



WATERSHED ECOLOGY INSTITUTE 2017

AGENDA

Instructors & Partners:

Ina Ahern, Plymouth Regional High School
Shane Bradt, UNH Cooperative Extension
Lara Bryant, Keene State College
Matt Carpenter, New Hampshire Fish & Game Department
Bob Craycraft, UNH Cooperative Extension
Patti Dugan-Henriksen, Groveton Middle School
Kyle Glencross, New Hampshire Fish & Game Department
Nancy Heckel, Lake Sunapee Protective Association (LSPA)
Rebecca Lilja, USDA Forest Service
Brick Moltz, The Fells
Kathleen Stowell, Lake Sunapee Protective Association (LSPA)
Jen Thompson, Unity Elementary School
Judy Tumosa, New Hampshire Fish & Game Department

Goals & Objectives:

The goals of the course are to give participants an opportunity to:

- Develop a grade level appropriate watershed-based unit using appropriate scientific and educational protocols
- Learn how to use existing aquatic natural resources data and collect their own data in freshwater ecosystems
- Explore the use of Geographic Information Systems (ArcGIS) to locate, map, share, and analyze aquatic resource data
- Understand the value of resources and cultivate a conservation ethic, translating course content into action in their community
- Obtain access to free ArcGIS software and organizational accounts to use in their own classroom
- Experience teachers teaching teachers how to use ArcGIS
- Learn about the natural aquatic wonders of the Lake Sunapee watershed

This workshop is provided by the federally funded New Hampshire Fish and Game Department Aquatic Resources Education Program in partnership with NHedGIS team members and the GeoPRiSM MSP, LSPA, and the Fells.

Monday, July 17, 2017 @ Colby-Sawyer College and LSPA

Introduction to ArcGIS Online (AGO) & Lake Data Collection

Class will meet at Colby-Sawyer College, 541 Main Street, New London, NH

Directions: <http://colby-sawyer.edu/driving-directions>

Curtis L. Ivey Science Center, Room 102

Building 11 on Campus Map: <http://colby-sawyer.edu/pdf/campus-map.pdf>

- Agenda:**
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|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:30-8:45 | Welcome and introductions (All)
Watershed ice breaker activity (LSPA staff) |
| 8:45-9:00 | Introduce the institute goals and objectives (Judy) |
| 9:00-11:00 | Introduce ArcGIS Online “How Clean is YOUR Watershed?”
Pre-field review of your watershed (Judy, Rebecca)
Put the “NHWEP” tag on all your maps! |
| 11:00-11:15 | Break |
| 11:15-11:45 | Introduce the Field Trip (Kathleen)
Visit LSPA Water Quality lab
Identify problem, deliverables, and data needed
Lake Sunapee water quality testing on the pontoon boat for
data analysis (dissolved oxygen, temperature, conductivity,
chlorophyll, pH, secchi disk)
Deep sites data, stream site data
Lake Sunapee shoreline impact assessment for Story Map |
| 11:45-12:45 | Travel to LSPA for lunch and field work, what is LSPA?
LSPA, 63 Main Street, Sunapee, NH
Directions: http://www.lakesunapee.org/contact-us/ |
| 12:45-4:00 | Lake Sunapee water quality testing/ pontoon boat (LSPA staff)
Shoreline impact assessment (LSPA staff)
Switch groups and repeat |
| 4:00-4:30 | Questions, announcements and WEI evaluations |

Essential Questions:

What is Geographic Information System (ArcGIS) technology? How is it used to study watersheds?

Why is a pre-field assessment important before collecting data in the field?

Name 5 water quality parameters measured in lake assessments.

Tuesday, July 18, 2017 @ The Fells and Colby-Sawyer College Stream Data Collection & Posting using AGO

Class will be hosted at The Fells, 456 Route 103A, Newbury, NH
Directions: <http://www.thefells.org/visit-the-fells/directions-hours-fees/>

- Agenda:**
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|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:30-8:45 | Welcome and introductions (All)
Watershed activity (Fells staff) |
| 8:45-9:30 | Introduce the Field Trip
Identify problem, deliverables, and data needed
UNH Online Stream Key, EPSCoR, LoVoTECS (Shane)
Provide water quality and macroinvertebrate VBAP protocol training (Bob, Judy)
Introduce NHF&G Fisheries Management (Matt, Kyle) |
| 9:30-9:45 | Break |
| 9:45-12:00 | Electro fish at Beech/Bartlett Brook (Matt, Kyle)
Identify, measure and weigh collected fish for AGO data
Collect Water Quality and Macroinvertebrate data at Beech Brook using VBAP for AGO data (Bob, Judy) |
| 12:30-1:30 | Lunch on The Fells veranda, What is the Fells? (Brick)

Return to Colby-Sawyer College |
| 1:45-2:45 | Bring field data into AGO (Shane, Rebecca, Judy)
Fisheries, Water Quality and Macros (VBAP):
Excel csv browse to file, drag and drop (Fish data)
Editable feature service (Water Quality data) |
| 2:45-3:00 | Break |
| 3:00-4:00 | Follow the Flow in Your Own Watershed exercise
https://learn.arcgis.com/en/projects/no-dumping-drains-to-ocean/ |
| 4:00-4:30 | Questions, announcements and WEI evaluations |

Essential Questions:

How are aquatic macroinvertebrates and water quality parameters used to evaluate water quality for fish and wildlife?

How are new water quality and fisheries data sets added to ArcGIS?

Wednesday, July 19, 2017 @ Colby-Sawyer College and Low Plains Stream Data Analysis using AGO, Wetlands Ecosystem Study

- Agenda:**
- 8:30-8:45 Watershed activity (LSPA)
 - 8:45-10:15 Analyze the water quality and fisheries data from Beech Brook (Rebecca)
 - 10:15-10:30 Break
 - 10:30-12:00 Field trip to Esther Currier Wildlife Management Area at Low Plains Wetlands ecosystem study and photos for Story Map (Judy, Kathleen)
 - 12:00-1:00 Lunch at the wetland
 - 1:00-2:30 Demo story map using Lake data or shoreline assessment (Rebecca)
Working with lake data; buoy (43° 23' 28.64" N / 72° 3' 28.51" W) near [Loon Island Lighthouse](#), WEI data, deep sites
Compare changes in data sets during lake stratification and turn over (Rebecca, LSPA staff)
 - 2:20-4:00 Create your own Story Map!! (Patti, Jen)
 - 4:00-4:30 Questions, announcements and WEI evaluations

Essential Questions:

How can schools in New Hampshire compare watershed data within and between watersheds?
How can geospatial technologies be used to communicate and analyze data?
How can ArcGIS be used to compare data sets in the lake: deep sites, buoy data, teacher collected data

Thursday, July 20, 2017 @ Colby-Sawyer College

- Agenda:**
- 8:30-8:45 Watershed activity (LSPA staff)
 - 8:45-10:15 Explore and work on your projects with the help of your own spatial ArcGIS specialists!!!
Geoinquiries – Play!!!
 - 10:15-10:30 Break
 - 10:30-12:00 Use AGO in the classroom and in watershed studies (Judy)
Use the Watershed Education Program AGO watershed map to share data statewide (Judy)

NHedGIS

Share with others - how would you use this in your class? (All)
 - 12:00-1:00 Aquatic pot luck lunch
 - 1:00-1:30 **GRADUATION**

Watershed send-off activity (LSPA staff)
 - 1:30-2:30 Optional Survey 123 Survey Training (Rebecca)

Workshop Preparation for July 17

Accept invitation to be a “user” of the NH F&G WEP AGO Organizational Account.

Review information about the Watershed Education Program (WEP)

<http://www.wildlife.state.nh.us/education/watershed.html>

Getting Started with ArcGIS Online video: <http://video.arcgis.com/series/18/arcgis-online>

Read over ArcGIS Online Watershed Tutorial: “How Clean is YOUR Watershed?”

Lake testing protocol information: <http://www.lakesunapee.org/water-quality-sampling>
<http://www.lakesunapee.org/live-buoy>

Workshop Preparation for July 18

From “New Hampshire Fish & Game Department Watershed Education Program (WEP) Teacher Manual”, please review:

- 1) Section 3: Water Quality Testing Protocol
- 2) Section 4: Macroinvertebrate Protocol; VBAP (Volunteer Biological Assessment Program)

Review:

New Hampshire Fish and Game Department Fish Species & Fisheries Management information:

<http://www.wildlife.state.nh.us/fishing/species.html>

<http://www.wildlife.state.nh.us/fishing/fisheries-mgt.html>

UNH Center for Freshwater Biology, An Image-Based Key To Stream Insects:

<http://www.cfb.unh.edu/StreamKey/html/index.html>

Workshop Preparation for July 19

Esri tutorial on analysis tools: <http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm>

Esri tutorial about Story Maps: <http://storymaps.arcgis.com/en/>

Keene State College Policies for Graduate Credit:

- Attendance/participation – Course credit is primarily based on participation in the teacher summer institute provided by NHedGIS. Full participation in the 4-day institute, completion and submission of an electronic portfolio of the institute activities and a classroom implementation plan are required.
- If you have a documented disability and require adaptations or alternative testing, please notify me in writing or meet with me during my office hours. This way we can collaborate and ensure proper resources and supports are in place to assist you with your success. Students with disabilities who believe that they may need accommodations are encouraged to contact the Disability Services Office at 358-2354 as soon as possible to ensure that such accommodations are implemented promptly.
- Keene State College expects students to understand and observe certain widely accepted principles and standards of academic and intellectual honesty. Students should read and be familiar with the entire Policy on Academic Honesty: <http://www.keene.edu/administration/policy/detail/academic-honesty/>.

Course work in this class will consist primarily of:

- Institute Activities – Complete all institute activities. Once the institute is completed you need to submit a portfolio of institute activities the following Monday July 28th.
- Classroom Implementation Plan – a detailed classroom implementation grounded in relevant research is required. It is due August 1st.

Grading:

Activity	Points	Grade Scale
Institute Participation	100	186-200 points = 100% ≥ A ≥ 93%
Classroom Implementation Plan	100	176-185 points = 93% > AB ≥ 88%
Your final percentage will round to the nearest whole number, e.g., 89.2=89 but 89.6=90.		166-175 points = 88% > B ≥ 83%
Grades at Keene State College are recorded as: A(4.0), AB(3.5), B(3.0), BC(2.5), C(2.0), CD(1.5), D(1.0), F(0.0)		156-165 points = 83% > BC ≥ 78%
		146-155 points = 78% > C ≥ 73%
		136-145 points = 73% > CD ≥ 68%
		120-135 points = 68% > D ≥ 60%
		000-125 points = 60% > F

Course Readings:

Baker, Thomas R. 2005. "Internet-Based GIS Mapping in Support of K-12 Education." *Professional Geographer* 57(1): 44-50.

Bodzin, Alex M. and David Anastasio. 2006. "Web-based GIS for Earth and Environmental Systems Education." *Journal of Geoscience Education* 54(3): 297-300.

Dickinson, Janis L. et. al. 2012. "The Current State of Citizen Science as a Tool for Ecological Research and Public Engagement." *Frontiers in Ecology and the Environment* 10(6): 291-297.

Fitzpatrick, Charlie. 2011. "A Place for Everything: Geographic Analysis and Geospatial Tech in Schools." *The Geography Teacher* 8(1): 10-15.

Goldstein, Donna and Marsha Alibrandi. 2013. "Integrating GIS in the Middle School Curriculum: Impacts on Diverse Students' Standardized Test Scores." *Journal of Geography* 112(2):68-74.

Meyer J.W., et. al. 1999. "GIS in the K-12 Curriculum: A Cautionary Note." *Professional Geographer* 51(4): 571-578.

Milson, Andrew J. and Joseph J. Kerski. 2012. "Around the World with Geospatial Technologies." *Social Education* 76(2): 105-108.

Watershed Ecology Institute Resources

Natural Resource Information

Lotic Volunteer Network (LoVoTECS): <http://www.plymouth.edu/center-for-the-environment/projects/ecosystems-and-society-nh-epscor/nh-lovotecs-network/>

New Hampshire Fish and Game Department Watershed Education Program (WEP): <http://www.wildlife.state.nh.us/education/watershed.html>

New Hampshire Fish and Game Department Fish Species information: <http://www.wildlife.state.nh.us/fishing/species.html>

New Hampshire Fish and Game Department Fisheries Management: <http://www.wildlife.state.nh.us/fishing/fisheries-mgt.html>

UNH Center for Freshwater Biology, **An Image-Based Key To Stream Insects:** <http://www.cfb.unh.edu/StreamKey/html/index.html>

Pond and river macroinvertebrate keys: <http://watermonitoring.uwex.edu/pdf/level1/riverkey.pdf>

<http://watermonitoring.uwex.edu/pdf/level1/pondkey.pdf>

Technology - ArcGIS Information

Esri Educational Resources (lessons and videos) and ConnectEd to request an organizational account for your school: <http://edcommunity.esri.com/Resources/Collections>

General ArcGIS online info: <http://doc.arcgis.com/en/arcgis-online/>

How to do analysis: <http://doc.arcgis.com/en/arcgis-online/use-maps/perform-analysis.htm>

How to do story maps: <http://storymaps.arcgis.com/en/>

Assorted instructional videos: <http://video.arcgis.com/series/18/arcgis-online>

NHedGIS team training updates and resources: <http://www.nhedgis.org/about.html>

Partner Information

Lake Sunapee Protective Association: <http://www.lakesunapee.org/>

The Fells: <http://www.thefells.org/>