2017 TNGIC Annual Conference



Knoxville, TN April 25-27, 2017



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ABOUT THIS GUIDE

TNGIC (Tennessee Geographic Information Council) was established in 1994 to improve the connection between the various agencies working with GIS in Tennessee.

TNGIC has an annual conference in the spring of each year. We also sponsor more localized meetings in the fall in East, West, and Middle Tennessee. At these meetings we encourage everyone from the seasoned GIS Professional to students just entering the field to attend and participate.



2017 TNGIC Annual Conference – Schedule

Tuesday, April 25, 2017

8:00AM – 11:30AM	ESRI Mobile Workshop – Salon A (Advanced registration required)
12:00PM - 5:00PM	Annual Golf Scramble (Advanced registration required)
12:30PM - 4:00PM	Introduction to Lidar Data Utilizing ESRI ArcGIS (Advanced registration required)
2:00PM - 5:00PM	Geocaching (Advanced registration required)

Wednesday, April 26, 2017

8:00AM - 9:00AM	Breakfast (Summit Ballroom)
8:00AM - 12:00PM	Registration (Outside Summit Ballroom)
8:00AM - 5:00PM	Exhibit Hall Open (Mezzanine and Summit Foyer)
9:00AM - 9:15AM	Welcome: Knox County Mayor Tim Burchett (Summit Ballroom)
9:15AM - 9:45AM	Opening Session / Board of Directors Nominations: David McMillen, TNGIC President
9:45AM - 10:45AM	Keynote Speaker: Desiree Kocis, GIS Coordinator, MA Emergency Management Agency
10:45AM - 11:00AM	Break
11:00AM - 11:30AM	State of Tennessee GIS Coordination Update: Dennis Pedersen (Summit Ballroom)
11:30AM - 12:30PM	Lunch (Summit Ballroom)
12:30PM - 1:00PM	Break
1:00PM - 3:00PM	Concurrent Presentation Session #1 - Salons A, B & C
3:00PM - 3:30PM	Break
By 3:30PM	Deadline: Board Member Ballots / Corn-hole Tournament Sign-up
3:30PM - 5:00PM	Concurrent Presentation Session #2 - Salons A, B, C & Summit Ballroom
By 5:00PM	Deadline: Submit Map Gallery Viewer's Choice @ TNGIC Booth
6:00PM - 9:00PM	Social Event at The Standard: 416 W. Jackson Ave. Head East on Summit Hill Dr. to
	S. Gay Street; North on S. Gay Street 2 blocks to W. Jackson Ave. See map in program)

Thursday, April 27, 2017

7:00AM - 8:00AM	Breakfast (Summit Ballroom)					
7:00AM - 3:30AM	Exhibit Hall Open					
8:00AM - 10:00AM	M Registration (Outside Summit Ballroom)					
8:00AM - 10:00AM	Concurrent Presentation Session #3 - Salons A, B & C					
10:00AM - 10:30AM	Break / Map Gallery Q & A in Map Gallery					
10:30AM - 11:00AM	TNGIC Business Meeting: David McMillen, TNGIC President (Summit Ballroom)					
11:00AM - 11:30PM	M Regional Meetings:					
	East (Salon A)					
	Middle (Salon B)					
	West (Salon C)					
11:30PM - 1:30PM	Lunch, Keynote: Stacey Whaley, Sevier Co. GIS Director, Awards (Summit Ballroom)					
1:30PM - 2:30PM	Concurrent Presentation Session #4 -Salons A, B & C					
2:30PM - 3:00PM	Committee Meetings:					
	Communication (Salon A)					
	Conference (Salon B)					
	Education (Salon C)					
	 Professional Development and Training (Summit Ballroom) 					
	Web and Data (Summit Ballroom)					

3:00PM - 3:30PM

Closing Session, Door Prizes – Summit Ballroom (must be present to win!!!)

			2017 TNGIC #	Knoxville, TN		
		Start Time	Salon A	Salon B	Salon C	Summitt Ball Room
Wednesday	Session #1	1:00 PM	Change and Relevance: Implementing Enterprise GIS in a Small Regional GIS Group (Michael Hamrick)	Best Practices Considerations for the User Experience (UX) of your Web Applications (Craig Robinson)	Agencies Sharing Data (Dwayne Coley)	
		1:30 PM	Congratulations! You've just been served (Rick Stieg)	Transitioning from Web Flex Viewer to AGOL: A Success Story (Megan Catalina)	The Process of Geocoding using Excel and ArcGIS (Kenric McCay)	
		2:00 PM	Sanitary Sewer Interceptor Modeling – The Development of an Efficient Rehabilitation Design Process Utilizing ArcGIS with Innovyze InfoSWMM® Software (Chase Givens)	Knox County Storm Viewer: A Web Map Application for Engineering and Public Works (Cathy Olsen)	ArcGIS Enterprise Overview: What's New and the Road Ahead (Bob Rike)	
		2:30 PM		Exploring Tennessee 3DEP LiDAR within the ESRI World Elevation Services (Chris Meeks)	Large Scale Data Migration from GIS to Civil3D and Back Again (Mark Crow)	
	Session #2	3:30 PM	Prioritizing Online Mapping Tasks for Disaster Response (Yingjie Hu)	Asset Management with Professional-Grade Street-Level Imagery (Paul Madrid)	Knox County eCodes-Field Services Application (Cary Thomas)	Radon Gas in Karst Areas (Jon Zetterberg)
		4:00 PM	Use of GIS to Assess Influences of Roof Covering Type on Wildfire Damage in Gatlinburg, TN (Lori Weitzel)	Investigating the Impact of Land Use / Land Cover Change on Water Quality in Chattanooga, TN using GIS and Remote Sensing (Jonah Hall)	Solution Engineer – Facilities/Geodesign, ESRI (Ian Feathers)	Criminal Activities in White County, TN (Nick Hallums)
		4:30 PM	Best Practices for Disaster Response: Lessons Learn from Past Events (Jeff Baranyi)	Outreach and Community Engagement Update from UTK Geography (Michael Camponovo)	The Future of Lidar (Jeff Lovin)	Geologic Substrate Mapping of the Calfkiller River (Daniel Adams)
Thursday	Session #3	8:00 AM	Leveraging 3DEP Lidar for Statewide Hydrography Projects and Ele-Hydro Concepts (Susan Phelps)	Landslide Susceptibility Mapping (Yasin Wahid Rabby)	Century Farms in Rutherford County: Rapid Growth and its Impact (Michael Bleddynn)	
		8:30 AM	Statewide Hydrology Data in Tennessee (Suzanne White)	Then and Now: Long term Land- Use Changes Impact Bobwhites (David Moore)	Setting up an ESRI Collector Project for High Accuracy Data Collection (Cliff Hoeffner)	
		9:00 AM	Using ESRI Story Maps To Help Facilitate Delinquent Property Tax Sale (Bryan Lynn)	Improved Sinkhole Detection and Mapping for Knox County, TN with LiDAR Data (Clint Shannon)	ArcGIS Pro: The Road Ahead of Desktop (Jay Fowler)	
		9:30 AM	The Flow of Information: The Bridge Between CIS and Asset Management (Chris Holder)	City Energysheds: Assessing Current and Future Energy-Water- Carbon Dynamics among U.S. Urban Systems (Chris DeRolph)	Mapping and TN Base Mapping - Planning, Managing and Sharing (Tracey Shaw)	
	Session #4	1:30 PM	Developing a Climate-Induced Social Vulnerability Index for Climate Change Adaptation Analysis (Thomaz Carvalhaes)	Python Scripting for GIS Workflows - Don't be Afraid of Snakes (Brett Burkholder)	GIS: Much More Than a Map (Shawn Anderson)	
		2:00 PM	Mapping Daily Light Integrals and other Solar Radiation Data (Joanne Logan)	ArcGIS Solutions for State and Local Government (Christie Thiem)	Building a Routable Road Network (James Brink)	

TNGIC Board of Directors Nominees



Kendrick J. Curtis, PhD.

Assistant Executive Director, Middle Tennessee Industrial Development Association

I would like to be considered for membership on TNGIC's board of directors and welcome the opportunity to apply my experience to the Council's support of the profession and its membership. During my career, I have used geospatial technologies to solve problems in both the planning and economic development fields. As the Assistant Director of the Middle Tennessee Industrial Development Association, I have the opportunity to leverage the rapid advances in aerial mapping with drones to support the industrial

recruitment efforts of communities in the mid-state. During my time with the Tennessee Department of Economic and Community Development (ECD), I used GIS to accomplish the agency's mission in a number of areas. Originally serving as the GIS Manager for the Local Planning Assistance Office (LPO), I developed the agency's parcel based land use model using both the State Base Mapping Program and CAAS datasets. I have a long experience with TNGIC and presented LPO's land use model at a past meeting of the Council. As ECD's Technical Program Director, I used GIS in the development of the state's certified industrial site program. A graduate of the University of North Alabama (BS) and the University of Tennessee (PhD & MS), my coursework focused on geospatial technologies, infrastructure, as well as urban and rural geography. I currently serve on the Tennessee Geographic Alliance Board of Directors and am pleased to support the important work of the Alliance. A longtime resident of Knoxville, I along with my wife, Kathy, and our two daughters currently live in the Nolensville area of middle Tennessee.



David Light, GISP

Eastman Chemical Company, GIS Program Coordinator

David S. Light graduated from East TN State University in 1987 with a BS in Engineering Technology. He received his GISP Certification from the GISCI in 2011. Since 1991 he has been employed by Eastman Chemical Company in Kingsport, TN where he is currently Principal Technologist and the GIS Program Coordinator since 2006. Prior to that David was a Production Supervisor at AFG Industries. He also serves as the IT Manager and Part-Time Real Estate Broker for the family owned business - Earl Light Realty Company.

David was honored to be selected as the TNGIC GIS Champion at the 2014 Annual Conference. He served as TNGIC President in the 2010 Conference Year, Past President in the 2011 Conference year, and as a Board Member from 2009 – 2011. In 2008 he was an appointed, non-voting liaison for the East Tennessee Region.

As founder and current President of the NE Tennessee GIS User's group – NETGIS. He served as Conference Chair for the 2008 Fall East

Tennessee Regional TNGIC Conference, held at Meadowview Conference Center in Kingsport, TN and Co-Chair/Planning Committee member for the 2010, 2011, 2012, and 2015 East Tennessee Regional TNGIC Conferences. David and his wife Janet have been married for 29 years and they have one son, Jason. Jason and his wife Kara live in Jonesborough TN and are expecting their first child in October. As is evident from the profile picture, David and his family love fishing and outdoor activities.

If re-elected to the TNGIC Board, David plans to continue to promote training opportunities for GIS users of all levels across Tennessee and the surrounding areas.

TNGIC Board of Directors Nominees



Kristen Johnsey, GISP

GIS Manager - Hamilton County, TN

Kristen took a non-traditional path to find her home in GIS. Growing up in rural Mississippi she wasn't exposed to GIS until her first year of college in a Land Surveying class. She didn't know this was going to be her chosen path for several years. After working on a survey crew, she returned to the University of North Alabama, majoring in Environmental Biology. This is where she came across the Geography Department and decided GIS would be in her future. Shortly after graduation, she relocated to Chattanooga to work with Hamilton County GIS. She's been with the department over 10 years. During her early career, she was involved in data procurement, utility asset management, and map creation. In 2014, Kristen became the GIS Manager. Her department has overseen a Regional Addressing Study, several county-wide data

acquisitions, helped other Hamilton County offices learn to use GIS, and has made a strong effort to promote GIS in local schools. Kristen has been a TNGIC member since 2007. In 2009 & 2013, she led her department in hosting the East TNGIC meetings in Chattanooga. Kristen was the 2016 TNGIC Conference Chair and intends to lead the conference planning for the 2017 East TNGIC meeting in the fall. If elected, Kristen will work with other Board Members to continue the growth of TNGIC across the state by encouraging members to volunteer and participate in TNGIC.



Marie E. Holyfield CMS/TMA

GIS Analyst Shelby County ITS / ReGIS

Currently serving as GIS Analyst for Shelby County Information Technology Services. Assigned as Data Management Specialist for Regional GIS Services (ReGIS). Previously GIS Technician / Cadastral Mapper for Shelby County Assessor of Property for 27 years. Member of Memphis Area Geographic Information Council for 15 years. Board Member of MAGIC for over 8 years. Graduate of Phillips County Community College Drafting Technology. Graduate of Southwest TN Community College GIS Engineering / Support. Married to Burton Holyfield for 29 years. Mother of two sons and one daughter. Grandmother of one three year old grandson. US Navy Veteran.

Matt Lane, GIS Analyst

State of Tennessee, Strategic Technology Solutions

Matt is the GIS Analyst leading STS-GIS's application development team and helping to build out all facets of the TNMap enterprise. He has worked for the state for the last 12 years. Prior to that he worked in higher education as a GIS Research Associate for the University of the South and the University of Arkansas. Matt earned a Master's degree in Forest Resources, specializing in GIS and Remote Sensing, from the University of Arkansas in



Monticello. His work in UAM's Spatial Analysis Laboratory is where he first recognized the importance of programming and data sharing in the field of GIS. Matt has been serving on committees, presenting, and volunteering for TNGIC for almost 14 years. If elected to the Board of Directors he will work to promote education, training, and data sharing across the Tennessee GIS community.

2017 TNGIC Annual Conference Keynote Speakers

Desiree Kocis, GIS Coordinator, Massachusetts Emergency Management Agency

Desiree is the GIS Coordinator at Massachusetts Emergency Management Agency (MEMA) and an alumna of the University of Tennessee, Knoxville. She has developed a vast array of tools for public and agency use in planning for and responding to state events. Her development of a dynamic, real-time monitoring dashboard for the Boston Marathon was recently highlighted on CNBC and other media outlets, and has been internationally noted as a "best practice." Outside of MEMA, Desiree is a Private Pilot and Chapter Secretary of the Ninety-Nines, an international organization of women pilots. She currently lives in Oxford, MA with her husband, Jim, and two children, Jamis and Anna.





Stacey Whaley, Sevier County GIS Director

Stacey is the Director of Geographical Informational Systems for Sevier County Government. She is a lifetime resident of Sevier County, TN and proud to call the Great Smoky Mountains her home. She has been in the field of GIS since 2009. She has been a presenter for ESRI at the Southeastern Conference, and is currently the Chair of Sevier County's Local Emergency Planning Commission, Vice Chair of Sevier County's Leadership Tomorrow, member of Property Records Industry Association, and the Tennessee Geographic Information Council (TNGIC).

2017 TNGIC Annual Conference Planning Committee

The Conference Planning Committee is made up of individuals from Federal, State, and local governments and private industries across Tennessee who volunteer their time and effort to make this a successful event. Without the hard work of all of these individuals this conference would not have been possible. Please join me and extend a very warm "thank you" to each of them!

Sincerely, Kurt Butefish 2017 Conference Chair

Planning Committee

- Bill Avant
- Kevin Bingham
- Mike Camponovo
- Kim Denney
- Jason Duke
- Kristen Johnsey
- David Light
- Dave McMillen
- Sam Moffat
- Marc Pearson
- Bruce Ralston
- Kurt Snider
- Keith Stump
- Suzanne White



Wednesday Evening Social &

World Famous Cornhole Tournament

Featuring music from The Bearded Band



See Michael Camponovo to sign up for the **WORLD** famous Cornhole Tournament.



Location: The Standard (416 West Jackson Avenue, Knoxville, TN)

2017 TNGIC Conference: Concurrent Session Presentations

Wednesday 1:00PM (Session #1)

Change and Relevance: Implementing Enterprise GIS in a Small Regional GIS Group, Michael Hamrick (Salon A): This presentation will be about Michael's experiences in implementing GIS/GIT in East Tennessee. Regional GIS Groups are one way organizations share the costs in implementing GIS technology. While this approach may reduce the bottom line, it can also introduce new workflows and processes that deviate from established routines. Managing this change is just as important as managing your information. In order to stay relevant in this attention economy, your GIS must be well documented. That documentation (of data maintenance, of procedures, of configurations) leads to meaning and trust, and that trust leads to usability. When people trust your information enough to use it, then you have their attention. If you can keep it, then you'll stay relevant.

Best Practices Considerations for the User Experience (UX) of your Web Applications, Craig Robinson (Salon B):

Web GIS is becoming a significant new pattern for organizations to distribute access to business information and business systems. This means that there are often many, many applications deployed across the enterprise that enable your workforce's daily business. But how do you ensure that your applications offer the best experience and are easily adopted? In this session, we'll discuss some best practices to consider when building and deploying web applications for your organization. We will talk about User Experience (UX), User Interfaces, and some common pitfalls, and demonstrate some high-quality examples.

Agencies Sharing Data, Dwayne Coley (Salon C): This presentation will show how Tipton County Agencies are sharing data for day to day use and too help increase communications and to cut cost.

Wednesday 1:30PM (Session #1)

Congratulations! You've Just Been Served, Rick Stieg (Salon A): It's been a while since TNGIC addressed the legal responsibilities that come with providing public-service geospatial support. You as a professional geospatial analyst have certain duties, responsibilities, and actions you need to adopt as part of your regular business plan to ensure that you are ready when-not if you are called upon in a legal setting to present geospatial information that your agency is charged with developing, designing and maintaining in the public realm. There are several simple steps an agency and individual can take to ensure that when the legal system turns a rheumy bloodshot eye on YOU, you can respond quickly in an appropriate manner. Geospatial information is becoming an increasingly important part of the civil fabric we live in, and the accuracy and timeliness of that data reflects directly on the data originators, owners and caretakers. You can never know in what context or situation your data may be used for, but you can ensure that it well documented, has a provable provenance, and was developed to the strictest standards the circumstances allowed.

Transitioning from Web Flex Viewer to AGOL: A Success Story, Megan Catalina (Salon B): With ESRI stopping support for Web Flex Viewers in 2016 Tennessee American Water (TAW) started to transition to AGOL in the fall of 2015. AGOL offers much more information and flexibility to users than Web Flex Viewers. Any large change in process can cause issues in an organization. TAW will share their lesson learned on best practices. These will include 'How To's' on the following; an efficient way to share information to an organization, organize your organization, deal with symbology, sharing with internal and external company members, and dealing with change management. In addition, TAW is using AGOL to get more data to and from the field with mobile applications. This presentation will go over the process of transition, current workflow in AGOL, AGOL as a mobile application, and sample projects in AGOL.

The Process of Geocoding using Excel and ArcGIS, Kenric McCay (Salon C): The Electric Department found that 3073 electric consumers were not in our GIS. I wanted to import these consumers at one time instead of manually adding each one separately. Originally, all I had were the consumers account numbers in Excel without their

associated addresses. Our end-goal was to add these consumers with their account numbers correctly into our GIS. First, I needed to prepare the dataset in Excel. I used my original dataset of missing consumer account numbers and compared it to another dataset that includes their account numbers and their addresses. For this, I used the "concatenate" and "vlookup" functions so that the data would correspond with the correct account numbers. I then used this Excel table within GIS to geocode these addresses to acquire coordinates. For this step, I created an Address Locator and used ArcGIS Online to geocode. Then, I exported these new coordinates to the Excel dataset carefully not to mix one up with another, which would result in incorrect account numbers at different addresses. Finally, I imported the consumers with their correct addresses and account numbers into our GIS.

Wednesday 2:00PM (Session #1)

Sanitary Sewer Interceptor Modeling – The Development of an Efficient Rehabilitation Design Process Utilizing ArcGIS with Innovyze InfoSWMM Software, Chase Givens (Salon A): One hundred year or older existing sewers are both undersized for today's demand and structurally deteriorated. Such sewers often require immediate rehabilitation, upsize, or replacement. However, shrinking budgets combined with strict environmental regulations put utilities in a difficult position with respect to system rehabilitation. Therefore, it is critical to design improvements in an efficient and cost effective manner by targeting the biggest problems of the system first. Innovyze InfoSWMM Software, an extension of ArcGIS, is a powerful tool that can be utilized to provide a clearer picture of where a sewer system's hydraulic weaknesses exist. Based on the location of these weaknesses, the targeted construction projects can be selected to address the system's worst issues first. The resulting design scenario is then modeled to verify the removal of the existing issue, quantify the capacity improvement from the previous condition, and identify the next location limiting the system. The implementation of this design process utilizing the Innovyze InfoSWMM Software will ensure that utilities receive a prioritized design that addresses their biggest issues first. The concepts, procedures, and methods available to achieve these results are presented along with a case study of a utility in East Tennessee.

Knox County Storm Viewer: A Web Map Application for Engineering and Public Works, Cathy Olsen (Salon B):

Knox County Engineering is responsible for the permitting, inspection and approval of land development in the Unincorporated County, with a primary focus on ensuring new drainage patterns are managed so as to prevent flooding and avoid negative impacts on water quality. Knox County Engineering staff, in collaboration with Knoxville- Knox County-KUB GIS (KGIS) have built an innovative application to share local, state and federal data, maps and tools in order to support the plans review and permitting process, and to make data available to staff in the field. The new mapping application, nicknamed the "Storm Viewer" provides users access to historic aerial and development site time sliders, network trace tools to track the flow of water or illicit discharges through the stormwater system, tools to delineate local drainage areas, oblique photography, parcel and ownership details, water quality data and much more. This presentation will introduce the application design and demonstrate the ways in which this application is used by Knox County Engineering and Public Works staff to create efficiency and consistency in their workflows.

ArcGIS Enterprise Overview: What's New and the Road Ahead, Bob Rike, and Jay Fowler (Salon C): This presentation will provide an introduction to ArcGIS Enterprise and new capabilities that have been introduced, such as portal collaboration, Insights for ArcGIS, ArcGIS Image Server, ArcGIS GeoEvent Server, and ArcGIS GeoAnalytics Server. This session will demonstrate new approaches to common workflows, discuss current and upcoming product capabilities and outline ways for users to maximize the value of their ArcGIS deployment.

Wednesday 2:30PM (Session #1)

Exploring TN 3DEP LiDAR within the ESRI World Elevation Services, Chris Meeks (Salon B): The Tennessee Department of Finance and Administration, GIS Services group is continuing its efforts to bring statewide LIDAR coverage to Tennessee through the USGS 3DEP program. This presentation will explore the benefits and practical aspects of accessing Tennessee LiDAR via the Esri World Elevation Services. Discussion will center on what products are available, what requirements or limitations affect access and a demonstration on how to access LiDAR products hosted within the Esri elevation services.

Large Scale Data Migration from GIS to Civil3D and Back Again, Mark Crow (Salon C): GIS is the ideal data entry, analysis, and visualization platform for a comprehensive sanitary sewer assessment. Often, sewer rehabilitation design documents are produced using GIS software (such as ArcMap); however traditional plan and profile drawings for construction frequently must be provided in a CAD format. S&ME will demonstrate a refined process that helps transition large Sanitary Sewer datasets from file geodatabase feature classes into AutoCAD Civil3D pipe networks. Civil 3D pipe networks are necessary to produce plan and profile sheets, tables, and construction quantities for cost estimation. This workflow preserves as much important feature class attribute data (from the GIS) as possible, which will be utilized in CAD drawing production. Other large-scale items migrated into CAD from GIS datasets to be discussed include: existing ground surfaces, other underground utilities (water, gas, electric, and communications), and planimetric data. As design projects progress, additional data is often entered into the CAD system which eventually requires conversion back to GIS. This step is critical in order to empower clients with the best resulting GIS datasets after a project has been completed. We will discuss this workflow, along with other lessons learned when operating in both CAD and GIS platforms.

Wednesday 3:30PM (Session #2)

Prioritizing Online Mapping Tasks for Disaster Response, Dr. Yingjie Hu (Salon A): In recent years, online volunteers have played important roles in disaster response. After a major disaster, hundreds of volunteers are often remotely convened by humanitarian organizations to map the affected area based on remote sensing images. Typically, the affected area is divided using a grid-based tessellation, and each volunteer can select one grid cell to start mapping. While this approach coordinates the efforts of volunteers, it does not differentiate the priorities of different cells. Consequently, volunteers may map grid cells in a random order. Within the disaster-affected area, different cells may contain geographic information that is of different values to emergency responders. Ideally, cells that potentially contain more valuable information should be assigned higher priority for mapping. I will present an analytical framework for prioritizing the mapping of cells based on the values of information contained in these cells. Our objective is to provide guidance for online volunteers so that potentially more important cells are mapped first.

Asset Management with Professional-Grade Street-Level Imagery, Paul Madrid (Salon B): Communities are using positionally-accurate, high-resolution, street-level imagery to speed workflows and reduce transportation costs by reducing the need for field visits. Transportation and public works departments complete asset data collection projects more quickly and without leaving the office. Desktop reappraisal for assessors is enhanced with a clear view of building condition and grade as well as address verification. Assessors can also capture images of structures for property reports and websites. Ability to integrate with exiting systems, including ArcGIS, makes access simple. This session will describe projects in several communities that benefit from adding this valuable resource to their GIS toolset, including Maricopa County, AZ with assessment and Washington D.C. with their traffic sign management project.

Knox County eCodes-Field Services Application, Cary Thomas (Salon C): In 2014 Knox County Engineering and Public Works (EPW) found itself using multiple information systems to manage its business practices across its many business units, partly due to separate operations centers and/or slightly differing needs across groups. Knox County IT was asked to bring all EPW business units under a single Permit, Asset and Work Order Management system to offer site activity awareness across all EPW workgroups, enterprise management/reporting capabilities, and closer integration with Knox County GIS (KGIS) spatial data/services. In December 2015 eCodes-Field Services, a custom Java-on-Oracle application, was implemented for EPW's Stormwater Management, Highway

Maintenance and Construction Services units that brought these groups into a redesigned database already in use by the Building Inspection, Fire Prevention, and Zoning Enforcement groups for their permitting and inspection activities. A thin-client Java UI was released with eCodes-Field Services for Stormwater/Highways/Construction Services. The same is under development for Building/Fire/Zoning to replace their current client/server UI. Integrating spatial data with core business data is inherently difficult, often leading to separate environments for each. Combining these within eCodes-Field Services has brought valuable spatial elements to their land development project management methods, required lifecycle management of County drainage assets, and the ability to search for and view thousands of EPW work sites and drainage features along with their respective attributes and inspection activities in a spatial setting.

Radon Gas in Karst Areas, Jon Zetterberg (Summit Ballroom): Radon gas exposure is the second leading cause of lung cancer. It is an invisible odorless gas that naturally occurs through the breakdown of shale rock units. Our initial hypothesis was that the open channels in karst areas would allow for the gas to flow freely, resulting in higher Radon levels throughout the area. This project was started as a semester long class project by three students, and then was adapted as a senior thesis project by one. The project was worked on for a year and a half by two of the students; with most of the data collection being carried out in the first year. To complete this project, a known karst area of Cookeville was identified. The Capshaw area has a number of sinkholes and known, mapped caves, while also having homes throughout. The homes were divided into sections, and with a limited time frame, the goal was to test at least one home in each section. Doing this would create a dataset that would be more evenly spread across the area, allowing for a more accurate interpolation process. The targeted homes were asked door to door, offering free Radon tests and distributing flyers about the project. Out of the 36 homes selected, 15 agreed to have their homes tested. Each test was carried out over a three day period. Continuous Radon Monitors, Model 1029 by Sun Nuclear Corporation, were used to record temperature, pressure, and Radon level once every hour. The machines were then plugged directly into a computer and the averages for the three day periods were processed out using Microsoft Excel. This information was then joined to a point layer for each home in ArcMap. A number of interpolation methods including Inverse Distance Weighted (IDW), Kriging, Natural Neighbor, and Spline were used to create a continuous average Radon level layer for the area. Each of these interpolation methods were tested using a root mean squared error calculation and it was found that IDW was the best method for this dataset. Using a known cave overlay map from the Tennessee Cave Survey, there was no correlation between Radon level and proximity to known caves. While looking through the individual test data graphs, there were cycles that repeated approximately every 24 hours. This data was compared to external temperature from a nearby weather station. It showed a strong correlation in that cooler external temperatures resulted in a higher recorded Radon level. This is believed to occur to a vacuum like effect, causing more outside air to be sucked into the home. The Average Radon interpolation was overlaid with elevation for the area and another pattern was detected. Average Radon levels were higher in lower elevation areas than they were in areas of higher elevations. Most of the smaller sinkholes also occurred in the areas of lower elevation. This project helped members of the community understand the dangers of Radon gas and the Earth Science Department better understand factors leading to differences in Radon levels. The results of the project have been shared with all participants, community members, and at events such as the Tennessee Academy of Sciences, Tennessee Tech University Research Day, and the City of Cookeville's GIS day. This project has the possibility of being expanded by a future student at TTU. They could look at a different area and try to duplicate, confirm, our results or expand the study area to cover more of the Capshaw area of Cookeville.

Wednesday 4:00PM (Session #2)

Use of GIS to Assess Influences of Roof Covering Type on Wildfire Damage in Gatlinburg, Lori Weitzel (Salon A): Wildfire destroys homes, wildlife and vegetation. In 2016, Gatlinburg, TN experienced severe wildfires which infringed upon commercial and residential building areas. The fire has caused a significant loss on human life and properties: 14 people dead, 175 injured, and 2,822 houses, businesses and other structures are fully or partially destroyed. Within the fire perimeter, only 485 buildings were with no damage. The type and assembly of roof covering in a building may determine the risk of wildfire damage. Preliminary observation shows that buildings in the Gatlinburg fire perimeter area were composed of different roof covering types. The focus of this study was to determine the effect of roof covering type (assembly) of a building on the degree of damage on the roof structure caused by wildfire. Out of the total 3,307 buildings in the fire perimeter, we decided to look into the 2,822 buildings that were fully or partially destroyed. A sample of 254 buildings were selected using DATA REVIEWER in ArcMap with a statistical sample of 90% confidence level, 5% margin of error and 2% failure threshold. Information compiled from existing records and visual analysis of before and after aerial photography from the Data Globe and TDOT were used to determine whether the roof was metal, shingles or other roof covering types and achieved corresponding classification of Class A, B, or C fire rating for a roof assembly. The results of this study could be used to determine future decisions about fire safety codes and increase public awareness of protecting homes from future wildfire damages.

Investigating the Impact of Land Use and Land Cover Change on Water Quality in Chattanooga, TN Using GIS and Remote Sensing, Jonah Hall (Salon B): As Hamilton county continues to increase urbanization it is critical to research the surrounding environment to see how it is responding to this rapid development. There has been previous research investigating the impact of urban development has on hydrological processes that directly or indirectly impact water quality. Satellite remote sensing began in the 1970's and has accrued an extensive wealth of geospatial data with over a long temporal span. The combination of multispectral spatial data across a large period of time allows for regional spatial analyses to be conducted to measure urbanization growth through time. This research investigates the total urbanization change and growth within HUC-12 watersheds within Hamilton county. Also impervious development located near waterbodies within the watershed boundaries are investigated as well. These results can be used as indicators of areas causing suspected water quality changes or degradation. Having this information Hamilton county can implement sustainable development procedures to help ensure that future growth does not compromise its hydrologic resources.

A Smart GIS Platform for the Workplace and Facilities, Ian Feathers (Salon C): This presentation reviews the value of implementing a Smart GIS Platform for your workplace or facility. ArcGIS supports aggregation of all workplace and facility data into a common map that can be shared across an organization. We'll review the importance of utilizing CAD/BIM data, connecting to other business systems, decreasing data conversion costs, reducing maintenance & downtime costs, and increasing staff productivity. Learn how Esri is utilizing and implementing GIS technology to increase ROI of the built environment.

Criminal Activities in White County, TN, Nick Hallums (Summit Ballroom): This study analyzes a five-year data set of crime occurrence ranging from 2011-2015. The data was provided by the City of Sparta Police Department and the White County Sheriff's Department. Processes used in this research include a Kernal Density mapping for crimes in the city limits, as well as the county (with the city data excluded) using ESRI Arc Map Geographic Information Systems Software. A statistical analysis was performed to determine if there is a correlation between criminal activities and moon phases. Another statistical analysis was performed to see what day of the week has the highest crime rates. Results from this Kernal Density analysis show the concentration of specific crimes (requested by the White County Sheriff's Department) in particular areas for each year. The moon phase statistical analysis shows the percentage of crimes on each of the four moon phases. The statistical analysis shows the amount of crimes by day of the week by year.

Wednesday 4:30PM (Session #2)

Best Practices for Disaster Response: Lessons Learn from Past Events, Jeff Baranyi (Salon A): For many years, the Esri Disaster Response Program has supported our users in times of crisis. We have learned a lot by having a virtual front row seat to many of the disasters over the past 20 years. In conjunction with this experience we have witnessed both technology and GIS mature which have resulted in a wealth of easy-to-use apps that can be configured quickly and easily to support a diverse set of mission requirements. During this talk we will share our lessons learned from past events on how modern GIS can be valuable for response by providing examples of how mission-focused apps were used to support a variety of disasters. Hopefully you will walk away with new ideas on how you can be better prepared for the next disaster in your jurisdiction.

Outreach and Community Engagement Update from UTK Geography, Michael Camponovo (Salon B): While people in our geospatial community eagerly discuss updates in Lidar availability, GPS constellations, drones, and

updates to our favorite software, much of the general public still associates geography with memorizing capitals and the lengths of rivers. The Geography Department at UTK recognized this disconnect between public perception and reality and created the position of Outreach Coordinator to lead efforts to promote GIS, geospatial education, and geography as a career path. The purpose of these efforts is to recruit new students to our field and enhance the educational experience of our current students while making a larger impact in our community. Attendees to this session will learn how our faculty, staff, and students have increased our involvement with K-12 teachers and students, the general public, local and state government, and professional organizations through undergraduate research, internships, and volunteer work.

The Future of LiDAR, Jeff Lovin (Salon C): Lidar technology has been providing accurate 3D elevation data for the commercial market for over 20 years. Woolpert, a pioneer and innovator of this technology, has been at the forefront, completing first-ever projects while leading the market with advanced sensor research, development and applications. Most recently, we were asked to assist the United States Geological Survey (USGS) with evaluating two new Lidar sensors that could have a dramatic, positive impact on the future of the Lidar market. These two new sensors are Single-Photon and Geiger mode Lidar. While similar in how they operate, they each offer unique opportunities and challenges in their application for real world projects. This talk will give an overview of currently accepted technology, as well as an explanation of the pros and cons for each of these new sensors. Despite the challenges, both sensors offer opportunities to capture high density point clouds over larger areas, more quickly and at a lower cost than traditional Lidar systems.

Calfkiller River Steam Habitat Modeling, Daniel Adams (Summit Ballroom): This project is a collaborative effort with the U.S. Fish and Wildlife Service Tennessee Field Office, located in Cookeville, TN. The goal for this project is to map the geologic substrate of selected portions of the Calfkiller River using side scan sonar techniques. The Calfkiller River was selected as the site of interest for this project due to the following reasons: there has been no prior stream habitat modeling done in the area, it is home to numerous endangered species, and it will create a set of temporal data for future studies and comparisons. The *Etheostoma akatulo*, more commonly referred to as the bluemask darter, has been one of the more focused on endangered species in recent times. This small aquatic species is unique to the Caney Fork River system and its tributaries. It has been known to spawn in shallow, sandy substrate. A possible resultant from this project are possible sites, along the Calfkiller River, for reintroduction of the bluemask darter. Due to this, the data produced from the project will be invaluable for conservationist and biological efforts.

Thursday 8:00AM (Session #3)

Leveraging 3DEP Lidar for Statewide Hydrography Projects and Ele-Hydro Concepts, Susan Phelps (Salon A) This presentation will focus on the role lidar has played in the development of local-resolution (i.e. parcel level) National Hydrography Data (NHD) within the states of Indiana and Mississippi. AECOM will provide an overview of the technical approach used in both states to identify and extract NHD hydrography features from hydrocorrected, lidar-based terrain sources. We will also talk about how other local datasets such as storm water pipes and dams have been incorporated into this local-resolution NHD. Additionally, we will discuss recent ele-hydro developments across the country and Tennessee's responses to the USGS' hydro requirements and benefits study (HRBS) – and how this information will be of value for any future local-resolution hydrography projects within the state.

Land Use Susceptibility Mapping of South Eastern Hilly Region of Bangladesh by using Google Earth Image, Yasin Wahid Rabby (Salon B): Landslides are very common in south-eastern part of Bangladesh. Most of the landslide events are not documented as in this area. So it is important to prepare a landslide inventory map of the study area and visual interpretation of optical images can help to prepare it. The present study has given an attempt to prepare a landslide inventory map of the south-eastern part of Bangladesh by using Google Earth imageries and to use it in landslide susceptibility assessment. In the stud, landslide inventory based probabilistic techniques are going to be used. These techniques involve the inventory of landslides, construction of databases, geomorphological analysis and producing a susceptibility map based on the collected data. For inventory mapping at first existing literature will be used to identify the prime locations of landslides in the study area. Then in Google Earth those areas will be digitized and available images will be used for identifying landslides that occurred in the past. The outcome of the research will help to establish a new technique of using Google Earth imageries in land slide inventory creation and subsequently this inventory will help in preparing landslide susceptibly map.

Century Farms in Rutherford County: Rapid Growth & its Impact, Michael Bleddynn (Salon C): The Tennessee Century Farm Program is a documentary effort to chronicle farmland remaining within the same family for at least 100 years and which remains actively engaged in agricultural production. Since 1970, Rutherford County's population has increased from approximately 59,000 residents to more than 260,000 residents as of the 2010 census. With this in mind, we have to ask, how has the increased demand for housing affected the large tracts of land associated with our historical farms? How much farmland have we lost to commercial housing developments? We begin our study with the digitzation of tax maps from the Rutherford County Assessor's Office obtained in the 1960s and approved in 1974. Our poster will detail the locations and size of the farms on the 1974 maps and compare the information with the modern farms. How many have we lost? How many have suffered losses in acreage? This will allow us to analyze and examine land use and expansion within Rutherford County, TN.

Thursday 8:30AM (Session #3)

Statewide Hydrology Data in Tennessee, Suzanne White (Salon A): As part of the Tennessee Base Mapping Program, the State of Tennessee, Strategic Technology Solutions, GIS Services has built out geospatial streams and waterbodies for Tennessee at a scale of 1:1200 and 1:4800. GIS Services has since added valuable information to these streams. See how this dataset can benefit your hydro projects!

Then and Now: Long Term Land-Use Changes Impact Bobwhites, David Moore (Salon B): Populations of the onceabundant Northern Bobwhite Quail (NBQ) have declined steadily for decades, and now are scarce or gone from vast areas of their former range across their 25 state core range. Wildlife biologists hypothesize that this decline is due to long-term changes in land-use that cause degradation of bobwhite habitat. However, there is a perception among stakeholders is that land cover has not changed and this has impeded range-wide restoration of bobwhite habitats. Consequently, the purpose of this research is to determine how land use/land cover has changed over the last 50-75 years, across 13 states in the core historic range of the bobwhite. The goal of this study is to identify and map trends in land use/land cover change within known areas of NBQ decline in abundance and determine if there is a common pattern across 13 states where wildlife managers have provided data.

Setting up an Esri Collector Project for High Accuracy Data Collection, Cliff Hoeffner (Salon C): Esri's latest released of Collector allows for connections to external high accuracy GPS/GNSS receivers. This "How To" will cover setting up a project for high accuracy data collection. The session will cover configuring metadata fields & domains in your database, feature popups in the Web Map, and the receiver & datum transformation settings in the Collector. In addition, we will discuss data collection practices you may be using in your current workflow that are not "yet" available in Collector.

Thursday 9:00AM (Session #3)

Using Esri Story Maps To Help Facilitate Delinquent Property Tax Sale, Bryan Lynn (Salon A): By using a combination of ArcGIS Online Story Maps, Excel, Python, and a simple web application KGIS has been able to help the Knox Co. Trustee's office track, manage, and auction their delinquent property tax sale.

Improved Sinkhole Detection & Mapping for Knox County with LiDAR Data, Clint Shannon (Salon B): According to the USGS, sinkholes over the last 15 years have caused over \$300M dollars worth of damage per year in the US. Sinkholes near or on roads are especially costly and occasionally deadly. Knox County and much of East TN contain karst geology, deeming it at risk for sinkholes caused by this porous, soluble type of rock. Currently, Knox County uses 4' resolution contour data to map sinkholes and potential sinkholes. In this project we develop a more accurate LiDAR-based GIS layer to show the potential locations and extents of sinkholes surrounding the Dutchtown Road area. Knox County Stormwater Management is providing data and will use the project as a pilot for consideration of a larger project. This project also aims to eliminate the non-sinkhole depression features from the current contour-based layer. We will further analyze the underlying geology in the study site to determine

possible sinkhole locations not found by in the surface map with geologic maps. Lastly, we will assess the accuracy of the new method for prediction and location of sinkholes.

ArcGIS Pro: The Road Ahead of Desktop, Jay Fowler (Salon C): This session will review the new, capabilities of ArcGIS Pro including a simplified editing environment, interactive editing tools, the interface for creating and modifying your geographic features and the Road ahead.

Thursday 9:30AM (Session #3)

The Flow of Information: The Bridge Between CIS and Asset Management, Chris Holder & Greg Butler (Salon A): In 2016, Hixson Utility District began the process of eliminating paper from the daily workflow between the office and service technicians in the field. Utilizing GIS and Citywork, all work orders and service requests are now completed electronically. HUD continues to explore ways to not only streamline this process for employees, but also make data more accessible to customers. To do this, we will soon rollout new updates to Cityworks and new maps on our website using ArcGIS Online.

City Energysheds: Assessing Current & Future Energy-Water-Carbon Dynamics among US Urban Systems, Chris DePolph (Salon B): Urbanizing areas are characterized by spatially and temporally heterogeneous energy demands, and are supported by multiple sources of energy production. Planning for sustainable urban growth requires integrating disparate policy sectors. One of the principle challenges in integrative decision making lies in capturing interdependencies among urban and energy systems. A spatially explicit framework is presented that links high resolution energy demand estimates to a power grid network to allow for delineation of energysheds under different present and future scenarios of energy demand. Electricity generation for power plants in the conterminous U.S. was acquired from the UCS EW3 database. State-level electricity demand data for 2012 was obtained from EIA and was downscaled to the Census block group level. Power flow analysis and network balancing was performed on a hierarchical electricity grid. Using the output from the power flow analysis, we can 1) approximate competition between cities for electricity since cities contain block groups, 2) apportion water withdrawals, water consumption, and CO2 emissions from each plant to each block group centroid and associated city.

Mapping and TN Base Mapping - Planning, Managing and Sharing, Tracey Shaw (Salon C): History: A very brief description of our historical film archive. We store approximately 581,760 analog images. Captured between 1977 and 2008. Our early digital days: Our first Photogrammetric Nadir camera, the UltraCamX by Vexcel Imaging. Now there are 144,000 digital images to manage. Tie it all together: ESRI ArcGIS for desktop allows my group to use shape files and DGN files as well as share them as needed. My goal is to be able to share these projects and make our images more accessible. Shape files will be a first step to provide a visual reference to where all the historical images merge with the current and future collection. This year I began teaching co-workers the ArcGIS skills that are specific to these goals. Today and the future: With new image processing and management software this year and we hope to add more functions to our flight group. Distributed processing automated AT, Densification, and Orthorectified image processing are now possible. 3D Tin modeling is expected to be out of "customer preview" mode in 2018. To take advantage of these, we will need to expand our project size and provide more side, and end overlap. Our future looks bright, and big.

Thursday 1:30PM (Session #4)

Developing a Climate-Induced Social Vulnerability Index for Climate Change Adaptation Analysis, Thomaz Carvalhaes (Salon A): Cities can proactively mitigate future threats and challenges related to climate change by developing adaptive strategies. To better understand the impacts and implications of climate change in urban areas, we developed a spatially explicit Climate-Induced Social Vulnerability Index (CSVI) for the East Tennessee area. Census 2008-2012 ACS data was leveraged to produce social vulnerability indicators for County tracts in the study area. The indicators are then combined with downscaled climate projections using an additive model. The CSVI consists of four themes: Socioeconomic Status, Household Composition & Disability, Minority Status & Language, and Housing & Transportation. An Overall CSVI is an aggregate of the four themes. The CSVI is not only useful for vulnerability analysis and equitable distribution of resources, but also as a way to be mindful of the social impacts of mitigation strategies. For example, adaptive strategies, such as green infrastructure projects, have been shown to sometimes inadvertently create environmental justice issues. These projects often make excessive use of vacancy and low-resistance in lower socioeconomic communities, which can drive up housing costs for untenured residents causing possible displacement and housing disparities. Thus, a "just green enough" approach is often suggested in allocating these types of solutions.

Python Scripting for GIS Workflows (Don't be Afraid of Snakes), Brett Burkholder & Joe Pyle (Salon B): Many users of ArcGIS products are inexperienced in writing and using Python scripts. ArcGIS utilizes the coding language Python as a way to let users automate repetitive tasks. This presentation will detail examples of Python scripts that can be used to increase speed, accuracy, and productivity. We will explain and explore the Python window within ArcMap, the Arcpy module, and show some basic examples of Python scripts. Utilizing these built-in features can save users the burden of mundane tasks such as editing layers in a map document. Other examples include editing any number of shapefiles stored within a file system using one python script. We will inform ArcGIS users of the potential return on investment when they commit time to learn this skill, as well as the time needed to become competent with Arcpy. Additionally, we will highlight resources we use at the Python Lunch and Learn Series hosted by the East TN Chapter of ASPRS (American Society of Photogrammetrists and Remote Sensing).

GIS: Much More Than A Map, Shawn Anderson (Salon C): The presentation will examine there is much more to GIS than just making maps from organization, essential elements, risk, preparation and being prepared.

Thursday 2:00PM (Session #4)

Mapping Daily Light Integrals and Other Solar Radiation Data, Joanne Logan (Salon A): The daily light integral (DLI) is a measurement of the total amount of photosynthetically active radiation (PAR) received on a flat surface over a 24-hr period and is an important factor influencing plant growth & development over weeks and months. Understanding the spatial distribution of DLI is especially important for greenhouse production of high value crops such as poinsettias. The National Renewable Energy Laboratory (NREL) developed the National Solar Radiation Database at a 10 km resolution to make solar radiation data available for various uses throughout the US. The database provides global horizontal irradiance data that we converted to DLI(mol m-2 d-1) using the conversion factor of 0.007265mol(PAR)/Wh(full spectrum) which assumes that 45% of the solar radiation is in the PAR region and 4.48 µmol/J is the conversion from radiometric to quantum units. The new maps provide geographically relevant & valuable information for producers of crops that are especially sensitive to daily light accumulation & for supplemental lighting. In addition, maps provide insight about some of the regional & local variations in solar radiation that would not be apparent from using point data from a nearby weather station.

ArcGIS Solutions for State and Local Government, Christie Thiem (Salon B): This session will review current capabilities of the ArcGIS Platform to rapidly deliver COTS based solutions. and We will review current and planned configurable solution templates and platform tools deliver focused workflows to meet user needs.

Building a Routable Road Network, James Brink (Salon C): KGIS has been asked by partnering agencies to develop a Routable road network with the MPC Street data. With the other routable road network dataset out there, why should KGIS build its own routable road network? The Knoxville-Knox County Metropolitan Planning Commission (MPC) maintains the street data for Knox County and keeps it up to date with the new roads, road name changes, and addresses. KGIS would have the most current and accurate street data for a routable road network.

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who desire to enter a graduate program. With GIS becoming an increasingly important part of our everyday lives, job opportunities in this field are rapidly increasing.

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