



2017 Award Nomination

*Please email completed form to nygis77@gmail.com

Date: August 18, 2017	Category: <input type="checkbox"/> Lifetime Achievement <input checked="" type="checkbox"/> Individual Contribution to the Profession <input type="checkbox"/> GIS Champion <input type="checkbox"/> You Tube Sensation <input type="checkbox"/> UAV Innovation <input checked="" type="checkbox"/> Geospatial Applications Program (<i>skip to entry form below</i>)
Nominee (please include name, address, phone, and email) Kristy E. Primeau (work: kristy.primeau@dec.ny.gov , home/preferred: keprimeau@gmail.com) Work: NYS DEC Region 4, 1130 N. Westcott Road, Schenectady, NY 12306 (518.357.2373) Home/Preferred: 23 Mosher Road, Sand Lake, NY 12153 (518.937.6965)	
Submitted by (please include name, address, phone, and email) Dennis Wischman (dennis.wischman@dec.ny.gov) NYS DEC Region 4, 1130 N. Westcott Road, Schenectady, NY 12306 (518.357.2157)	
Sector: <input type="checkbox"/> Local Government <input checked="" type="checkbox"/> State Government <input type="checkbox"/> Tribal Government <input type="checkbox"/> Private (For Profit) <input type="checkbox"/> Private (non-Profit) <input checked="" type="checkbox"/> Academic	Functional Area: <input type="checkbox"/> Transportation <input type="checkbox"/> Urban Planning <input type="checkbox"/> Emergency Response <input checked="" type="checkbox"/> Environmental <input type="checkbox"/> Infrastructure <input checked="" type="checkbox"/> Other (please note) _____ Archaeological
Narrative Description of Contribution. (Attach separate file or pages as necessary. Please refer to the Narrative Guidance for additional information on the narrative description.) Please see attached.	



2017 NYS Geospatial Applications Awards Competition Entry Form

Please use the below template to submit your entry for the **2017 NYS Geospatial Applications Awards Competition**. By entering the competition, you grant permission for the NYSGIS Association to publish and publicize your entry. Click [here](#) to view the 2016 submissions.

Required Information

Sponsoring Organization: NYS DEC

Stakeholder/Participant List (by Organization):

NYS DEC: Division of Environmental Permits

Title: Soundshed Analysis (multiple titles, publications, applications.) Please see attached.

Abstract:

In an effort to better evaluate the impacts of noise, Kristy created a Soundshed Analysis Tool for use in ArcGIS 10.3 using a combination of Python script and open source data. This tool has been used in both state government and private academic applications, as well as featured in numerous media outlets as described in the attached documentation.

Statement of the Problem: Please see attached.

Response to the Problem: Please see attached.

Results: Please see attached.

Return on Investment/Cost-Benefit Analysis. Do your best to use the ROI benefit and cost formulas found at [GISCalc](#). Your project can then be used to strengthen GISCalc metrics:

We don't have sufficient data to run GISCalc, Enterprise GIS Costs are not released to members of DEC staff. However, it is apparent this project would result in a "More efficient map making" benefit.

Key Participants: (Name, Organization, Title) Kristy E. Primeau, NYS DEC, Environmental Analyst;
David E. Witt, NYS DEC, Indian Nations Affairs Coordinator

URL (if applicable): Please see attached.

Contact Information:

<u>Name</u>	<u>Phone #</u>	<u>Email</u>
Kristy E. Primeau	518.937.6965	keprimeau@gmail.com

Deadline & Submission Information

The deadline for entries is Friday, September 8th, 2017. Please email this completed template to the NYSGISA Awards Committee at nygis77@gmail.com, with “**GIS Applications: [Name of Submitting Organization]**” in the message Subject line.

Thank you for your submission and Good Luck!

Narrative Description of Contribution Attachment & Geospatial Applications Awards Competition Attachment

Background:

Kristy is an Environmental Analyst working in the Division of Environmental Permits at the NYS Dept. of Environmental Conservation. She serves as project manager for the environmental permitting process within Greene County and selected regions of Delaware, Schoharie, and Albany Counties. She also serves as a GIS specialist (as needed) as part of DEC's emergency response team, most recently contributing to the Hoosick Falls Water incident. At work, Kristy is responsible for interpreting environmental laws and regulations to evaluate project impacts in accordance with the State Environmental Quality Review Act (SEQR) and other legislation. Part of SEQR review, and the analysis of solid waste and mining permit applications, includes an assessment of the potential environmental impacts of noise on nearby receptors.

Statement of the Problem:

In an effort to better evaluate the impacts of noise, Kristy created a Soundshed Analysis Tool for use in ArcGIS 10.3 using a combination of Python script and open source data. Under DEC's Noise Analysis guidance (2000) Environmental Analysts investigate how sound is experienced by a receiver at a set distance from the source of the sound, by creating a linear sound profile similar to the output of a line-of-sight analysis. Kristy, and fellow DEC employee David Witt, sought to create a three-dimensional tool that looked at sound throughout a much larger landscape, rather than along a linear path at a single point. Using GIS to model the spread of sound reduces the amount of time spent by an analyst doing long-hand sound physics calculations (the tool can be run in the background while analysts are doing other work), and provides data for a multitude of potential receptor locations simultaneously, rather than concentrating at a single sound receptor location.

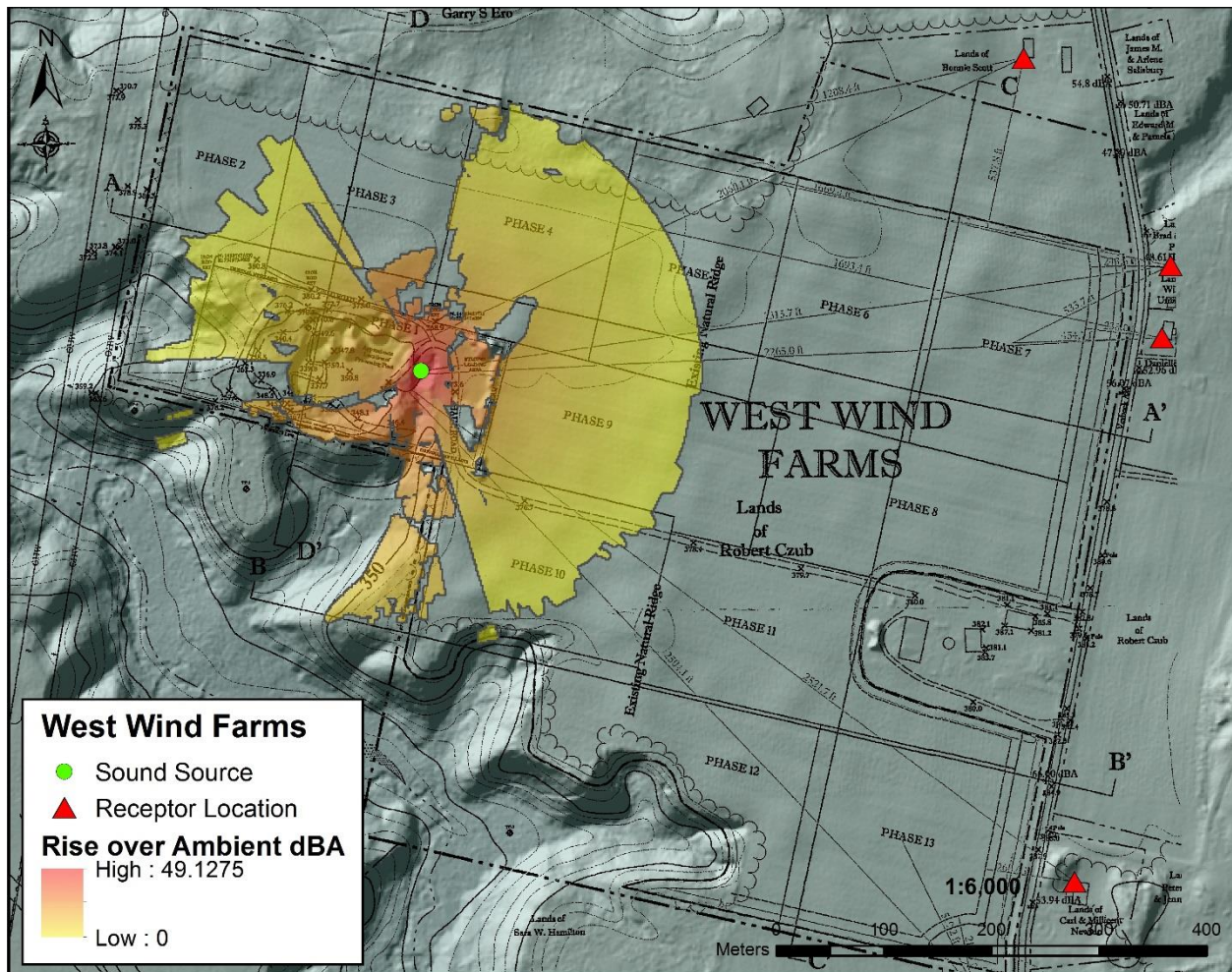
The Tool:

The Soundshed Analysis 0.9.2 script consists of six sections: 1) collection of user input variables; 2) the definition of the study area; 3) calculating distance attenuation; 4) calculating atmospheric absorption loss; 5) calculating barrier effects and topographic loss; and 6) creating cumulative model outputs describing sound propagation patterns and rise over ambient sound levels in A-weighted decibels. Each of these sections represents a calculation step in the modeling process. To run the Soundshed Analysis tool in GIS, the user must input nine model parameters consisting of seven variables, a point feature class of the study location, and an elevation raster dataset as either DEM or LiDAR data. (*There are two versions of the script, one to work with 30m resolution DEMs, and another to work with high resolution 1.5m LiDAR data.) Variables required by the model include the sound source height (feet), frequency of the sound source (Hertz), sound pressure level of the source (decibels), the measurement distance from the source (feet), air temperature (degrees Fahrenheit), relative humidity (percentage), and the ambient sound pressure level (A-weighted decibels, or dB(A)) of the study location.

Results:

The resulting output of the Soundshed Analysis Tool includes raster data describing the propagation patterns of sound throughout the landscape and the rise over ambient sound pressure level. These outputs may be symbolized using isolines, contours, or as graduated colors. While the propagation pattern output shows where and how the sound spreads, it does not take into account the ambient sounds occurring naturally within the landscape; therefore the output data describing the rise over ambient sound pressure levels more accurately reflects how audible sounds would have been experienced. Each run of the model takes, on average, eight to ten minutes for each

iteration at a 1.5-meter raster cell size and 3.2 kilometer (2.0 mile) study area designed to accommodate 1.5 meter LiDAR data. An alternate version, designed for the more widely available Digital Elevation Models with a 30-meter raster cell size takes on average four minutes to complete.



Above: The modeling result for rise above ambient sound pressure level at West Wind Farms (DEC #4-3842-00110) is displayed over a georeferenced sound assessment map (line drawing). Labels within the sound assessment map (located approximately in the center of the figure) indicate the location of a natural ridge, which contributes to barrier attenuation. A berm located approximately 75 meters east of the sound source location is also observed providing barrier attenuation.

Additional Application:

In addition to her position at DEC, Kristy is also a Registered Professional Archaeologist and PhD Candidate at SUNY Albany. Her academic research includes work within the growing field of Archaeoacoustics, particularly modeling sound at the landscape scale. Kristy uses the Soundshed Analysis Tool to model culturally produced sounds in past-archaeological contexts using GIS. She believes that putting sound back into the archaeological landscape is an important part of understanding how people lived, what they valued, how they shaped their identities and experienced the world and their place in it; and that by considering the sounds heard by people moving through the landscape, we're able to more fully understand their culture, and thus better relate to them as human beings.

Kristy's work in archaeoacoustics includes a journal article (in press) that describes the Soundshed tool, its application at DEC, and its application to past cultures. (A corrected proof can be obtained by emailing Kristy at keprimeau@gmail.com.)

In Press 2017. "Soundscapes in the Past: Investigating Sound at the Landscape Level." Kristy E. Primeau and David E. Witt. *Journal of Archaeological Science: Reports*, special issue "Geography on a Human Scale: Global Case Studies Exploring Landscape Archaeology," edited by Lisa M. Fontes and Rachel A. Horowitz.

It also includes a poster presented at the 82nd Annual Meeting of the Society for American Archaeology, Toronto, Canada. (Soundscapes in the Past: Interaudibility in the Chacoan Built Landscape. Available on her Academia page at: http://www.academia.edu/32283575/Soundscapes_in_the_Past_Interaudibility_in_the_Chacoan_Built_Landscape)

URLs & Publicity:

After creating the Soundshed Analysis Tool, Kristy and co-author David Witt have been featured in Science Daily (Archaeologists put sound back into a previously silent past:

<https://www.sciencedaily.com/releases/2017/07/170706143145.htm>); a radio interview on BBC Newsday (July 7, 2017); A Science Magazine online news article from Science AAAS (This conch shell trumpet would be heard far and wide in the ancient world:

<http://www.sciencemag.org/news/2017/07/conch-shell-trumpet-would-be-heard-far-and-wide-ancient-world>); an article written by Kristy and Dave for The Conversation (Soundscapes in the past: Adding a new dimension to our archaeological picture of ancient cultures:

<https://theconversation.com/soundscapes-in-the-past-adding-a-new-dimension-to-our-archaeological-picture-of-ancient-cultures-80861>) which was reprinted and distributed through nationwide news outlets including the Albany Times Union (August 3, 2017:

<http://www.timesunion.com/news/article/Soundscapes-in-the-past-Adding-a-new-dimension-11730169.php>) and an NBC News Mach article on technological advances in Archaeology

(These Technologies Are Giving New Life to the Ancient World - From ocean-going robots to virtual reconstructions of ancient cities, new tools and techniques are transforming archaeology like never before: <https://www.nbcnews.com/mach/science/these-technologies-are-giving-new-life-ancient-world-ncna792921>).

Future Research:

Kristy's future work includes a new Python script and GIS tool for the Soundshed Analysis Toolbox that will compute the cumulative decibel level of sounds being produced simultaneously at different locations within a site or landscape. Sound pressure created by multiple sound sources does not create a mathematical additive effect, rather the cumulative dBA is added logarithmically.