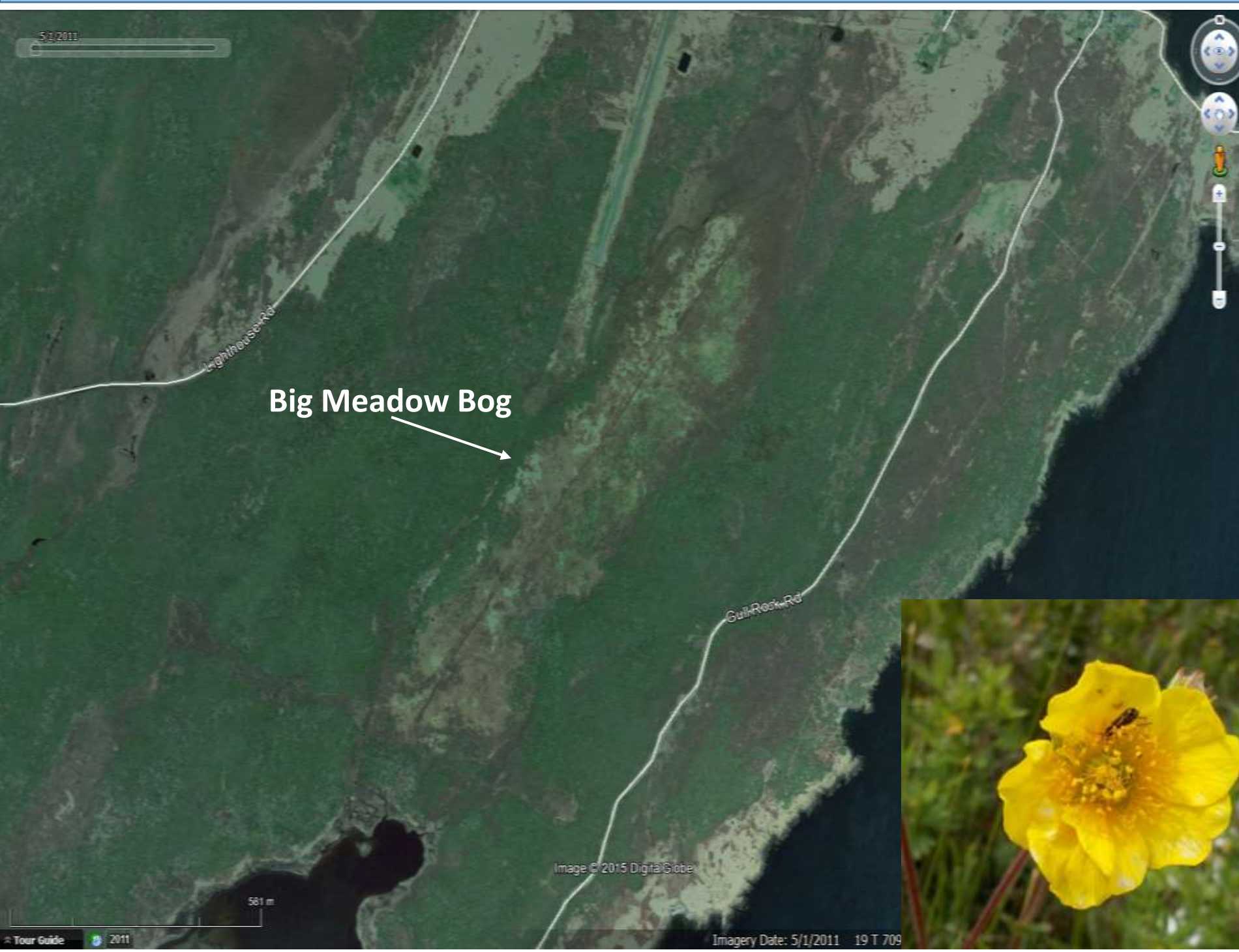


## AND RECOVERY OF THE ENDANGERED EASTERN MOUNTAIN AVENS

Nick Hill<sup>1</sup>, John Brazner<sup>2</sup>, Samara Eaton<sup>3</sup>, Craig Smith<sup>4</sup>, John Drage<sup>5</sup> and Sherman Boates<sup>2</sup>

<sup>1</sup>Fernhill Institute, Berwick, NS, Canada; <sup>2</sup>Department of Natural Resources, Kentville, NS, Canada; <sup>3</sup>Environment Canada, Sackville, NB, Canada;

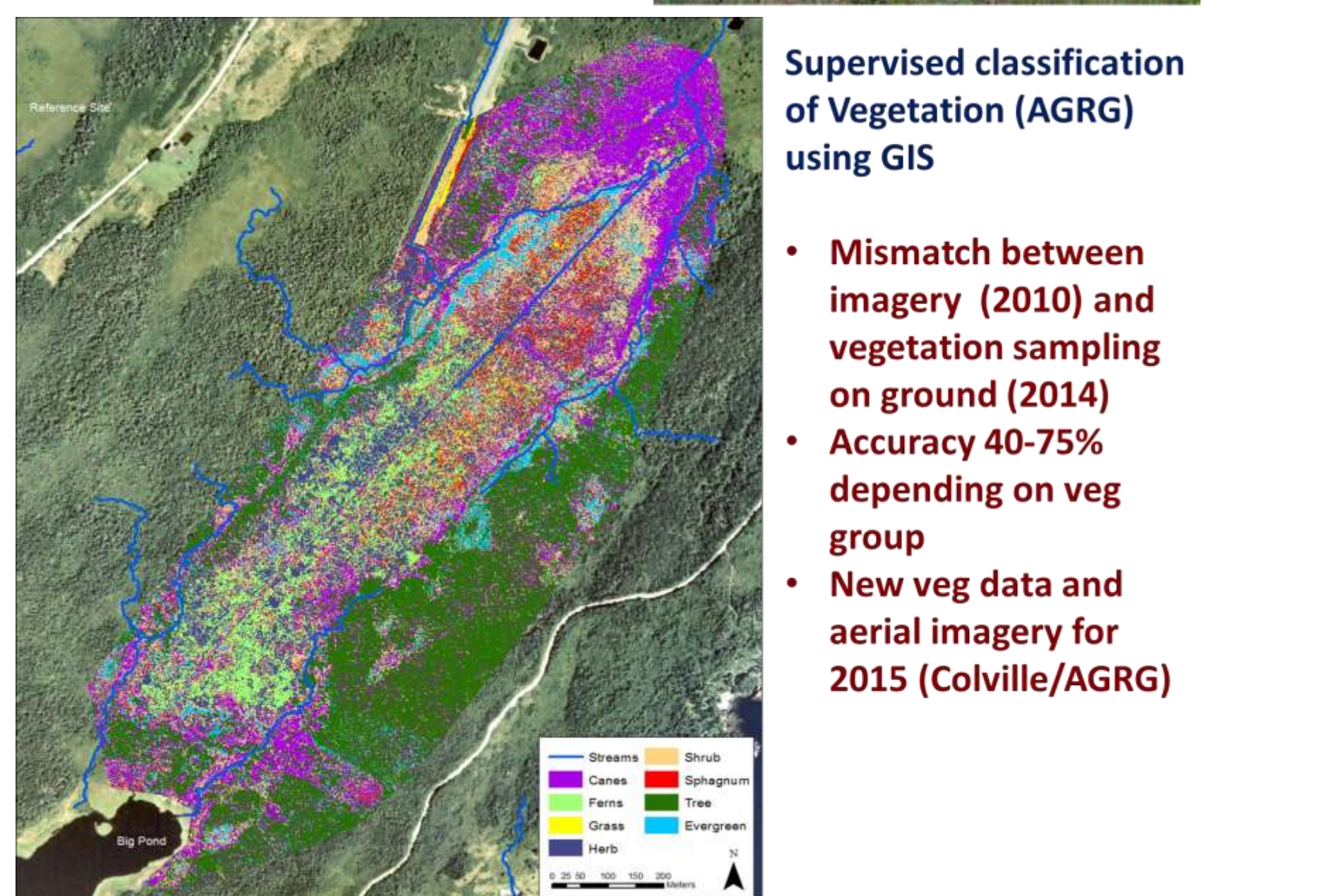
<sup>4</sup>Nature Conservancy of Canada, Halifax, NS, Canada; <sup>5</sup>Department of Natural Resources, Halifax, NS, Canada



1928  
 "That was another thing that I can remember, it was always, like I say it was a great expanse, there was no other place on the island that had much open land. When you walked down there you could see from one end to the other. Not like now, you can't see anything now."  
 Brier Island Elder 2014



Three impacts of 50 years of drainage...



Supervised classification of Vegetation (AGRGR) using GIS

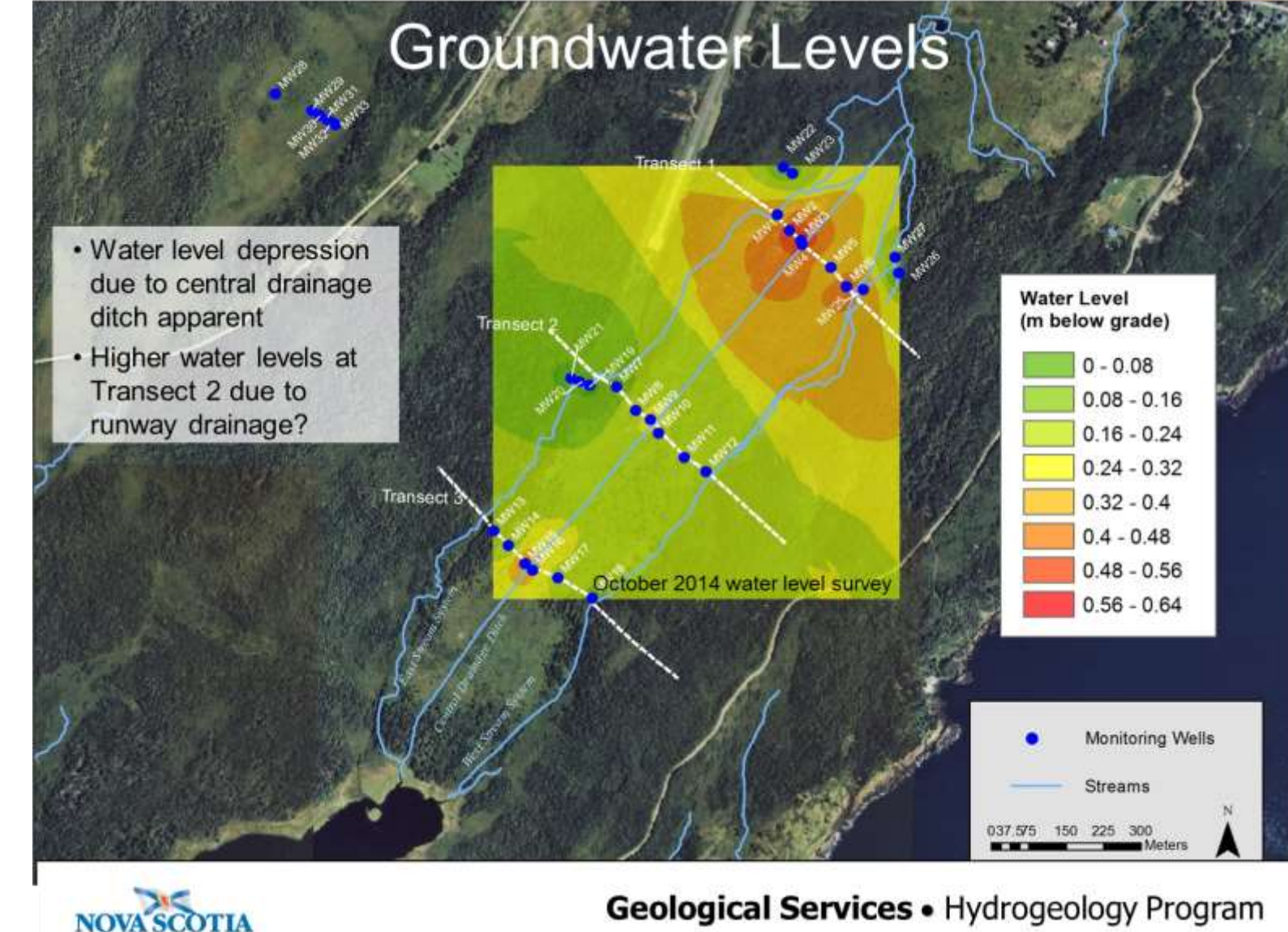
- Mismatch between imagery (2010) and vegetation sampling on ground (2014)
- Accuracy 40-75% depending on veg group
- New veg data and aerial imagery for 2015 (Colville/AGRGR)

Other Baseline Studies

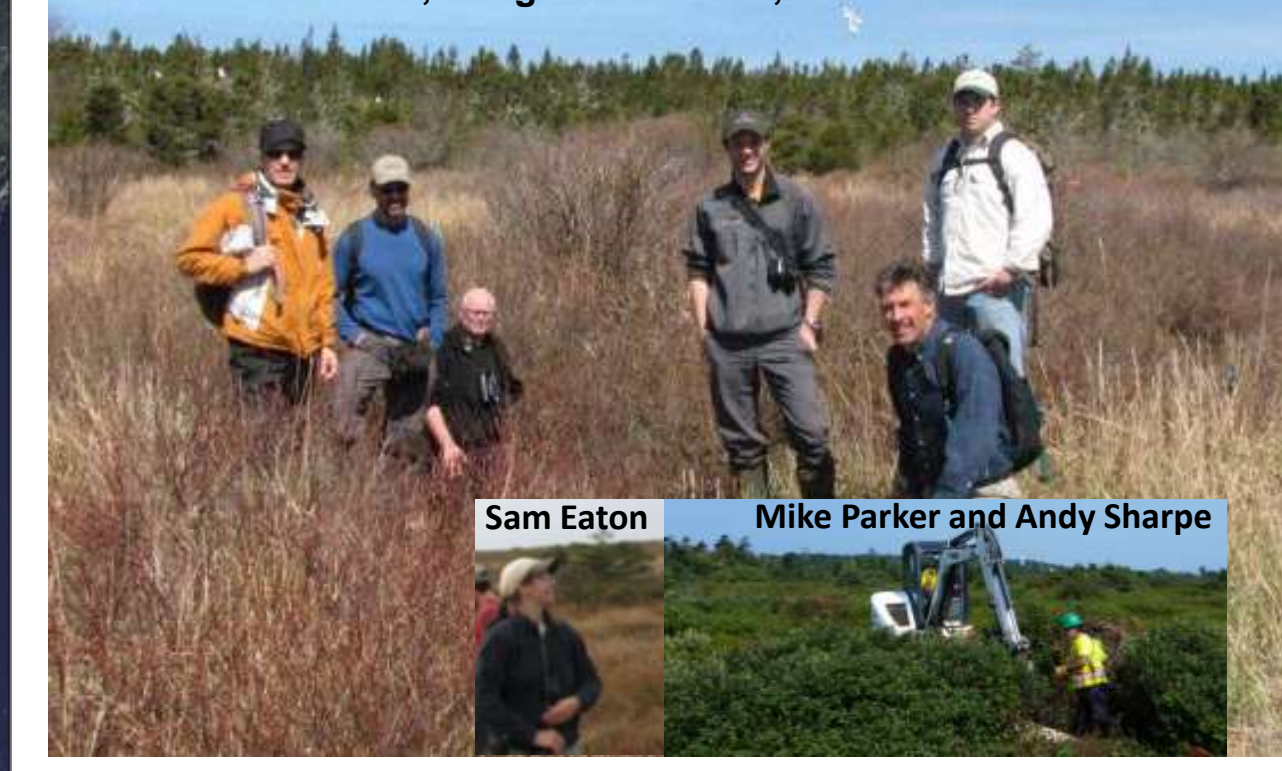
- Bird Community Distribution
- Hydrology and Hydrologic modeling
- Water Quality – Surface and Groundwater
  - Mercury
  - Nutrients
  - Metals
- GHG Balance
- Geum Physiology
- Paleoecology/Ecological History
- Community Attitudes

### Abstract

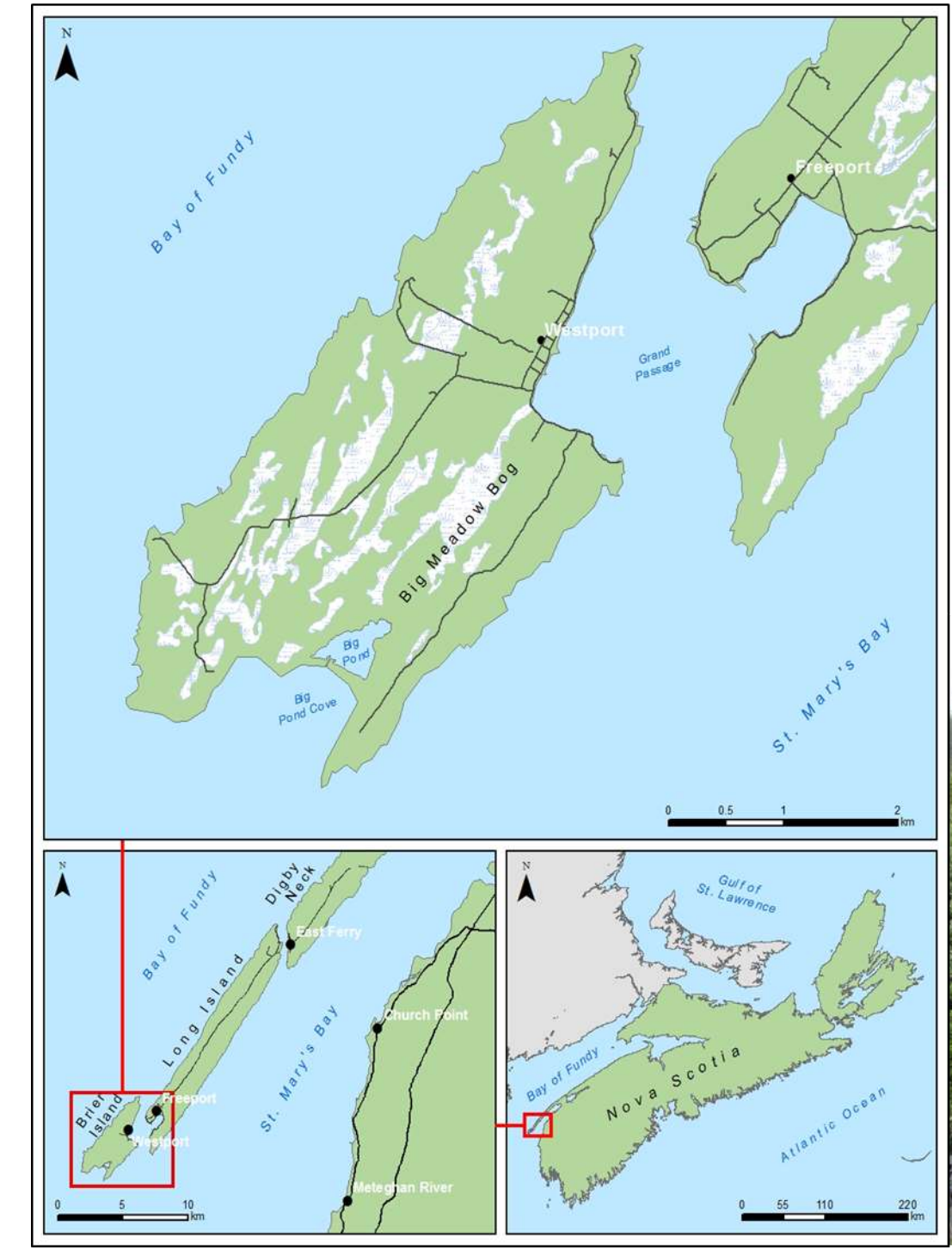
Peatlands are complex and dynamic. They are home to a specialist community of animals and plants that function in a highly nutrient impoverished ecosystem. Intact, these ecosystems play a major biogeochemical role as they purify waters and can serve as a sink for atmospheric carbon dioxide. The 80 hectare Big Meadow Bog complex was ditched in 1958 in a failed agricultural enterprise that was abandoned shortly thereafter. Residents of the village of Westport, Brier Island, recall how prior to ditching, the bog's berries and waterfowl were a part of village life, but invasion of a dense undergrowth post-ditching has reduced access and community use dramatically. Conservation biologists recognize the lag of Big Meadow Bog as the principal habitat of the globally imperiled species, eastern mountain avens (*Geum peckii*), which is currently in population decline. As part of a broad collaboration between academia, NGO, private industry and government scientists, we are in the third year of pre-restoration data collection in preparation for physical restructuring of ditches and outflow channels that will return a more historic hydrology to the Big Meadow starting in 2016. With this poster, we present preliminary efforts to understand the present condition of this unique bog ecosystem, restoration goals and plans for restoring historic function and rejuvenating populations of *Geum peckii* in coming years.



Some Suspicious Characters  
 John Drage, Gavin Kennedy, Sherman Boates - NSDNR Jonathan Price of U. Waterloo, Craig Smith – NCC, Nick Hill – Fernhill Institute



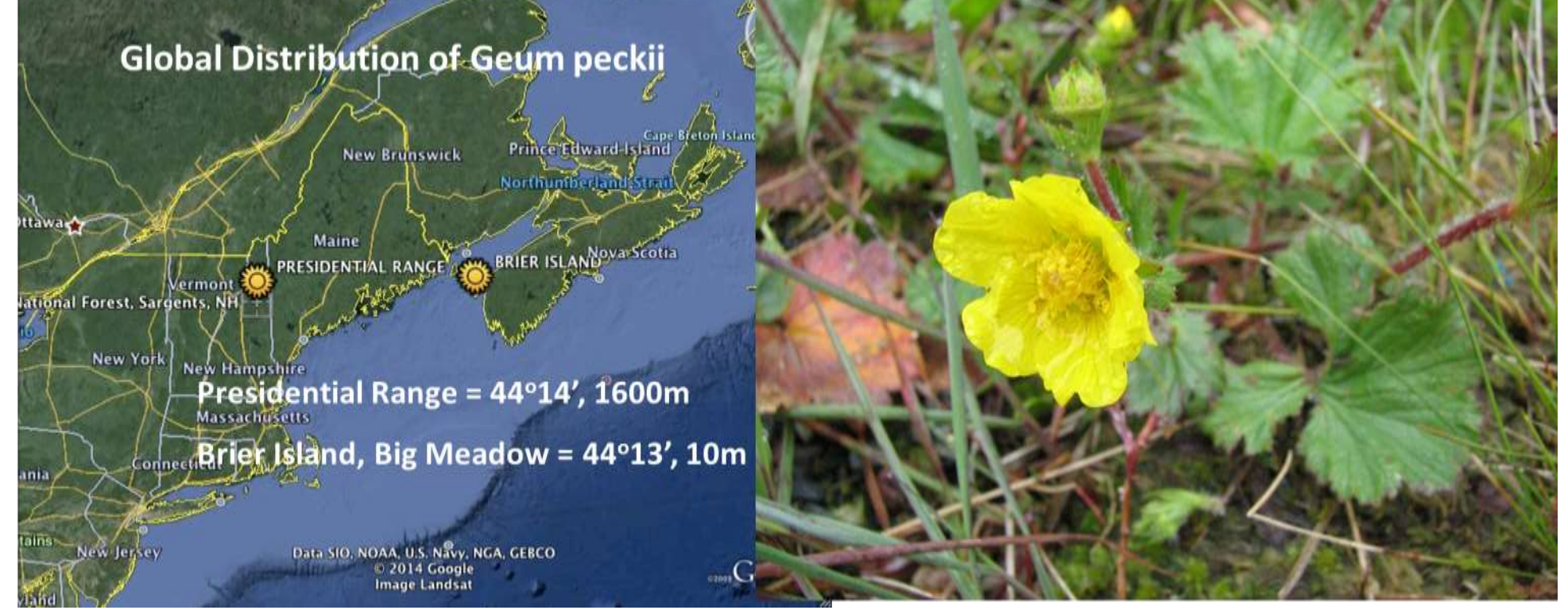
Rewetting the Bog - Peat Dams



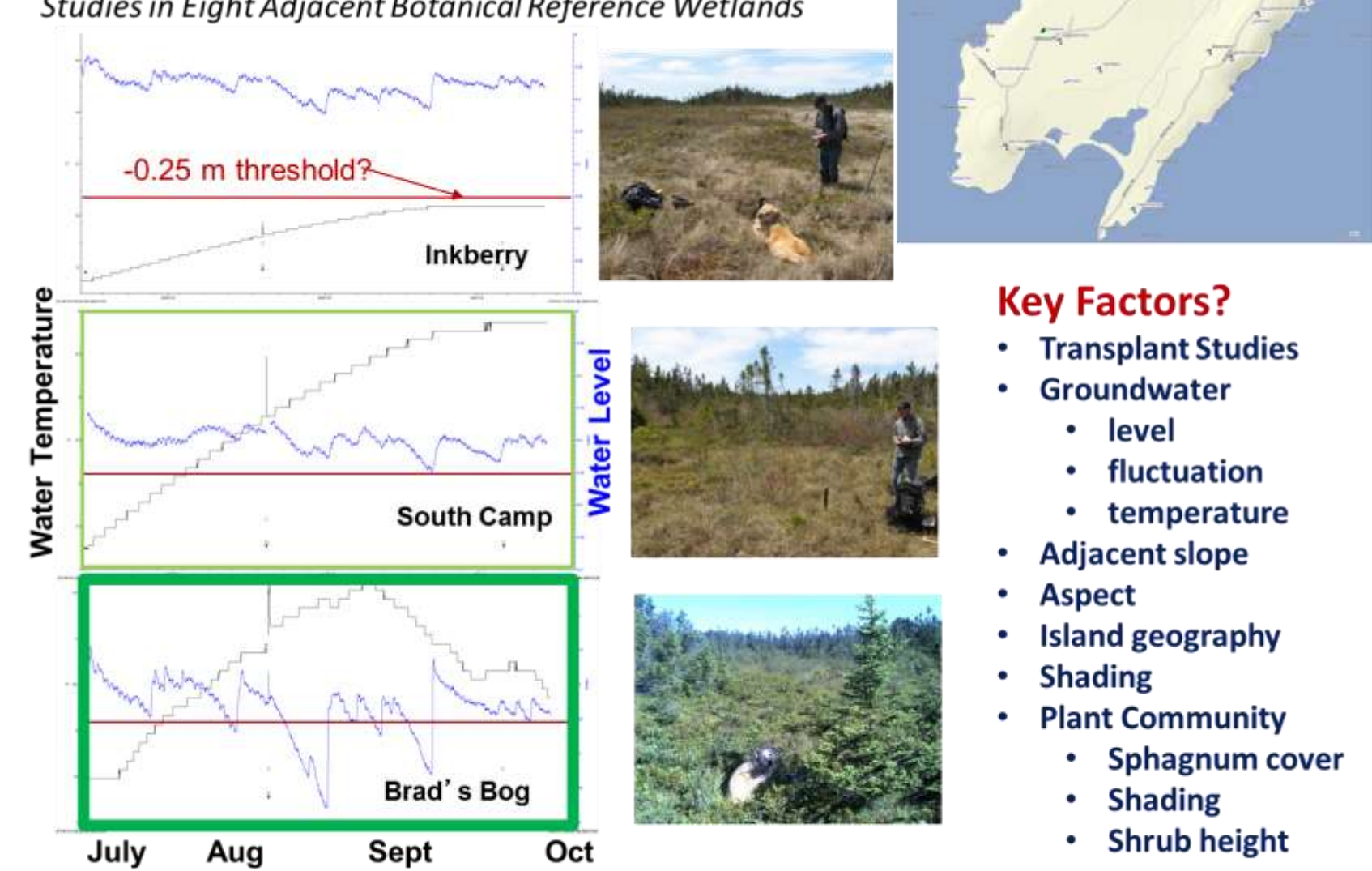
- ### Big Meadow Bog Fun Facts
- 80 ha swamp-fen-bog complex underlain by North Mountain Triassic basalt (~200 mya)
  - Drains to Grand Passage in NE and to Gulf of Maine on SW
  - Historically a raised bog, now heavily degraded
  - 6-10 m above sea level
  - Most important habitat for *Geum peckii* in Canada (first record in 1949)

### Geum peckii Status

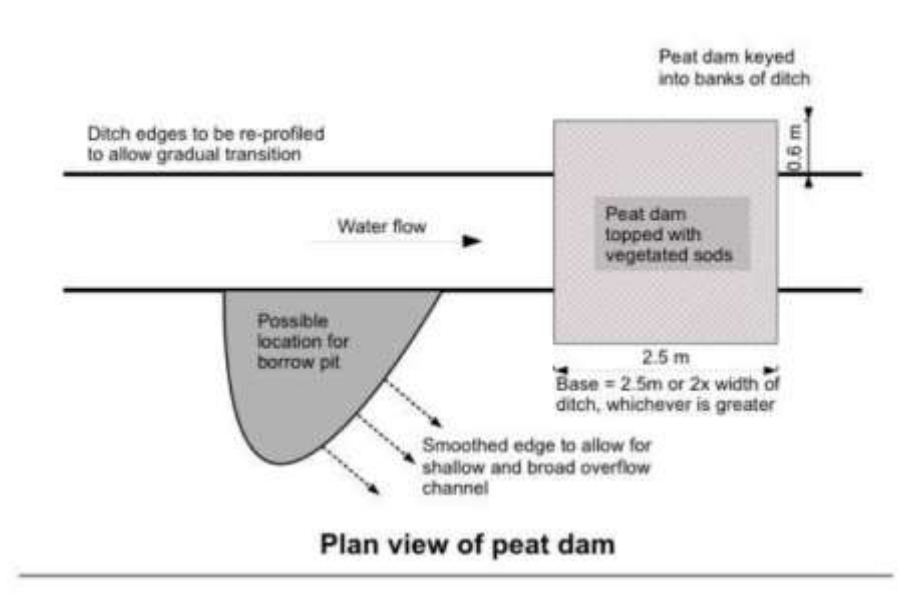
- G2 Imperiled** – high extinction risk
- Federally **Endangered**
- Provincially **Endangered (S1)**
- restricted range, few populations, high habitat loss, steep decline in population (?)**



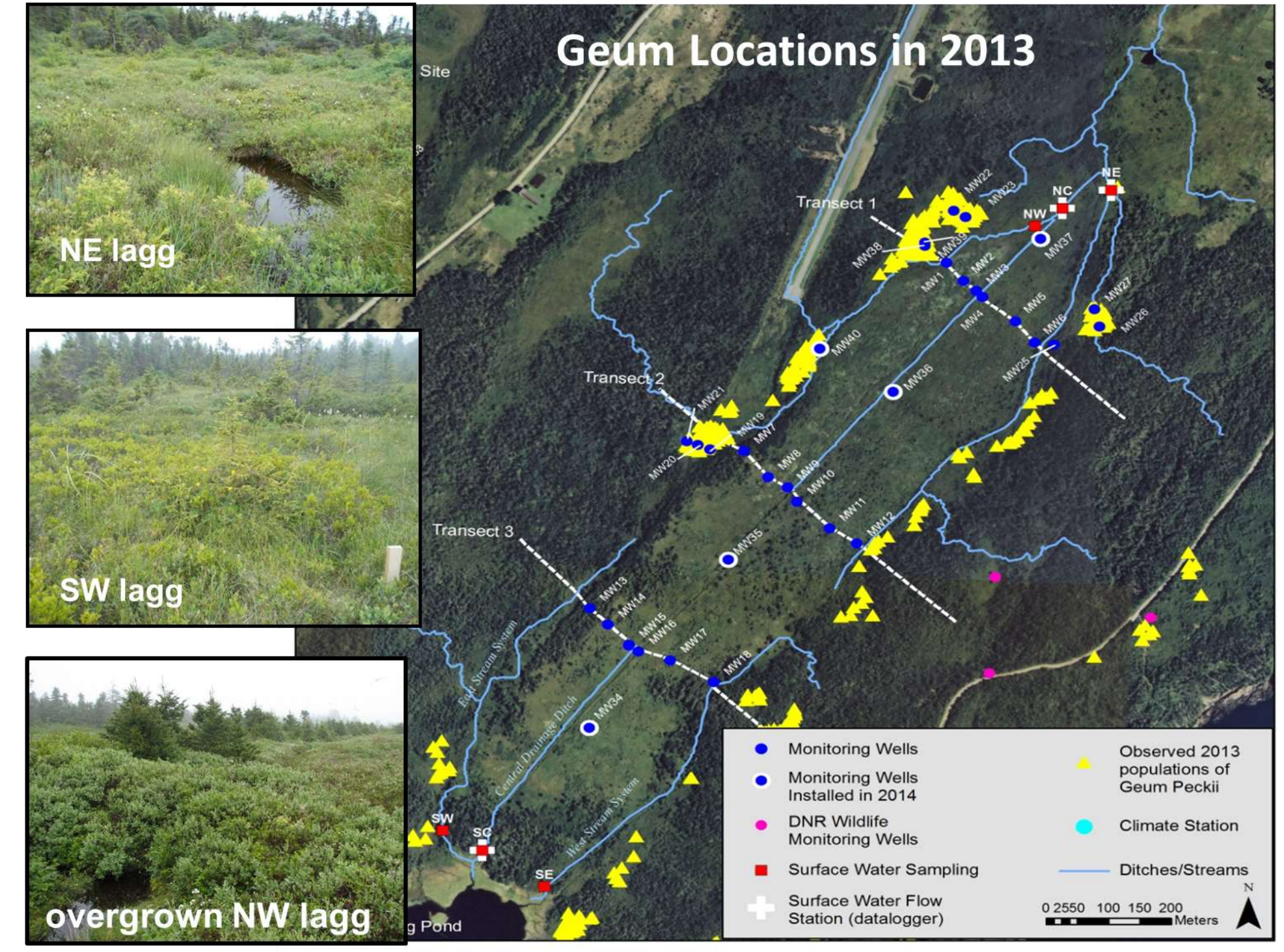
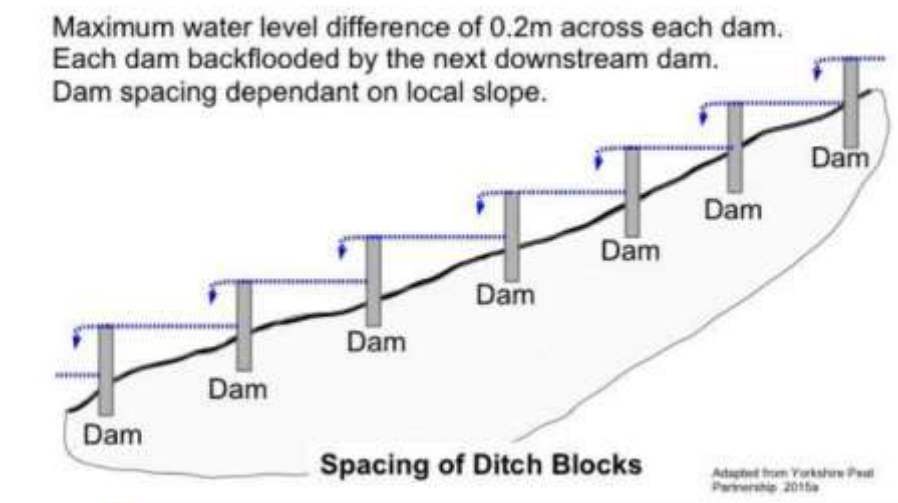
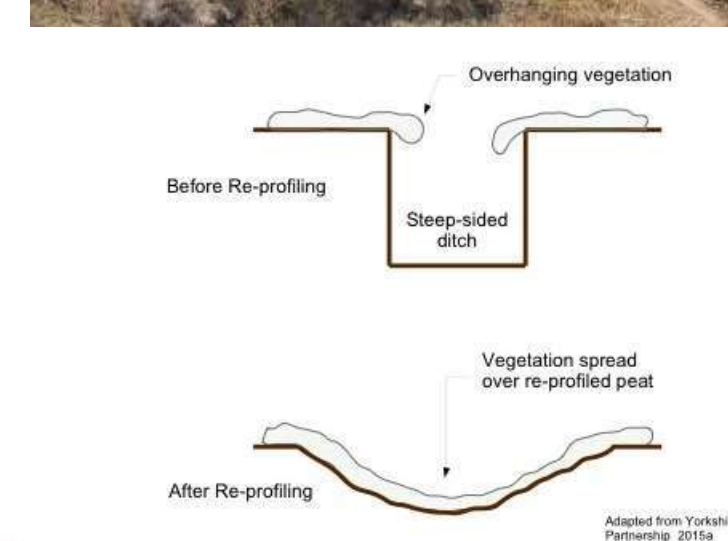
### What's Driving Geum Distribution?



- ### Key Factors?
- Transplant Studies
  - Groundwater
    - level
    - fluctuation
    - temperature
  - Adjacent slope
  - Aspect
  - Island geography
  - Shading
  - Plant Community
    - Sphagnum cover
    - Shading
    - Shrub height



### Ditch Re-profiling

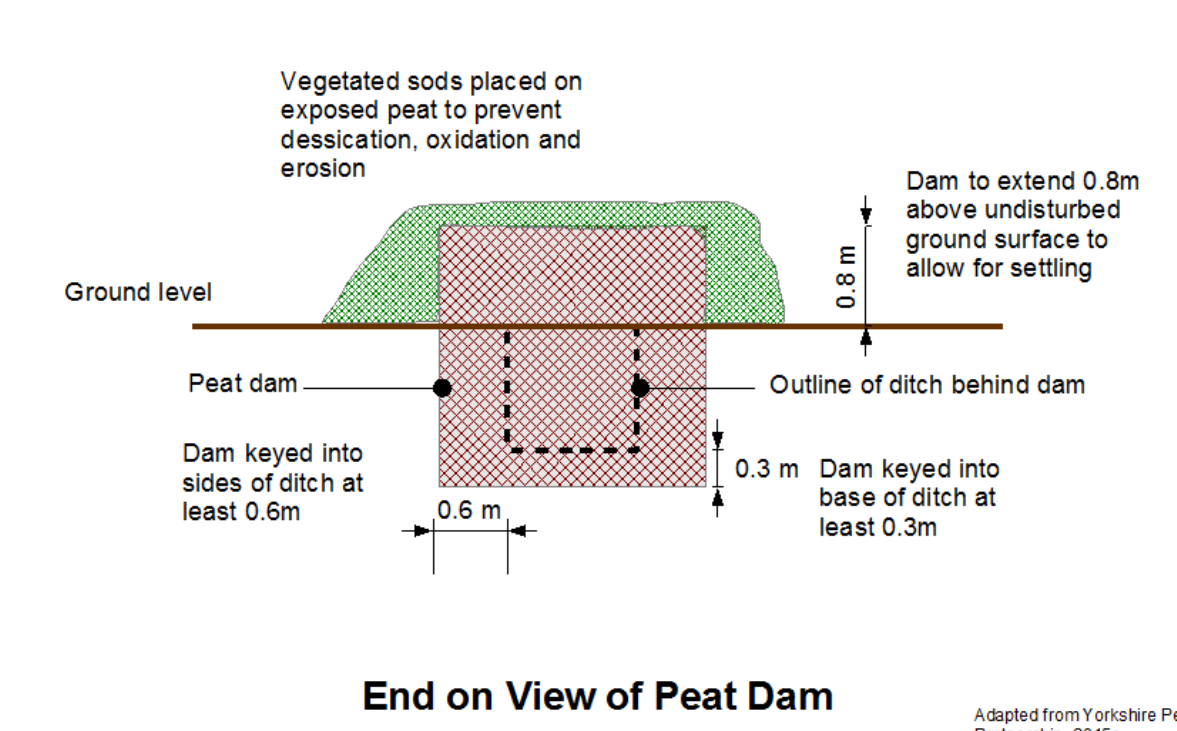
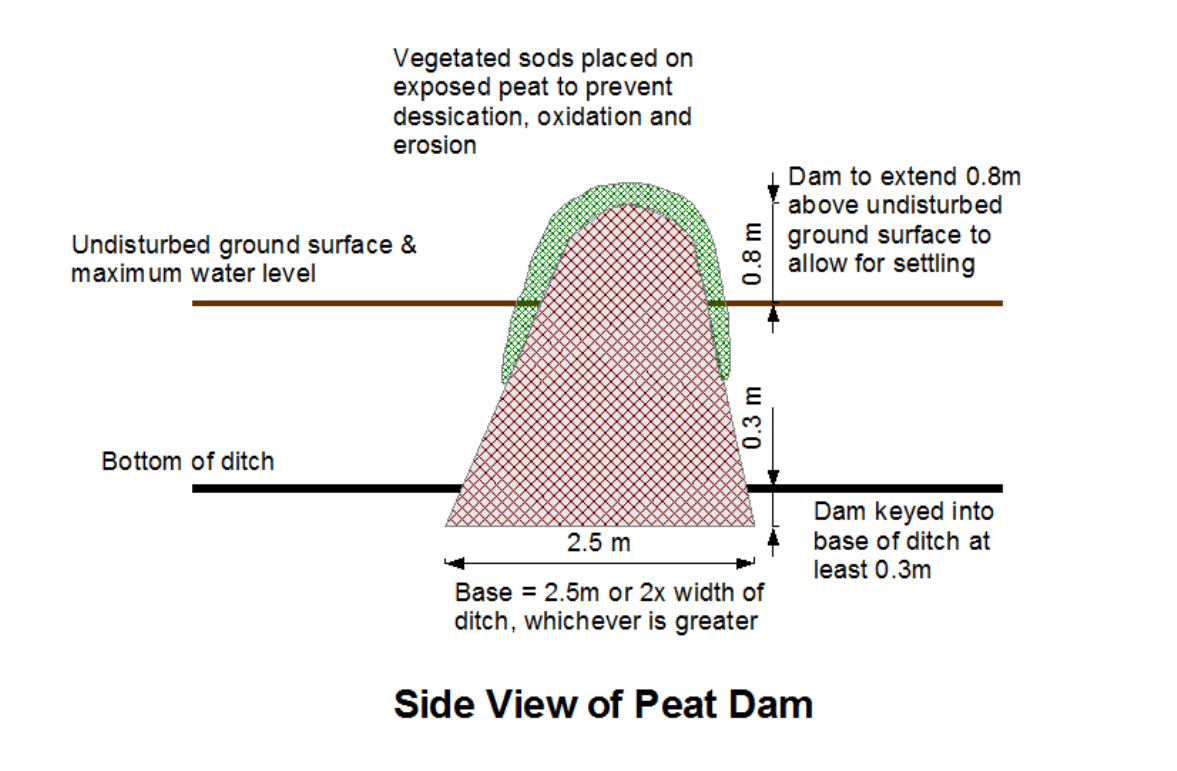
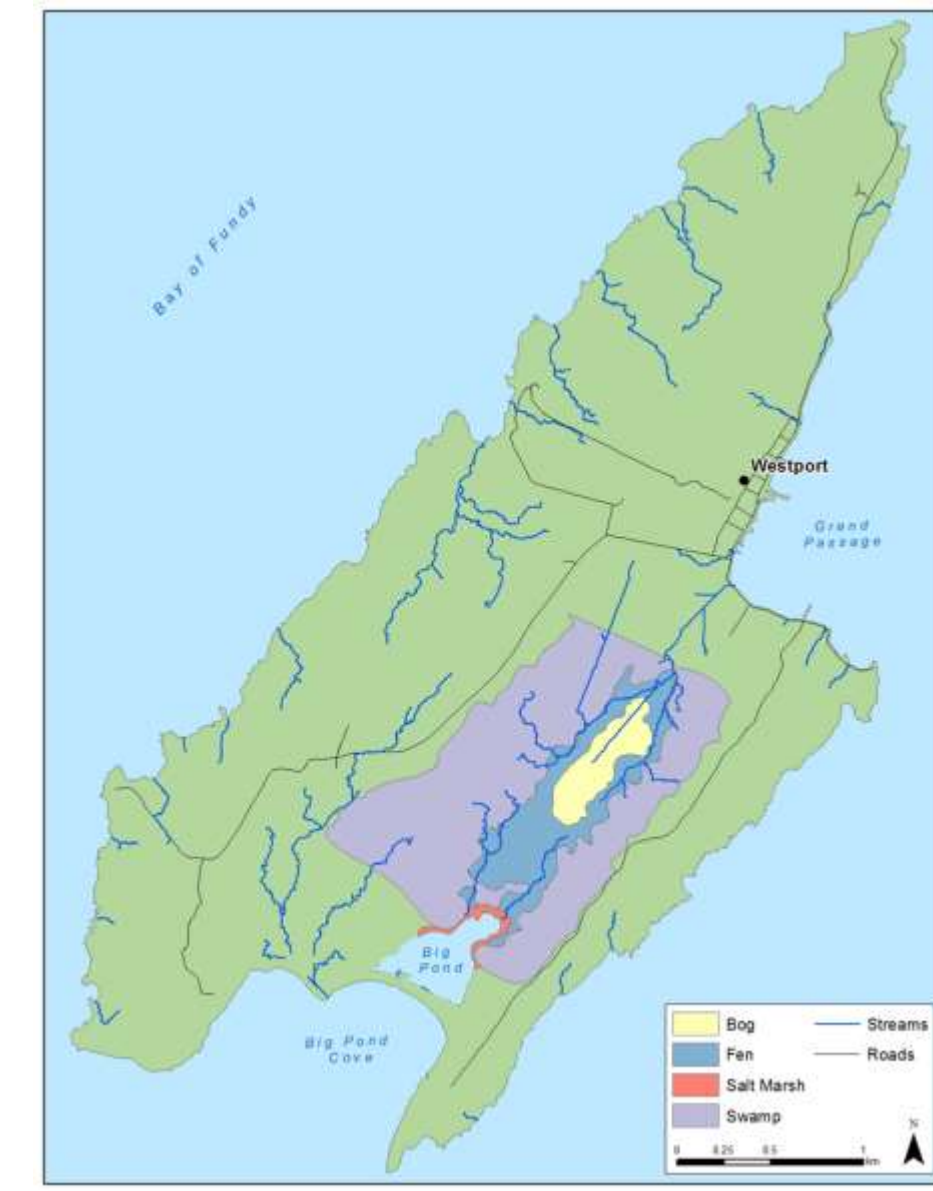


### Planned Restoration Actions (2016-17)

Prescription	Brief Description	Brief Rationale
1. Ditch Blocks	Construction of frequently spaced ditch blocks composed of peat (or peat and stone where applicable) along all excavated ditches, completely blocking the flow of water within the ditch.	All surface water flows are re-directed into adjacent vegetation and natural channels, leading to a re-activation of the site's historic drainage network.
2. Re-profiling of Ditch Edges	Steep, erodible ditch edges are re-profiled to a gradual slope and covered with native vegetation.	Reduction of deep-water safety hazards, increased ditch stability, and provision of a diversity of micro-habitats to allow for native vegetation re-colonization.
3. Moss Inoculation (Optional, pending funding)	Spreading of viable moss fragments in shallow water areas associated with ditch blocks.	Introduction of viable sphagnum moss spores to establish new growth in central bog areas.
4. Woody Vegetation Reduction (Optional, pending funding)	Cutting of deciduous and coniferous tree species and shrubs within the central raised bog.	Reduction in evapotranspiration and low ground shading, promoting the faster recovery of water levels and former vegetation communities.
5. BM1 Ditch Barriers and Channels (Optional, pending funding)	Five options from "do nothing" to realigning ditched upslope flows, to diverting natural channel flows to BM1	BM1 is a key <i>Geum</i> cluster that appears to be hydrologically impaired. Bog restoration may or may not adequately recover hydrology of this area altered by upslope activities, and these other options may need to be considered.
6. Ditch Barriers (Optional, pending funding)	Installation of steel barriers within the most steep ditch segments.	Use of steel ditch barriers in steeper gradient outlet areas of ditches to ensure long term stability.

### Performance Goals

- Return pre-disturbance wetland complex
- Historic hydrology
- ↑ *Geum* populations
- ↓ carbon release
- Return open expanse



Proposed Bogwalk Many Thanks to the Community of Westport!