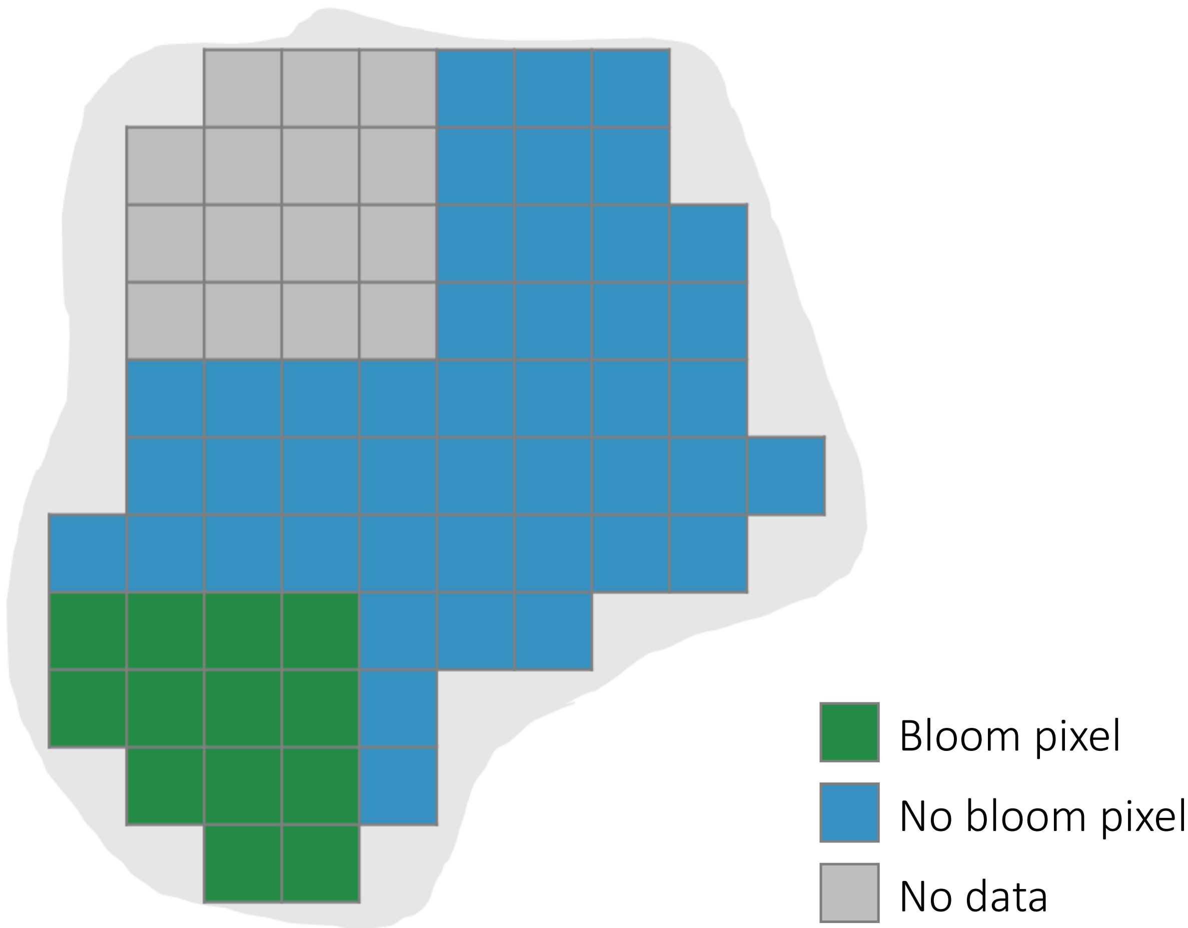
Bloom percentage

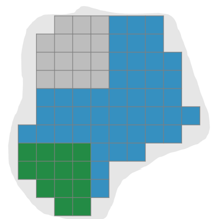
- The percentage of lakes across CONUS that are experiencing a cyanobacterial bloom on a weekly basis
  - The percentage of lakes without a bloom and the percentage of lakes without any valid data were also found
  - CONUS was also broken up into nine climate regions to examine regional patterns
- Goal: Provide national overview of the number of inland lakes across CONUS affected by cyanoHABs

Coffer et al., 2019. *In clearance.*



Coffer et al., 2019. *In clearance.*

For each weekly composite...



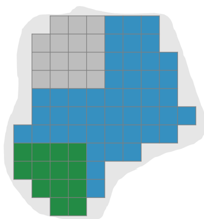
1,500
BLOOM

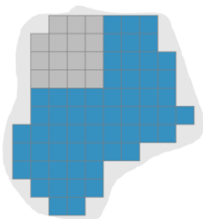
2,321
TOTAL LAKES

= 64.62%

Coffer et al., 2019. *In clearance.*

For each weekly composite...





1,500
BLOOM

2,321
TOTAL LAKES

= 64.62%

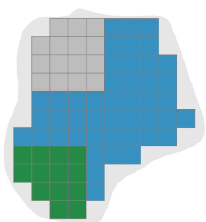
500
NO BLOOM

2,321
TOTAL LAKES

= 21.54%

Coffer et al., 2019. *In clearance.*

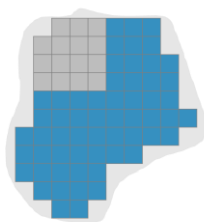
For each weekly composite…



1,500
BLOOM

2,321
TOTAL LAKES

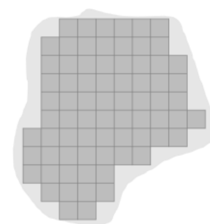
= 64.62%



500
NO BLOOM

2,321
TOTAL LAKES

= 21.54%

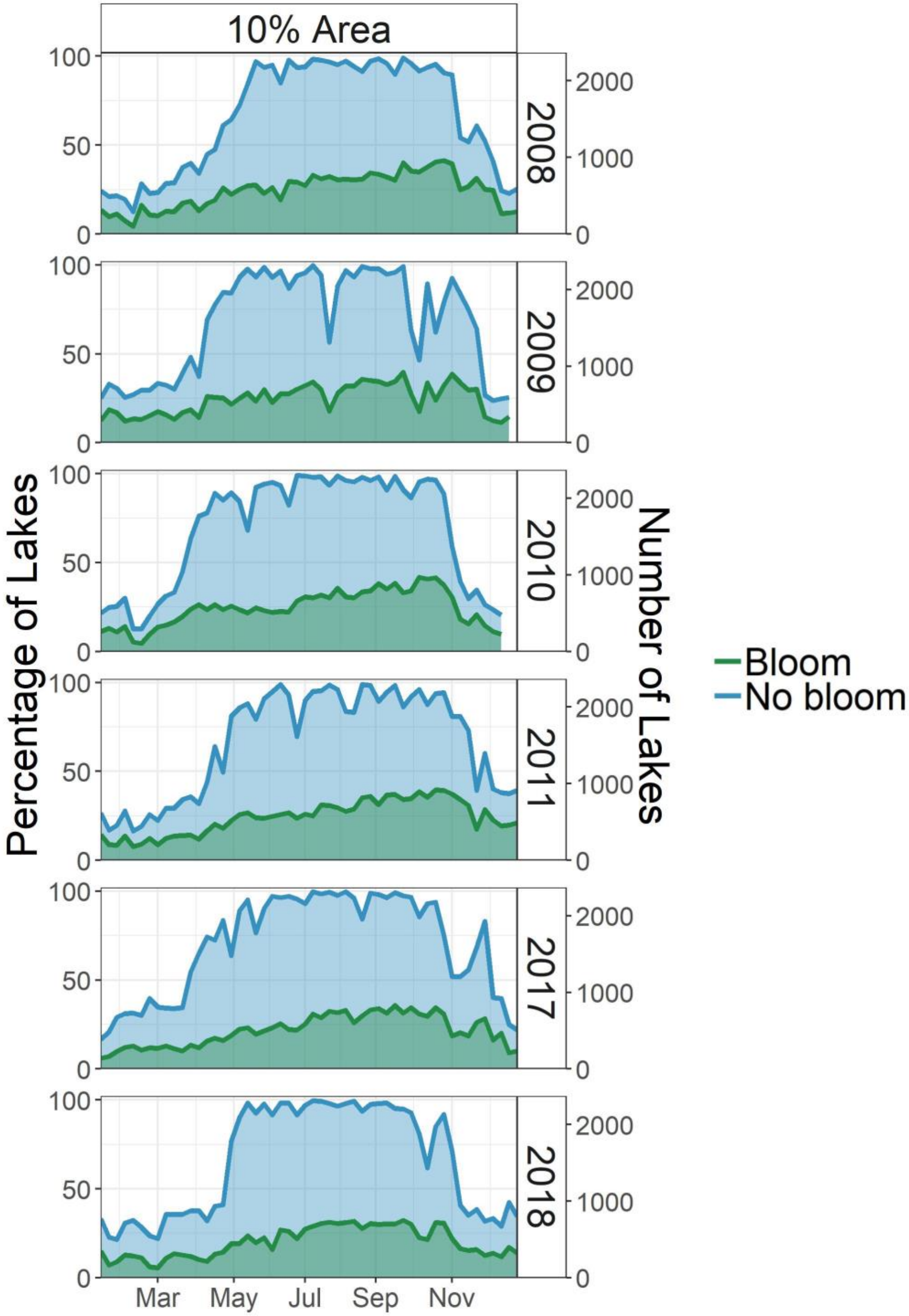


321
NO DATA

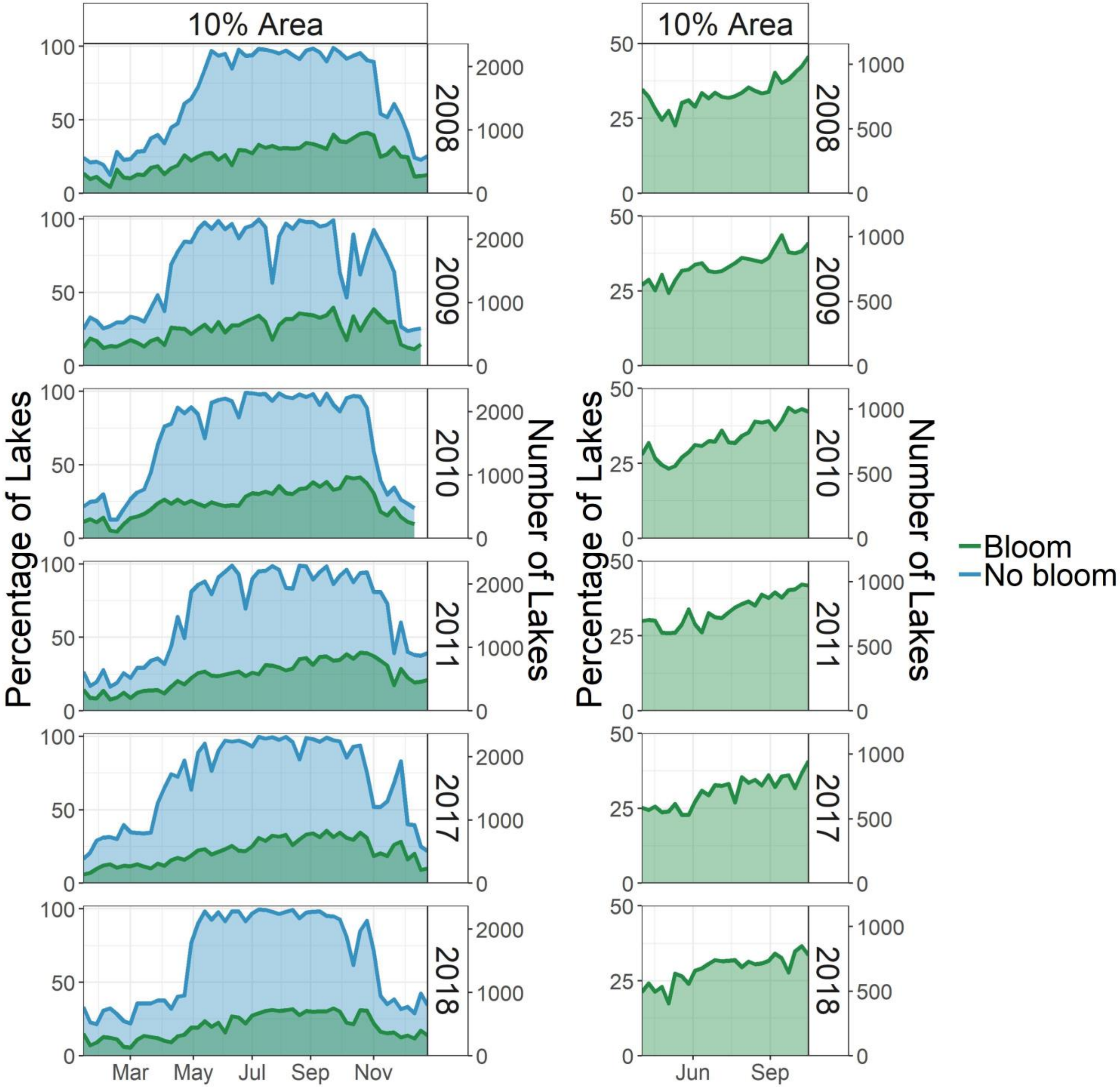
2,321
TOTAL LAKES

= 13.83%

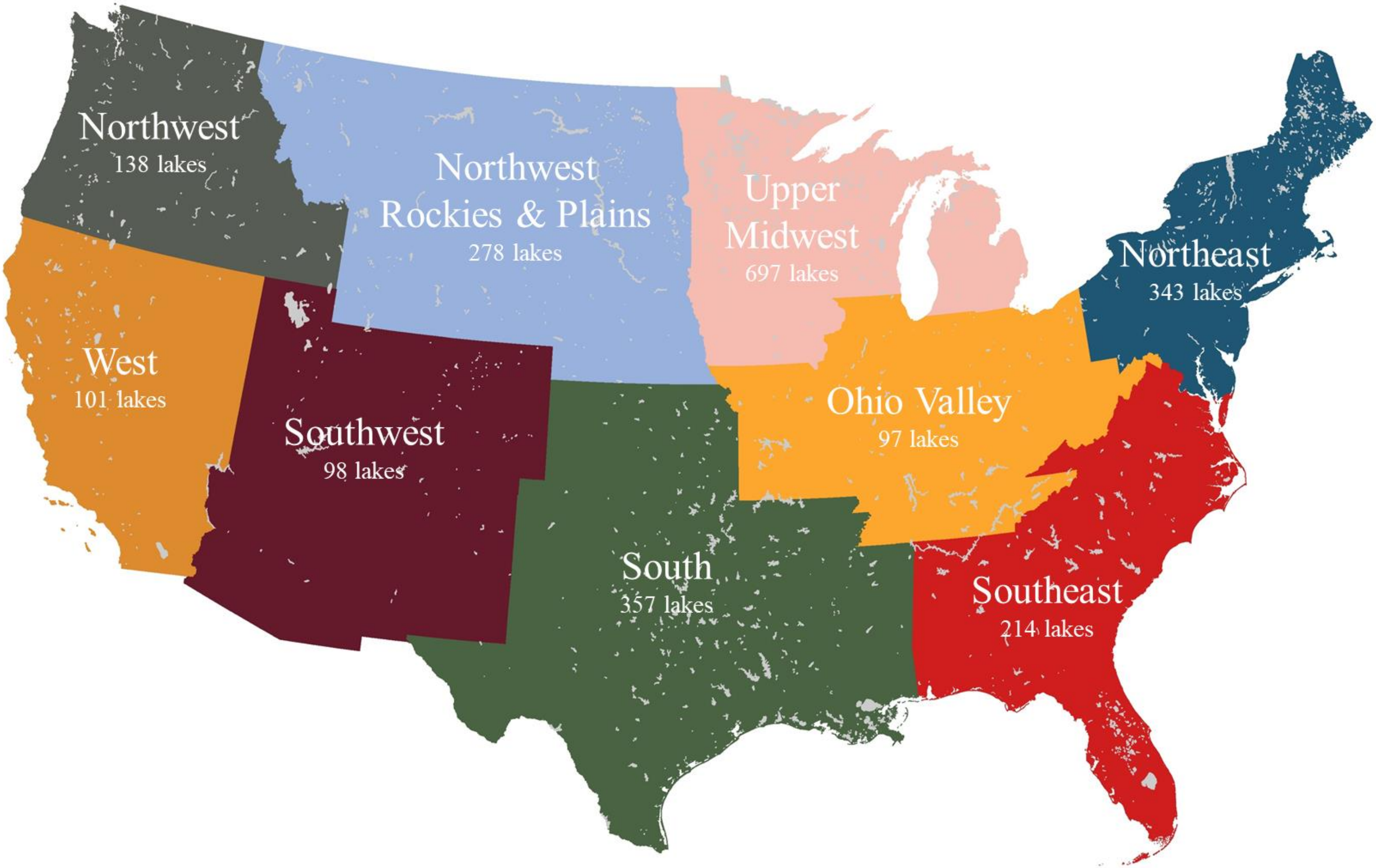
Coffer et al., 2019. *In clearance.*



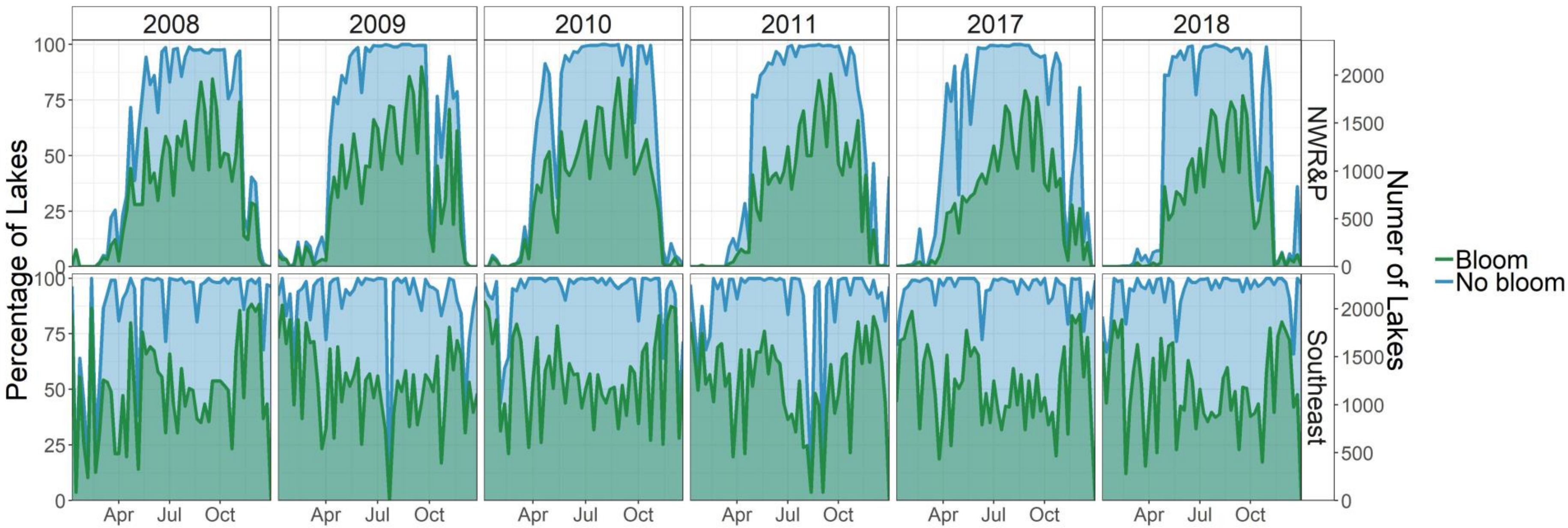
Coffer et al., 2019. *In clearance.*



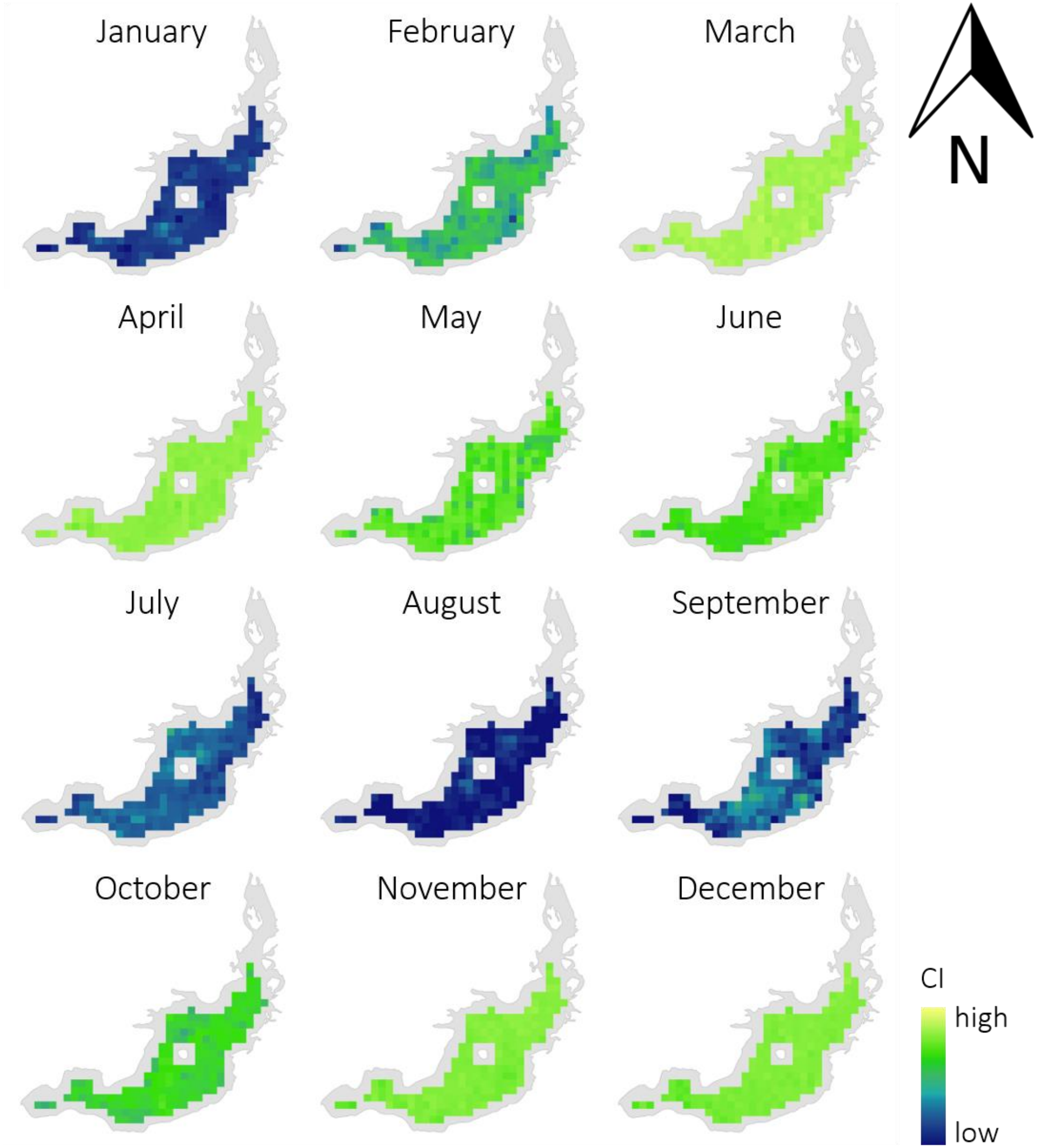
Coffer et al., 2019. *In clearance.*



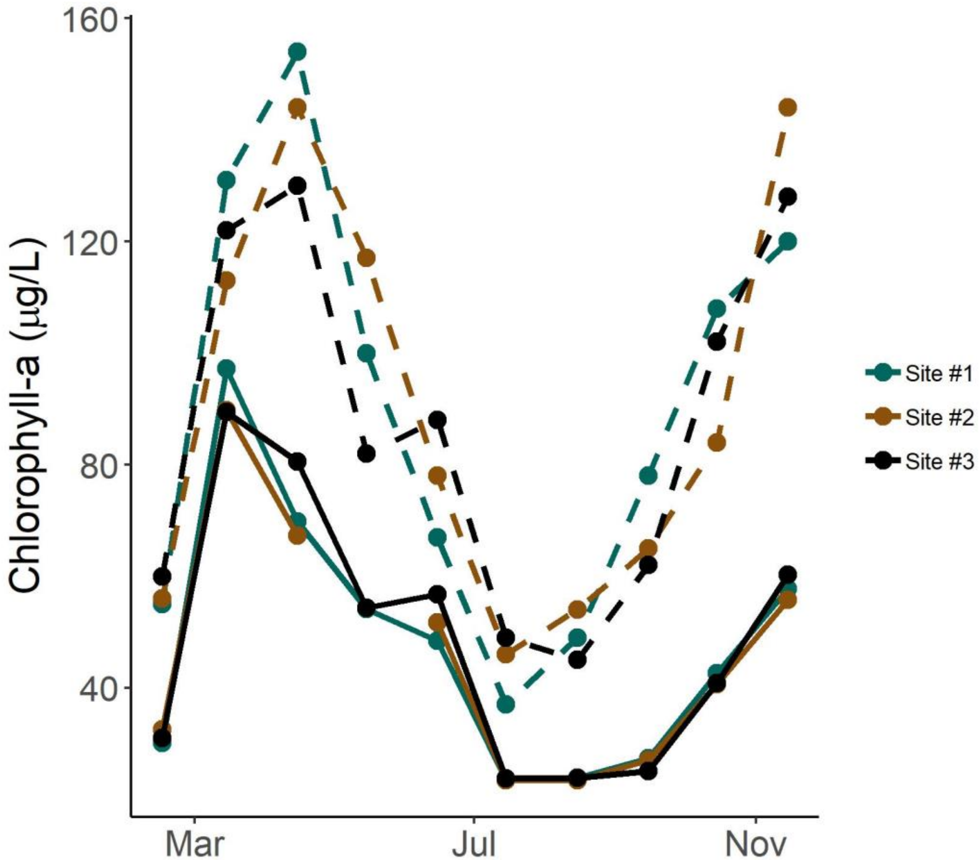
Coffer et al., 2019. *In clearance.*



Coffer et al., 2019. *In clearance.*



Coffer et al., 2019. *In clearance.*



Coffer et al., 2019. *In clearance.*

Bloom frequency

- For each pixel, the frequency of all weekly composites within a year that indicate a bloom out of all valid weekly composites within a year
  - At the pixel level, can identify the regions within a lake that are more problematic
  - Can be summarized to the lake, state, or regional level
- Goal: Quantify how often an area experiences cyanoHABs. Can be useful for baseline measures or the identification of vulnerable areas.

Schaeffer et al., 2019. *In prep.*

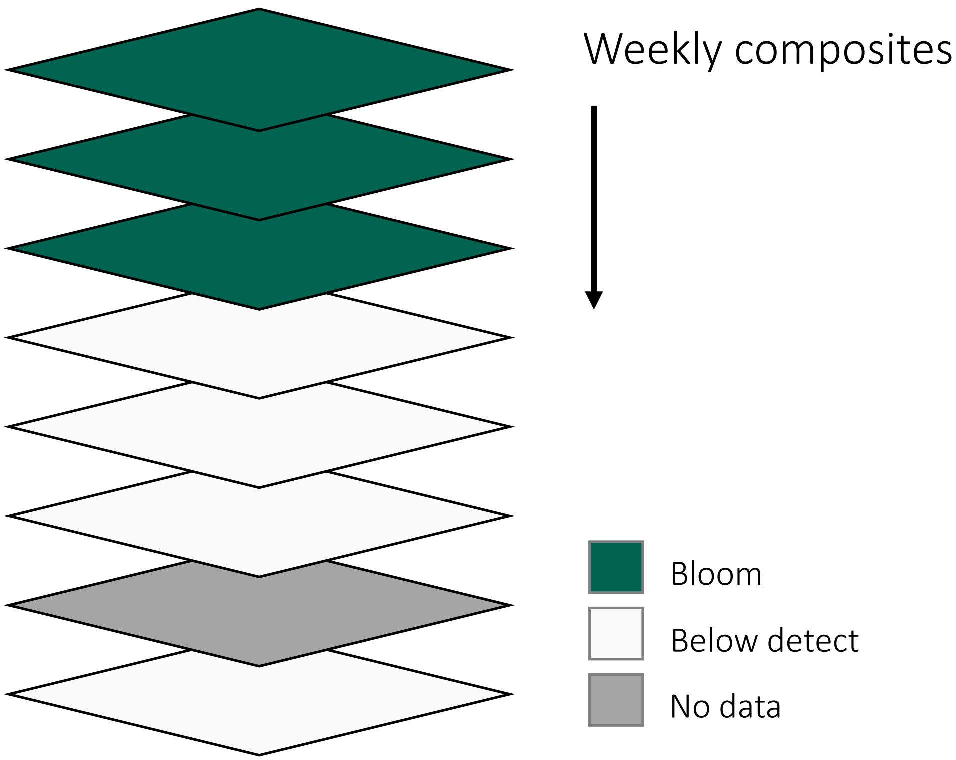
Bloom frequency

Calculated for each pixel across an entire year and then average across a spatial area.

Schaeffer et al., 2019. *In prep.*

Bloom frequency

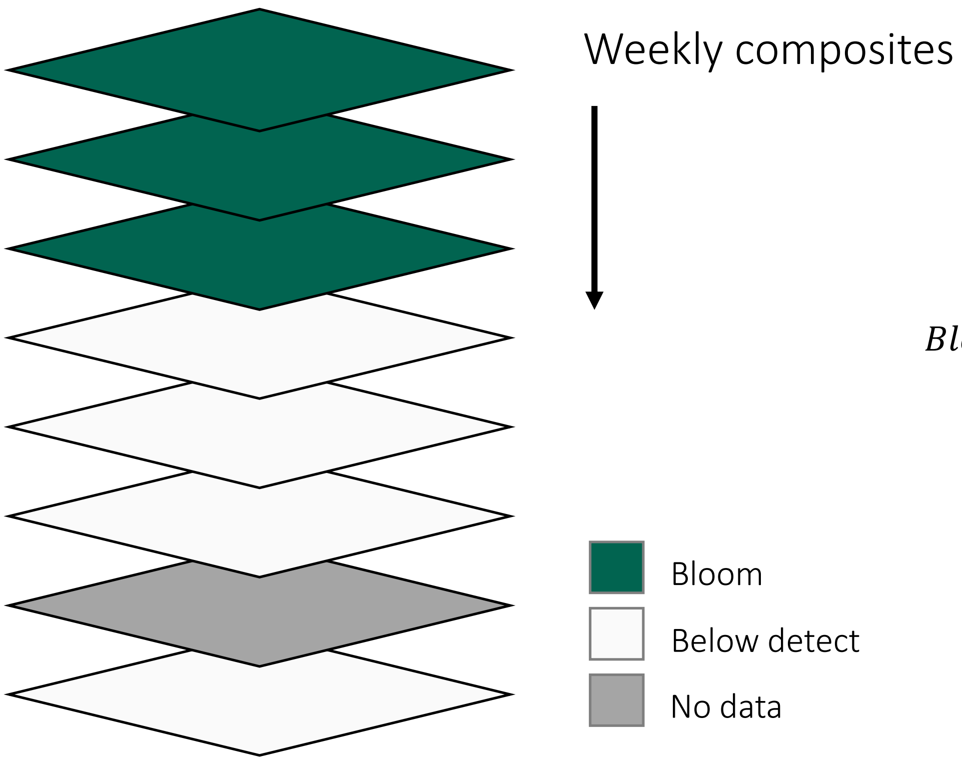
Calculated for each pixel across an entire year and then average across a spatial area.



Schaeffer et al., 2019. *In prep.*

Bloom frequency

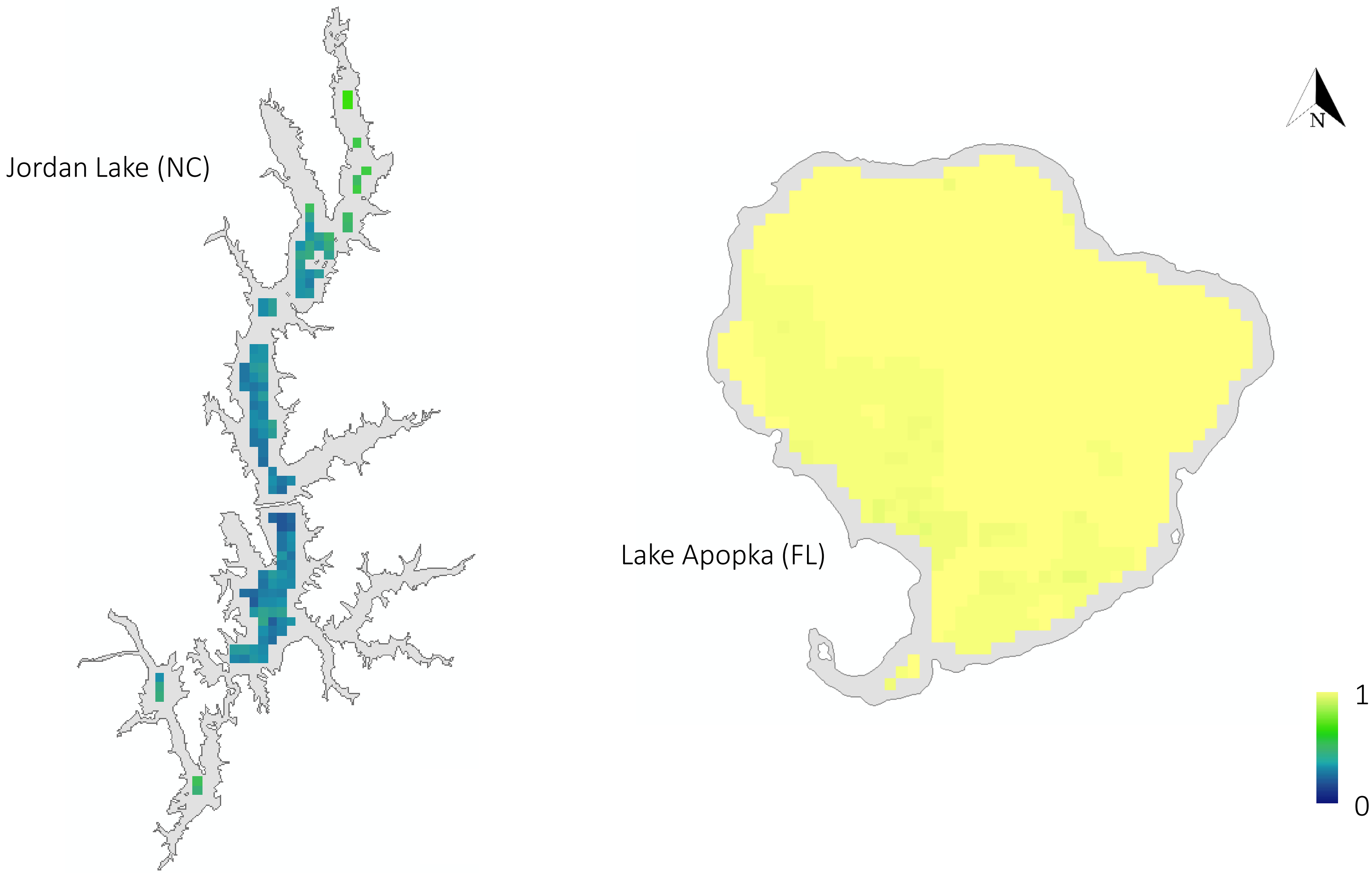
Calculated for each pixel across an entire year and then average across a spatial area.



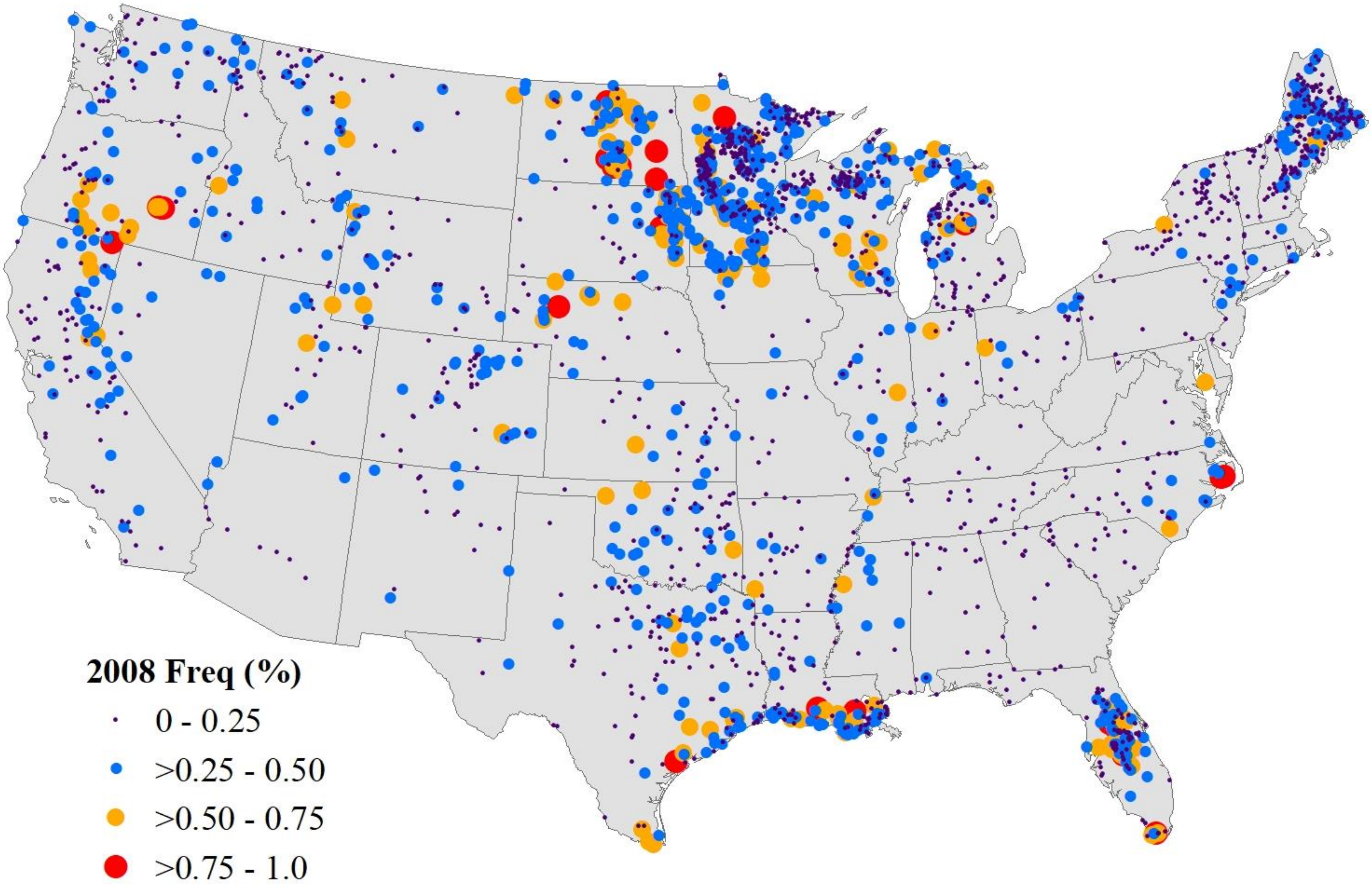
$$Bloom\ frequency = \frac{Number\ of\ bloom\ pixels}{Number\ of\ observable\ pixels}$$

$$= \frac{3}{7} = 0.43$$

Schaeffer et al., 2019. *In prep.*

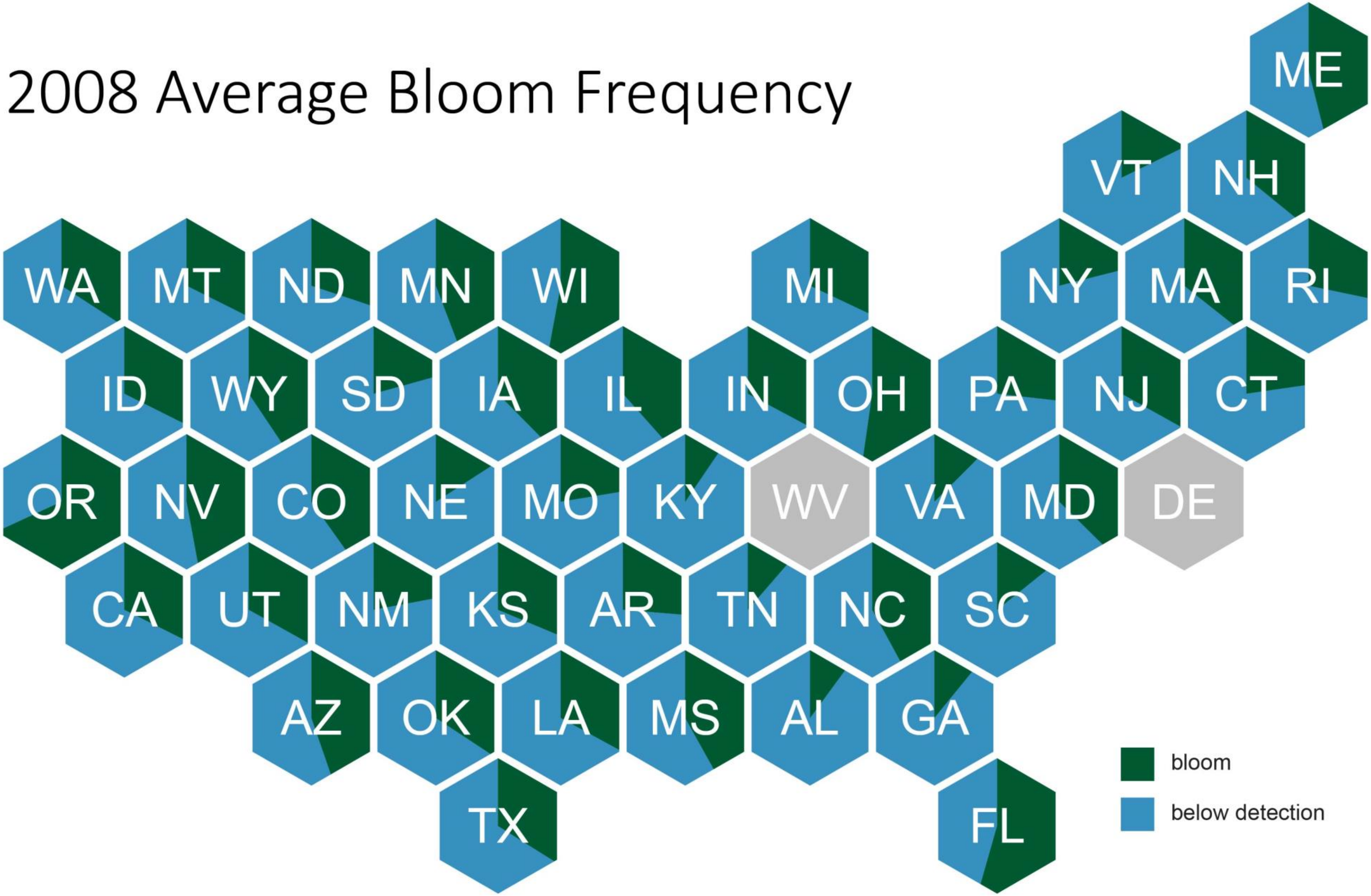


Schaeffer et al., 2019. *In prep.*



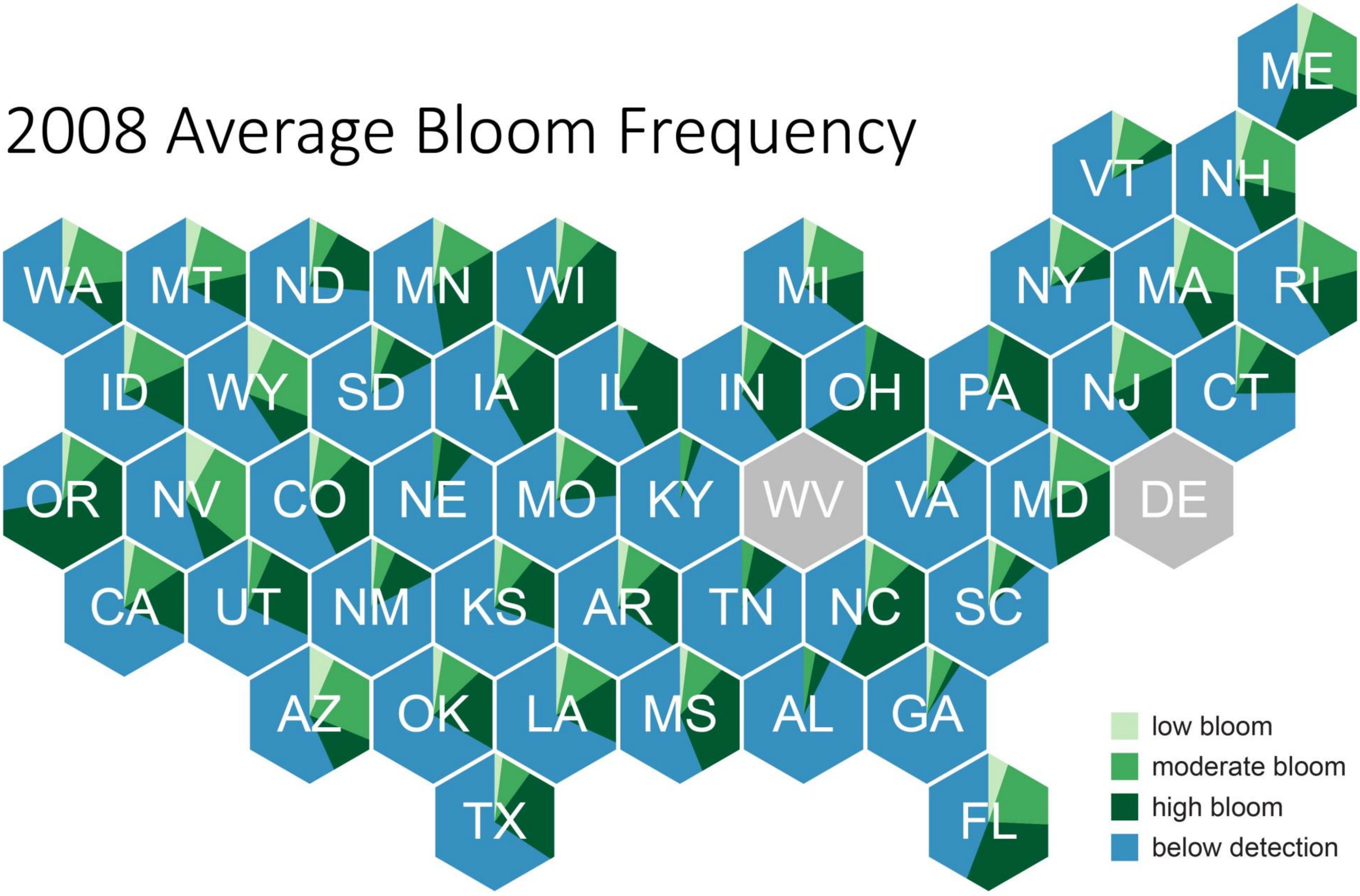
Schaeffer et al., 2019. *In prep.*

2008 Average Bloom Frequency



Schaeffer et al., 2019. *In prep.*

2008 Average Bloom Frequency



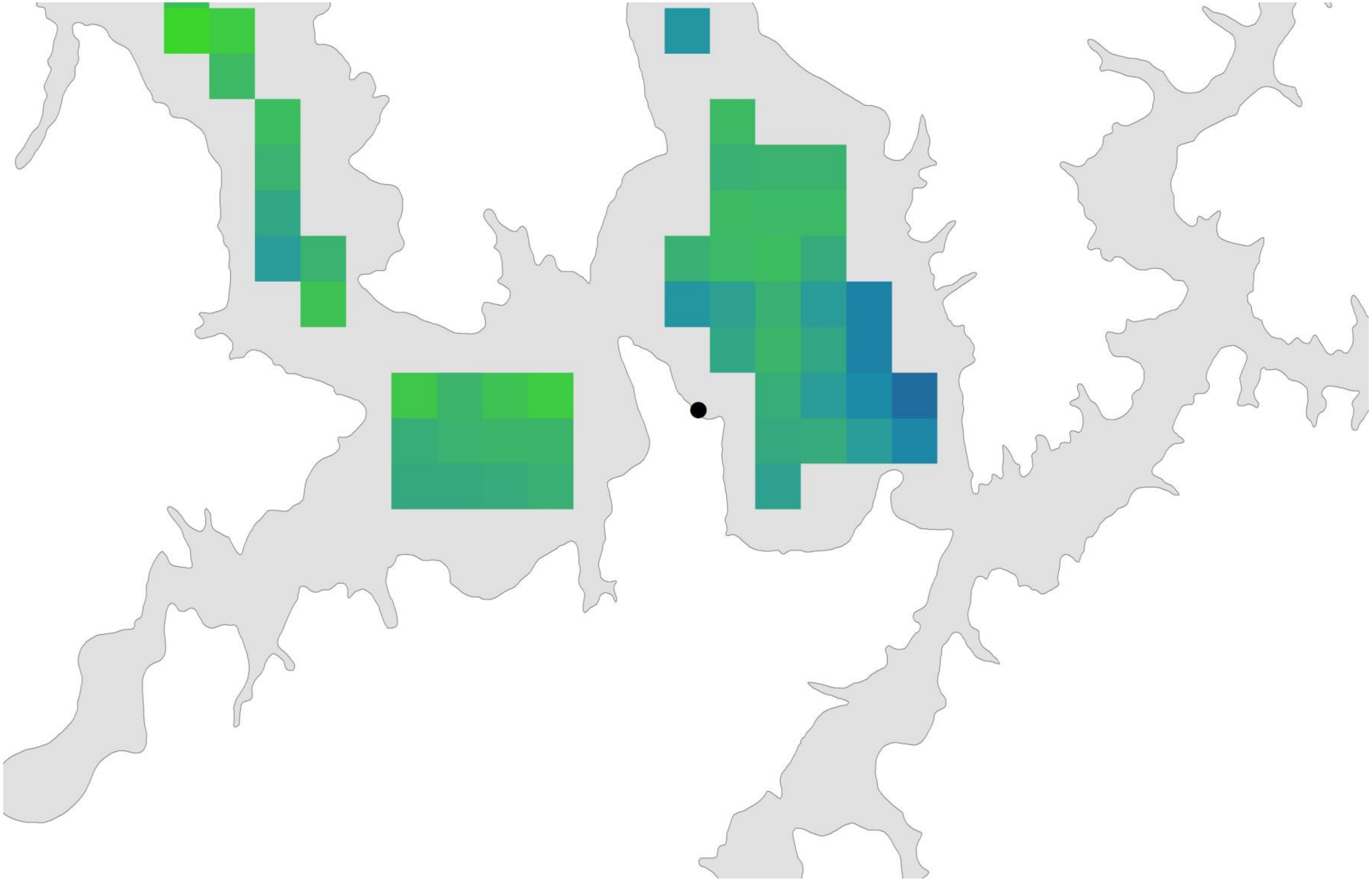
Schaeffer et al., 2019. *In prep.*

Drinking water intake analysis

- For each intake, summarize the annual bloom frequency for the nearest pixels to each intake
  - Of over 3,000 intakes across CONUS, we can obtain data for approximately 20% of these intakes
  - Compare satellite data to UCMR results for 2018 at matching intake locations
- Goal: Identify intakes that more frequently experience cyanobacterial blooms

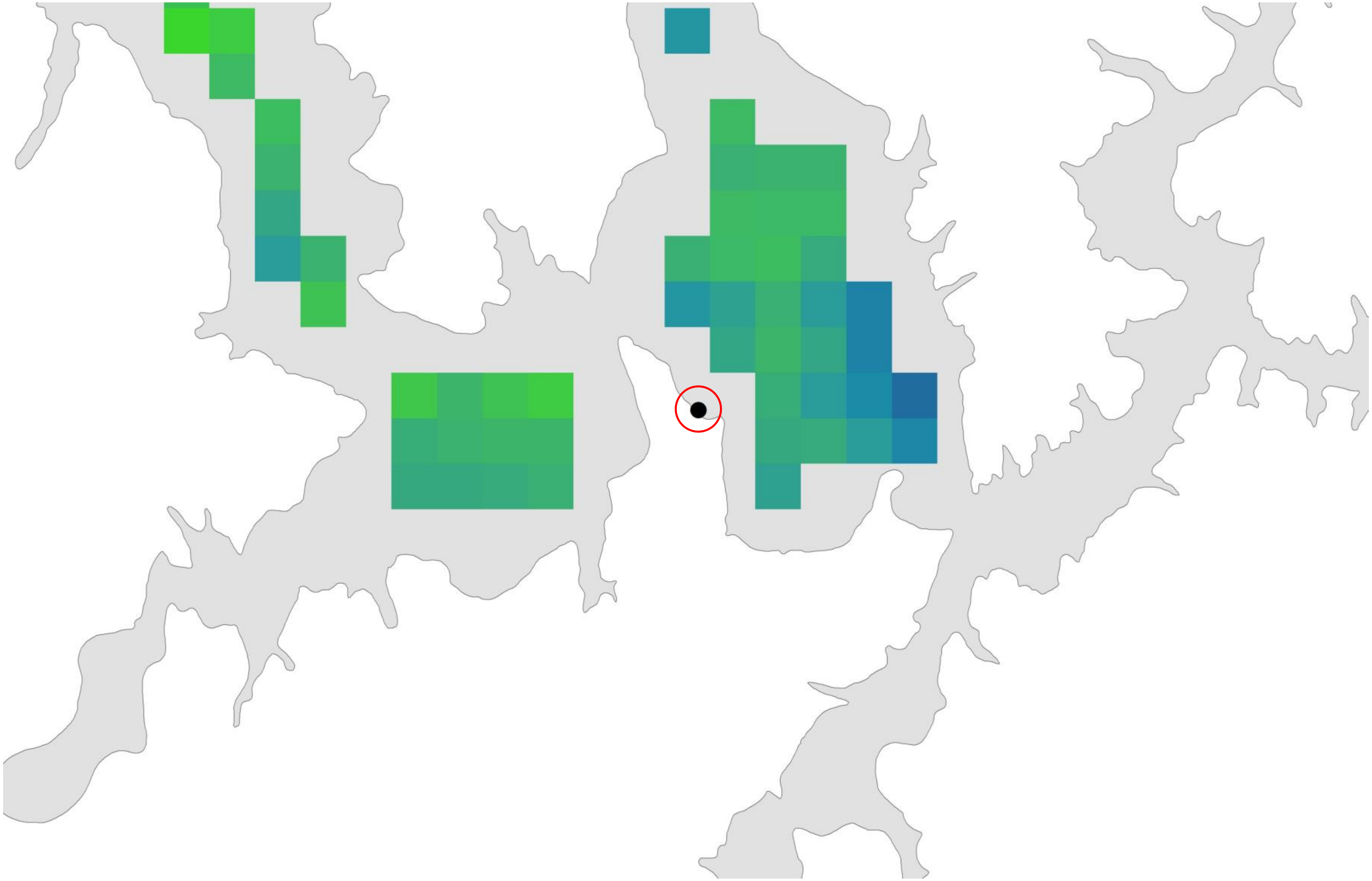
Coffer et al., 2020. *In prep.*

1. Given a drinking water intake



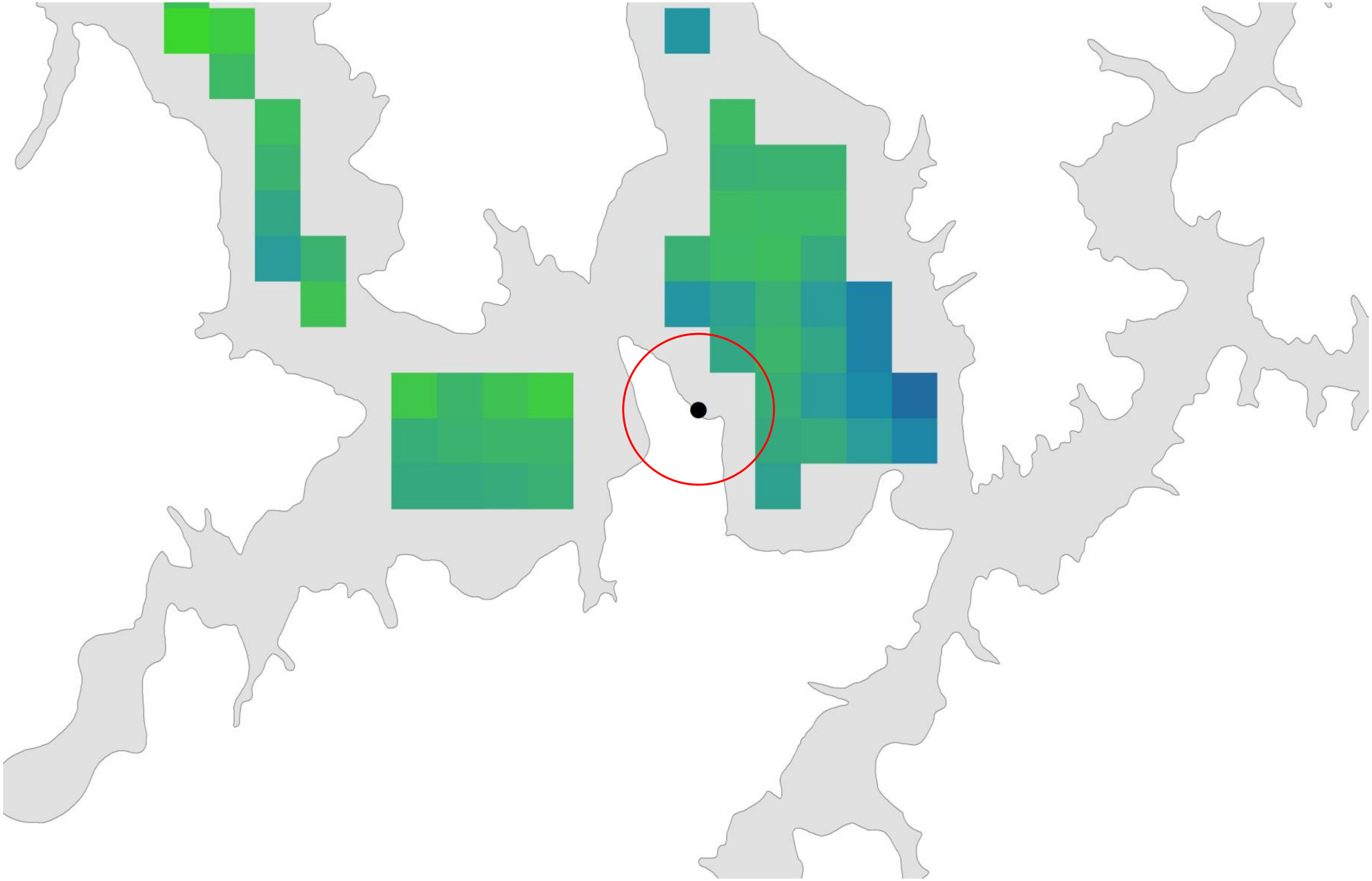
Coffer et al., 2020. *In prep.*

2. Ensure that a lake boundary falls within 100 meters of the intake



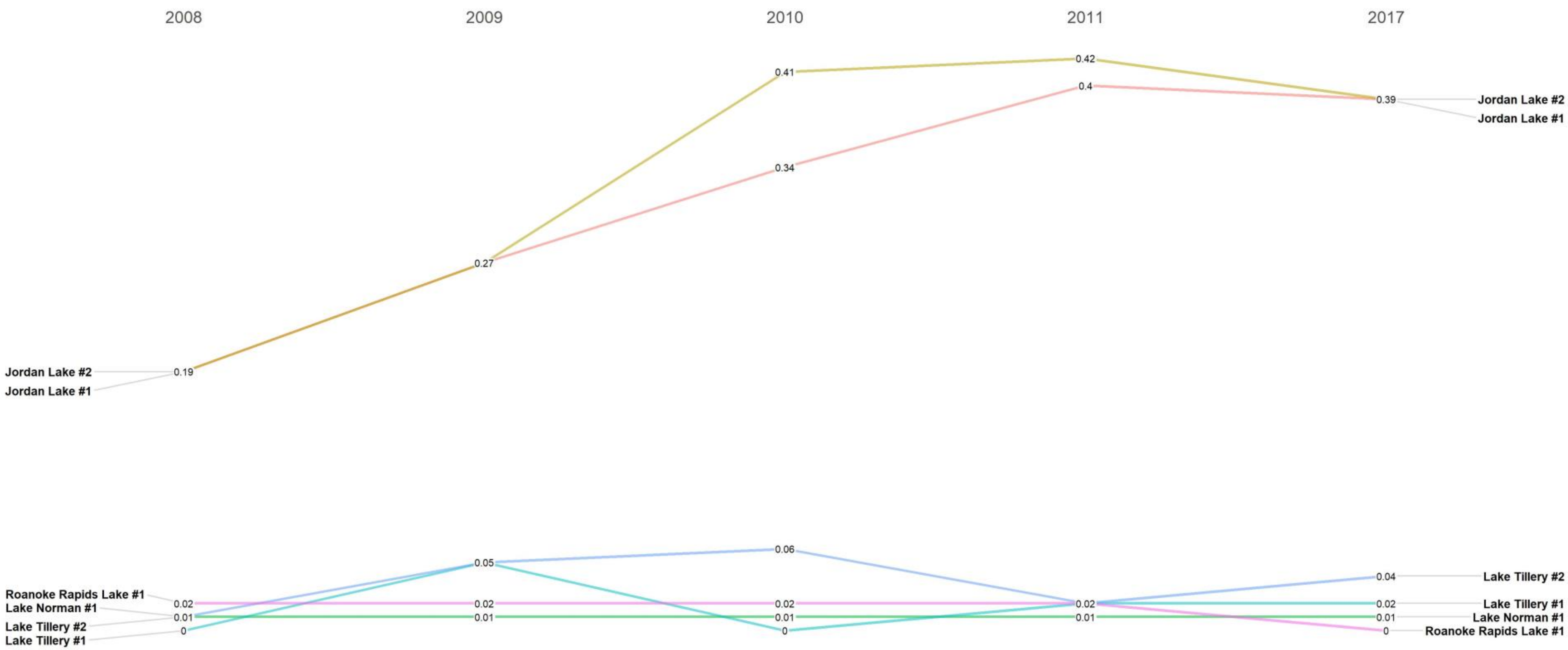
Coffer et al., 2020. *In prep.*

3. Find all 1-9 pixels whose centroid falls within 900 meters of the intake



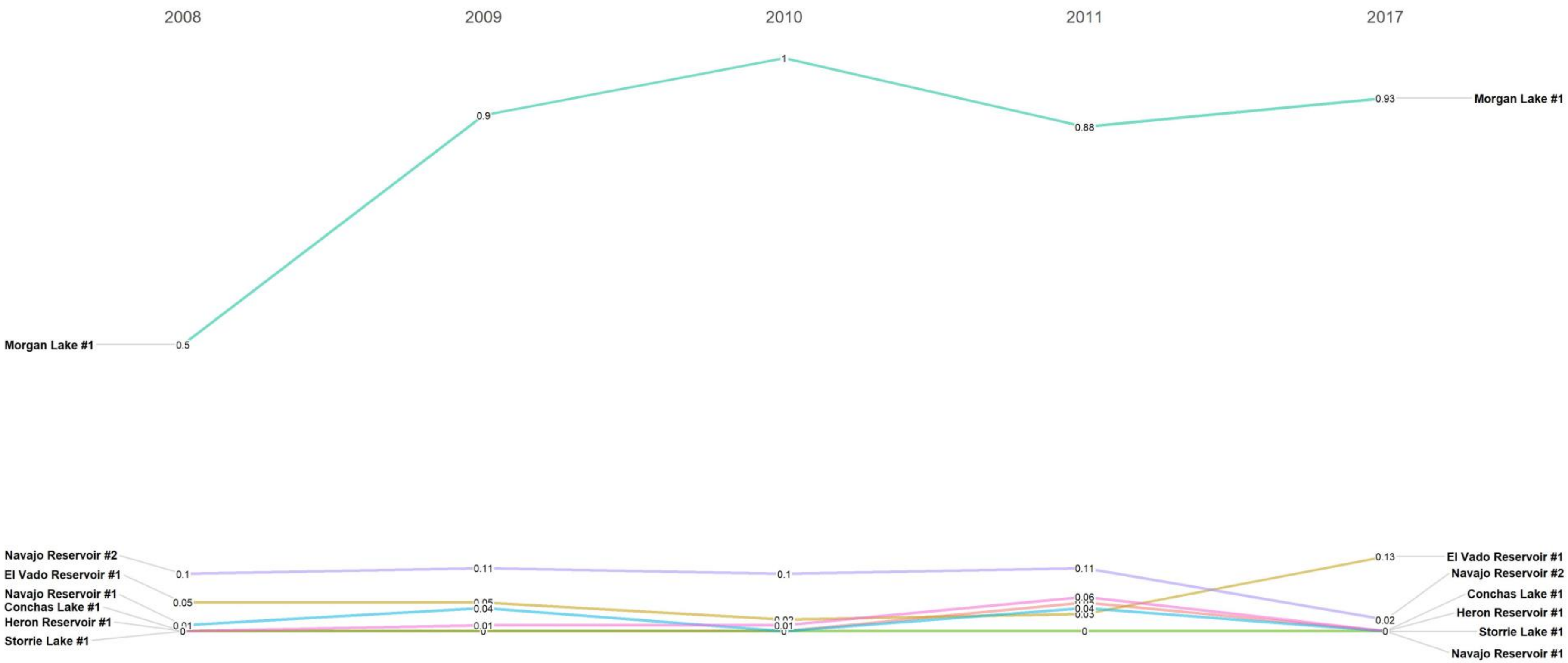
Coffer et al., 2020. *In prep.*

NC Drinking Water Intakes



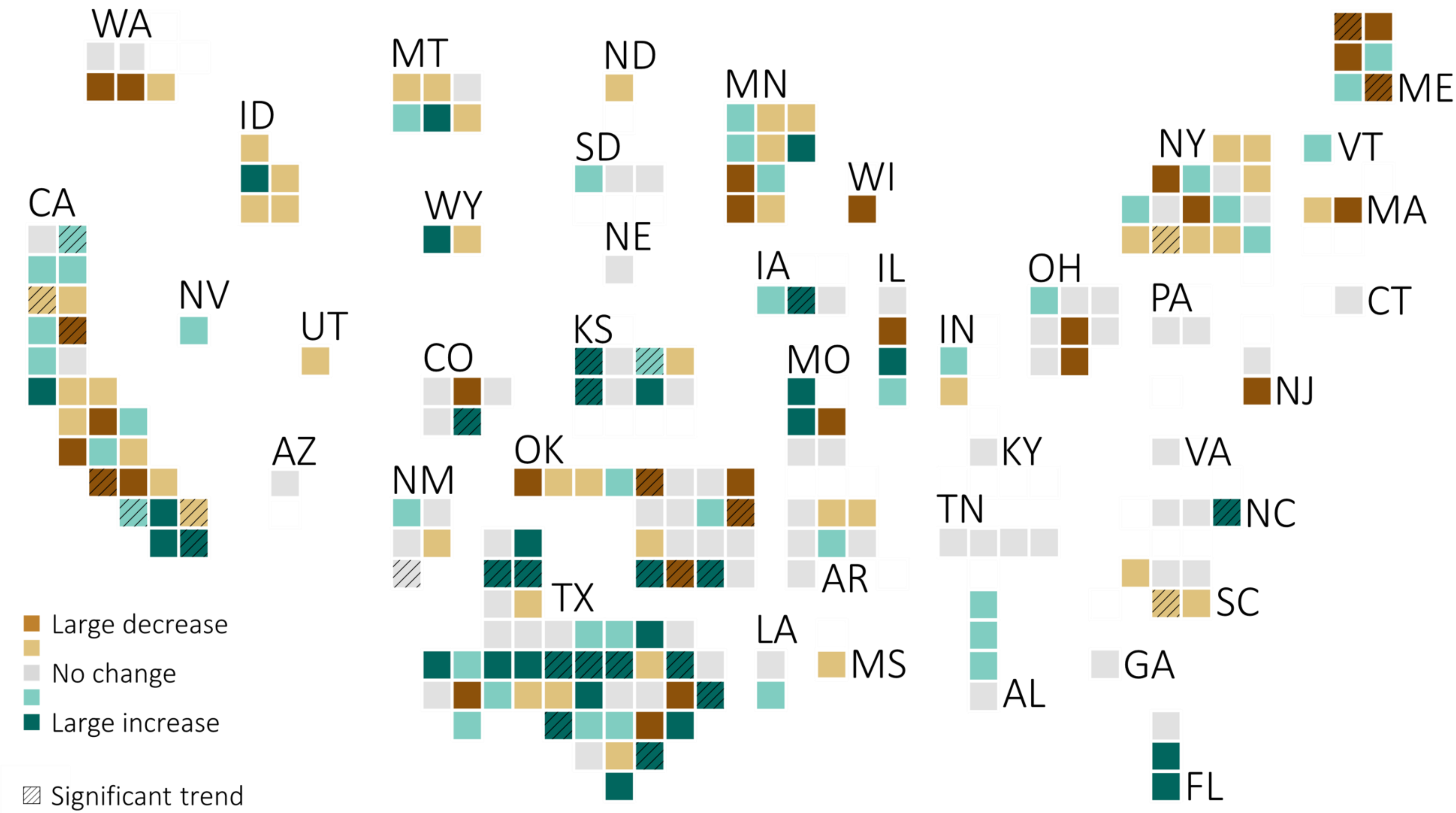
Coffer et al., 2020. *In prep.*

NM Drinking Water Intakes



Coffer et al., 2020. *In prep.*

Changes in Cyanobacteria for Lakes Containing Intakes (2008-2011)



Coffer et al., 2020. *In prep.*

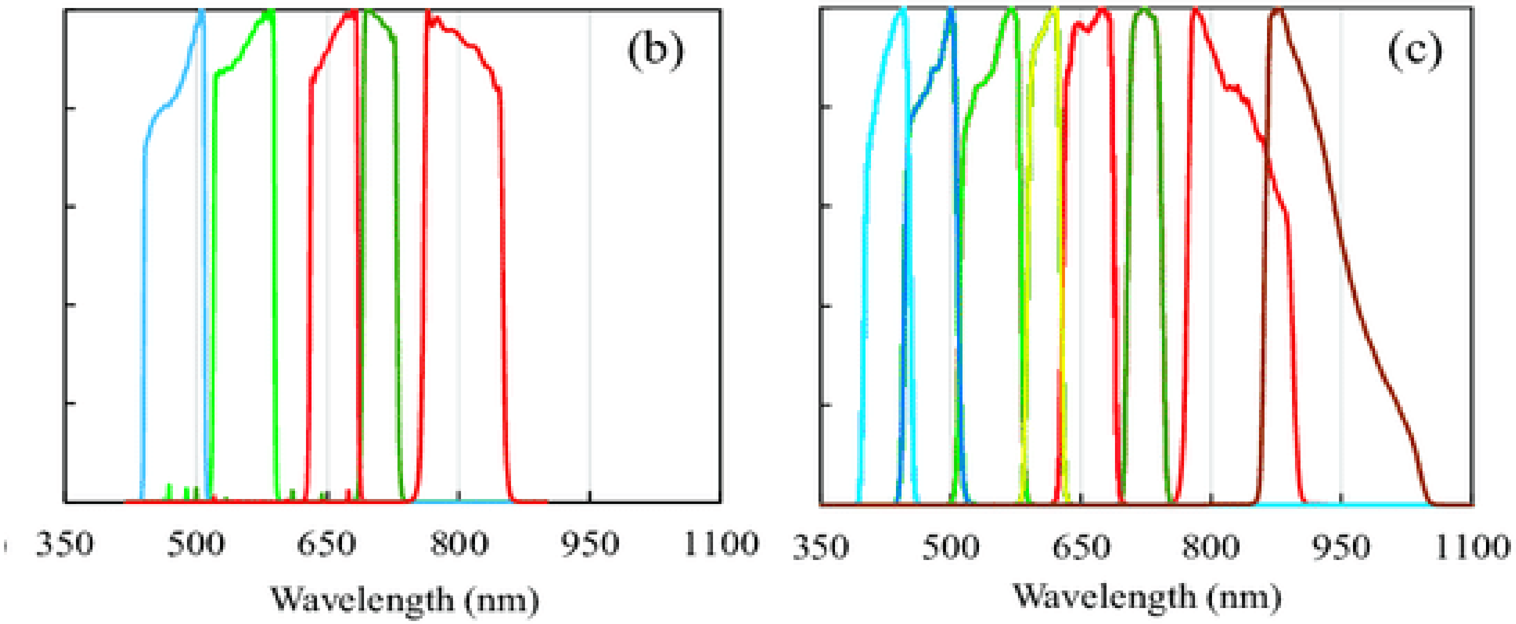
Placeholder for UCMR comparison

Coffer et al., 2020. *In prep.*

Commercial satellite analysis

- Develop a workflow to process and analyze commercial satellite imagery, particularly data from WorldView, RapidEye, Dove, etc.
  - Assess the feasibility of using commercial imagery for applications including cyanobacteria monitoring, oil spill detection, and seagrass mapping
- Goal: compare a classification on seagrass extent in coastal waters using data from WorldView and RapidEye

Coffer et al., 2019. *In prep.*



Coffer et al., 2019. *In prep.*

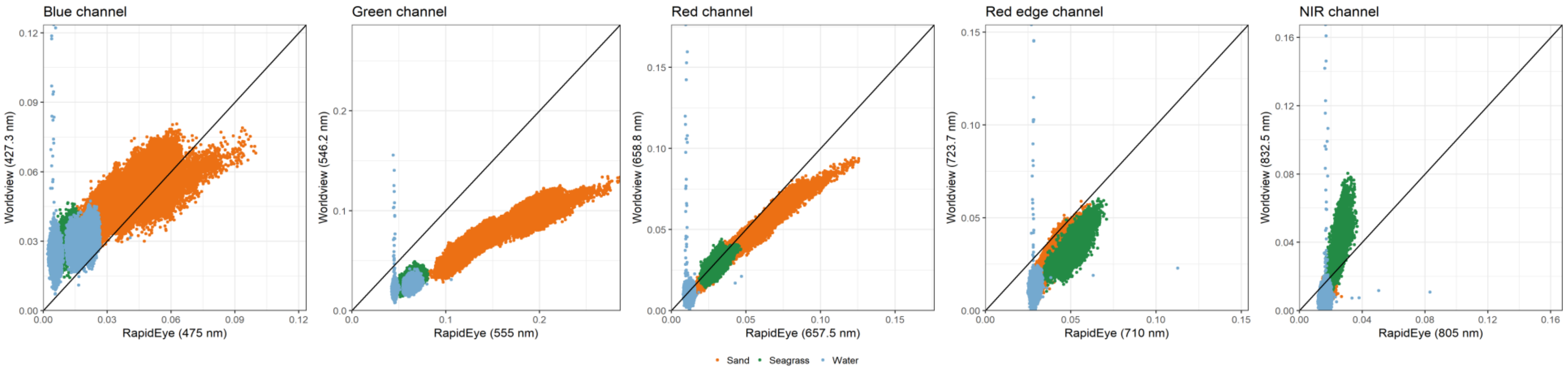
St. Joe Bay in Florida

WorldView-2 overpass Nov. 14, 2010

RapidEye overpass Nov. 10, 2010

Coffer et al., 2019. *In prep.*

Channel-by-channel comparison of reflectance within each ROI



Coffer et al., 2019. *In prep.*