



Conservation and
Restoration Program

Coastal Resilience to an Invasive Species

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Project Manager – Parks Canada



Kejimikujik Seaside inventories conducted 1986-87

“Every surface under water is covered with life.”
- Burzynski 1992



...But when we looked a little
closer while developing
monitoring measures



Initial Observations

- Declining eelgrass beds to 2%
- Decrease in juvenile soft shell clam abundance
- Water quality concerns



R. D'Entremont



Zostera marina



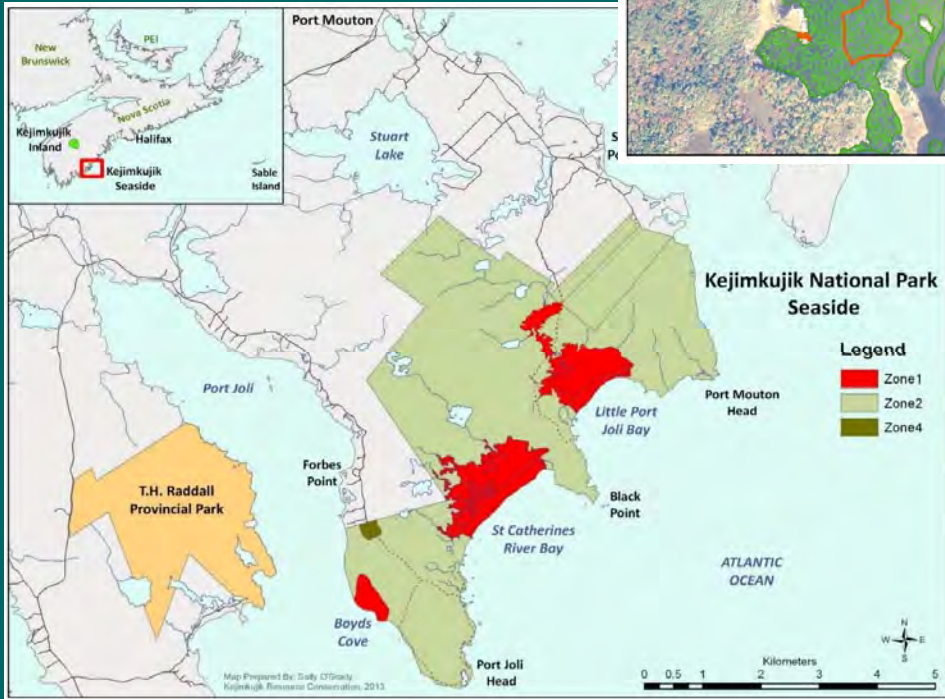
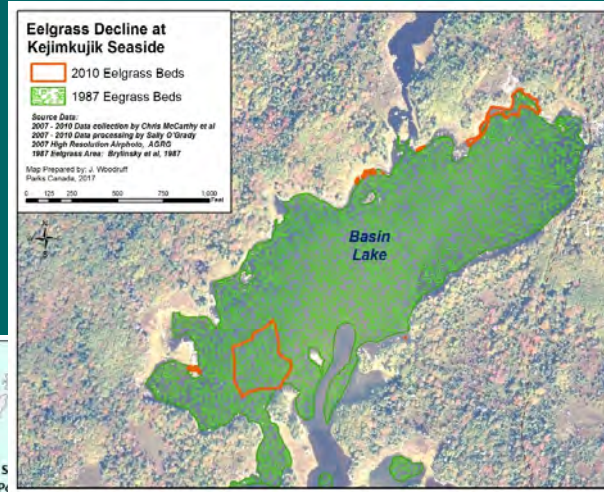
Mya arenaria

Coastal Measures	State
Piping Plover	
Barrier Beach Stability	
European Green Crab	
Soft-shell Clam	
Eelgrass	
Salt Marsh Vegetation	
Estuarine Water Quality	

Condition ³				Trend			
							N/R
Good	Fair	Poor	Not Rated	Improving	Stable	Declining	Not Rated



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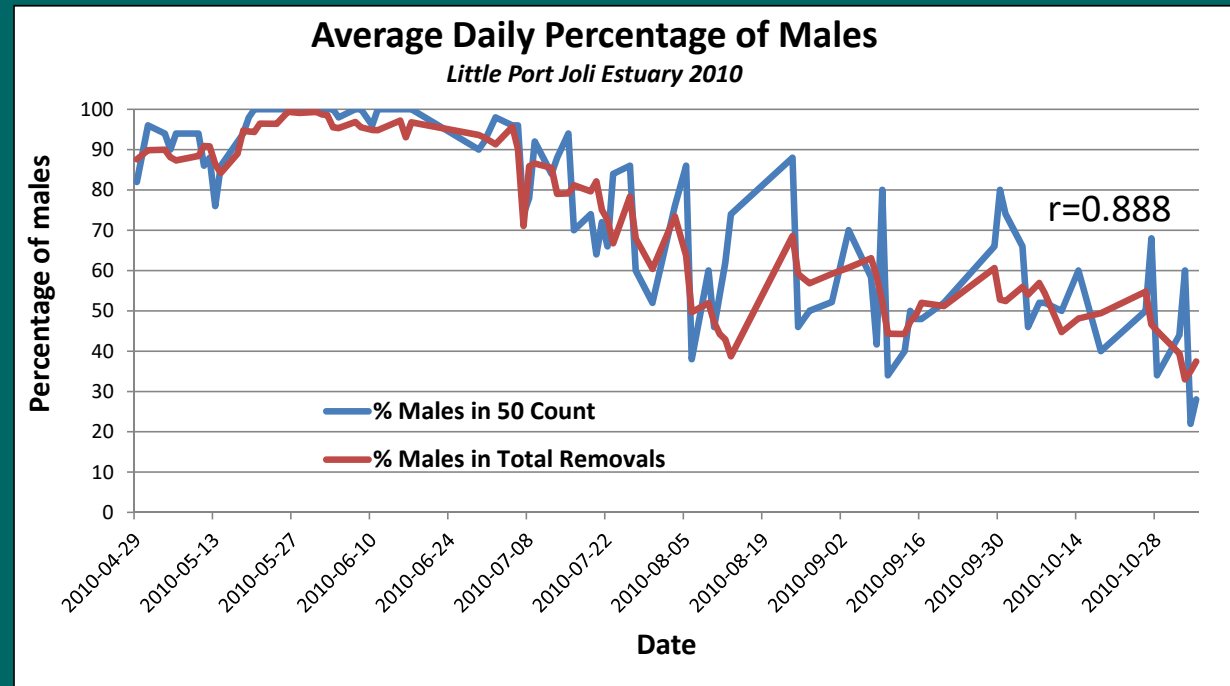
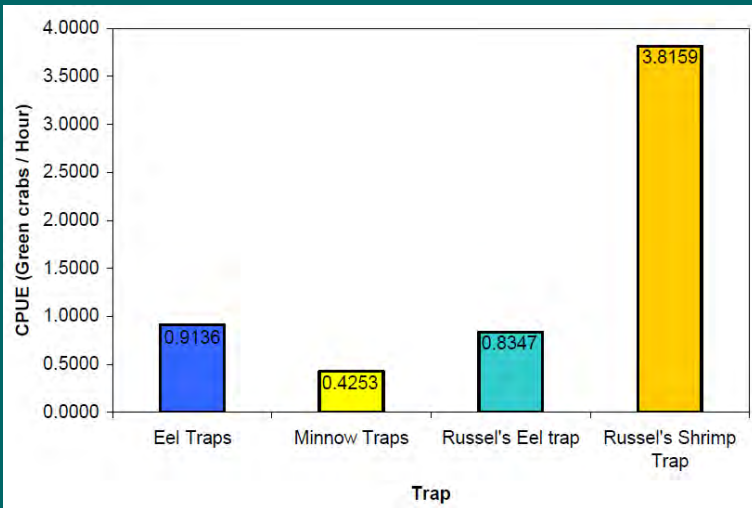
RestorAction!

- Discussions with DFO, fishers and ecosystem experts
- Focus on LPJ Estuary before eelgrass entirely lost from Kejimikujik Seaside
- Unique geography permitted evidence-based decision making
- Could we control green crab impacts?
- Pilot project → refine methods → CoRe



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Evidence-based decision-making





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Evidence-based decision-making

Removals with daily 50 counts

Objective: Remove as many green crabs as fast as possible

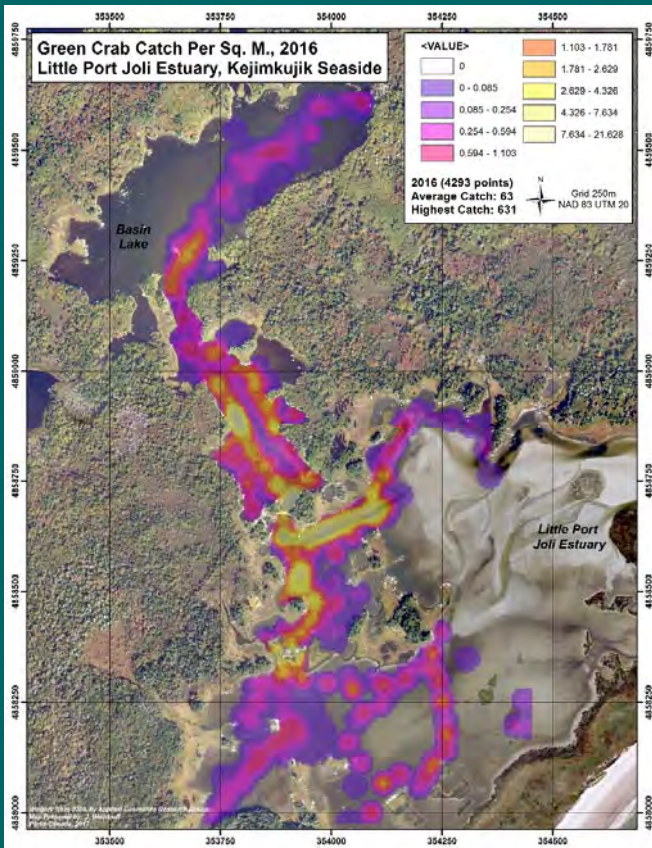
Standardized Monitoring

Objective: Long term standardized EI monitoring of green crabs

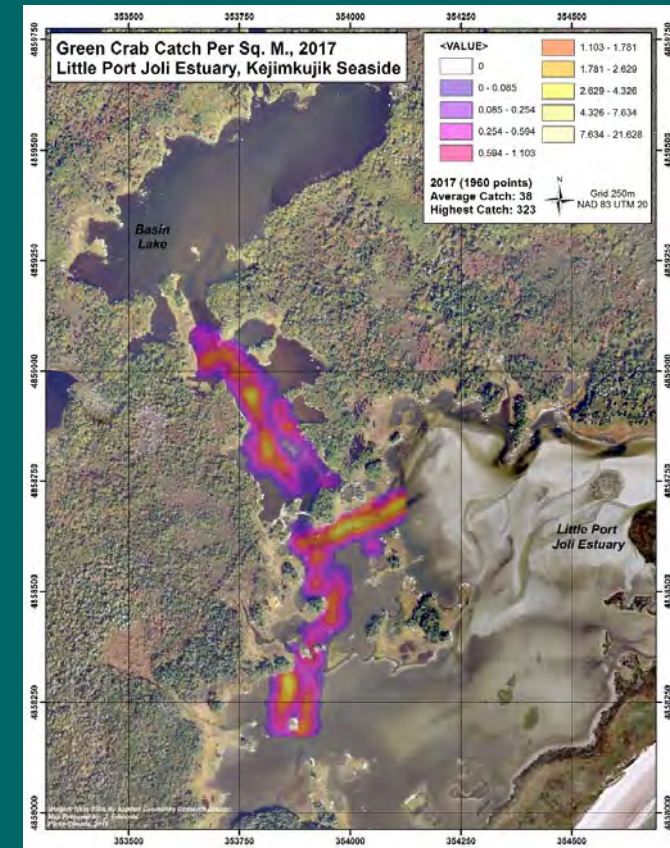




Green Crab *Removals*



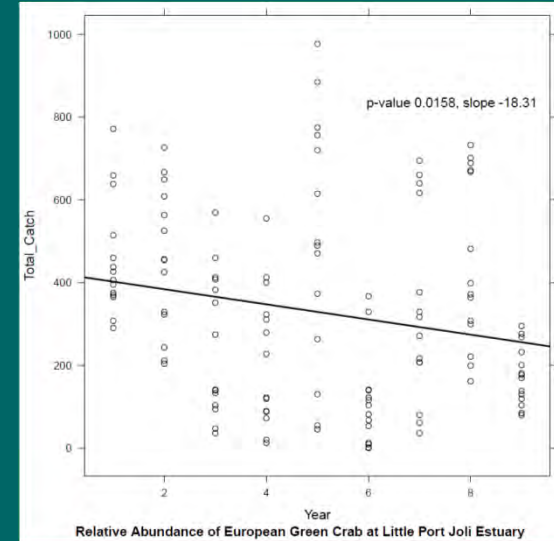
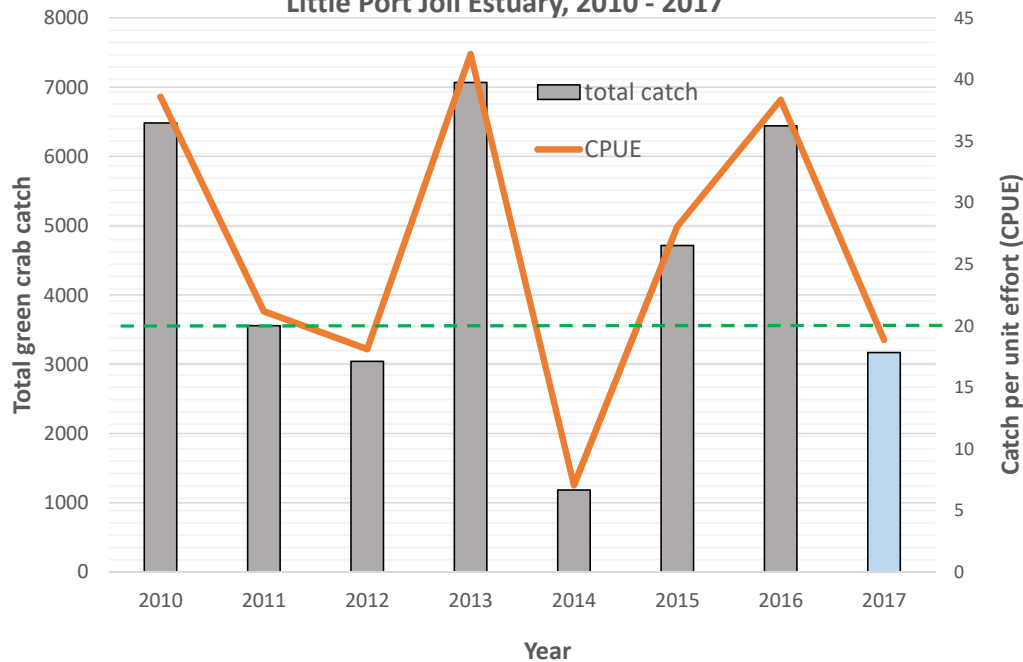
REMOVALS LPJ			
Year	Trap days	Total green crab	CPUE
2010	3532	175,110	49.57814
2011	6821	488,202	71.57338
2012	6879	278,813	40.53104
2013	5716	271,832	47.55633
2014	9196	254,679	27.69454
2015	4631	75,406	16.28288
2016	4035	167,418	41.49145
2017	2750	147,392	53.59709
Grand Total	43,560	1,858,852	42.67337





Green Crab *Monitoring*

Green Crab Monitoring at Kejimikujik Seaside's
Little Port Joli Estuary, 2010 - 2017



- Preliminary monitoring set the baseline for testing methods
- Threshold of 20 crabs/trap
- Variability due to Removals?
- Significant relationship between Removals and Monitoring



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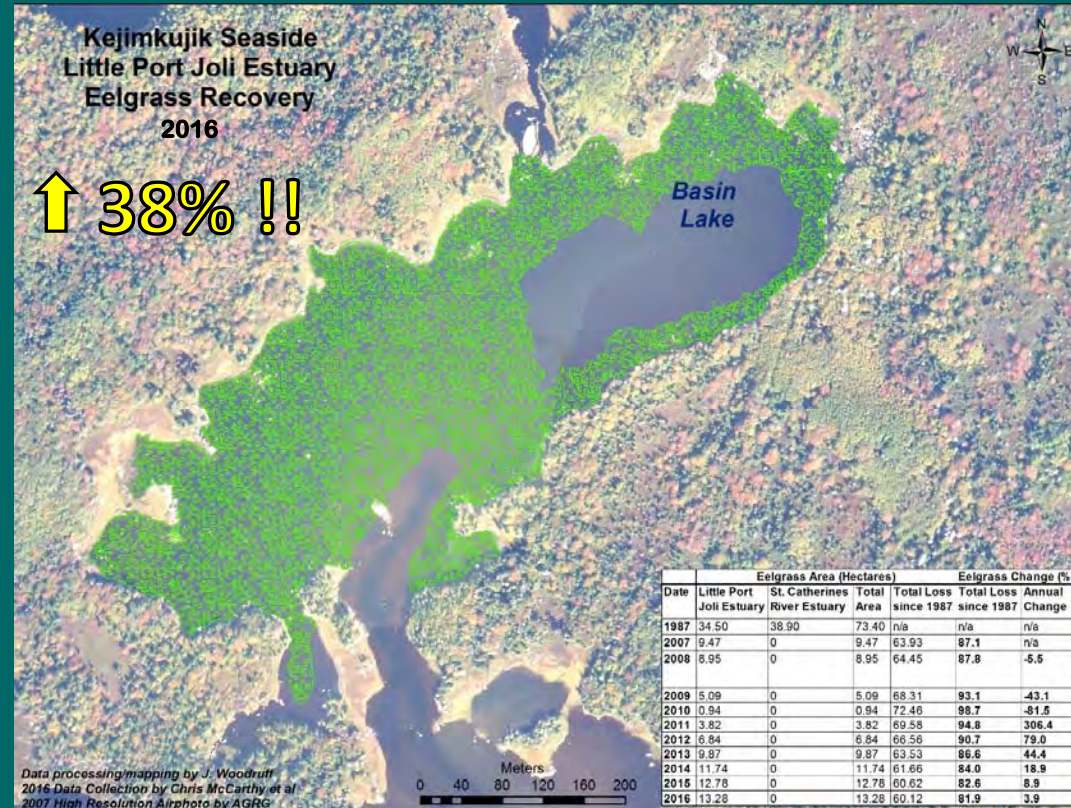
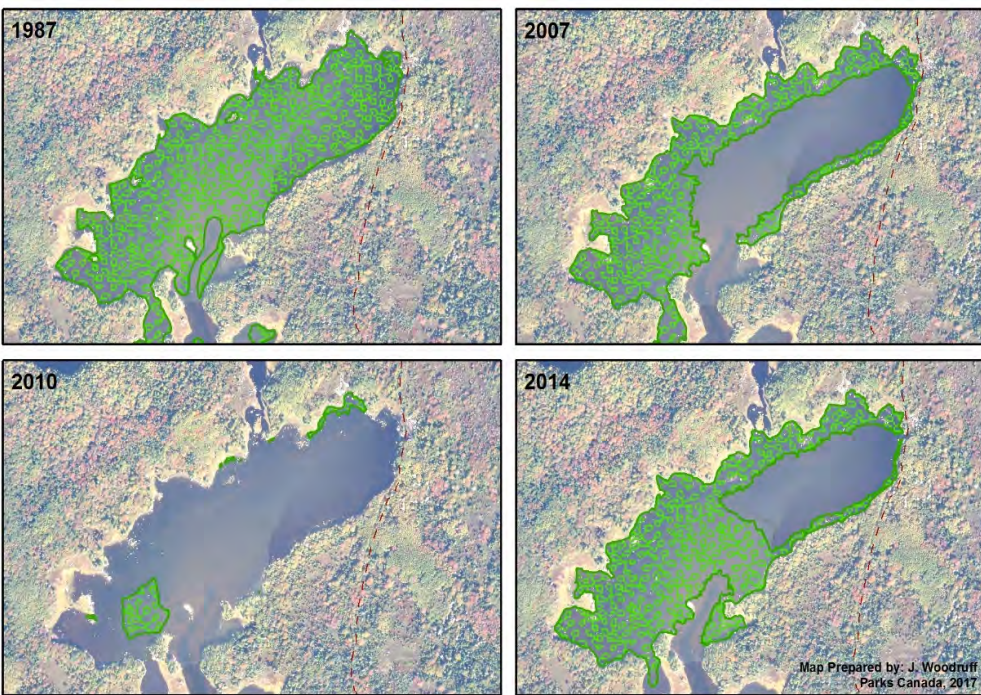
Coastal Ecosystem Resilience

Capacity for an ecosystem to return to a stable
state following a perturbation.....



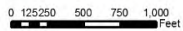


Resilience – Eelgrass recovery



Eelgrass at Kejimikujik Seaside

Eelgrass Beds



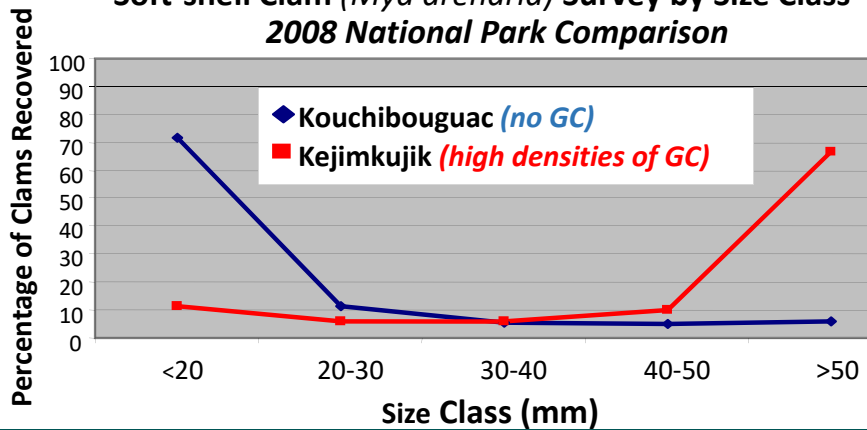
Source Data:
2007 - 2010 Data collection by Chris McCarthy et al
2007 - 2010 Data processing by Sally O'Grady
2007 High Resolution Airphoto, AGRG
1987 Eelgrass Area: Brylinsky et al, 1987



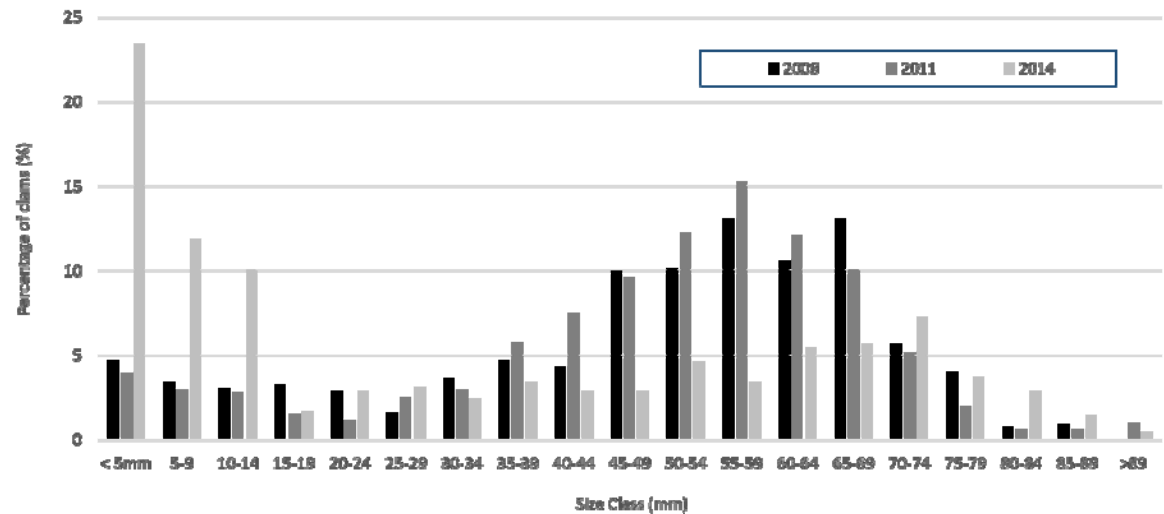
Resilience – Soft shell clam recovery



Soft-shell Clam (*Mya arenaria*) Survey by Size Class
2008 National Park Comparison



Size Class Frequency of Soft-shell Clams
Standardized Monitoring, Little Port Joli Estuary 2008-2014





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Resilience – Community of practice

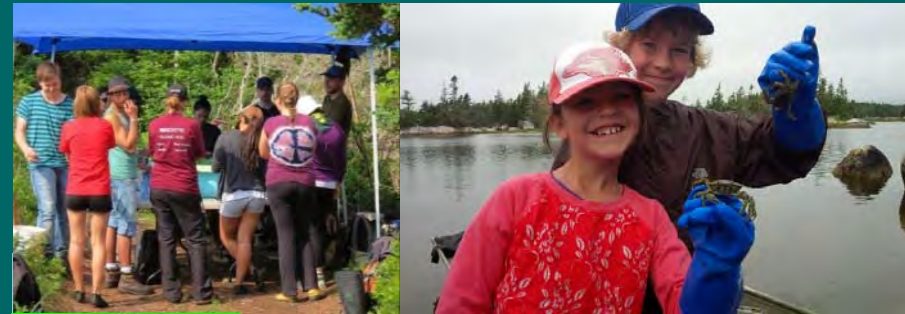
- Building on restoration success
 - Placentia Bay, PEI MPA, Bouctouche, Pictou Landing, Maine and Massachusetts USA
- Honing in on effort required
- Unique VE offer *Gone Crabbin'*
- Sustainability going forward





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Youth employment, volunteers and visitors





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Green Crab R&D
Friends of Port Mouton Bay
Fisheries and Oceans Canada, Small Craft Harbours
Mersey Tobeatic Research Institute
SeagrassNet
Kejimkujik Volunteer Program / Friends of Keji



Prior to green crab removals

Coastal Measures	State
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After green crab removals

Kejimikujik National Park of Canada

Indicators

5 Coastal/Marine

- Soft-shell clam
- Piping plover
- European green crab
- Eelgrass extent
- Barrier beach stability

Green Crab Trapping at Kejimikujik Seaside

- Trail
- Lake
- River
- Lagoon

Imagery from 2009, AGRG

Map Prepared by: J. Woodruff
Parks Canada, 2017

0 250 500 1,000 1,500 2,000 2,500 Feet



Zone	Area (hectares)
Lake	18.15
River	7.35
Lagoon	89.64



