Will property values cool as AIS heat up?

Jake Walsh

MAISRC Showcase
On the horizon: New projects launched this summer
18 September 2019

Photo: John Tucci, wmuk.org
Project overview

1 – Predict EWM current and future abundance

2 – Quantify EWM impact on property values

3 – Online decision support tool
Predicting EWM abundance

Aquatic vegetation surveys
~2,000 multi-year point-intercept surveys
~150 with EWM coverage & abundance

Lake Data Predictors
Modeled lake temperature profiles
Clarity
Other limnological variables

Predict abundance
Machine learning models
EWM response to climate change

Modeling AIS response to climate change:
Often done with air temperature data

<table>
<thead>
<tr>
<th>Present day</th>
<th>Future</th>
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<td>Air</td>
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AIS don’t experience air temperatures!

Ex: Spiny water flea from Walsh et al. (submitted to Ecosphere)

Problems

1. Need variables that actual influence AIS
2. Even neighboring lakes vary in temperature/thermal regime
3. Lakes have varying responses to climate change
EWM response to climate change

Solution:
We need realistic lake temperature models to model EWM response to climate change.

Process-guided deep learning models
(Machine learning with limnological rules)

Modeling AIS response to climate change:
Often done with air temperature data

Present day

Future

AIS don’t experience air temperatures!

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EWM response to climate change

Predictions:

Generally, we expect warming to be good for EWM.

1) Longer growing season with earlier favorable temperatures (Smith and Barko 1990)

2) More thermal habitat as deeper parts of lakes become warmer (note: clarity matters)
EWM impact on property values

- Negative impact on property values:
  - -13% (WI; Horsch & Lewis 2009)
  - -$1,800/yr (WI; Provencher et al. 2012)
  - -19% (WA; Olden & Tamayo 2014)

- Impact likely linked to abundance (Zhang & Boyle 2010)

- Transaction and assessment database
  - Change before and after EWM
  - Compare change in invaded and non-invaded lakes
  - Assessor data: control for other factors that influence property values
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Online decision support tool

Early 2021: Workshops with managers and stakeholders (stay tuned!)

Spear, Walsh et al. AIS vulnerability mapping tool

Hansen et al. Bass-walleye response to climate change (Award-winning)
Contact

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AIS & ecosystem services

-60% *Daphnia*

-1 m clarity

(\sim \$140M)

Walsh et al. 2016. *PNAS*

Plankton images: Carol Dizack UW Media Solutions
About me

• PhD UW-Madison

• Spiny water flea’s ecological and economic impact on water quality in Lake Mendota

• BS Hamline University
  • Hometown: Hastings, MN

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