

Spring Spatial Technologies Conference

Surveying the landscape of spatial technologies from ArcGIS to the Web



Monday, May 11, 2015, from 8:00 AM until 5:30 PM

University of Massachusetts Amherst Lincoln Campus Center

Conference Map: [72° 31' 37.46" W, 42° 23' 29.57" N](#)

Conference Program

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Michael Turner @MT_AppGeo
 Great honor & deserved award for my longtime friend and @AppGeo partner for 24 years: [bit.ly/DvWvr](#) #PeterThacherAward #nearc

jesgooch @jesgooch
 Thanks #nearc for the awesome conference and location!!! #geogeeks #gis #nearc2016 @ Sea

Sunday 7:00 PM Pub Meetup
[High Horse Brewing](#), 24 N. Pleasant St., Amherst, MA, [just down the road from UMass](#).
 For those of you in town the night before the conference, please join a group of GIS locals and other attendees for conversation and good cheer.

Monday 8:00 AM Registration & Refreshments
 Campus Center 1st Floor
[Register online](#): \$65 in advance – \$75 after May 1 – Current Students: \$35/\$45 (\$0 for students who Present or [Volunteer](#), courtesy of [NEURISA](#))

9:00 – 10:15 Session 1
 Campus Center Auditorium

Welcome	Keynote
Welcome and Opening Remarks Niels la Cour Campus Planning, University of Massachusetts Amherst Brett Horr, GISP NEArc President; Town of York, Maine	Making and Unmaking Maps Catherine D'Ignazio Emerson College Through projects and examples, this talk makes the case that “data visualization” is not the only or possibly the preferred method for staging public conversations about complex issues. Rather, we may need to look to methods such as storytelling, unmaking maps, contesting data, building community, and making things talk that are more embodied, messy, and fluid.

10:15 – 10:30 Refreshment Break and Poster Session
 Campus Center 1st Floor Concourse

10:30 – 12:00 Session 2

ArcGIS	Aerial Mapping	Web GIS	Database Workshop
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10:30 AM
How Mapping and GIS Are Transforming the Work Environment

Mark Scott

Esri

The GIS profession is changing, presenting significant challenges as well as opportunities to meet new demands for access to authoritative data, user-centric approaches, and ease of use while expanding to new audiences and usage patterns. Through a presentation and live demonstrations, Mark Scott from the Esri-Boston office will discuss drivers influencing the change and show a workflow highlighting the current ArcGIS platform approach with the latest tools from Esri.

The Incredible Potential of sUAV (Drone) Technologies — And Why You Should Take Notice

Stephen Keen

geoResource Technologies

The media is full of colorful stories about drones, small Unmanned Aerial Vehicles (sUAV) — some positive, some negative, some factual, some alarmist, some funny and some deeply concerning. Whatever your stand might be on sUAVs, based on the proposed FAA regulations they are going to be integrated into the US airspace and be commonplace in only a few years — so the better informed you are, the better. This talk will discuss the relevant issues about the adoption of the technology into our own business areas. This will include a discussion on regulations, platforms, technology, sensors, software, and applications. Additionally I am sure there can be lively discussion about how this paradigm-shifting technology might integrate into our business processes and change the way we do things.

How My Company Can Avoid Geography in Providing GIS Services

Mike Doyle

Hilltop Northeast Enterprises

Setting up a “brick and mortar” company these days can be expensive, and technology is available to allow employees to be virtual, but have everything needed for close collaboration and even some “water cooler” conversations.

This presentation will begin with Microsoft tools, then delve into collaborating on projects using ArcGIS Online, ArcGIS Server, and ArcGIS Pro technologies to deliver complex projects through virtual offices.

Filter, Aggregate, and Combine: Taking Advantage of SQL Queries for Enterprise Databases

Guido Stein

Applied Geographics

If you are interested in getting comfortable writing queries with SQL and SQL spatial data types to take advantage of your enterprise data, then this is a great place to start. This session will introduce you to the SQL skills you need to write PostGIS spatial queries. This will be a hands-on tutorial using real data in a CartoDB test environment. Using these SQL skills you will be able to generate useful ArcSDE views with a geodatabase stored in the PostgreSQL database management system.

11:00 AM
UAVs in Academia: Challenges and Opportunities

Jon Caris

Smith College

Unmanned Aerial Vehicles (UAVs), also known as drones, will soon be integrated into the National Airspace System. However, drones are an extremely disruptive technology and the landscape for debate is diverse and contentious, often pitting industry/commercial desires against public/individual interests.

Academia offers a third space to engage the debate and think deeply about the affordances of drone technology and how they intersect with the GIS community. Learn how Smith College is developing a framework to study drones as objects themselves, as well as a useful technology for the spatial sciences.

We will also discuss how the GIS community, broadly defined, needs to join the discussion to shape the technology, policy, and ethics of drones.

ArcGIS Online Implementation by the Town of Peterborough, NH: Small Towns Can Do It!

Fash Farashahi

Town of Peterborough, NH

Ray Corson

Corson GIS

Over the last fifteen years, Peterborough, New Hampshire (population 6300) has built one of the state’s most comprehensive GIS system. Until recently, most of this data was only available to a limited audience using Desktop and ArcGIS Server intranet sites. This presentation will describe how Peterborough utilizes ArcGIS Online to rapidly deploy desktop and mobile solutions both to field staff and the general public.

11:30 AM
Implementing ArcGIS Pro Tasks for Creating Shareable Workflows

Erica Tefft

Environmental Data Center at the University of Rhode Island

ITS53 / Photogrammetry 101

Brian DuPont

Town of Wellesley, MA

Ted Covill

WSP

Development of the Environmental Assessment Form Application

Larry Spraker

Fountains Spatial

The new Esri ArcGIS tasks functionality available with ArcGIS Pro represents a new method of sharing complicated workflows with fellow Esri software users. ArcGIS tasks allow authors to set up a chain of geoprocessing tools that run in sequence, and pre-populate the input fields of these tools to guide users through a workflow. As a result, tasks help to largely eliminate questions about proper tool parameter input values, essentially distilling a complicated analysis down to a minimal number of mouse clicks and overall less end-user confusion.

This presentation introduces the fundamentals of building tasks and illustrates how they can simplify complicated workflows. Examples featuring mosaic dataset functionality will demonstrate how Esri tasks were used to modify a series of standard operating procedures to build and refine mosaic datasets. While mosaic datasets provide a quick and efficient way to store, manage, and manipulate many different types of raster data, there are certain caveats associated with using mosaic dataset tools that require advanced knowledge of their parameters and functions in order to achieve a high quality product.

Through a partnership with the National Park Service, the Environmental Data Center at the University of Rhode Island is working to transform traditional standard operating procedures into user-friendly, shareable workflows that can be quickly and efficiently run in conjunction with major coastal storm events.

The backbone of most GIS databases is land base mapping, compiled from photogrammetric mapping techniques. Cities, towns, and other state and regional agencies in Massachusetts can now purchase this data through the Master State Service Agreement (contract) for IT Services, ITS53. In this presentation, we'll explain how you can use this contract to procure planimetric mapping services from a recent or planned aerial flyover.

For many GIS professionals, procuring planimetric data can be a daunting task: Ground control? Analytical triangulation? Stereo compilation? The evolving world of map-accuracy standards? How are elevation contours drawn? In the second half of this session, a local photogrammetry expert will help you understand what you "need to know" as you get ready to purchase new base mapping or update an existing data set.

Fountains Spatial recently completed the development of the Environmental Assessment Forms (EAF) application for the NYS Department of Environmental Conservation (DEC). The EAF application is an integral part of the State Environmental Quality Review process. DEC started the effort with a redesign of the forms themselves. During this redesign, it was recognized that a significant subset of the questions were "place-based" in nature and could be answered using GIS technology.

Therefore, in conjunction with the update to the forms, a Web-based GIS application was developed that allows users to define their project site and then automatically calculates answers to the place-based questions contained within the EAFs, and populates the PDF forms accordingly. Using this innovative approach has resulted in considerable time savings to both the applicant and reviewers, and an increased level of credibility and confidence for the generated results. The application was developed using ArcGIS Server and the JavaScript API, and leverages third party tools for managing PDF files.

This presentation will provide an overview of the project, the technical design of the system, and a live demonstration of the application.

12:00 – 1:15

Lunch

Campus Center Auditorium

Birds-of-a-Feather Tables

1:15 – 2:45

Session 3

	Government and Security	Geospatial Modeling	Environment	ArcGIS Online Workshop
	Campus Center Auditorium Moderator: Niels la Cour	Campus Center 163C Moderator: Len Desson, GISP	Campus Center 175 Moderator: Darren Mackiewicz, GISP	Integrative Learning Center N111 Coordinator: Mike Olkin
◆ 1:15 PM	Meeting State Parcel Standards: A Regional View from the Capitol Region Council of Governments Project Kristen LaBrie Applied Geographics An overview of a regional parcel data standardization project and	Using Digital Elevation Models Derived from Airborne Lidar and Other Remote Sensing Data to Model Channel Networks Christine Hatch Noah Slovin Department of Geosciences, University of Massachusetts Amherst	Using GIS for Precision Agricultural Conservation John Waterman, PMP, GISP GCS This presentation will discuss a new approach to utilizing GIS to help reduce soil loss on farms. For precision conservation to be practical and effective, farmers	ArcGIS Online Platform Workshop Mark Scott Esri Online mapping, once reserved for organizations contracting out Web hosting, and/or those owning the required hardware and software infrastructure, is

some of the challenges faced when managing a regional parcel project involving state standards, expectations, a website, and many stakeholders – the client (the regional agency) as well as the member municipalities (38 cities and towns). We'll touch on how having a well-defined standard is important, and how unique requirements from municipalities can affect the project budget, timing, and success of the final outcome.

A careful assessment of water flow and accumulation patterns across a landscape, and the geomorphological characteristics of the river channels formed by those processes, can give researchers insight into sediment dynamics, stream power, flood risks, habitat health, and future changes. Historically, conducting detailed fluvial-geomorphic (FGM) assessments remotely was challenging, especially on low-gradient meandering rivers, because of limitations in data resolution and modeling capabilities. Improvements in remote-sensing technologies and GIS analysis methods present a new means of conducting rapid and objective assessments over entire watersheds, including hard-to-model meandering rivers.

In this paper I explore ArcGIS tools available to researchers that can be used to extract fluvial-geomorphic parameters from digital elevation models (DEMs). Results derived from DEMs of different resolutions and from different sources, including digital orthophotographs and lidar datasets, are compared. Field-based FGM assessment data is used as a baseline for comparison. As a conclusion, I provide an assessment of the strengths and weaknesses of DEM data sources and GIS analysis methods as useful tools for scientists, planners, engineers, and other interested parties.

and agronomist must have tools that can pinpoint conservation needs. Using GIS on the Web, conservation practitioners can quickly and easily target appropriate management practices to landscape positions that contribute the most significant sediment loads and evaluate which practice alternatives provide the most environmental benefit. Traditionally, this process was time consuming on the desktop and required scientific and professional knowledge. Moving to a simple Web-based front end and cloud back end now requires no previous GIS experience to produce complex analysis in short order. This presentation will review the front end as well as technical mechanics of the solution.

now available to everyone. Esri's ArcGIS Online platform allows organizations of all sizes to utilize online Web mapping solutions.

Please join us for an ArcGIS Online Hands-On Workshop. The workshop will be supervised by Mark Scott, Solutions Engineer with Esri. The workshop will provide a set of hands-on exercises using components of the ArcGIS Platform to create Web maps, services, and mapping applications. Students may be using pre-release versions of upcoming functionality. Exercises are designed to be completed by the student at their own pace. Students will receive a temporary ArcGIS Online Identity, or they can use an existing organizational account. Come learn, ask questions, and have fun!

◆ 1:45 PM

Data Management in Emergency Prevention and Response

Michael Funaro
George Davis
Latitude Geographics

In emergency situations, it's essential for field workers and incident commanders to communicate clearly and have access to accurate and comprehensive data. Gathering information from a wide range of sources is key to making decisions that save lives and protect property. How can workers on the scene reliably send up-to-the-minute information to their operators, and receive informed direction over the same channel? How can emergency-response teams integrate vital information spread through social media?

We will highlight technology advances that enable faster decision-making, giving responders and incident commanders a better overview of emergency situations. Managing data through ArcGIS Online, ArcGIS Server, and the ArcGIS GeoEvent Extension for Server

An Image Sketch Tool with ArcGIS API for Javascript, Canvas, and KineticJS

Joseph Doherty
Microdesk

Focused on solving real-world problems, this discussion will share insights on combining current Web and GIS technology to simplify documenting as-built conditions for tasks such as water-service installations by construction-inspection staff. Building an easy-to-use image sketch tool that combines the ESRI ArcGIS API for JavaScript with a number of current JavaScript APIs is a realistic possibility for your organization.

Landscape Pattern and Change by Integration of Remote Sensing and Stone-Wall Feature Identification

Rebecca Trueman
Yeqiao Wang
University of Rhode Island

Stone walls represent human land use, an accepted factor that generates the composition of landscape mosaics. By identifying the locations of both historical and present-day stone walls, compositions of post-agricultural landscapes common across the New England region can be assessed with inclusion of historical human-land use interactions.

This research selected the town of New Shoreham, known as Block Island, located approximately 14.5 km south of the Rhode Island mainland as the study area. Through visual image interpretation of 0.5-foot resolution orthophotography collected in the spring of 2011 and a historical topographic map from 1900, two standalone datasets were created of stone walls containing 260.6 km and 349.1 km respectively. These

offers powerful ways for organizations to structure planning and responses to crises. This presentation will illustrate how an intuitive GIS application can play a central role in the successful resolution of incidents, keeping communities and response teams safe in the process.

datasets were compared to determine which walls were removed, added, and matching between the two sets. Pattern and presence of present-day stone walls were integrated with temporal land cover and magnitude of change from 1988 to 2011. Stone walls were also assessed with the anthropogenic landscape based on parcel ownership as of 2013 and conservation lands as of 2013.

A relationship between stone walls and temporal land cover, frequency of land cover change, and land ownership exists as based on this analysis. By utilizing the abilities of GIS technologies to identify stone walls for a large geographic area, this research adds justification to continue the integration of remote sensing technologies and human cultural histories in studying driving factors of land cover change and landscape characterization.

↔ 2:15 PM

Does Publishing Your Floor Plans Represent a Security Risk? Is Not Publishing In-Building Floor Maps a Greater Risk?

Stu Rich
PenBay Solutions

In-building mapping represents one of the most important areas of opportunity for many enterprise GIS organizations. Many business problems including space planning, maintenance and operations, and safety and security as well as general search and way-finding benefit from in-building mapping and analysis. However some organizations have security concerns related to publishing floor plans for public consumption.

We will discuss methods for analyzing information sensitivity related to in-building data sets, as well as service publishing approaches for properly securing in-building data sources. We will also discuss opportunities to better enable the campus community to respond to emergencies.

Assessing Predictive Geospatial Modeling: A Test of Predictive Accuracy and Methodological Capability

Hailey McCall
Bank of America

This thesis is an initial effort to address the problem of assessing the accuracy of predictive geospatial models and the methodology's capability to produce accurate forecasts. The researcher uses comparative statistics to assess the similarities in the spatial and statistical distribution of the predictive geospatial model used in the study and the actual results of the event. Though the predictive geospatial model created by the author did not accurately predict the studied event, the statistical analyses indicate that the predictive geospatial modeling methodology is capable of producing accurate forecasts. This result emphasizes the importance of incorporating correct variables into these models and properly weighing each per the factor's influence on the studied event's occurrence.

Thermal Infrared Imaging Aerials Raise Some Questions

Peggy Minnis
Pace University – Westchester

The city of Norwalk, Connecticut had a thermal IR scan done one night during the winter to see if there was evidence of septic system failures near watercourses. The resulting scan may not have revealed what was intended, but it did make other things evident. The scan has raised many questions about environmental phenomena and may point to areas of research that should be pursued to answer these questions.

2:45 – 3:00

Refreshment Break and Poster Session

Campus Center 1st Floor Concourse

3:00 – 4:30

Session 4

GIS Profession	Lidar Mapping	Spatial Humanities	JavaScript Workshop
Campus Center Auditorium Moderator: Alexander Chaucer	Campus Center 163C Moderator: Mike Olkin	Campus Center 175 Moderator: Heather McCann	Integrative Learning Center N111 Coordinator: Alexander Stepanov

↔ 3:00 PM

GIS in Higher Education: Realities and Opportunities	Lidar, What Is It, and What Can We Do with It with ArcGIS	Surveying the Spatial Humanities	Getting Started Developing JavaScript Web Apps
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Realities and Opportunities

Timothy LeDoux
Carsten Braun
Westfield State University

Jon Caris
Smith College

Aaron D'Amario
Hatch Mott MacDonald

Geospatial technologies have become an essential analytical toolset in the professional workforce. Academically, such technologies have been used as a catalyst for fostering spatial thinking and developing problem-solving, creative thinking, and critical reasoning skill sets that nurture higher levels of learning while preparing students for the job market. Yet, the rapid diffusion of technology in the workforce and academia presents both challenges and opportunities in terms of creating a manageable GIS curriculum. This panel will bring together educators and GIS professionals to discuss the current state and future direction of GIS education in higher education.

We DO with it with ArcGIS

Brian Stice, GISP
TRC Solutions

We have seen in the past few years more industries starting to adopt or currently using remote-sensing technology, specifically lidar. From forestry to utilities, renewable energy to coastal management, many sectors are moving toward this innovative and increasingly affordable data source. So what is lidar and how does it work? We will provide a quick overview of remote-sensing principles, how lidar functions, and some examples of its use in various private and public industries. Lastly, we will look at some essential concepts for lidar manipulation within the ArcMap environment, some basic/intermediate workflows, and the resulting derived products that can be used for analysis.

Humanities

Carolyn Ferwerda
Wellesley College

Andy Anderson
Amherst College

Bruce Boucek
Brown University

Deborah Reichler
Hamilton College

The explosive growth of the digital humanities and the broad acceptance of a "spatial turn" in the humanities have changed how we support GIS and spatial technologies at academic institutions. These tools have become much easier to use and far more prominent on the Web and in the news. As a result, faculty and students with limited technical skills are asking for more assistance to implement humanities projects, while others are finding and using emerging technologies with which we have limited or no familiarity. Panelists from four institutions with different approaches to the digital humanities will review the technologies, techniques, and services they are providing, along with examples of projects using ArcGIS Online, Google Fusion Tables, Mapbox and OpenStreetMap, D3, and Neatline. Join us for an open discussion of the challenges and future trends within this growing area.

JavaScript Web Apps

John Waterman, PMP, GISP
GCS

This workshop will discuss how to get started with the ArcGIS JavaScript API. We will cover the basics for getting started, design techniques, best practices, and tips and tricks. The presentation will be supported with real-world examples. We will also discuss some of the latest features and exciting enhancements to look forward to this year.

◆ 3:30 PM

Eight Critical Skills You Need to Be a Successful GIS Professional

Chris Akin, GISP
Novara GeoSolutions

You've gone to school, taken some GIS training classes, logged countless hours creating shiny new maps, and maybe even been promoted or changed jobs a time or two. I'm right there with you. That's been my path as well. And over the last fourteen years of being involved in the GIS industry, I've come to realize that there are certain skills that can really make you successful in your GIS career.

So I present to you the top eight skills you need to be a successful GIS professional in today's world.

Using ArcGIS to Confirm Airborne Lidar Accuracy and Create Contour Maps

Roy Apostle
Glenn Hazelton
Northeastern University

Airborne lidar is an incredibly useful and powerful tool for GIS professionals and engineers looking to develop highly accurate representations of ground surfaces. The availability of and improvements in accuracy of lidar data has kept pace with the research into ways to confirm this accuracy. It has been shown that using set targets could confirm lidar accuracy (Csanyi and Toth, 2005) as well as by comparing paving stones (Brzezinska, et al., 2008). This presentation suggests that by using ArcGIS it is possible to compare known elevation data collected from total station survey with airborne lidar data to confirm its accuracy. Utilizing ArcGIS it is also possible to compensate for any errors in accuracy so as to improve it. As a result, ArcGIS-generated contours could prove to be a low-cost alternative to contour mapping derived from aerial photography.

◆ 4:00 PM

To Be, or Not to Be...a Certified GISP?

Brian DuPont
Town of Wellesley, MA

Steve Sharp, GISP

Vermont Center for Geographic Information

Using Lidar Data to Create 3D Building Footprints

Patrick Cunningham
Blue Marble Geographics

More and more GIS professionals

Synopsis of a New Book on GIS for the Humanities

Jenni Lund
Library and Information Services, Wheaton College

Abstract Machine Humanities GIS

Jeff Olson

Until

Considering applying for GIS Professional Certification? Maybe you're already a GISP and will be due for re-certification soon? In February of this year, the GIS Certification Institute announced some major changes to the GISP Certification Process that you should know about! In this session, we'll detail the evolution of the GISP Certification, and explain exactly what these planned changes mean for you. A panel from the Board of Directors of the New England Chapter of URISA (NEURISA) will be on hand to explore (and maybe even debate!) some of the major reasons for and against GISP Certification. We invite you to join us in this conversation, share your own thoughts, and make an informed decision about whether Professional GIS Certification is right for you!

are utilizing lidar data to leverage the third dimension in their GIS projects. The increased availability of these lidar point clouds, combined with the development of powerful software to efficiently and effectively utilize this data, have provided the means for GIS professionals to create 3D data layers that were virtually unheard of a few years ago. Beyond simply generating crude surface models, these tools significantly improve the usability of the data through the elimination of erroneous points and the automatic reclassification of the point cloud to reflect the actual characteristics of the mapped surface.

In this presentation we will explore how raw lidar data can be processed to create a 3D building footprint layer. Among the procedures employed in this workflow are classification tools that are designed to automatically detect and reclassify ground points, buildings, and vegetation in unclassified data. We will demonstrate how lidar data can be queried, filtered, and edited to create a more usable point cloud layer. We will introduce some of the advanced tools that have been recently developed to automatically extract and delineate vector features, including buildings, from classified lidar points. Finally we will explore several 3D visualization tools for generating a realistic fly-through perspective of the 3D vector models.

is a new book by literary scholar Charles B. Travis (Esri Press 2015). Travis describes several ways he uses GIS to turbocharge traditional literary analyses. This is quite a different approach from using traditional GIS methods to study humanities topics. In one case study, he creates an attribute table with locations in Dublin and the roles that those locations play in the meaning and metaphor of a novel. In another, he geographically correlates maps from different fictional works to demonstrate how a modern author incorporates the symbolism of a medieval author. It is a slim volume, generously illustrated, written for his fellow humanists. If you are interested in the topic but unfamiliar with humanities terms such as phenomenology, ergodicity, and deformation, this synopsis might save you some Googling.

4:30 – ? NEARC User Group Forum / Open Discussion / Poster Contest Winner Announcement

Campus Center U-Pub (First Floor)

All Day Posters

Campus Center 1st Floor Concourse

Coordinator: Pam Brangan, GISP

Ecology

Using GIS to Monitor Invasive Plants in Candlewood Lake

Jennifer Fanzutti
Gregory Bugbee

The Connecticut Agricultural Experiment Station

Invasive aquatic plants pose serious threats to Connecticut lakes and ponds. The Connecticut Agricultural Experiment Station's Invasive Aquatic Plant Program (CAES IAPP) has conducted over 200 vegetative plant surveys of Connecticut's lakes and ponds and found that nearly 60% contain one or more invasive

Landscapes

Geospatial Learning for Youth

Kim Pond
Linda Horn
UMass Extension 4-H YDP

Since the 4-H GIS Software Grant Program sponsored by ESRI kicked off at the National 4-H Technology Conference in St. Louis, MO in 2004, more than 700 4-H clubs have enhanced their members' understanding of science and technology and enriched their communities through their participation.

The Plant a Smile 4-H Club recently completed the mapping

Infrastructure

Bridge Susceptibility to Flood Damage

Angela Berthaume
Matt Moretti
Eben Spalding
Jonathan Rossini
Miles Jarvis
Mi-Hyun Park
University of Massachusetts Amherst

Bridge infrastructure is highly susceptible to damage during flooding events due to several factors. Scour at the piers and abutments as well as inundation and washout can cause service failures, rendering the structure unsafe or unusable. With

Social Science

Are District Compactness Scores an Indicator of Gerrymandering?

Michael Sellitto
Tufts University

After each census, states are required to redraw their legislative districts for the House of Representatives. In many instances, incumbent parties are accused of suppressing minority voting demographics by drawing districts in a way that underrepresents them through a process known as gerrymandering. Presumably, gerrymandering would result in

species. Candlewood Lake covers over 5000 acres with 62 miles of shoreline. CAES IAPP surveys Candlewood Lake yearly to monitor Eurasian watermilfoil (*Myriophyllum spicatum*), brittle waterlily (*Najas minor*), and curlyleaf pondweed (*Potamogeton crispus*). Eurasian watermilfoil poses the biggest problem because it grows in dense patches that reach the surface, outcompeting native vegetation and interfering with recreation and aesthetics.

Winter drawdowns are performed to manage the invasive plants with drawdown depths alternating between three feet and ten feet on a yearly basis. Our surveys are conducted with an on-board GPS navigation combined with a Lowrance HDS sonar system with structure scan technology to draw polygons around plant patches and locate reference transects. Changes in species coverage and abundance are determined and compared to drawdown depth and winter weather conditions. We now have eight consecutive years of surveillance that encompass deep and shallow drawdowns. Deep drawdowns resulted in Eurasian watermilfoil coverage between 221 to 373 acres while shallow drawdowns resulted in coverage of 407 to 505 acres. Our research suggests three possibilities for better control of Eurasian watermilfoil: (1) better management of the water level during the deep drawdown to maximize desiccation and freezing; (2) more frequent deep drawdowns; and/or (3) deeper deep drawdowns.

of the Newton Cemetery, home to one of the first Civil War monuments in the country. First, the 4-H-ers scoured the cemetery to find the gravesites of the local soldiers, then entered the information online, onto an ArcGIS map. Next, it was time for research! Back online, the 4-H-ers linked each gravesite on the map to the history of the individual soldier, battles they fought in, their dates of death, and branches of service. [The result is a Newton Cemetery map accessible to the public. Now anyone can tour the cemetery and learn about the local heroes buried there.](#)

Plant a Smile's adventure in GIS is just beginning. Currently, they're helping the Newton Cemetery map over 100 trees located on the grounds. Once they identify the varieties, the cemetery will be eligible to become a level-two arboretum.

predicted shortened return periods for flooding events due to climate change, bridge damage during flooding events will become a serious issue for decision makers for future maintenance procedures. This study aims to locate bridge structures in Massachusetts that may be susceptible to flooding incidents, and evaluate the possible severity of those events. We will conduct ArcGIS analysis to identify target structures by comparing structure elevations to base flood elevations and FEMA flood maps. This will allow us to prioritize bridges with high risk during flooding events as indicated by elevations approaching or less than the projected flood levels. While focused on the region of Massachusetts, this framework can be applied to other locations to determine at-risk structures for various flood events.

irregularly-shaped, non-compact districts. The extent to which minorities are underrepresented can be expressed by an "underrepresentation score," a difference between the number of representatives a state actually has for each party and the number it would theoretically have if constituents were represented fairly, normalized by population. Here, this score for each state is compared to two measures of compactness, the Polsby-Popper score of perimeter complexity, and the Roeck score of dispersion. Results show that, although the Polsby-Popper and Roeck scores are highly correlated, both are a very poor indicator of a state's underrepresentation score. Furthermore, the investigation shows that compactness scores are not significantly affected by a change in projection. Low compactness should not be used as the sole indicator of underrepresentation of minority constituents. There are simply too many other factors at play that may be responsible for some groups' underrepresentation, only one of which is intentional gerrymandering.

Species Distributions Do Not Reflect Climatic Tolerance

Tierney Bocsi
Jenica Allen
University of Massachusetts Amherst

Jesse Bellemare
Smith College

John Kartesz
Misako Nishino
Biota of North America Program

Bethany Bradley
University of Massachusetts Amherst

Projections of species' habitat loss associated with climate change assume that species cannot tolerate climate conditions outside of those found within their distributional ranges. This assumption has often been questioned, but rarely tested. Here, we asked whether occurrences in the native range effectively circumscribe the climatic conditions that the species can survive. We tested climatic consistency between

DEM Analysis of Potential Mars Rover Landing Sites

Luke Detwiler
Jun Gao
Shreya Mahajan
Asa Okerman
Claudia Vilcherrez
Mi-Hyun Park
University of Massachusetts Amherst

Recent talk about the potential colonization of Mars has put interest in the exploration of Mars at an all-time high. Most of our understanding of the Red Planet comes from remote sensing and unmanned missions, given the inherent risk and cost of manned missions. These remote sensing data have been used in the past to select the best possible landing sites for Mars rover missions.

The USGS curates a set of digital elevation models (DEMs) generated from satellite cameras circling Mars. The resolution of these images (6 m/pixel) is high enough to perform topographic

Creating a Tool to Aid in Urban Development and Restoration in Cambridge

Kathryn Booras
Gregory May
Brian Tafe
Cesar Acevedo
Claire Chen
Mi-Hyun Park
University of Massachusetts Amherst

The objective of this project is to provide a tool to aid restoration and development project-siting decisions in Massachusetts. A mapping tool in geographic information systems was developed to predict the effects of urban development (e.g. impervious cover, soil type, and elevation) on stream health in terms of stream temperature, dissolved oxygen, pH, and conductivity. To create the prediction tool, a case study was performed using data for the City of Cambridge water supply. A regression analysis was performed on water quality

Updating Food Desert Maps with Local and Alternative Food Sources

Patrick Bunk
Casey Gallagher
Katherine Meierdiercks
Siena College

The USDA defines a food desert as "...an urban neighborhood and rural town without ready access to fresh, healthy, and affordable food." However, the USDA's [map of the nation's food deserts](#) doesn't take into account factors like shared or borrowed vehicle use and the availability of fresh, healthy food via non-traditional mediums like convenience stores or corner stores. This project uses GIS to examine the standard USDA map of food deserts within the Capital Region of New York State in comparison to a food desert map that incorporates alternative food sources such as the Capital Roots Veggie Mobile (which offers fresh discounted and free produce at

occurrences in the US native vs. US non-native ranges using 144 endemic plants. Most species (86%) occurred in climates well outside those described by their native distributions, including a median expansion of minimum temperature tolerance by -2.9°C and minimum annual precipitation by -23 cm . Non-native occurrences expanded the modeled potential geographic range by a median of 35%. Our results suggest that plants' native ranges underestimate climatic tolerance, leading species distribution models to underpredict potential range. Most species could likely occur much more broadly if climate were the only factor limiting their distributions.

analyses relevant to determining potential Mars rover landing sites. Site criteria include considerations of slope and elevation over a wide enough area to provide a buffer zone in which to land as well as access to scientifically relevant targets.

While more complete analyses would enrich elevation data with supplementary data like surface reflectance for dust level approximations, time and data limitations restrict the scope of this project to DEM analyses. Without more data it is unlikely that these analyses can inform the decision-making process for an actual Mars rover landing, though it will serve as an example of what can be achieved from the use of publicly available data and hopefully stimulate the larger discussion of extraterrestrial exploration.

monitoring data collected from the US Geological Survey (USGS) and the City of Cambridge Water Department. Impervious cover, soil type, and elevation data was collected from USGS and the Massachusetts Office of Geographic Information.

The justification of this research effort is to provide a useful tool to urban planners, fishery managers, biologists, and the engineering community in Cambridge. The tool can be used to identify locations where large urban development will likely have the lowest impact on stream health, as compared to other locations within the catchment area. The tool is still at the early stages of development but it will be applicable to a wide array of practical situations with additional work.

various sites within the city) and data from the Healthy Stores Program (a collaboration between Capital Roots and local convenience store owners where convenience stores in underserved neighborhoods are supplied with fresh fruits and vegetables).

Biological Corridors: A Development Back to the Undeveloped

Brien Spier
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Westfield State University

In the past century urban sprawl, deforestation, and over-development have forced natural habitats into smaller and discontinuous areas causing species separation. In addition, the introduction of new roadways and housing developments increases the edge of forests and decreases the core habitat for many species that thrive inside dense forests. Road kill can also be linked to the decrease in resources in specific areas, creating a need to cross roadways in search of suitable resources. Biological corridors connecting these areas are therefore essential to our coevolution.

The goal of this project was to conduct a site suitability analysis to locate new wildlife connectors across the Massachusetts Turnpike. The most relevant criteria are a) the presence of core forest, b) primary habitat, c) conservation land space, and d) the absence of hazardous waste deposits. One site located in Stockbridge is in a very rural area connecting two large areas with formerly abundant wildlife, which would divert animals away from hazardous waste sites in the Lee area. Another site in Upton has a large area of state forest split by the Turnpike. Once developed, this corridor will allow wildlife to travel away from a large cedar swamp and the town of Hopkinton, where several hazardous waste sites are located.

Once these wildlife connectors

Land Use Response from Jökulhlaups in Southern Iceland

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Geothermal activity from Katla, a volcano in southern Iceland, has been known to cause dangerous amounts of melting beneath the glacier Mýrdalsjökull. The melt water may either be stored in subglacial lakes or move downslope at alarming rates (Björnsson, et al., 2000). These floods are referred to as jökulhlaups (an Icelandic term meaning "glacier run") and pose the greatest threat to the thriving agricultural community that lies in its path. Approximately 85% of Iceland's existing agricultural land below 200 meters would be lost should Katla erupt again.

Although the amount of agriculture likely to be lost is high, landscape response and recovery from jökulhlaups remain largely unquantified (Duller, et al., 2014). Therefore, the purpose of this study was to identify the different land uses in southern Iceland that lie in the path of one of the most recent jökulhlaups that occurred in 1999. Satellite imagery was used to identify land use classifications before and after the jökulhlaup in a similar manner to Guðmundsdóttir (2014). Results showed that by 2001 the landscape had changed significantly from both the flooding event and glacial retreat, with more than four million acres of agriculture lost and more than six million acres of rock exposed at the surface. Additionally, the soils on the floodplain were replaced with outwash from the jökulhlaup.

Similar analyses of the

Snow Management with Real-Time GIS and Automatic Vehicle Location

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City of Norwalk, CT

Consistently harsh winters have caused the City of Norwalk, Connecticut Public Works Department to upgrade their automatic vehicle location system to one that was more flexible and managed by city staff. Using ArcGIS Server and the ArcGIS GeoEvent processor, real-time vehicle locations are provided to snow managers for quick decision-making. Managers are able to view vehicle locations on a web viewer and run reports to see which streets have been missed. This technology has really made snow management much more effective as well as contributing to community safety.

An Oasis of Humanitarian Aid in Southern Arizona

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Clark University

In this paper, I analyze the strong contention in southern Arizona between the US federal government and non-governmental actors over efforts to mitigate the deadly factors of the undocumented migration across the US/Mexico border. Through an analysis of literature, case studies, and GIS tools I found that from 2001 to 2013 the percent of migrants' deaths related to the environment went down while the number of people that died each year remained in the same range. I present four interpretations of why this happened. First, the steady increase in undetermined deaths in the category of "undetermined" is not clearly defined and therefore many of these deaths may be due to environmental causes. Secondly, the decline in environmental deaths could be because of the higher likelihood of migrants being apprehended due to the increase in Border Patrol agents, and not because of an increased utilization of rescue beacons or other humanitarian resources. Third and most likely, the change in the number of migrant deaths and causes could be a combination of the last two conclusions. The final interpretation of my research shows that the method of preventing these deaths is inherently irrelevant. It is important to recognize that no matter how it is being done, the Border Patrol is successfully making progress in curbing environmental deaths of migrants crossing through southern

are installed, species will have more habitat available to gather resources in addition to being exposed to less risk.

jökulhlaups from 1996 and 2011 would contribute to an overall understanding of landscape response in subglacial volcanic environments such as this and help prepare for future events.

Arizona.

Environment

Quantifying Human Influence on Fire Ignitions Across the Western US

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Fire is a necessary disturbance in many of Earth's ecosystems, particularly in the western US. However, modern human societies have altered the spatial and temporal pattern of ignitions. Where fires were once started primarily by lightning, anthropogenic sources now drive many fire ignitions. Although many recent fires have been associated with humans, the spatial relationships between ignition events and human activity across landscapes and regions has not been explored in depth using the MODIS burned-area record.

Here, we quantify the relationship between human activity and non-lightning fire ignitions across the western US. After identifying individual fire events, we isolated potential ignition points for all fires occurring from 2000 to 2012 based on the first date of burning within fire perimeters. To our knowledge, this is the first data set that utilizes remotely sensed data to determine the location of fire ignition points. We compared these points to data from the Vaisala National Lightning Detection Network to determine if the ignition could be attributed to a natural lightning source. The remaining ignition points were considered anthropogenic ignitions.

We modeled these non-lightning ignitions as a function of roads, power lines, railroads, campgrounds, population density, and agriculture using USGS SAGEMAP Human Footprint data. Because the western US varies in climate and vegetation, we analyzed ignition data separately for seven western ecoregions. Using the derived spatial relationships, we aim to create a spatially explicit model of ignition pressure from anthropogenic and lightning

Health

The Relationship Between Particulate Matter and Valley Fever in Southern California with Respect to Environmental Variability

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Coccidioidomycosis (also known as Valley Fever) is a disease that is endemic to arid regions in the western hemisphere, and is caused by directly inhaling spores of the soil-dwelling dimorphic fungus *Coccidioides immitis*. In this study, we provide an analysis of the current trend in cases related to Valley Fever with respect to climate change and environmental variables. Previous research depicts the relationship between Valley Fever and its influence from temperature and precipitation. This study reviews the possible influence of other environmental variables in Southern California such as wind, soil moisture, land use, and particulate matter concentrations along with temperature and precipitation. It is predicted from this study that California's recent drought period and uncharacteristic climatic conditions will contribute to the outbreak of more cases related to Valley Fever. We conclude with recommendations for future research directions.

sources. This information will be critical for predicting regional fire risk.

Modeling Spatial Relationships Between Earthquakes and Hydraulic Fracturing in Ohio Using ArcGIS

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Recent news articles and scientific publications have cited several environmental concerns involved with the process of natural gas hydraulic fracturing or "fracking." This study examines the spatial and temporal relationship between irregular occurrences of earthquakes and relatively recent hydraulic fracturing activity in the state of Ohio. Hydraulic fracturing requires the extraction of ancient methane gas by puncturing of the shale layer and horizontal drilling to transversely fracture the fragile rock and extract the gas. During this process, the shale layer is permanently fractured, therefore causing potential instability of adjacent geologic layers. Several seismologists, geologists, and engineers have attempted to relate these phenomena, but none have succeeded with GIS mapping as a primary utility. By mapping locations of recent earthquakes and high concentrations of fracking activity, it is expected that these phenomena are spatially and temporally related. This study may potentially raise more attention to just one of the few environmental impacts related to fracking.

A Spatial Analysis of Lung Cancer and Air Pollution in Connecticut

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It is anticipated that in the year 2015 more than 220,000 men and women will be diagnosed with lung cancer across the United States, and almost half of those diagnosed will lose this battle with cancer (Siegel, 2015). Lung cancer is the second-most diagnosed cancer in Connecticut (Mullen 2014), which has been attributed to smoke from cigarettes as well as several common air pollutants (Pope 2002). The objective of this study was to determine if a spatial relationship exists in Connecticut between lung cancer in females and males and the common air pollutants associated with lung cancer, which include sulfur dioxide, particulate matter of 2.5 micrometers, and particulate matter of 10 micrometers.

The number of males and females with lung cancer for each town in Connecticut was obtained from the Center for Disease Control, and air pollutants for monitoring stations across Connecticut were obtained from the Environmental Protection Agency. Concentrations of air pollutants were interpolated and an average concentration of each pollutant was obtained for each town. A multivariate regression analysis was performed to determine whether these air pollutants contribute to the number of females and males with lung cancer. Although results indicated that some pollutants were statistically significant, the R^2 value and the clustering of residuals within the model suggest that other factors may contribute to lung cancer, and suggest that further investigation is needed in order to potentially reduce lung cancer in Connecticut residents.