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**Management of  
Submerged  
Aquatic  
Vegetation in  
Lake Banook &  
Micmac**

**RWAB, March 13, 2019**

# Agenda

**1** Project History

**2** Methods

**3** Results

**4** Summary and Conclusions

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# 1 Project History

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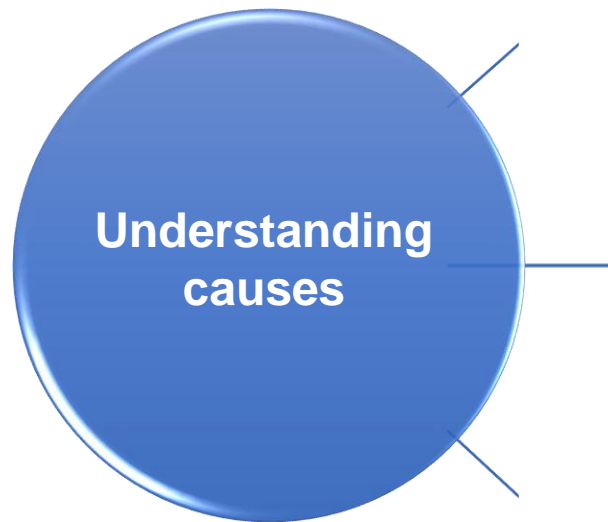


# What's the Issue?

- Complaints of excessive aquatic vegetation interfering with recreation started in 2009
- By 2010 paddlers, motorized boaters and swimmers were being adversely affected
- In 2013 Stantec was contracted by HRM to assess causes and determine potential solutions



# First Steps



# Vegetation Management Solution

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# What's Been Done To-Date?

- **2014 – Baseline data collected in Lake Banook including bathymetry, vegetation, and sediment types**

Vegetation Harvesting	Vegetation Harvest Monitoring
August 2015	September 2015
Late July / early August 2016	Early July 2016 (pre-harvest); Late August 2016 (post-harvest)
Late July / early August 2017	Early July 2017 (pre-harvest); Late August 2017 (post-harvest)
Late July / early August 2018	Early July 2018 (pre-harvest); Late August 2018 (post-harvest)

# Mechanical Vegetation Harvester





# 2 Methods

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# Vegetation Mapping

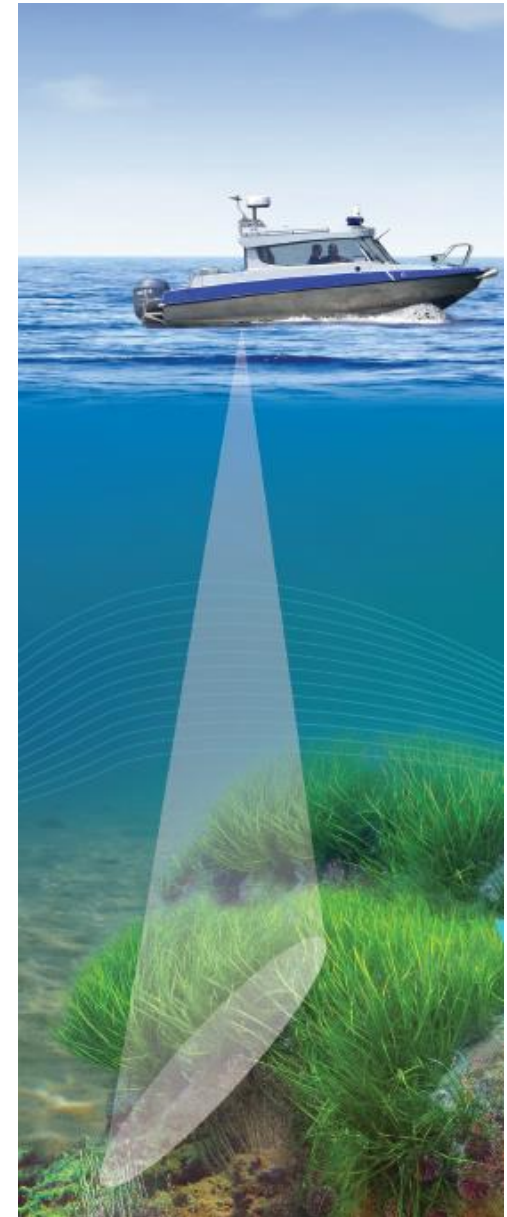
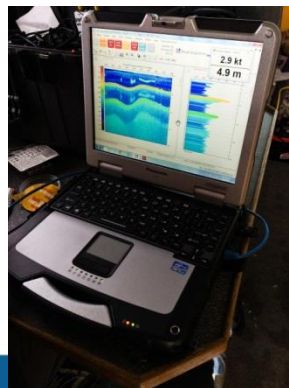
Stantec single beam acoustics  
plus underwater video

- Bathymetry
- Percent Cover
- Canopy Height



## Accuracy

- Range: 1.7 cm  $\pm$  0.2% of depth
- Positional: < 3 m, 95% typical



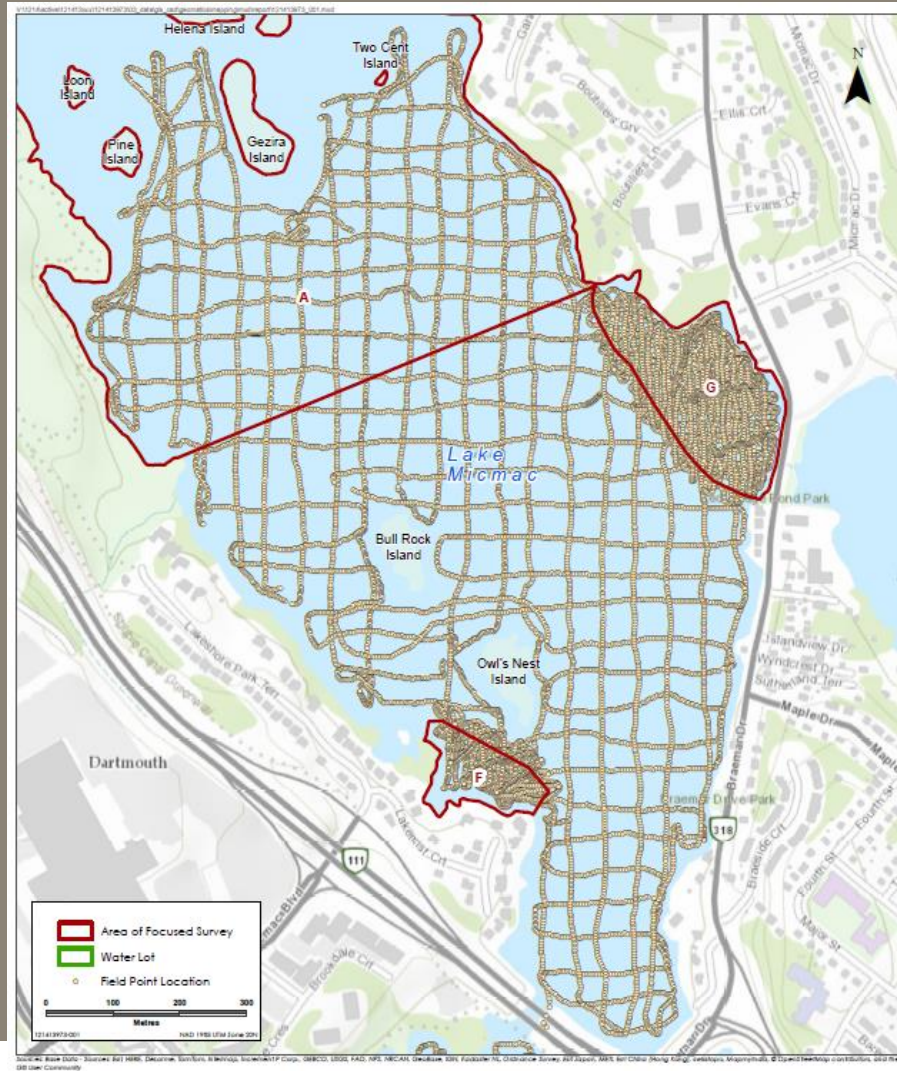
# Acoustic Data Acquisition

- Generalized Acoustic surveys via vessel based transects spaced 50 m apart
- Focused Acoustic via vessel based transects spaced 10 m apart in targeted harvest areas:
  - Banook – 6 Target Areas
  - Micmac – 2 Target Areas
- Along select transects underwater video was collected for ground truthing

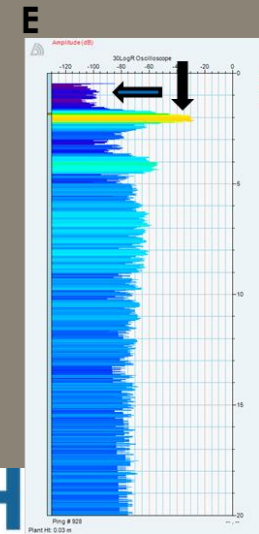
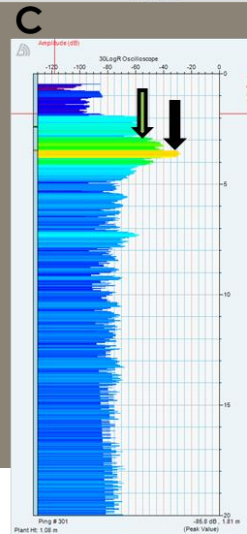
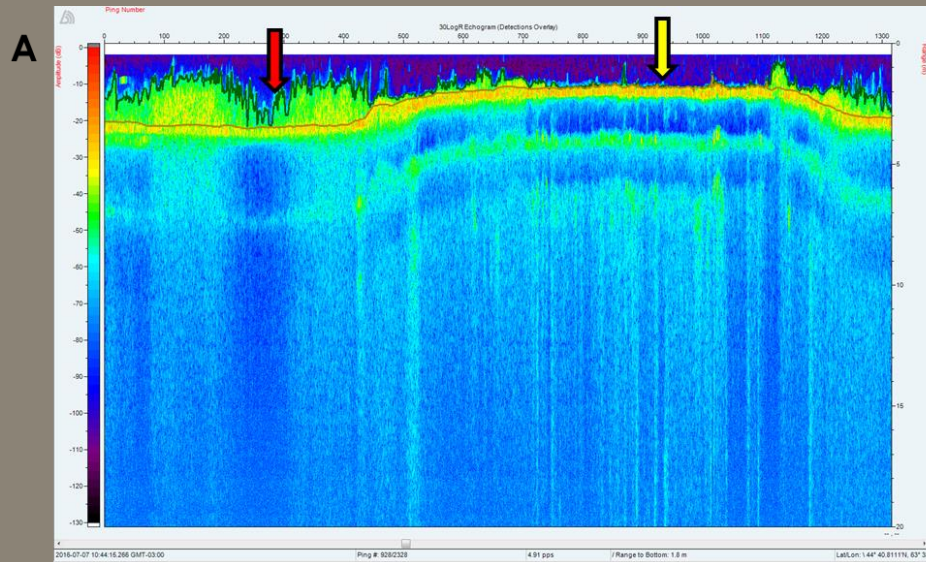
# Sampling Grid – Lake Banook



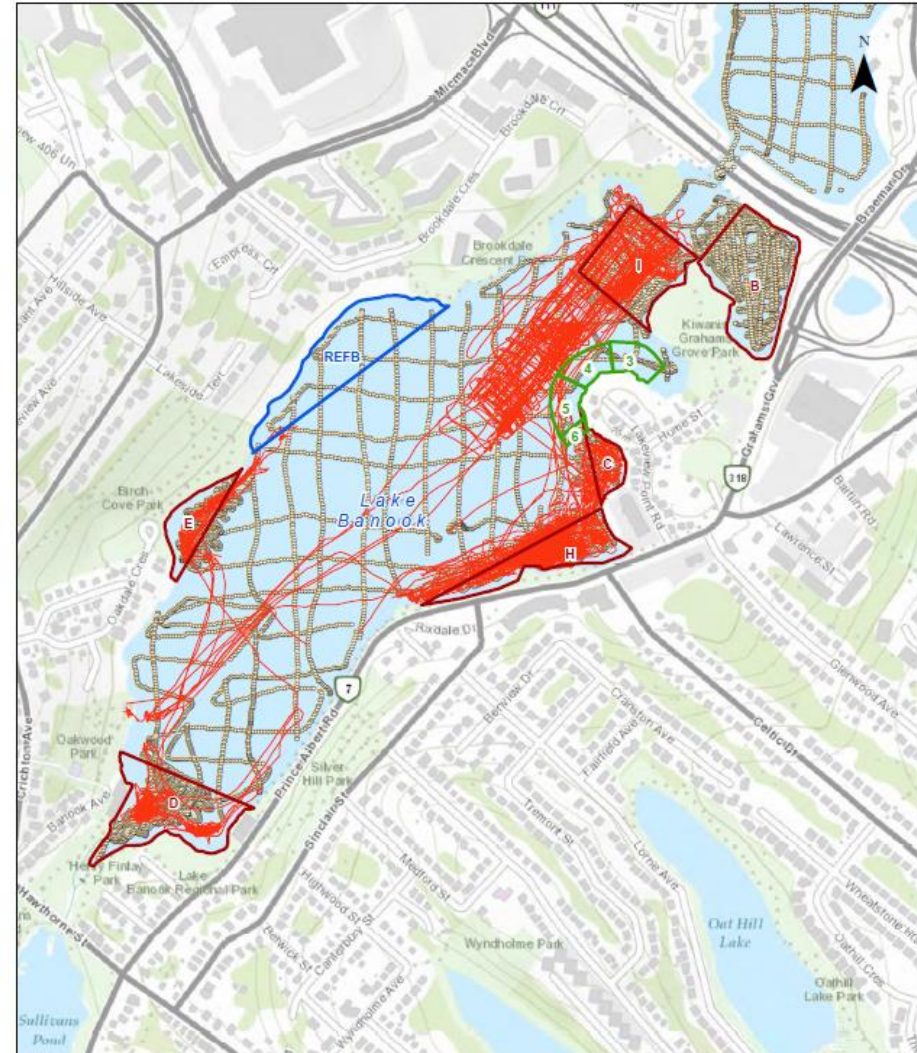
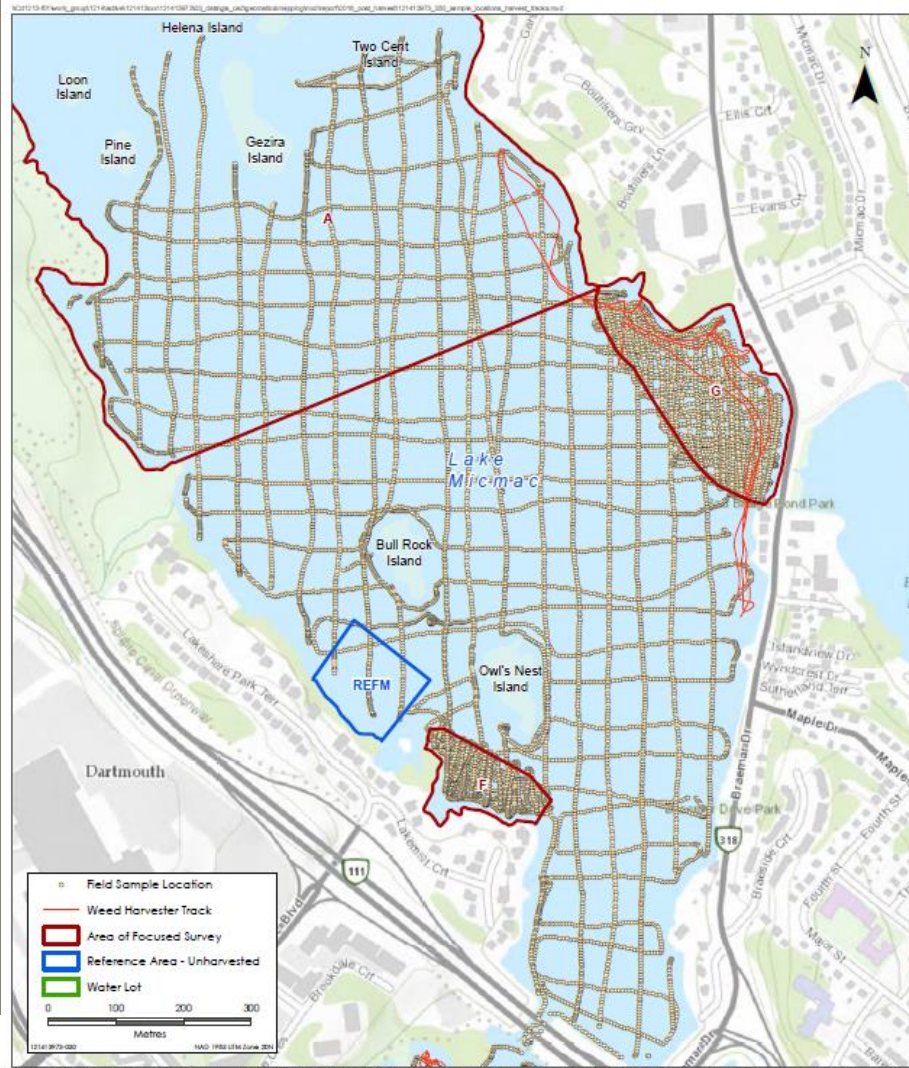
# Sampling Grid – Lake Micmac



# Acoustic Data Analysis



# Where was Vegetation Harvested?



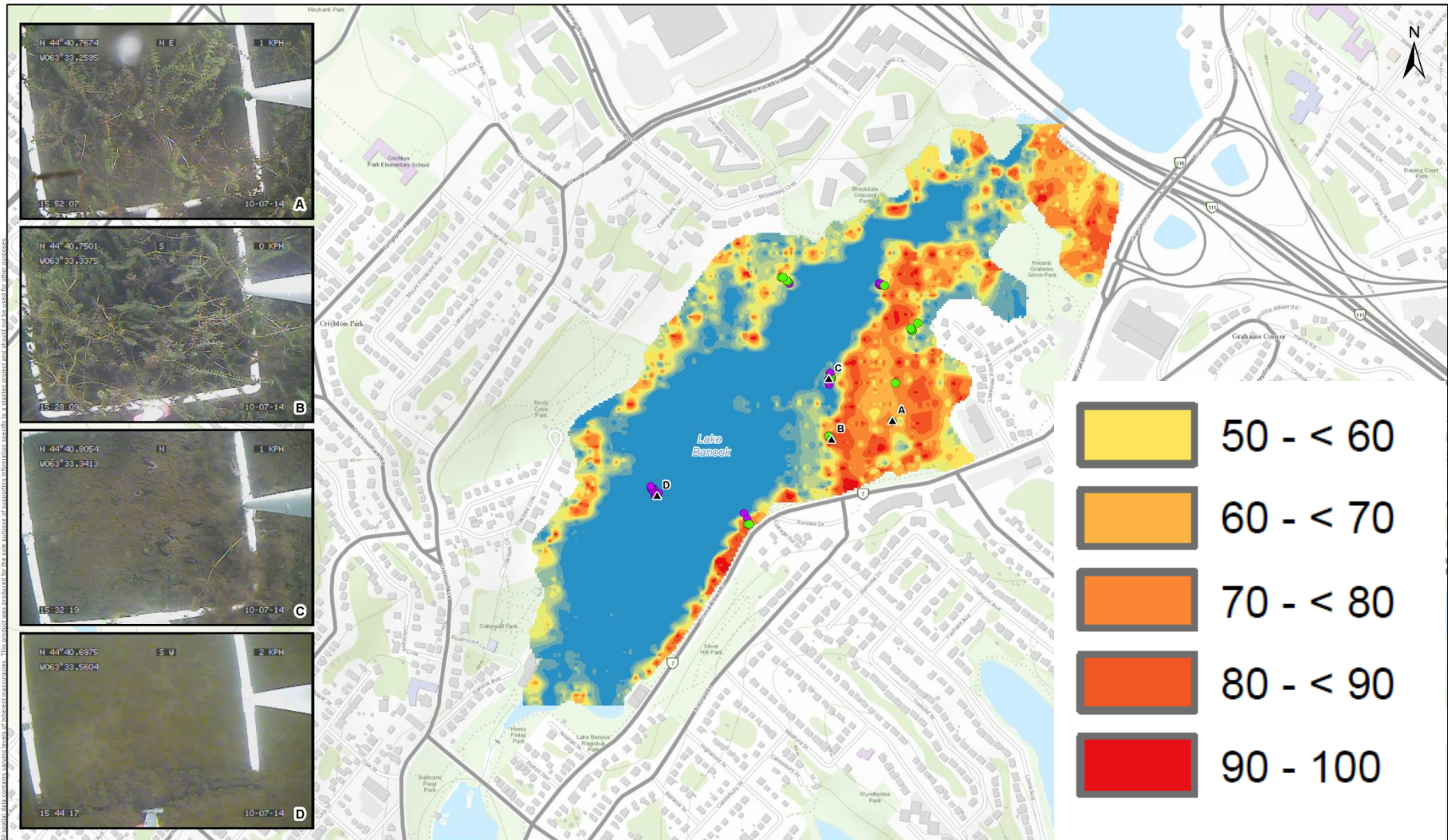
# 3 Results

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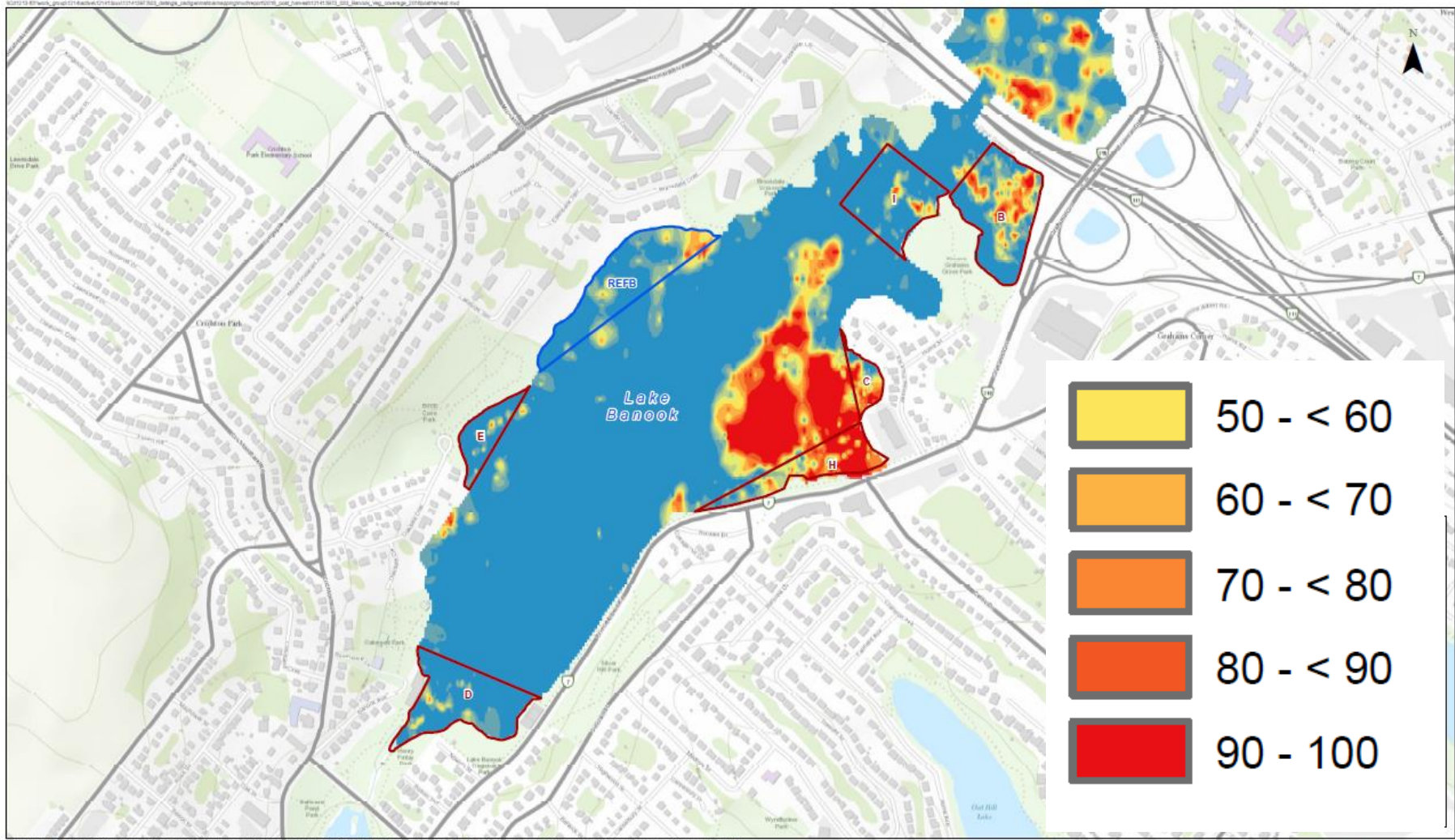




# Lake Banook Percent Cover - 2014

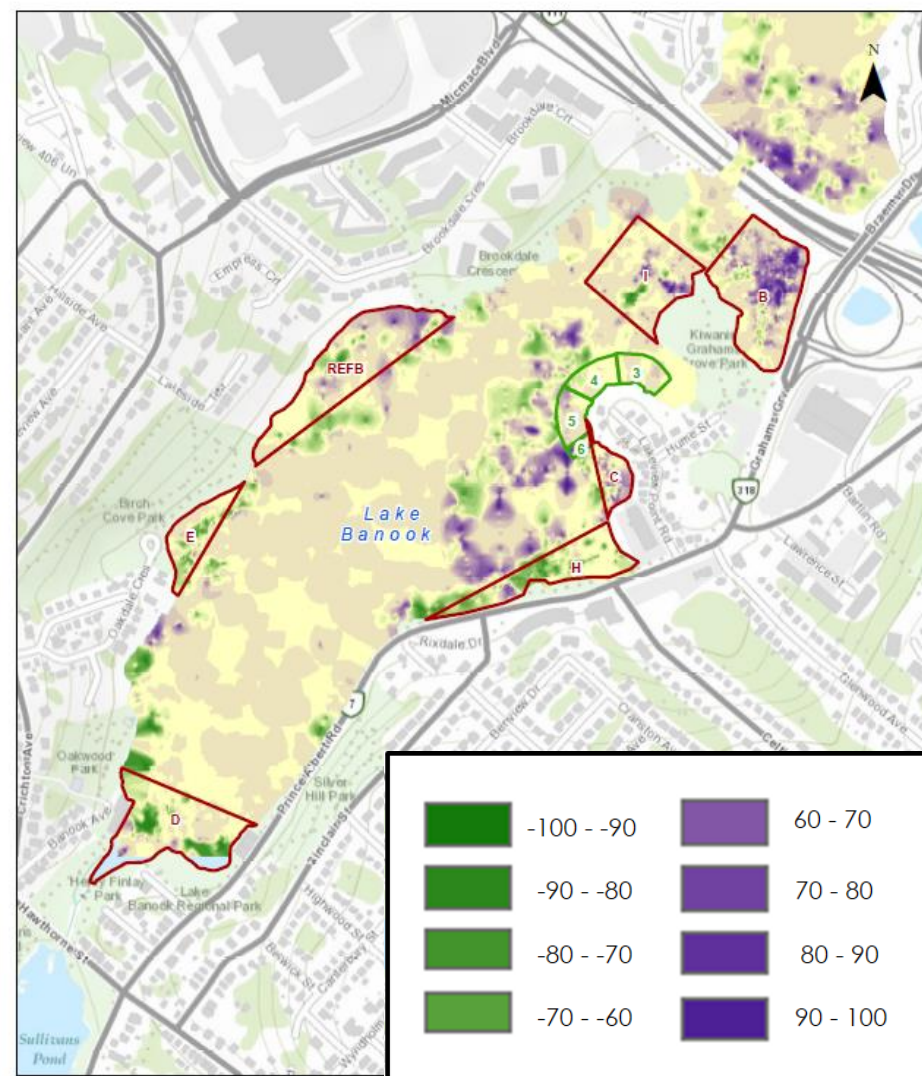
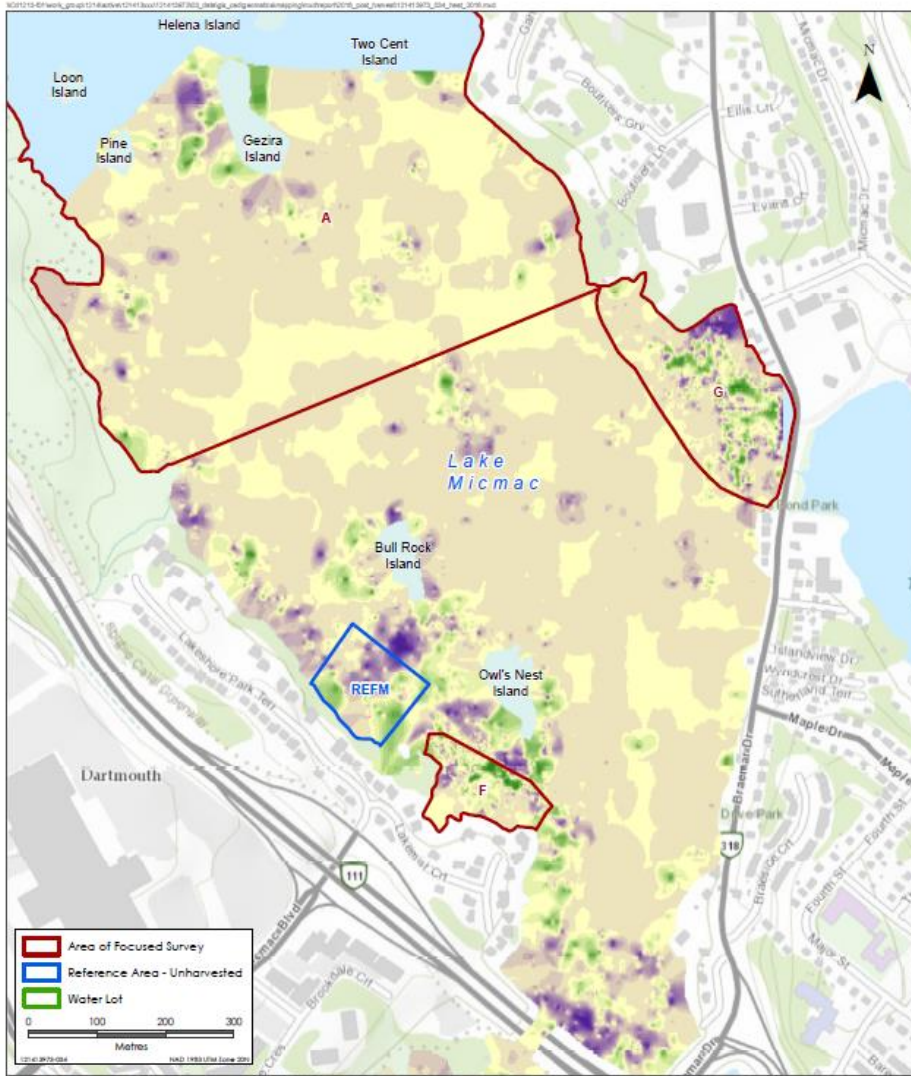


# Lake Banook Percent Cover – 2016 (Post Harvest)

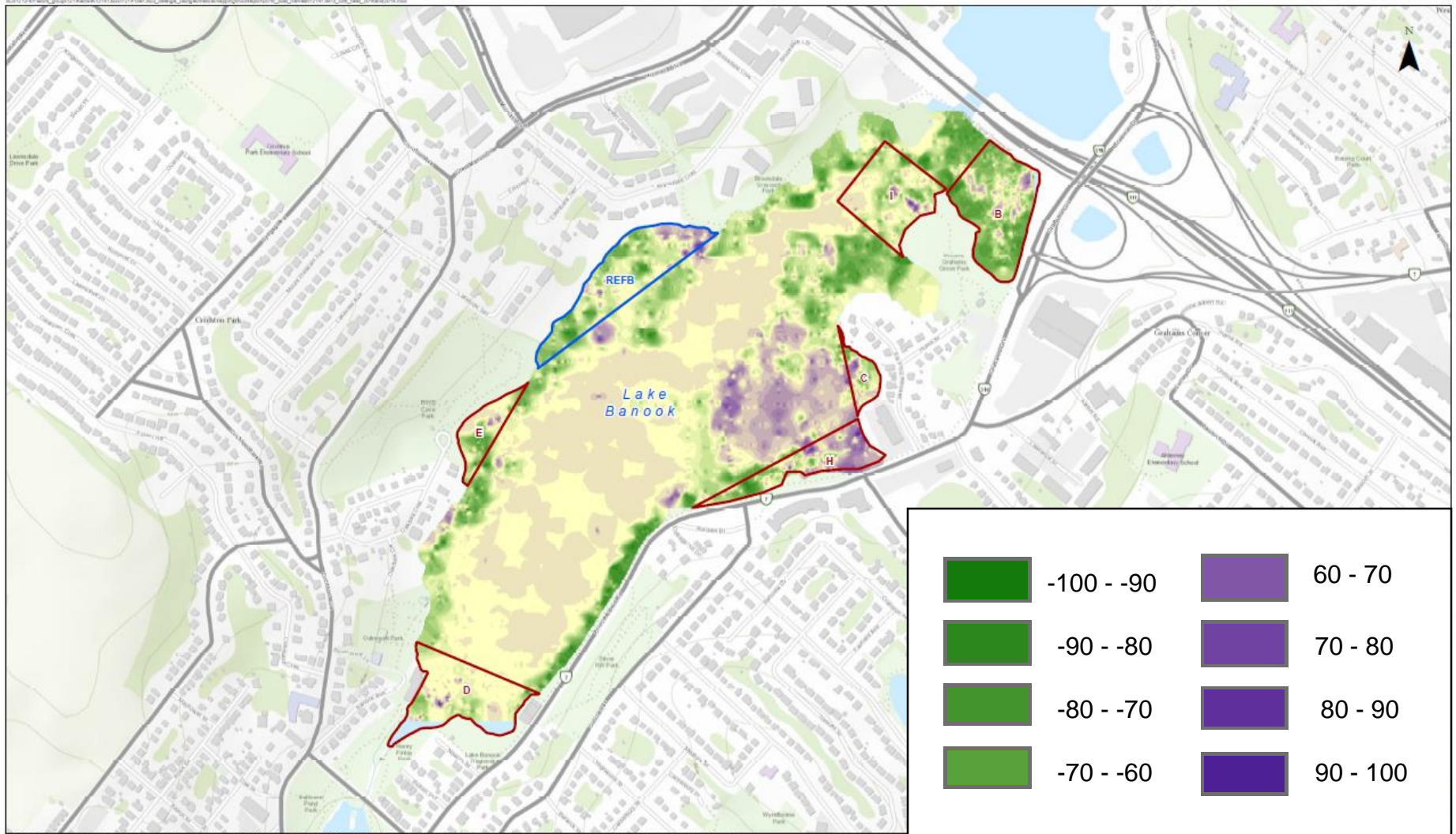


Source: Aerial 2016. Digitized and color-coded by Stantec. © 2016 Stantec. All rights reserved. Stantec is not liable for any errors or omissions in this map. The map is for illustrative purposes only. Stantec is not liable for any errors or omissions in this map. The map is for illustrative purposes only.

# Heat Map 2016 (Pre) – 2016 (Post)

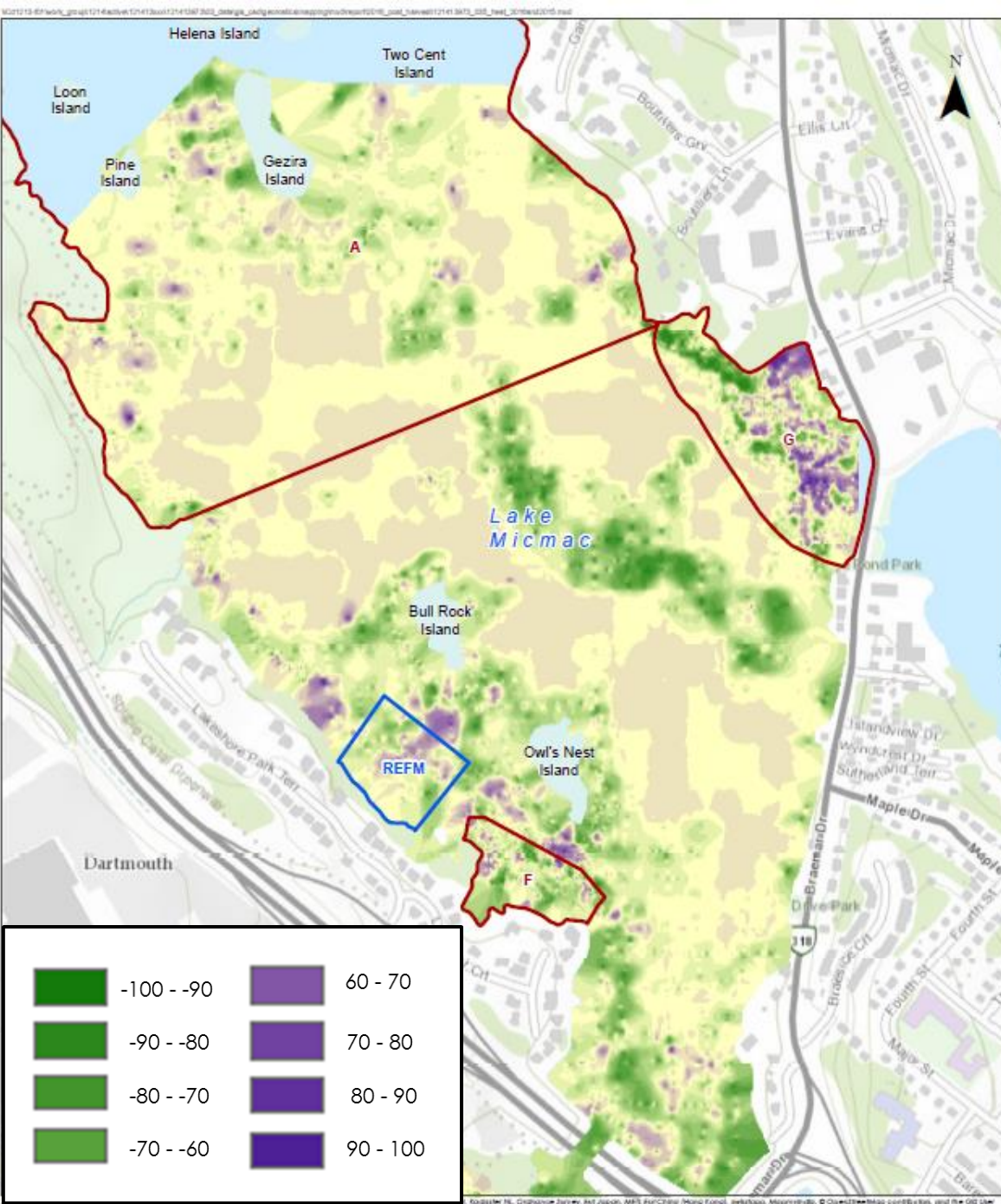


# Heat Map 2014 - 2016



Disclaimer: This map is for illustrative purposes to support this project. Questions can be directed to the issuing agency.

# Heat Map 2015 - 2016



# Canopy Height

- **Lake Banook:**
  - Post harvest canopy heights are noticeably lower than before the harvest
  - Vegetation heights increased in areas where harvesting did not occur
- **Lake Micmac:**
  - Similar trends found with decreased vegetation heights in targeted areas.

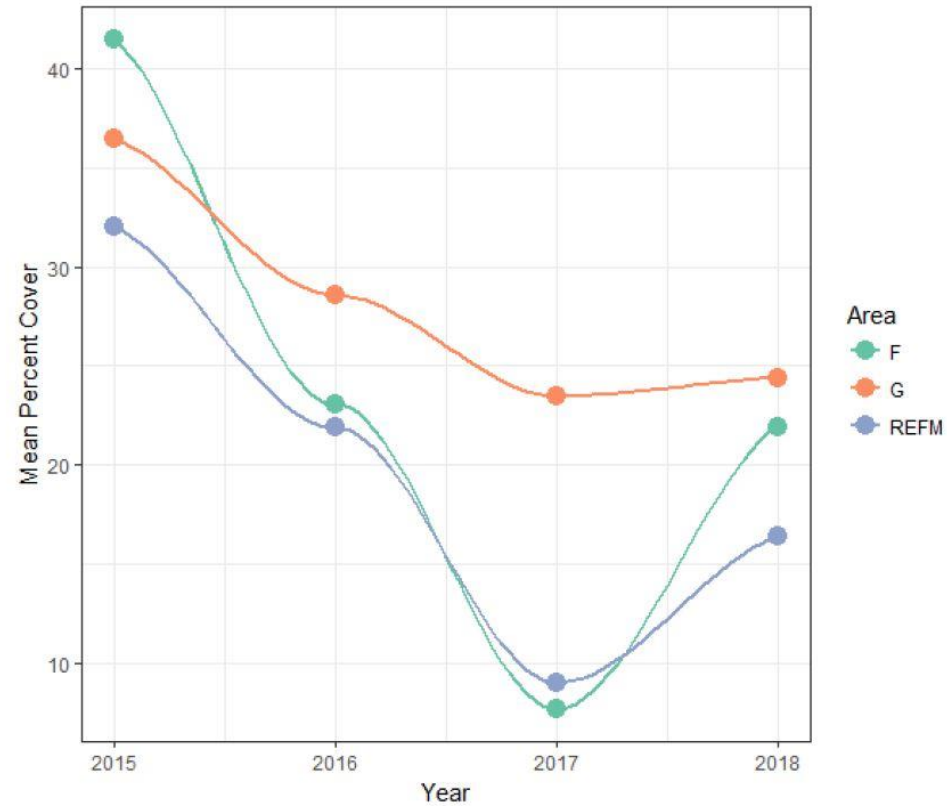
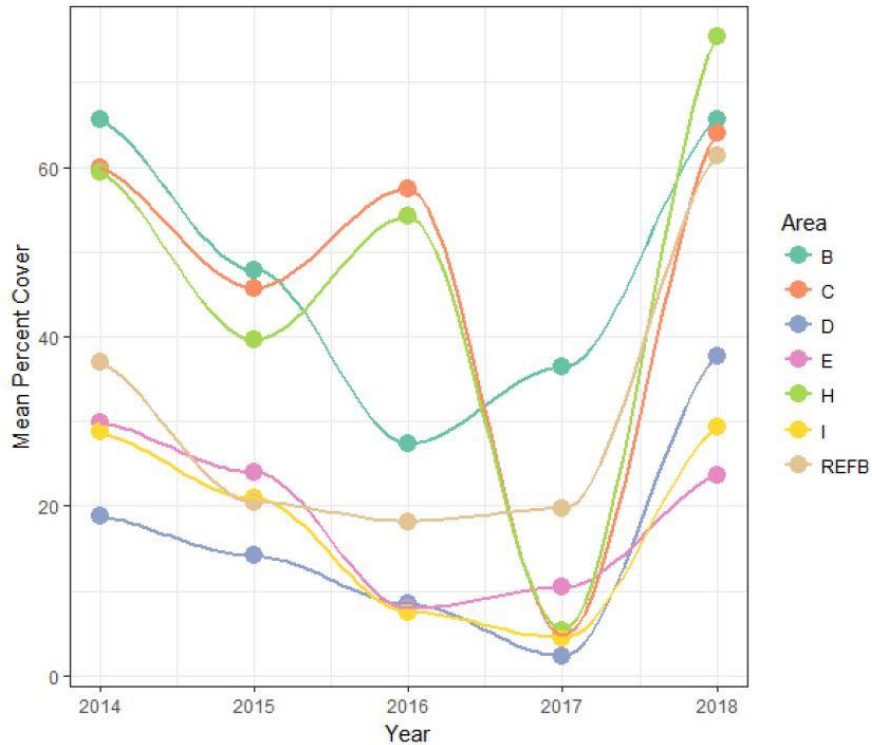


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# Mean Temporal Trends 2014-2018



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# 4 Summary and Conclusions

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# Summary

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- **Multi-year contracts concluded in 2018**
  - **Overall assessment: mechanical weed harvesting has been operationally effective, but not ecologically effective**
  - **All major paddling events have been unaffected by weed growth**
  - **Continued management will be required**

# Where Do We Go From Here?

- **Extend mechanical harvesting and monitoring to summer 2019**
- **Conduct additional pore-water sampling at deep stations of each lake to determine extent of influence on SAV growth**
- **Consider exploration of additional treatment technologies**
- **Consider the development of future long-term control and monitoring program**

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# Questions?

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