

# Hydrocarbon Activity Western Newfoundland



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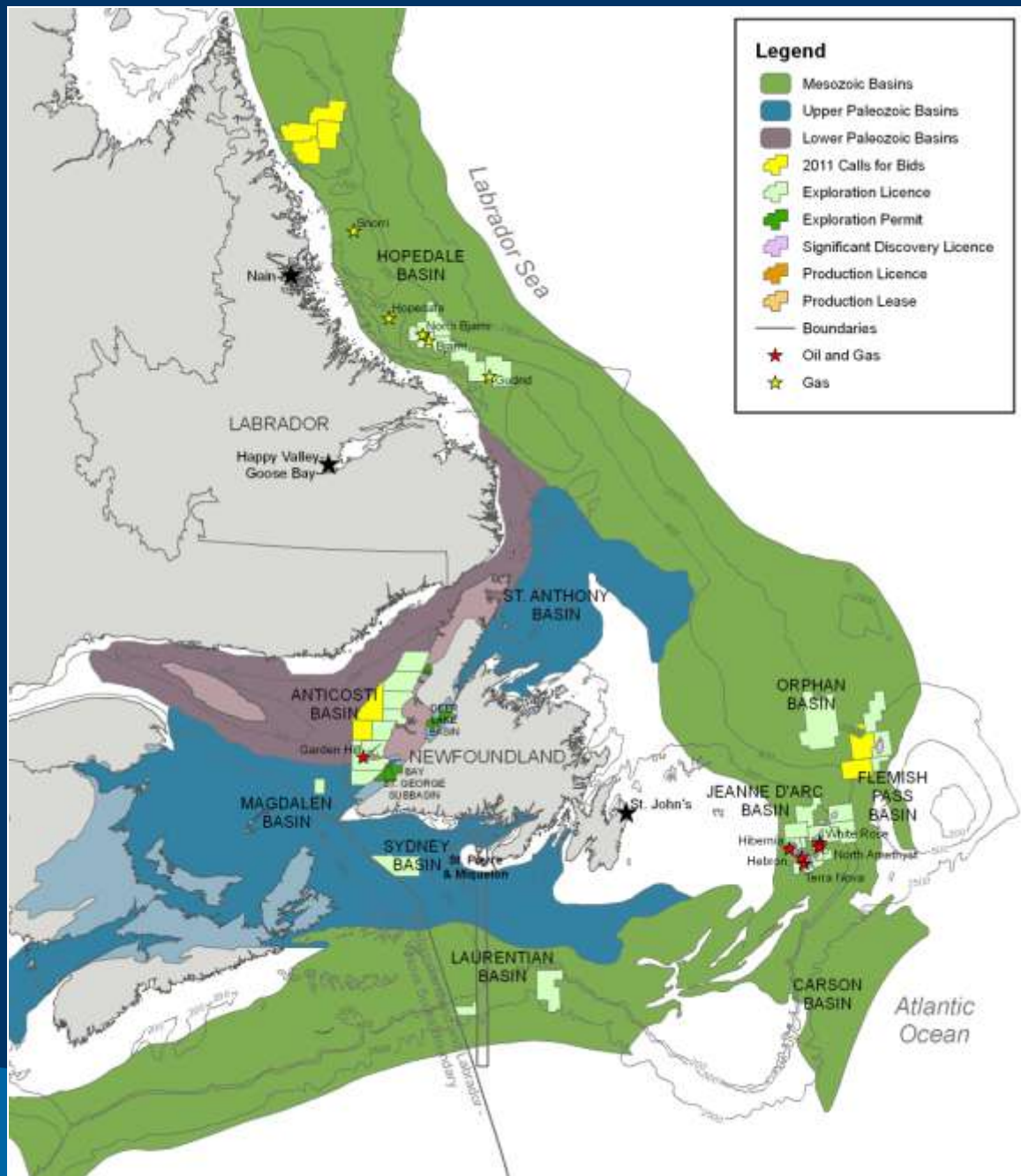
Presented at the



Symposium 2011

# Sedimentary Basins (Onshore & Offshore)

## NEWFOUNDLAND & LABRADOR



# Regulatory Framework - NL

## ONSHORE



- Administered by Province
- Department of Natural Resources (DNR) – Energy Branch
- Office – St. John's, NL
- Maintains Data Repository, Core Storage Facilities, etc.
- Web: [www.nr.gov.nl.ca/nr](http://www.nr.gov.nl.ca/nr)



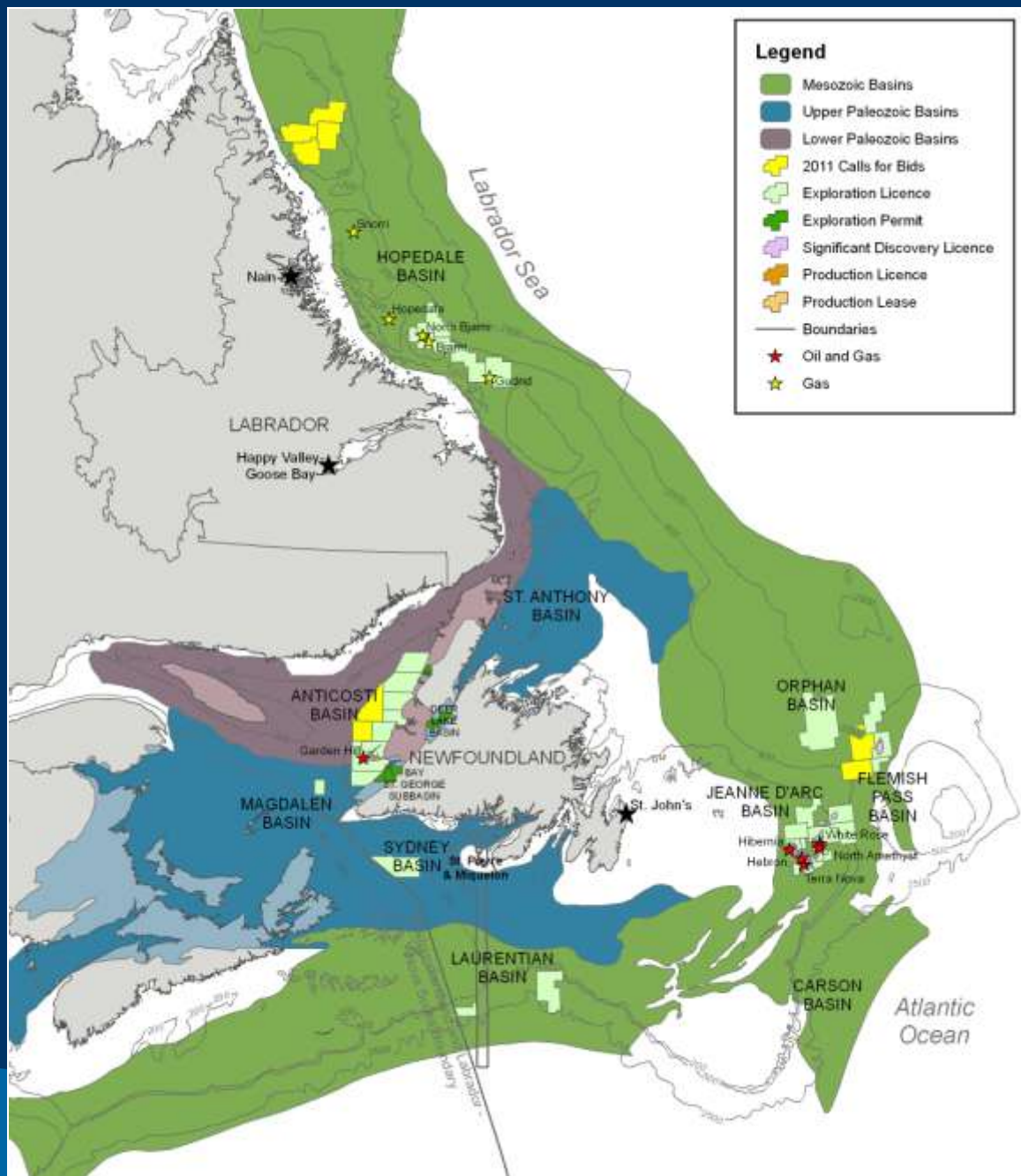
## OFFSHORE



- Administered by conjoint Federal / Provincial Board
- Canada – Newfoundland & Labrador Offshore Petroleum Board (C-NLOPB)
- Office – St. John's, NL
- Maintains Data Repository, Core Storage Facility, etc.
- Web: [www.cnlopb.nl.ca/](http://www.cnlopb.nl.ca/)



# NL Offshore



## Four Producing Fields

- **Hibernia** (Nov/97)
  - Hibernia South (Jun/2011)
- **Terra Nova** (Jan/02)
- **White Rose** (Nov/05)
- **North Amethyst** (May/2010)

## Discovered Reserves

### **Grand Banks**

- 3.0 billion barrels Oil
- 6.8 Tcf Natural Gas
- 355 million barrels NGL

### **Labrador**

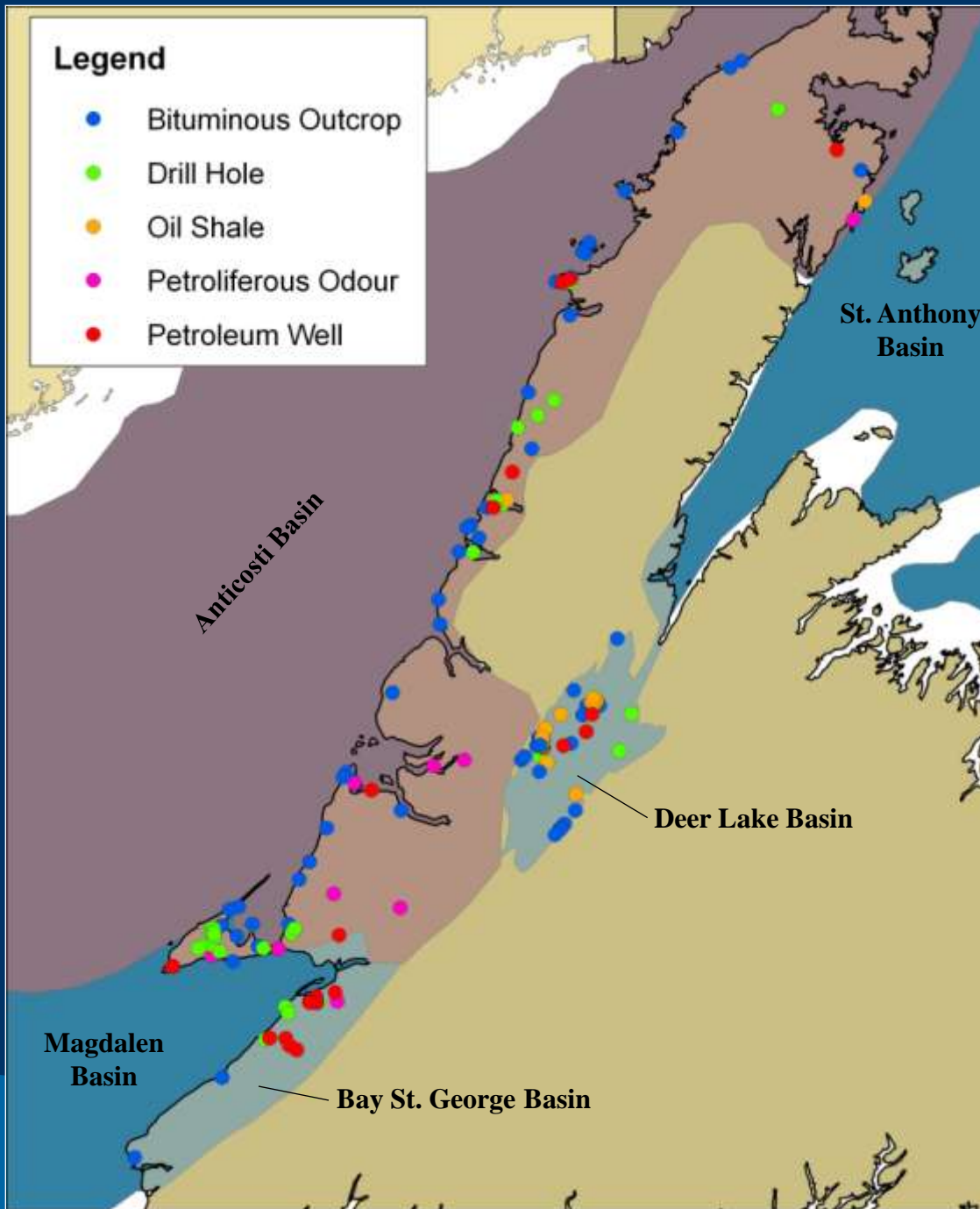
- 4.2 Tcf Natural Gas
- 123 million barrels NGL

## Undiscovered Resources

- 6 billion barrels Oil
- 60 Tcf Natural Gas

**ONSHORE  
WESTERN  
NEWFOUNDLAND**

# Onshore Hydrocarbon Shows



# GEOLOGY OF THE ISLAND OF NEWFOUNDLAND



**Parson's Pond**



**St. Paul's Inlet**



**Deer Lake Basin**



**Parson's Pond**

Digital cartography by T. Pattanavage, 1994



**St. Paul's Inlet**

**Deer Lake Basin**

**Shoal Point**

**Bay St. George**



**Bay St. George Basin**

## DEVONIAN TO CARBONIFEROUS

Subaerial, lacustrine fluvial and deltaic clastic sedimentary rocks; minor limestone

Clastic metasedimentary rocks and migmatitic equivalents



**Shoal Point**

## AVALON ZONE

### PROTEROZOIC III TO ORDOVICIAN

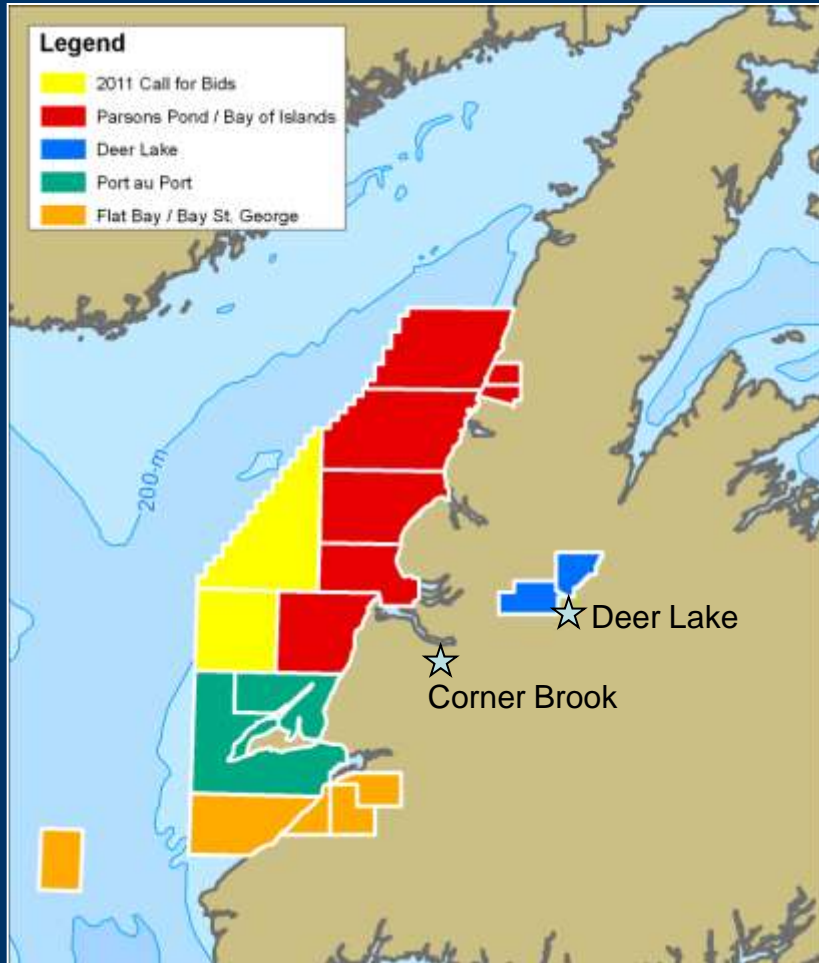
Subaerial and marine clastic sedimentary rocks; minor limestone

### PROTEROZOIC III

Marine and deltaic clastic sedimentary rocks

Mafic and felsic volcanic and volcanoclastic rocks

# Regional Summary



## Onshore:

- 7 Onshore Exploration Permits
- 1 Production Lease

## Offshore:

- 9 Offshore Exploration Licences
- 2 parcels offered in the 2011 Call for Bids

# Anticosti Basin

Age: Cambrian - Devonian

Area: ~13,100 km<sup>2</sup>

Basin Type: Foreland Basin  
(developed over deformed passive margin)

Basin Infill: 3500+ m; 2000+ m

## Source Rock (TOC's)

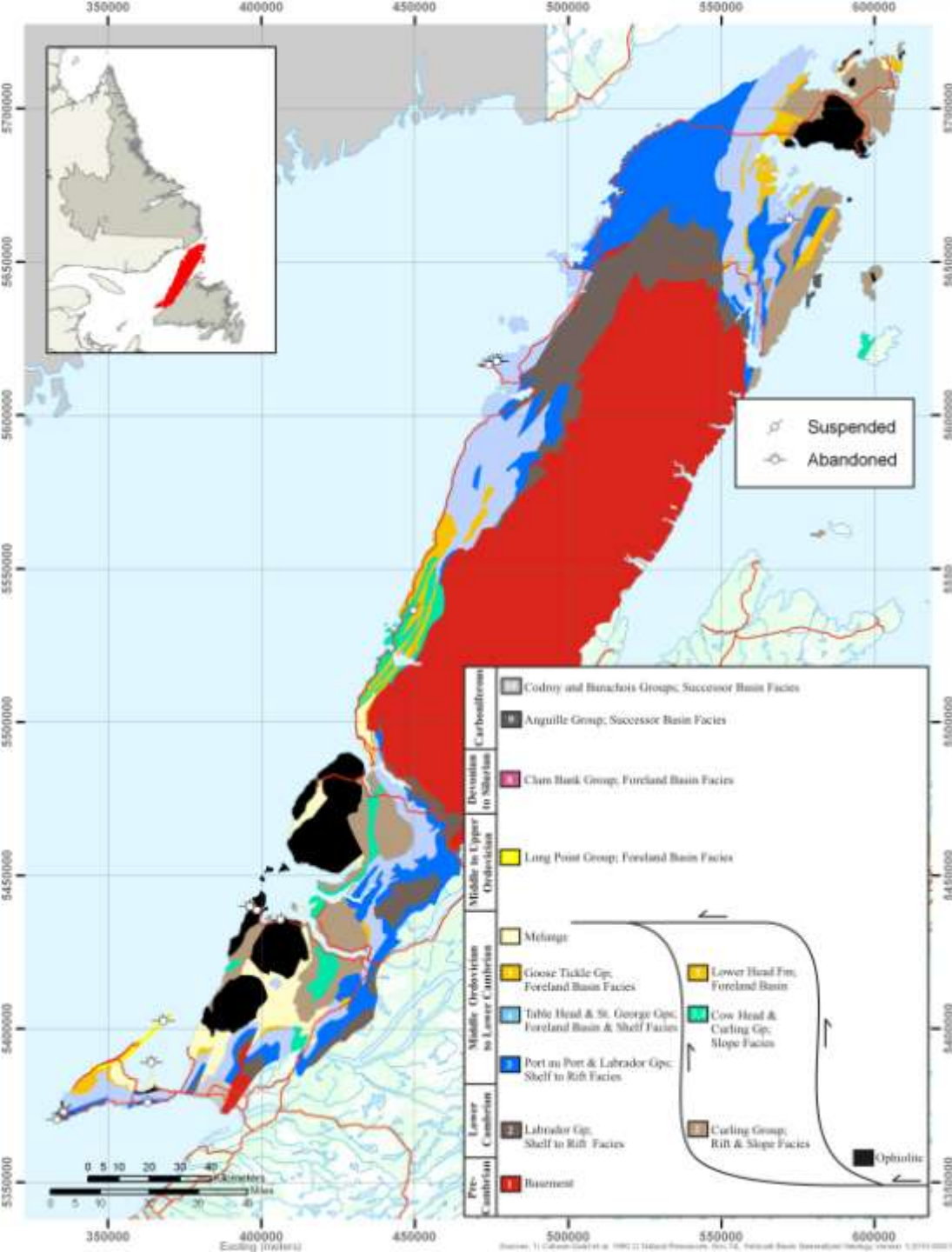
- CHG - Green Point Fm. – up to 11%
- GTG - Mainland/Black Cove Fm. – up to 8.1%
- Table Cove Fm./Curling Group – potential

## Kerogen Type

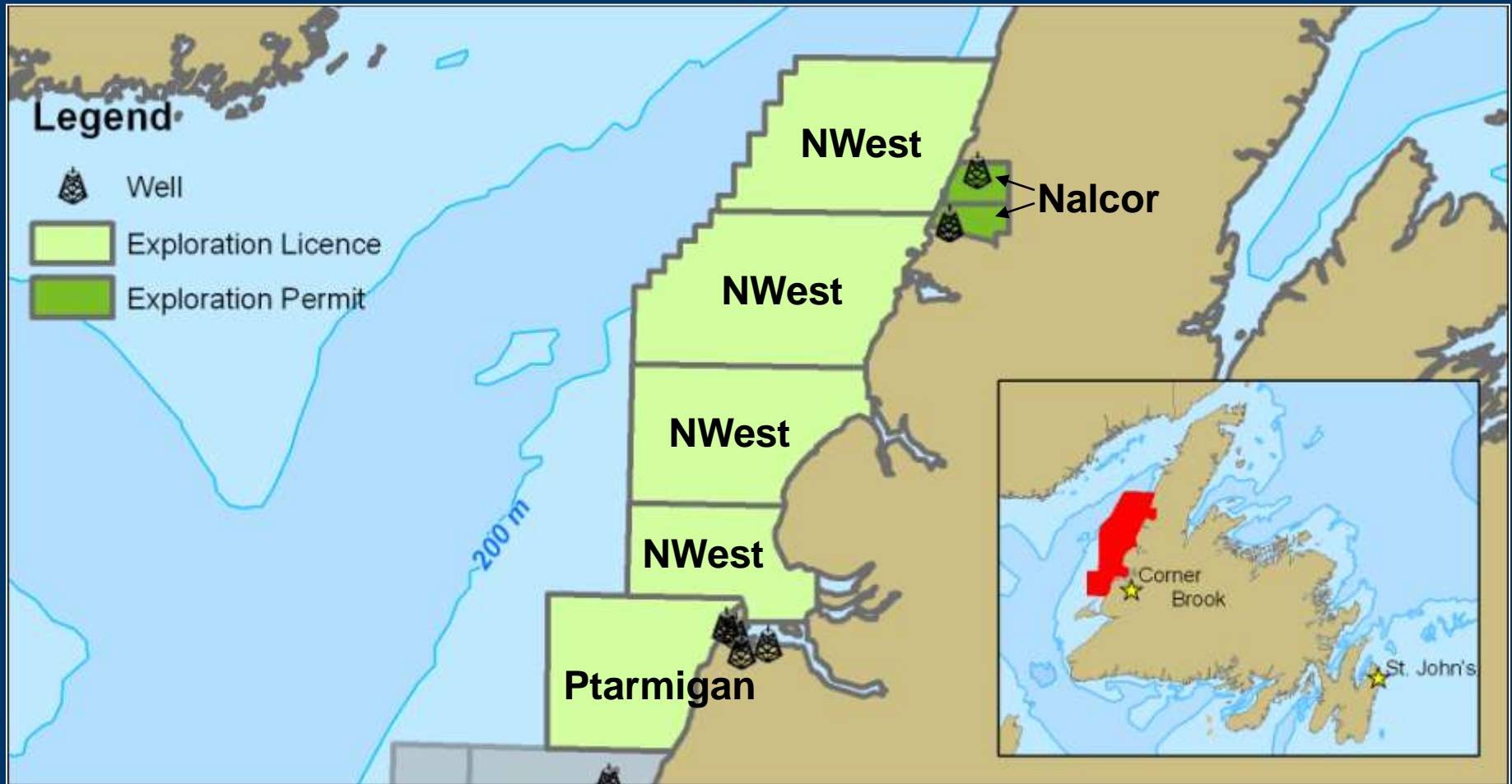
- mainly Type II (marine derived)

## Thermal Maturity

- immature to overmature (oil)
- maturity increases from W to E; S to N



# Parsons Pond/Bay of Islands



# NWEST Energy Inc.

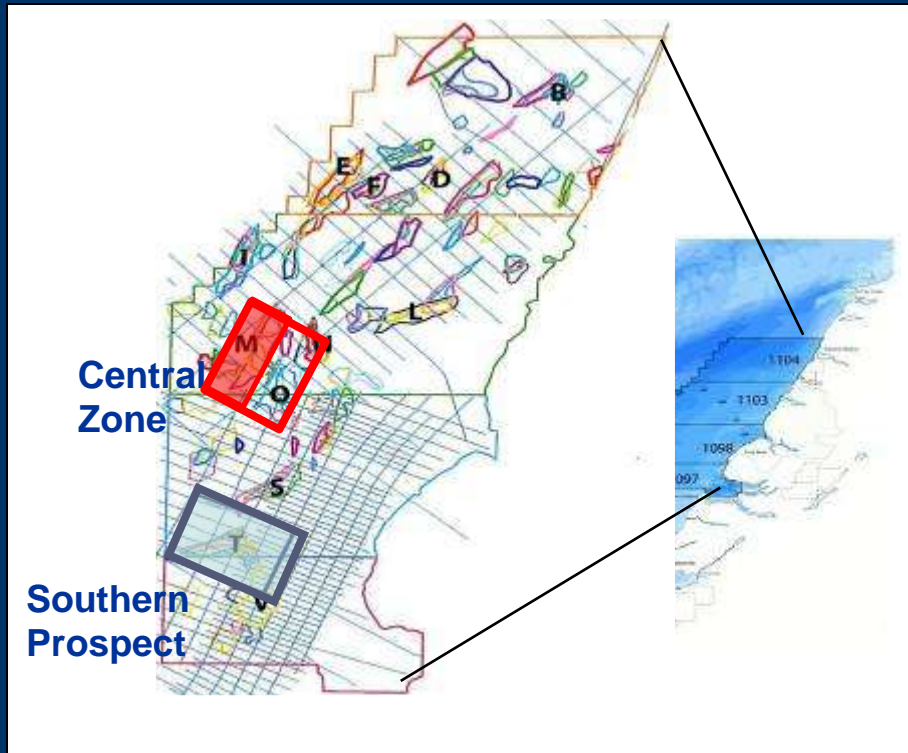
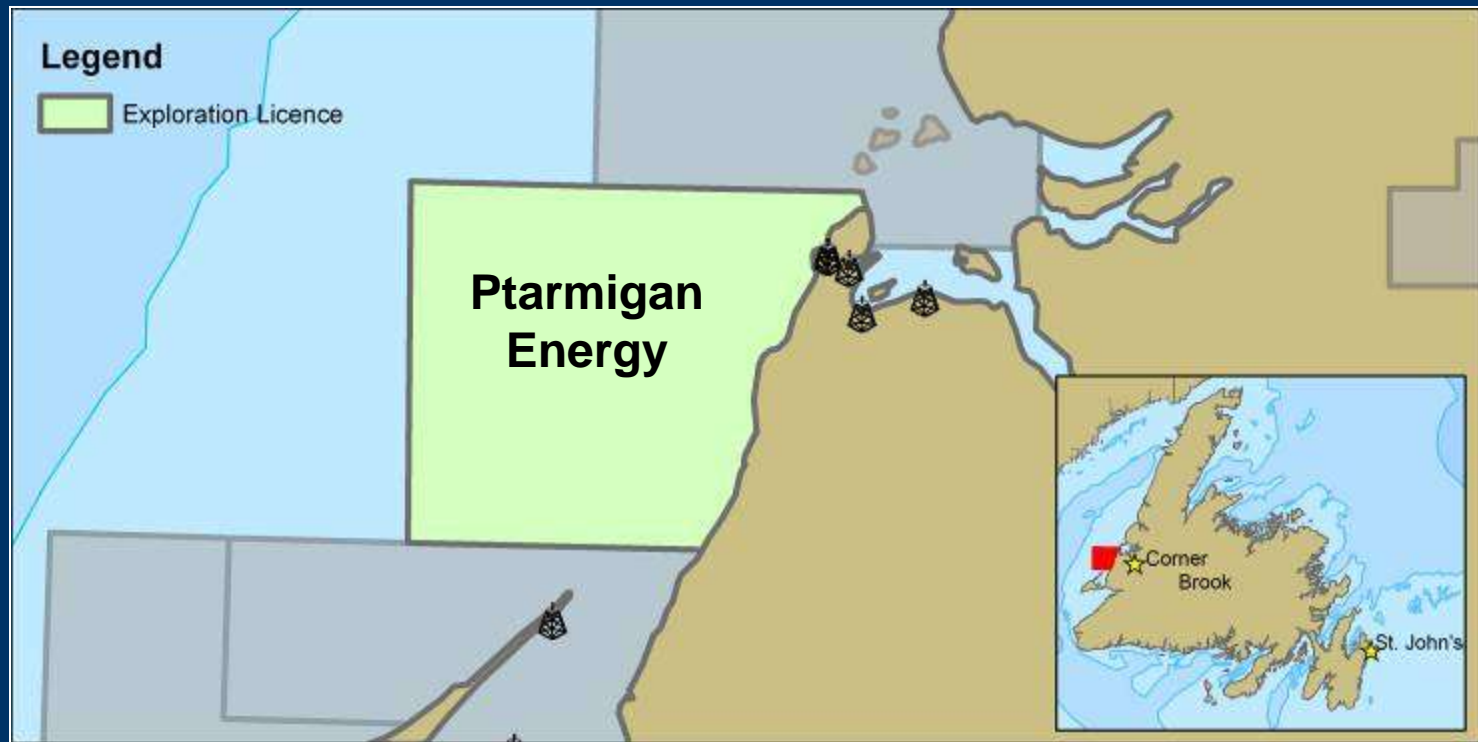


Image credit – NWest Energy Inc.

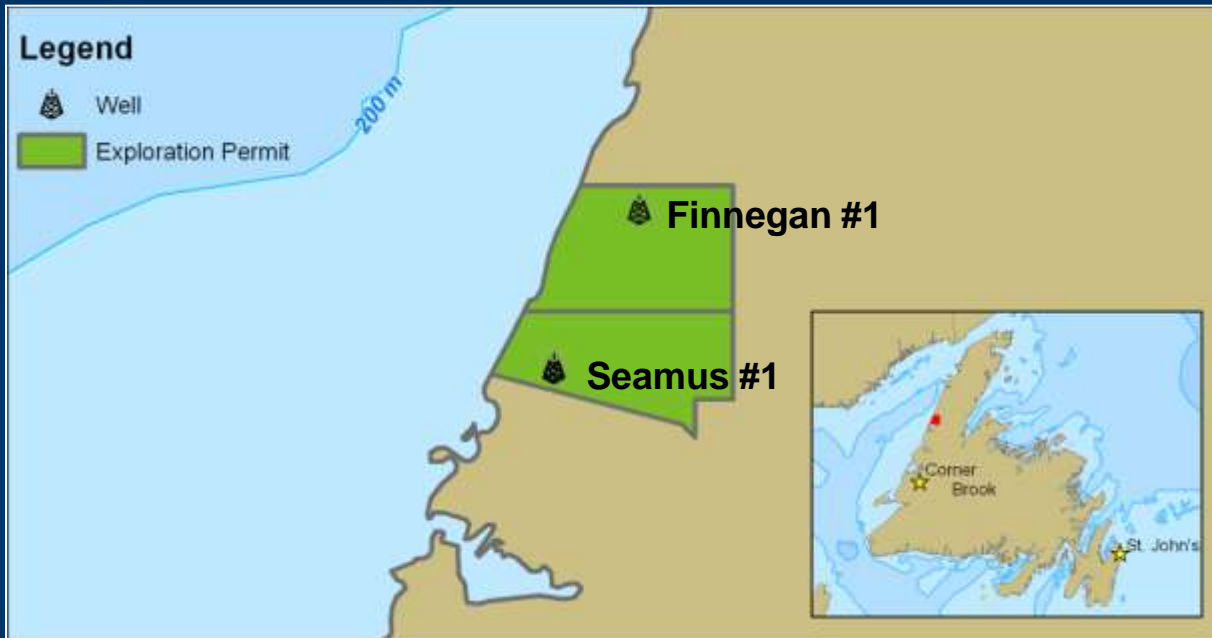
- Four offshore licences totaling almost 660,000ha
- 500 km<sup>2</sup> seismic completed in Dec 2008
- Two resource assessments completed
- Seeking investors/farm in partners

# Ptarmigan Energy Inc.



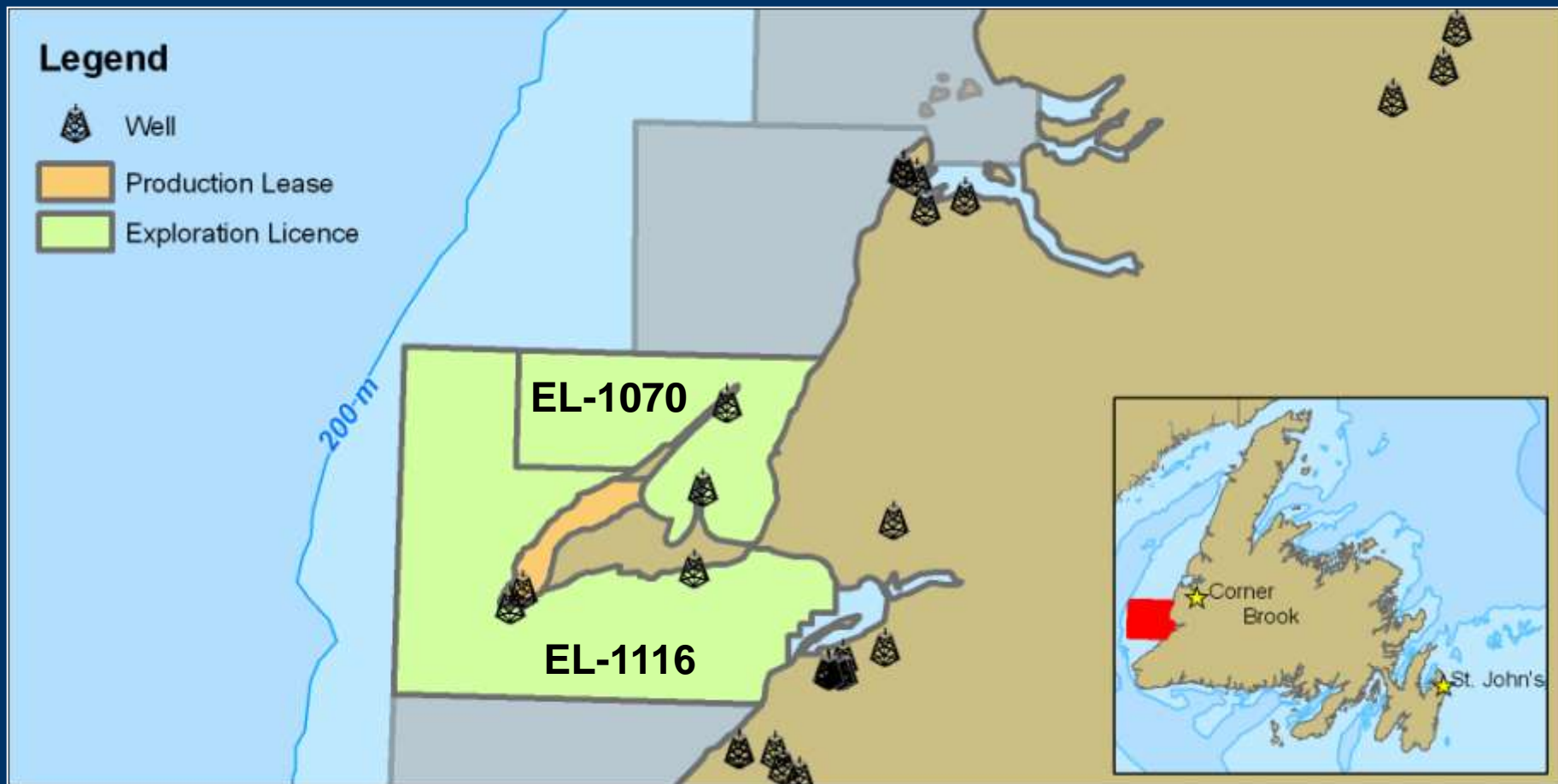
- Offshore exploration licence awarded in 2010
- Over 140,000 ha offshore Western Newfoundland

# Nalcor Energy – Oil & Gas

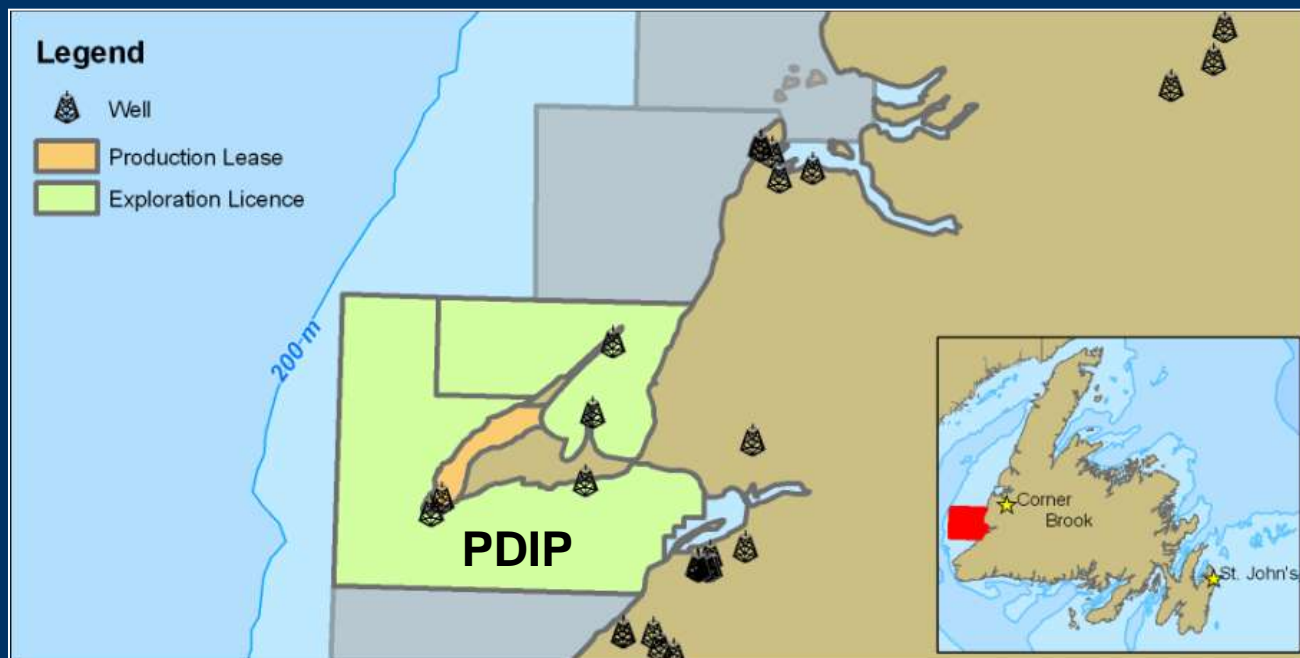


- Two onshore permits in Parson's Pond area
- Two exploration wells drilled in 2010 and both entered gas bearing zones

# Port au Port Area



# PDI Production Inc.



- Offshore exploration licence awarded in 2009
- Over 200,000 ha off Western Newfoundland
- Less than 200m water depth

# Shallow Rights EL-1070



- Offshore exploration licence awarded in 2002
- Over 103,000 ha north of Port au Port peninsula
- Onshore to offshore well to pursue oil-in-shale play
- Casing run to 1711 m / cement
- Plans to test, subject to regulatory approval

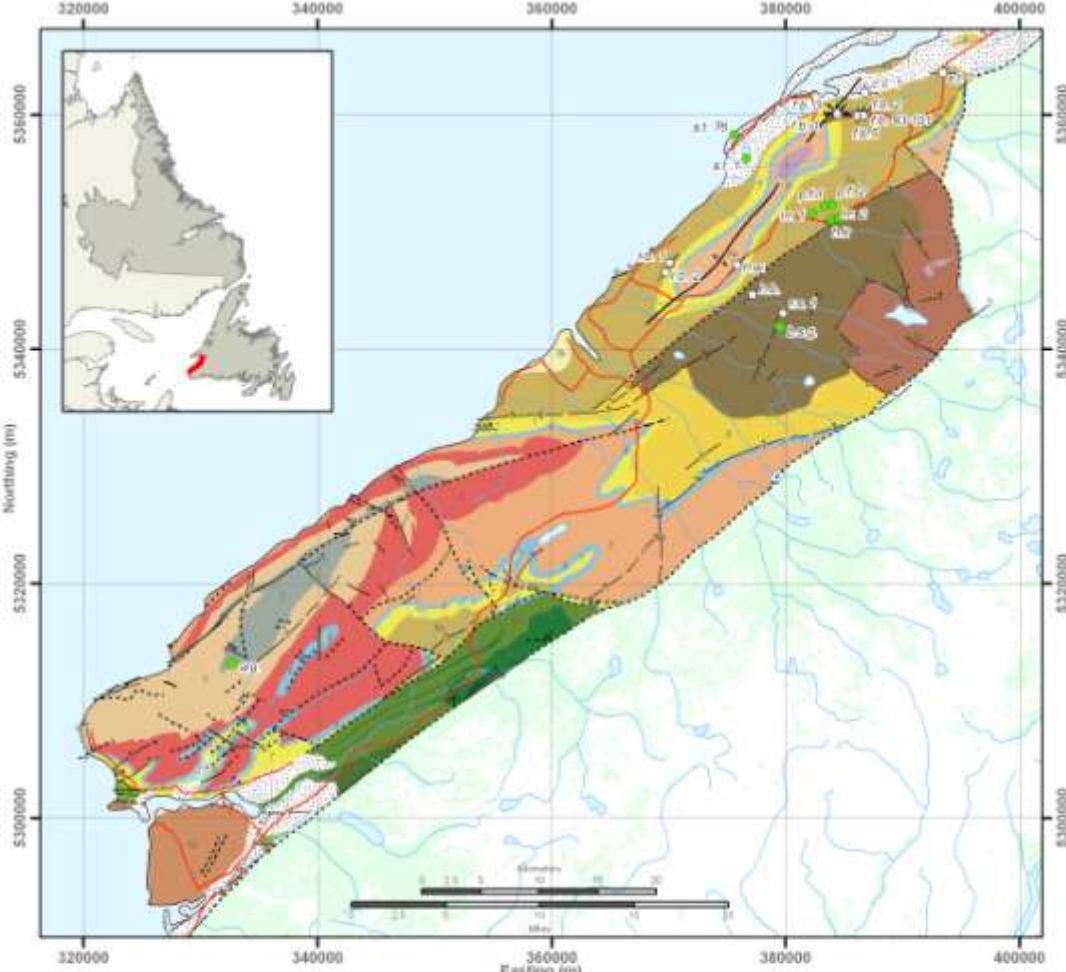
Image credit – Canadian Imperial Venture Corp.

# PDI Production Inc.



Image credit – PDI Production Inc.

- Drilled horizontal sidetrack to discovery well PAP #1 in 2009
- Produced 1,300 bbls in 2010, over 35,000 bbls to date
- Workover program completed in 2010
- Goal: Improve connectivity between wellbore and the reservoir



# Bay St. George Basin

Age: Upper Paleozoic

Area: ~2400 km<sup>2</sup>

Basin Type: Strike-slip

Basin Infill: 9,000+ m

## Source Rock (TOC's)

- (BG) up to 31.9% (L)
- (CG) Woody Cape Fm. – up to 3%
- (CG) Robinson's River Fm. – up to 4%
- (AG) Snakes Bight Fm. – up to 2% (L)

## Kerogen Type

- Type III (terrestrial), minor Type I & II

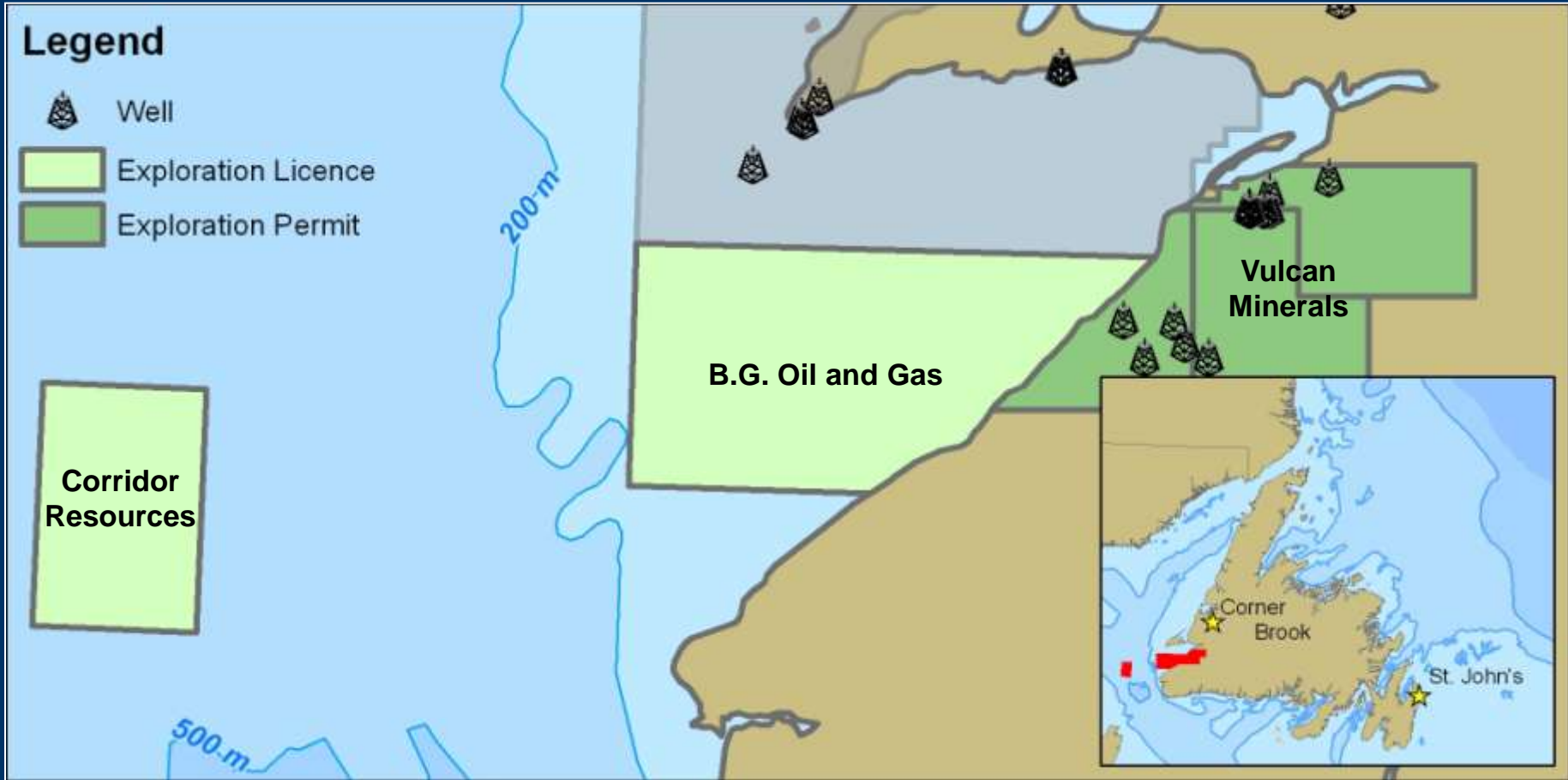
## Thermal Maturity

- variable; northern BSG – 'Oil window'
- southern BSG – mostly 'gas window'



Source: 1) Knight, 1982; 2) Mineral Production, 2004; 3) Bay St. George Geothermal Geology Report, 2011; 2010

# Flat Bay / Bay St. George



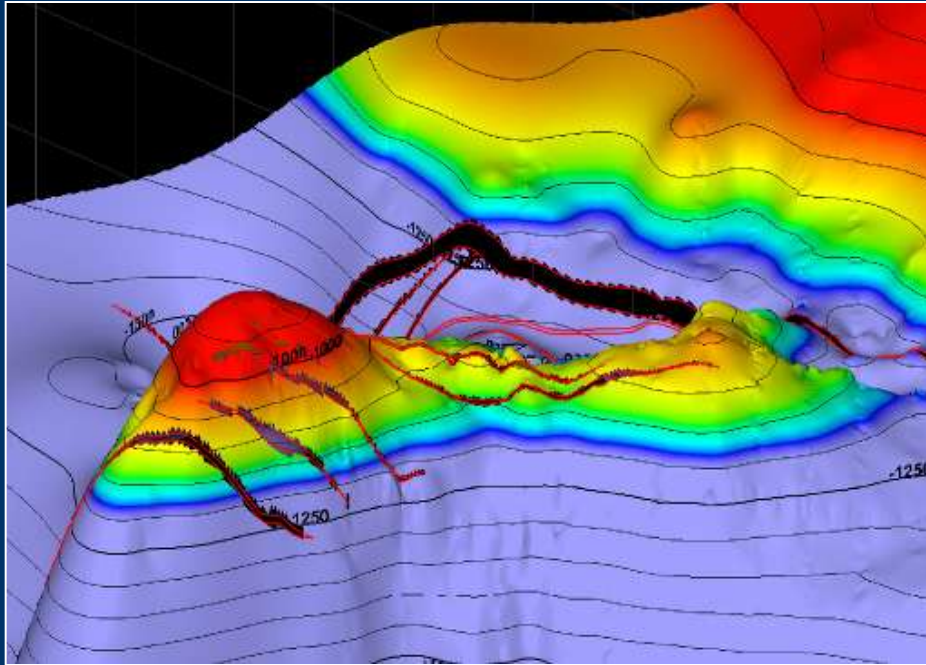
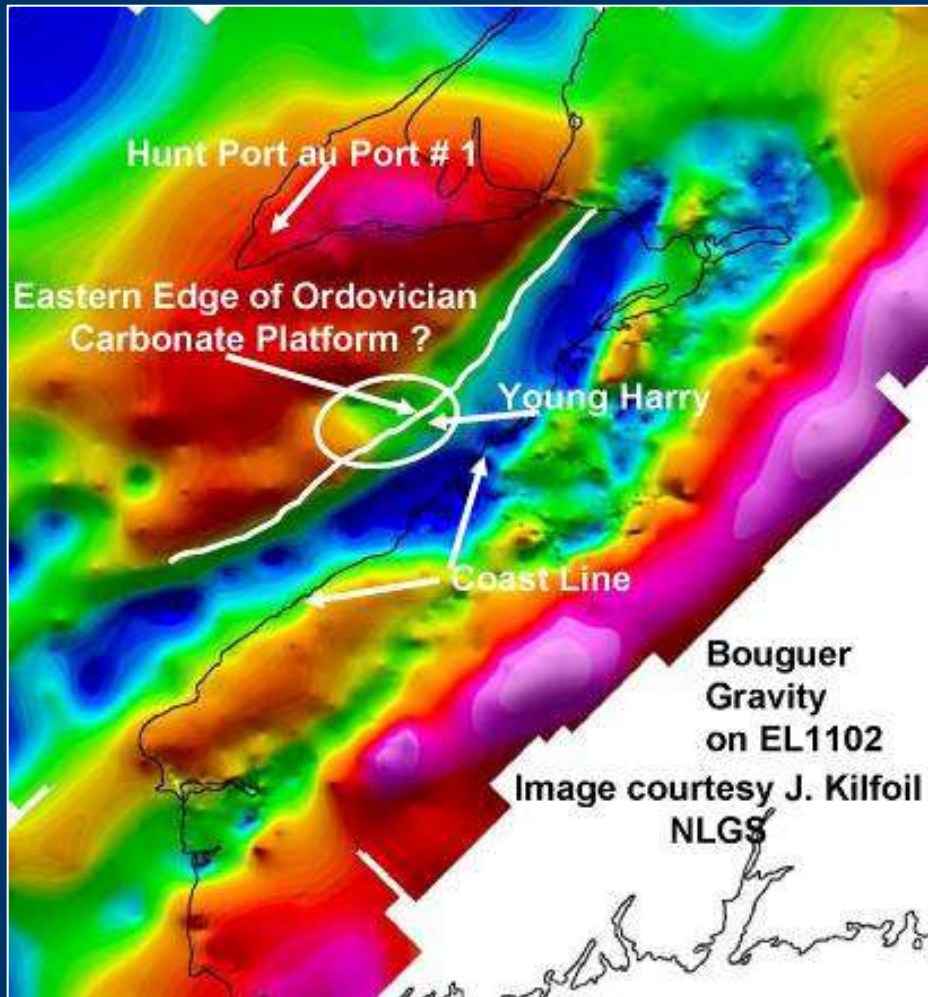


Image credit – Corridor Resources Inc.

- 20,000 ha in Laurentian Channel
- Referred to as the “Old Harry Prospect”
- Soliciting partner interest to drill an exploration well
- EOI issued for drilling unit to drill a well 2012-2014
- Environmental Assessment ongoing

# B.G. Oil & Gas Ltd.



- Offshore exploration licence awarded 2007
- Salt-associated hydrocarbon plays
- “Young Harry”

# Vulcan Minerals Inc.



- Three onshore permits in region
- Re-entered Flat Bay #1, Q3, 2010
- Completed Robinsons #1 & Red Brook #2, Q3-Q4, 2010
- Conducted 130km 2D seismic program, Q3-Q4, 2010
- Permitting underway for new test holes

# Deer Lake Basin

Age: Upper Paleozoic

Area: ~2400 km<sup>2</sup>

Basin Type: Strike-slip

Basin Infill: 3,000+ m

## Source Rock (TOC's)

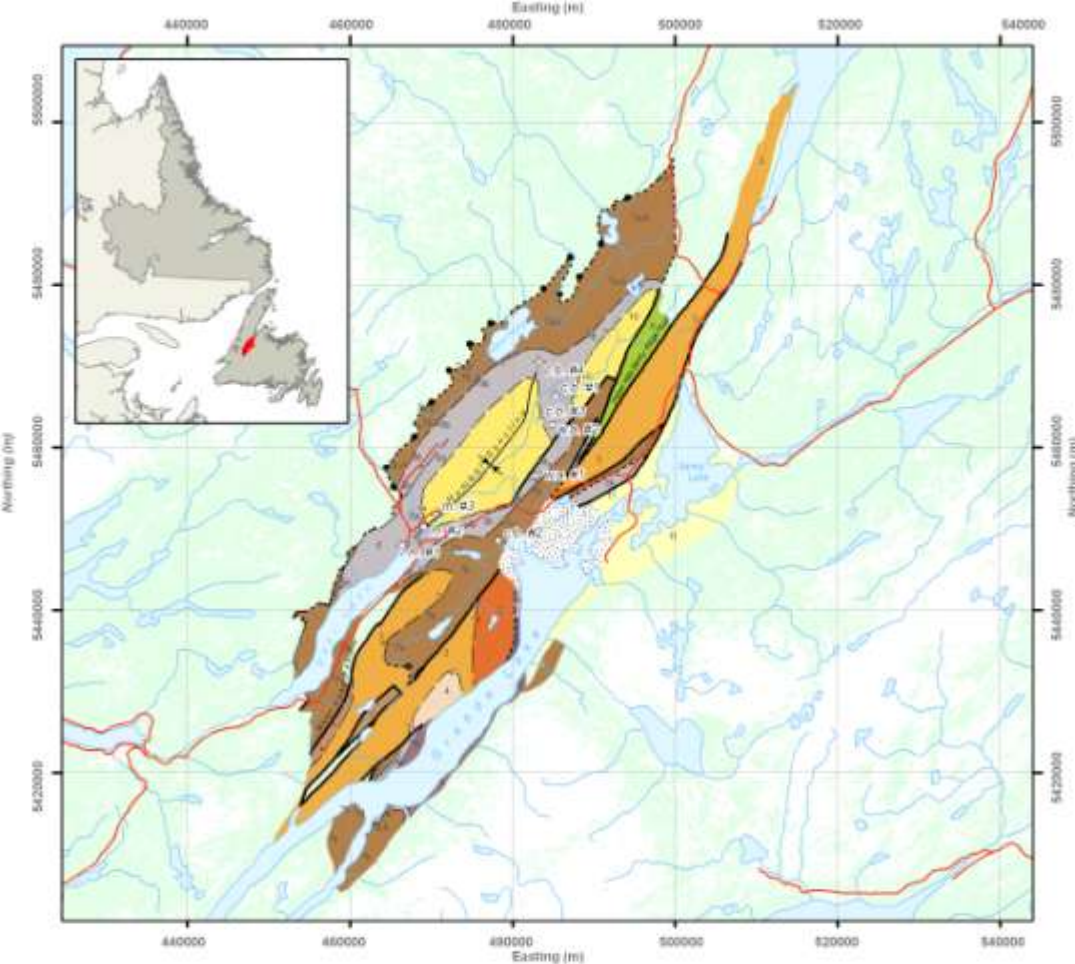
- Rocky Brook Fm. – up to 15.9% (L)
- Forty-five Brook Fm. – up to 2.5% (L)
- Cape Rouge Fm. – no data (L)
- Saltwater Cove Fm. – no data (L)

## Kerogen Type

- Type I (lacustrine), Type III (terrestrial)

## Thermal Maturity

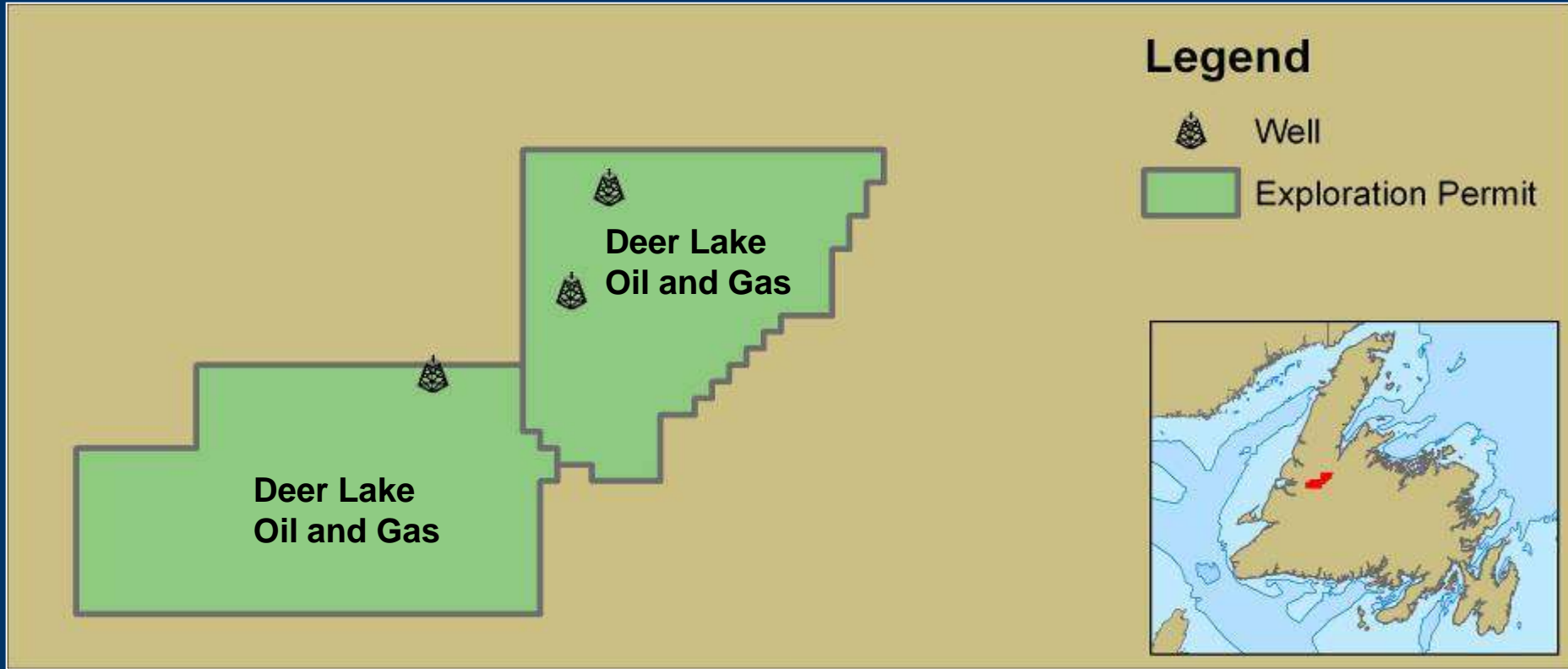
- post-Anguille Group: Immature to mature (oil)
- Anguille Group: late mature to overmature (oil)



### Legend

CARBONIFEROUS		Symbols and Abbreviations	
Westphalian A - Unit 17		Oil and/or Gas Show (suspended)	
11	Howley Formation	i.e. #1... Western Adventure #1	
DEER LAKE GROUP		i.e. #2... Western Adventure #2	
Viséan - Units 5-10		Show of Gas	
10	Humber Falls Formation	c.b. #1... Claybar #1	
8	Rocky Brook Formation	c.b. #3... Claybar #3	
9	Little Pond Brook Formation	m. #1... Mills #1	
7	North Brook Formation	Dry Hole (abandoned)	
Toornaisian - Units 6, 7		c.b. #2... Clay Bar #2	
6	Wigwam Brook Formation	c.b. #4... Clay Bar #4	
5	Weststone Point Formation	m. #2... Mills #2	
ANGUILLE GROUP		m. #3... Mills #3	
Toornaisian and older (?) - Fisher Hills Block - Units 1-4		Contact, defined	
4	Thirty-fifth Brook Formation	Contact, approximate	
3	Saltwater Cove Formation	Contact, assumed	
2	Forty-five Brook Formation	Contact, assumed	
1	Blue Gulch Brook Formation	Contact, transitional	
Surficial Deposits		Fault, approximate	
Major Roads		Fault, assumed	
		Syncline	
		Unconformity, assumed	

# Deer Lake

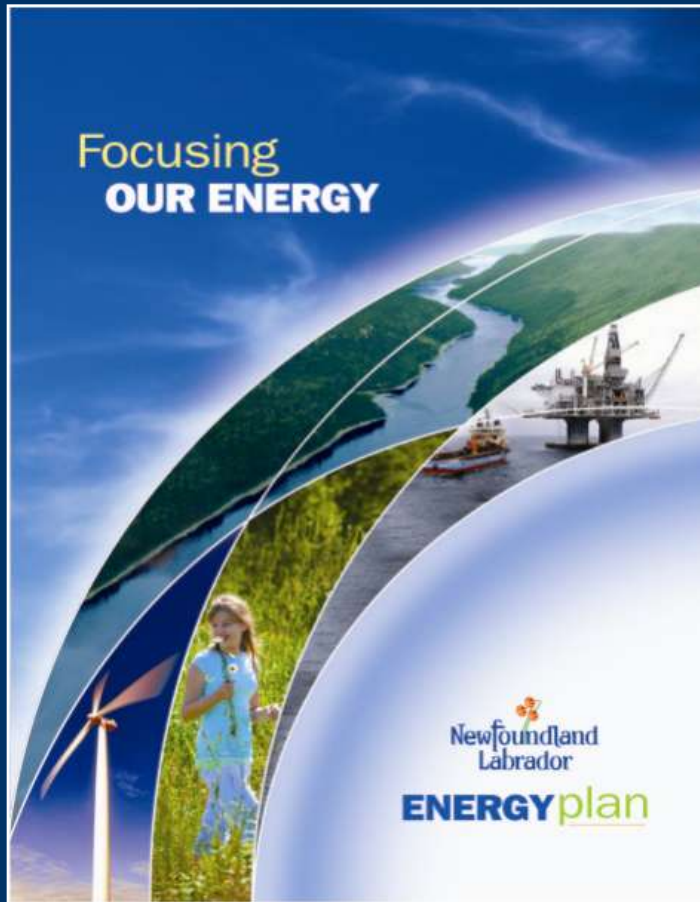


# Deer Lake Oil and Gas Inc.

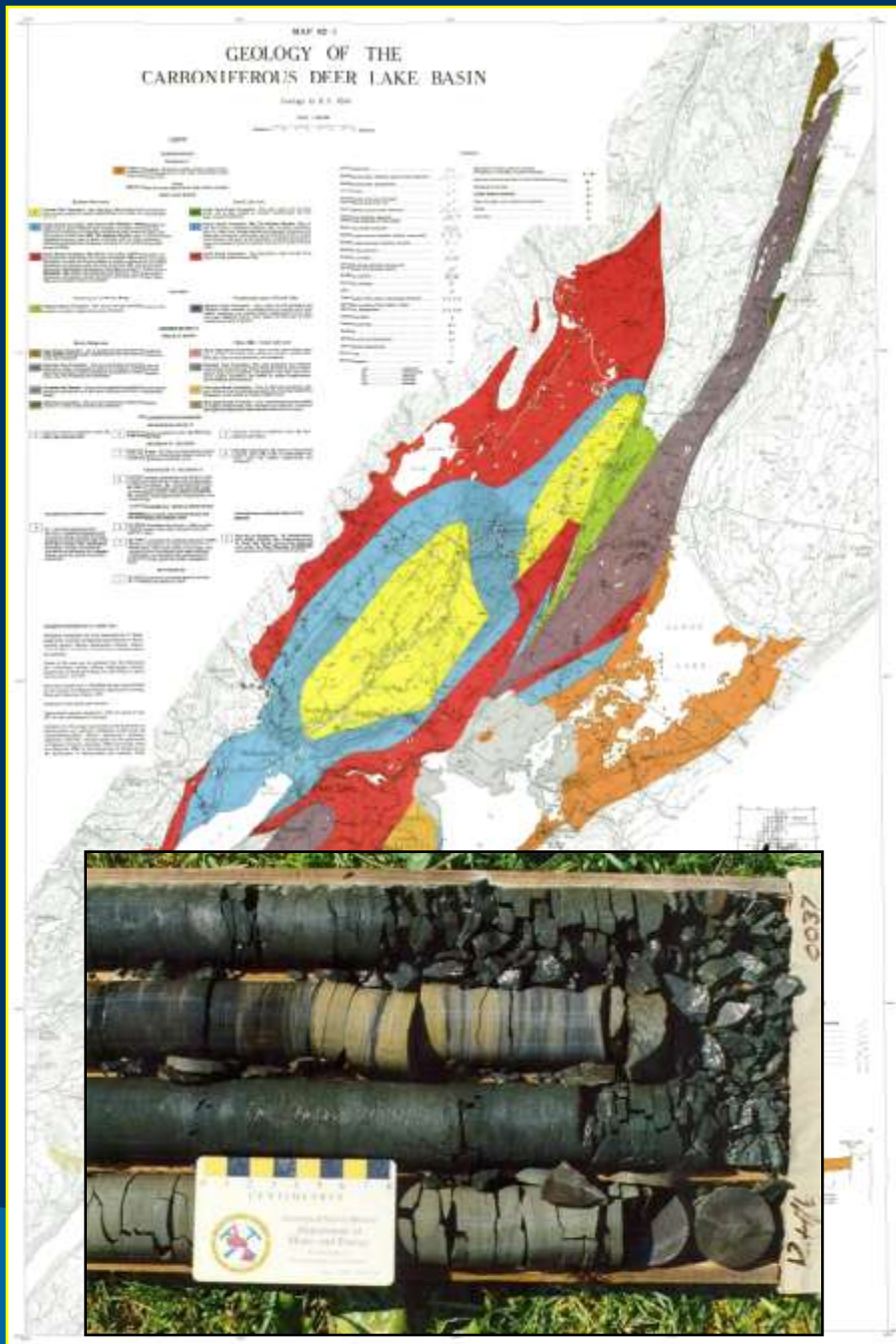


- Two exploration permits in Deer Lake Basin
- Drilled Werner Hatch exploration well in 2010
- Currently evaluating drilling results including an analysis of recovered core

# Petroleum Exploration Enhancement Program (PEEP)



- \$5 million onshore program jointly administered by the Department of Natural Resources and Nalcor Energy
- Currently supporting 18 projects in Western NL with \$2 million allocated to date.
- Projects include developing new seismic sources, acquisition of hi-res aeromag data, reprocessing of seismic data, geological and geochemical studies.



# PEEP Funded Project

Michael Kelly & Elliott Burden

“Atlas of strata and source rock characteristics for the Rocky Brook Formation, Deer Lake Group, Newfoundland and Labrador”

- Pasadena Core Library (7 of 9) & active mineral exploration program (3).
- Core examined for lithology, sedimentary structures; sampled for Rock-eval analysis; core photography.
- Plus – archival assessment reports; core & sample data summarized.
- Results - Core Atlas produced for Rocky Brook Fm.; assessment of thermal maturity & generative capacity.



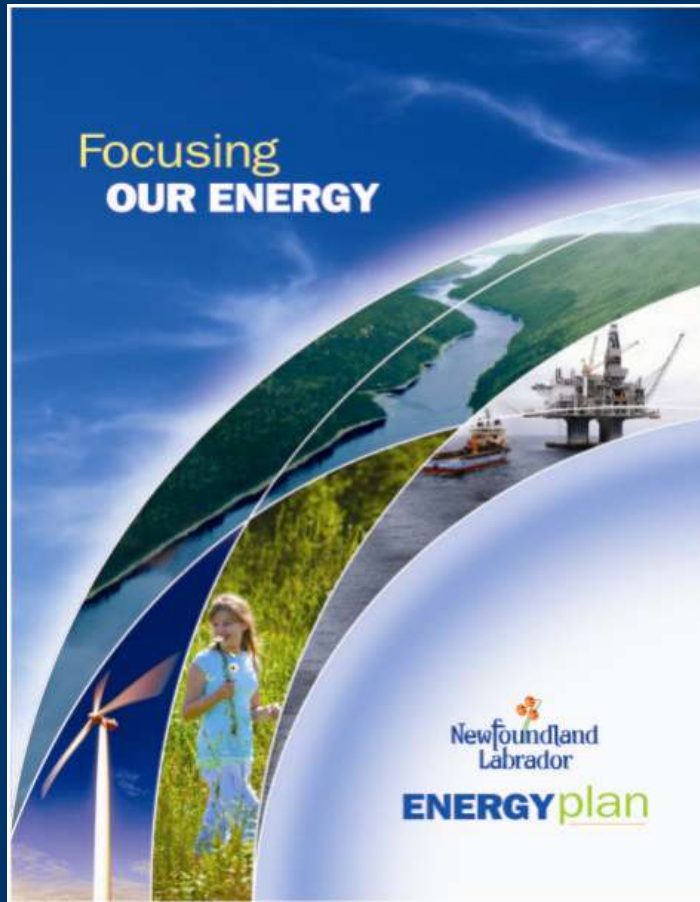
**Atlas of strata and source  
rock characteristics for the  
Rocky Brook Formation,  
Deer Lake Group,  
Newfoundland and Labrador**

**Michael Kelly and  
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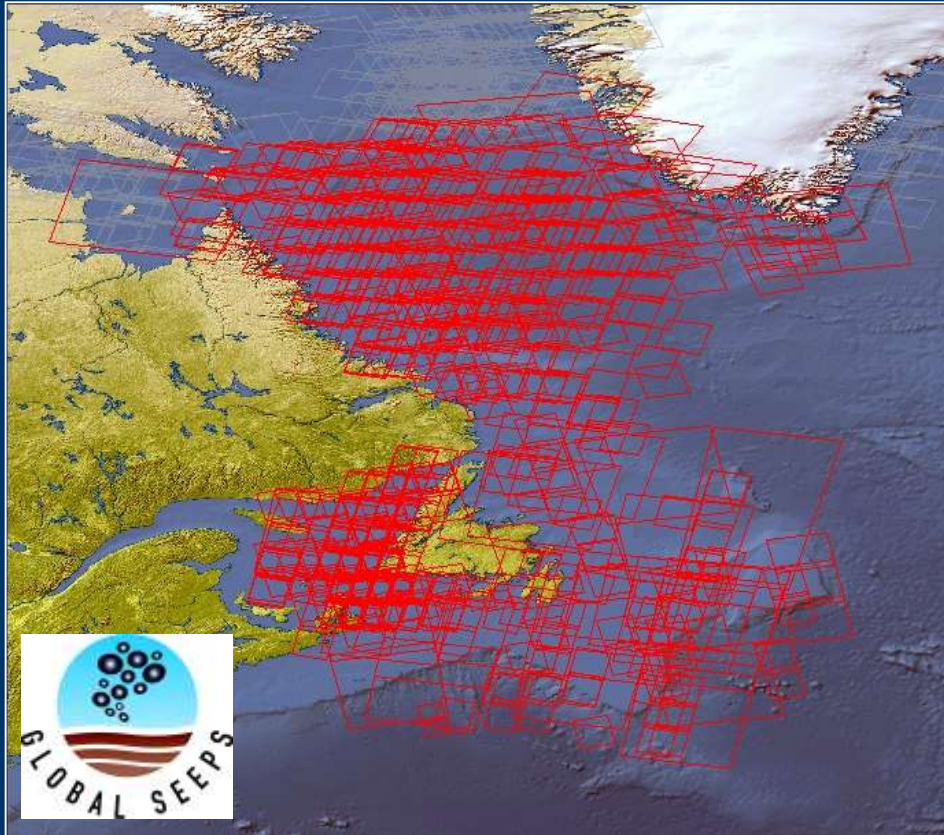
**148 pages**

# Offshore Geoscience Data Program (OGDP)



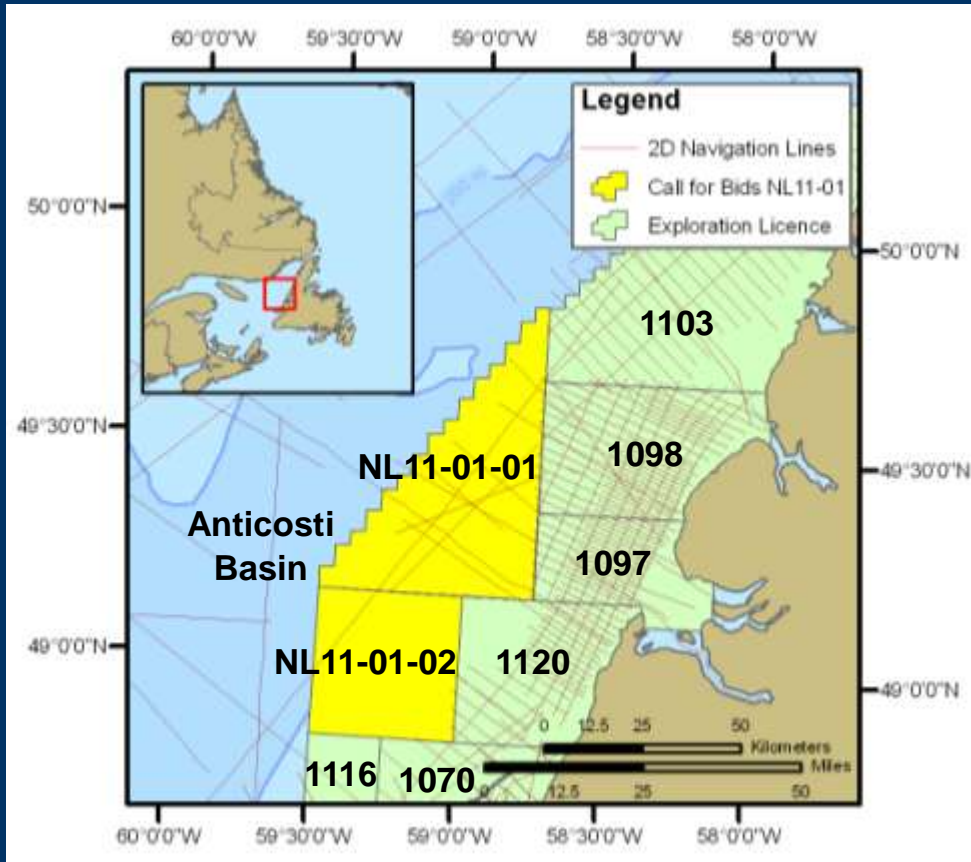
- \$20 million offshore program jointly administered by the Department of Natural Resources and Nalcor Energy
- Currently supporting 7 projects offshore with \$10 million allocated to date, 5 of these projects with \$4 million value relevant to Western NL
- Projects in Western NL include planned acquisition of hi-res aeromag data, and satellite seep surveying.

# Offshore Oil Seeps Survey



- OGDG initiative of Nalcor Energy and Astrium Services
- Study Area: Offshore Newfoundland and Labrador, 1.5 million sq. kms
- Data added to Astrium's Global Seeps database
- Data available by licence

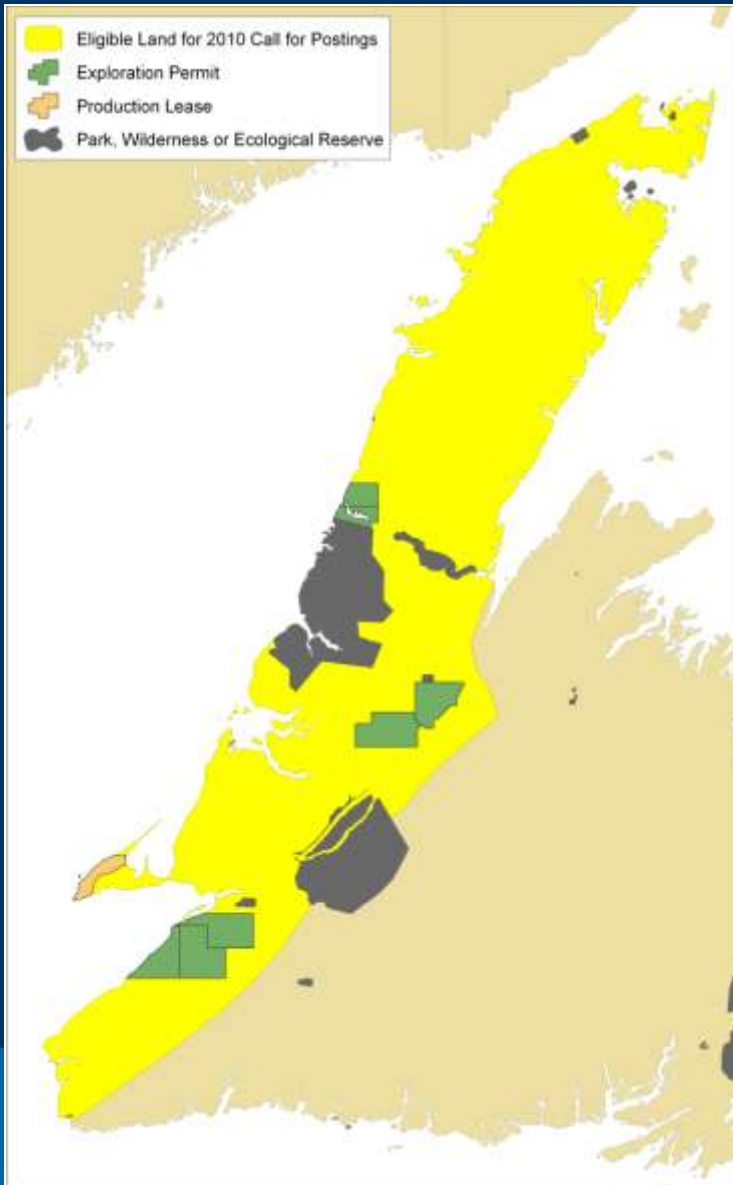
# 2011 Call for Bids - Anticosti Basin



## Call For Bids NL11-01

- 2 parcels – 353,988 hectares (874,723 acres)
- Average water depth: 143 m
- Water depth range: 30 – 240 m
- Close: Nov 15, 2011 (4 pm)

# Onshore Call for Postings



## Onshore Land Rights – Issuance Process



# Summary

- Three onshore basins (with proven petroleum systems)
- Conventional & Unconventional resource plays
- Multiple play types & associated reservoir rock
- Multiple, rich source rocks (Type I, II, III) – variable maturity
- Large land parcels (onshore – up to 40,000 ha; offshore – up to 80,000 ha)
- Modern data & core libraries (onshore & offshore)
- Call for Bids (offshore) – close on Nov. 15, 2011 @ 4pm
- Potential Request for Bids (onshore) - late 2011 / early 2012

**Thank You – Questions??**



[www.nr.gov.nl.ca/nr](http://www.nr.gov.nl.ca/nr)

Visit the DNR Booth at GeoExplo

Sample Location: **TEA COVE** – Port au Port Peninsula