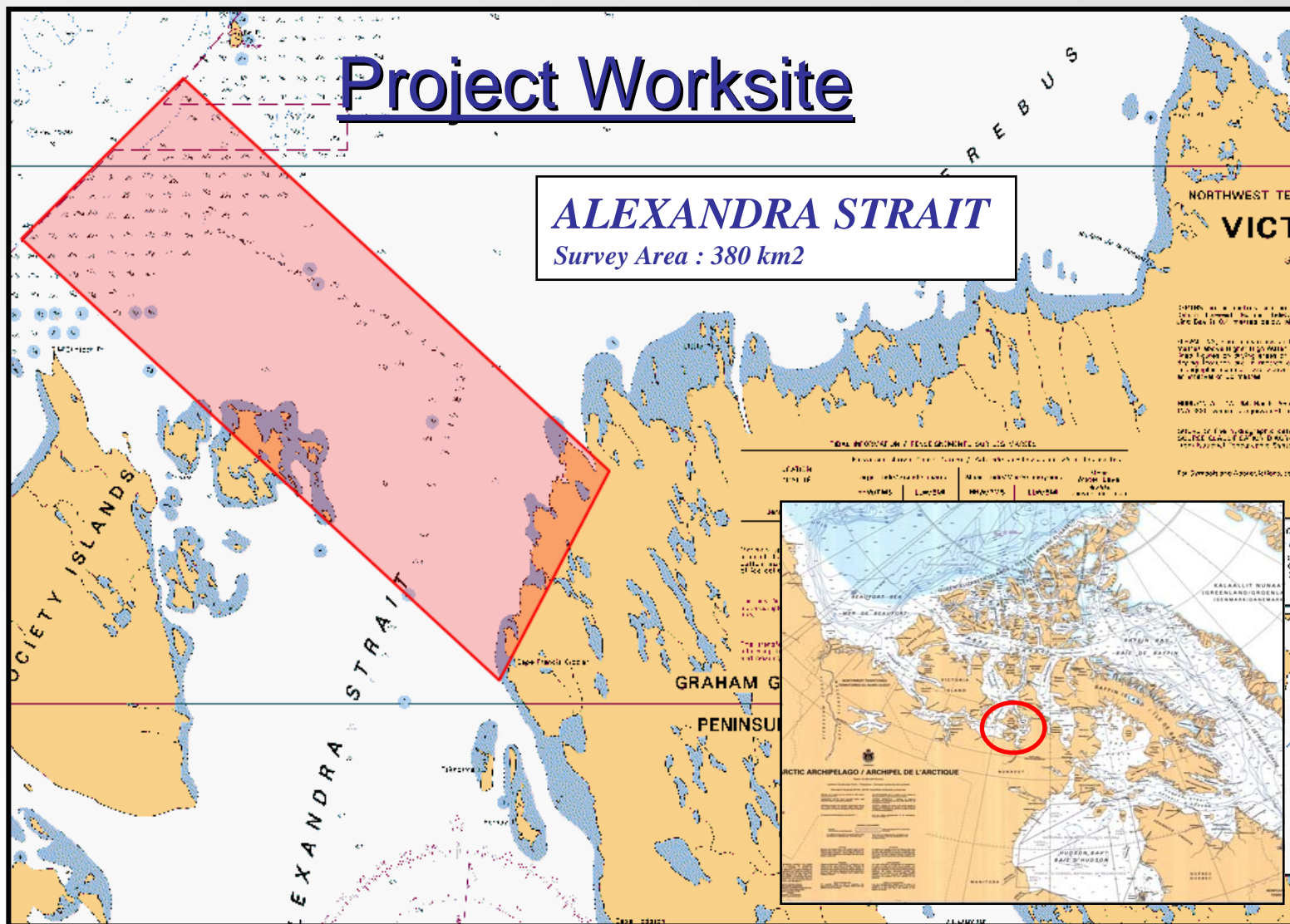
**Add-on surveys using vessels-of-opportunity**



# Project Worksite

## ALEXANDRA STRAIT

Survey Area : 380 km<sup>2</sup>





# System Specifics

## LIDAR SYSTEM

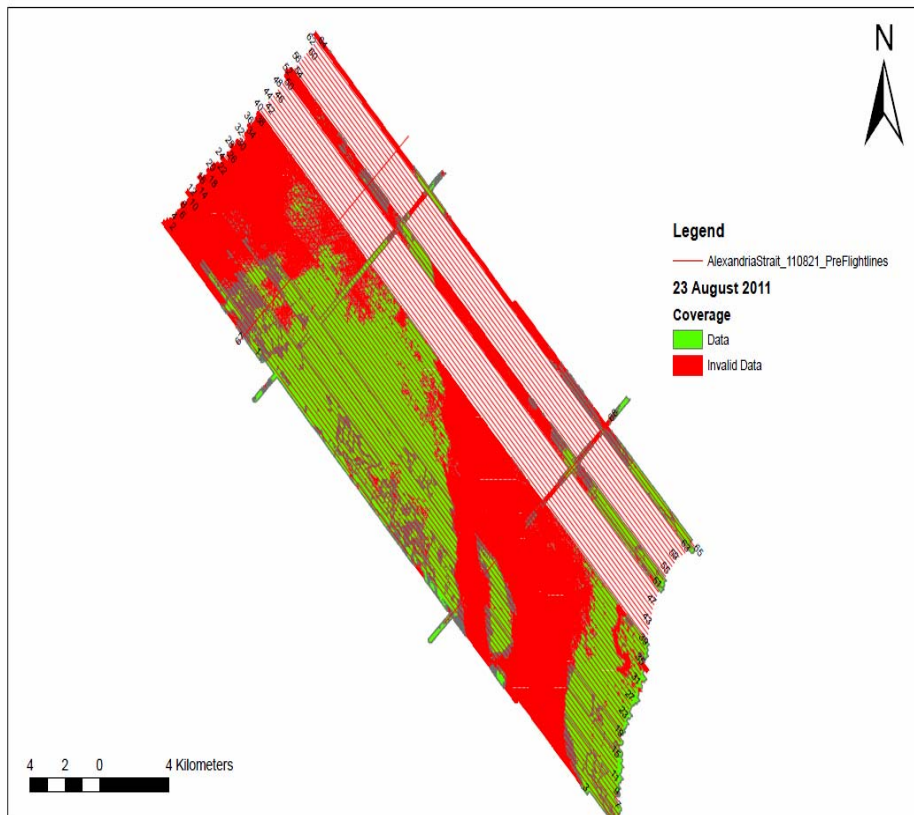
- Optech SHOALS-1000T
- Beechcraft King Air A90







# Data Collection



## STATISTICS:

Flown Coverage : 274 km<sup>2</sup> /380km<sup>2</sup>

Usable Data Coverage : 138.2 km<sup>2</sup>

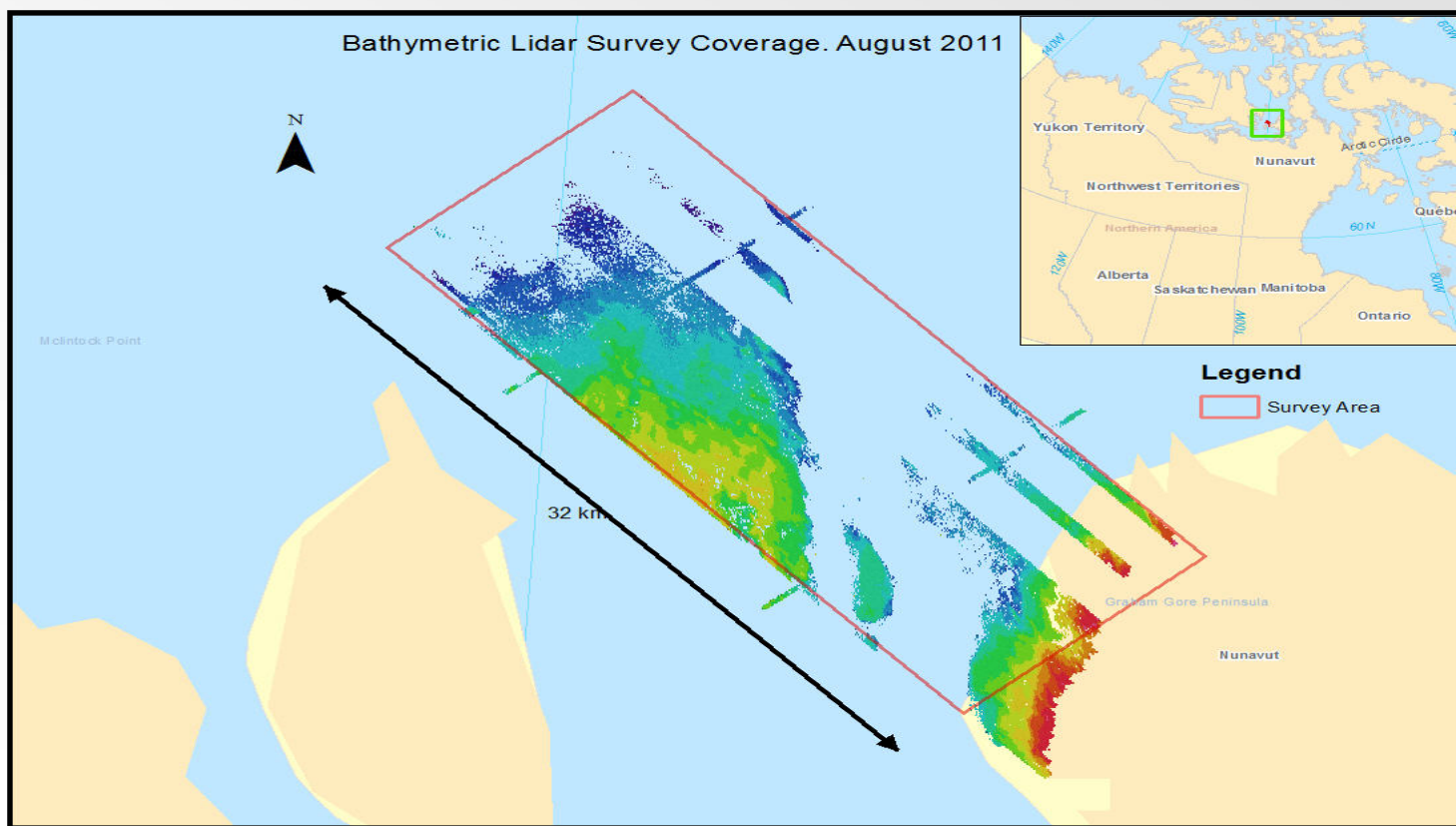
Valid Coverage: up to 15m depth

Invalid Coverage – Laser Extinction  
(water too deep for the clarity  
available)



# Data Collection

## COVERAGE





# Conclusion

- Partnership worked well.
- Satellite data assimilation provided valuable results
- For this experiment, vessel-based survey was most cost-effective due to limited LiDAR penetration and weather issues





# *Thank You!*



Pêches et Océans  
Canada

Fisheries and Oceans  
Canada