

NEW HAMPSHIRE VIEW 2022 - 2023 ACTIVITIES

NewHampshireView completed two high impact activities that began 2021. The first of these activities used high-spatial resolution remotely sensed imagery to measure levels of cyanobacteria in New Hampshire waterbodies and compare the results to actual water samples. High levels of cyanobacteria can cause sickness to those who swim or recreate in the impacted lakes. The results of the project were extremely promising showing that the remotely sensed imagery could not only accurately predict cyanobacteria cell counts, chlorophyll-a, and phycocyanin concentrations (PC) (Table 1), but also could save considerable time doing so (Figure 1).

	Cell Counts	Chl-a	PC
CLASSES	Low <70k cells/mL, High >70k cells/mL	Low <10 ug/L, High >10 ug/L	Low <55 ug/L, High >55 ug/L
Average Accuracy	93%	87%	92%
Most Important Image Bands and Indices	Blue_475 NGBDI_4 NGRDI_4 CI_2 Green_Stdev_531 Green_531 Red_Stdev_650 Green_Stdev_560	NGRDI_4 Green_531 FLHblue_2 Blue_475 CI_2 NGRDI_3 CI_1 FLHblue_1	Blue_475 NGBDI_4 CI_2 Green_Stdev_531 Green_531 NGRDI_4 Red_Stdev_650 Green_Stdev_560

Table 1. Results showing the accuracies of the image analysis for determining cyanobacteria cell counts, chlorophyll-a and phycocyanin concentrations (PC).

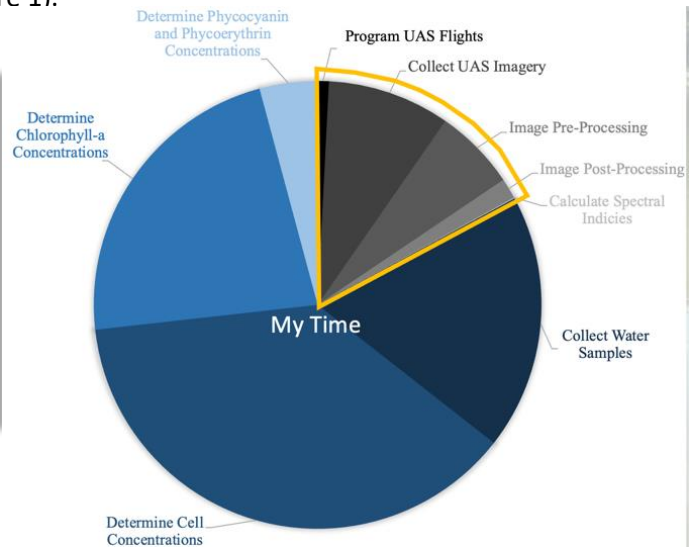


Figure 1. Breakdown of effort comparing the image analysis process vs. the water sampling approach.

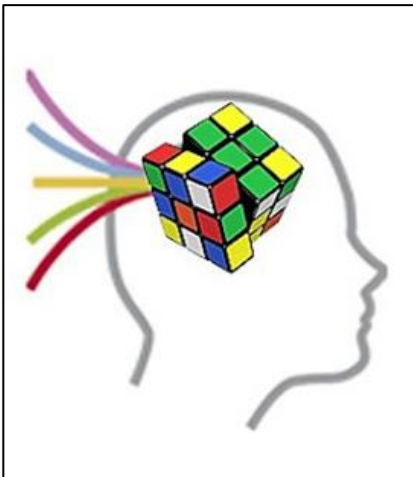


Figure 2. An example of spatial thinking.

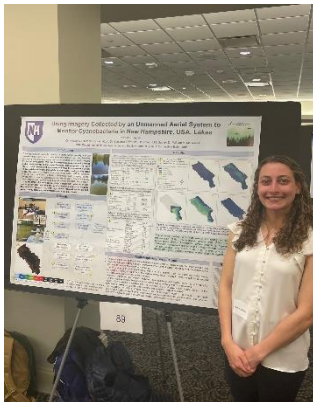
The second high impact activity was also a two-year project in which a series of educational videos and exercises to introduce and demonstrate the concept of Spatial Thinking were developed. Everyone has the ability to think spatially, and this ability can be enhanced with awareness and practice. For example, trying to solve a Rubik's cube is a very good way to improve spatial thinking as it encourages the player to study spatial patterns of color and twist and turn the rows and columns to align all the same color on a single plane (Figure 2). In today's world much of our spatial thinking has been replaced by technology. For example, map reading has been replaced by navigation systems on our phones and in our cars and boats. Many great scientific discoveries are credited to spatial thinking; most notably the double helix of DNA by Watson and Crick. Therefore, it is important that we continue to develop our spatial thinking abilities. A total of seven video lectures and three exercises were produced in this tutorial. Each exercise also includes a video explaining how to complete the exercise in addition to full written documentation.

BENEFITS TO NEW HAMPSHIRE

- NHView Director, Russ Congalton, presented three talks on NHView work this year; one at the Pecora Conference in Denver, a second was an invited lecture at Colorado State University, and the third was presented at the GeoWeek Conference in Denver.
- Christine Bunyon presented her cyanobacteria research at the GeoWeek Conference in Denver and at the University of New Hampshire Graduate Research Conference
- NHView continued its support of the University GeoSpatial Support Center (GSC). This facility provides consulting and workshops on remote sensing and geospatial analysis to students, staff, and faculty. Christine Bunyon presented four workshops in Spring 2023.
- NHView funded an graduate intern, Molly Cahill, to work in the Basic and Applied Spatial Analysis lab (BASAL) to aid our research. Molly's work on hemlock wholly adelgid (an invasive pest) is continuing in 2024.



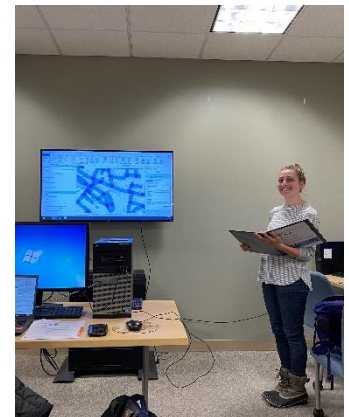
Field data collection.



Christine Bunyon presenting her cyanobacteria research.



Consulting and workshops in the GeoSpatial Support Center



NHVIEW CONSORTIUM MEMBERSHIP

- **Department of Natural Resources & the Environment, UNH**
The Basic and Applied Spatial Analysis Lab (BASAL) conducts basic research on spatial data uncertainty/map accuracy and applied research applying the tools of remote sensing, GIS, and spatial data analysis to solve natural resource problems.
- **NH GLOBE Partnership, UNH**
Carries out GLOBE teacher training in atmosphere, land cover, hydrology, soil and earth system science with a focus on land cover mapping and geospatial technologies.
- **EOS-EarthData, UNH**
A digital library of Earth science data that serves scientists, educators and the public.
- **NH GRANIT GIS Repository, UNH**
A cooperative project to create, maintain, and make available a statewide geographic data base serving the information needs of state, regional, and local decision-makers.
- **Diamond Library, UNH**
The library maintains an extensive map and aerial photo collection for NH and houses the GeoSpatial Support Center.
- **Forest Watch, UNH**
A New England environmental education activity using field, lab, and satellite data analysis methods for assessing the state-of-health of local forest stands.
- **Cooperative Extension, UNH**
Offers short courses in geospatial technologies including GIS, GPS, and field mapping.
- **NH Department of Natural and Cultural Resources – Division of Forests and Lands**
State agency responsible for the forest resources of the state.
- **Dartmouth College**
- **NH Planning Commissions**

NewHampshireView Principal Investigator:

Dr. Russell G. Congalton

University of New Hampshire

(603) 862-4644

russ.congalton@unh.edu



<http://sites.usnh.edu/nhview>