



# PAPER PRESENTATION ABSTRACTS

Rooms 110 and 111

Wednesday, May 25, 2022

Note: Panel discussions taking place in Room GHAB and ESRI's session taking place in Room 110 during Session 4 are omitted from this document. Please check the full schedule for all events taking place for the 2022 WV GIS Conference.

<b>Room 110</b> <b>Session 1</b>	<b>Estimated Start Time:</b> May 25, 2022 8:30 AM
<b>Name:</b> Marvin Davis <i>GIS Analyst</i>	<b>Organization Details:</b> City of Morgantown ( <i>Regional and Local Government</i> ) <a href="https://www.morgantownwv.gov/">https://www.morgantownwv.gov/</a>
<b>Title:</b> How GIS Aided the Morgantown Municipal Election	
<b>Abstract:</b> The 2021 Morgantown Municipal Election was the first election in which the City of Morgantown had the assistance of the City's GIS Analyst and the power of its GIS software suite available. After the successes of the Ward and Boundary Commission's work using GIS to better balance the City's wards, the Morgantown City Clerk inquired about how GIS could aid in outreach and Election Day management. It was soon determined to utilize the ArcGIS Solutions that were available for elections: Elections Outreach and Election Day Management. This presentation will cover the ArcGIS Solutions for Election Outreach and Election Day Management that were utilized for the purposes of public information, Election Day management, reporting of election results, and receiving feedback from the public on how well the election was handled.	
Keywords: election, outreach, management, GIS	

<b>Room 111</b> <b>Session 1</b>	<b>Estimated Start Time:</b> May 25, 2022 8:30 AM
<b>Name:</b> Rick Landenberger <i>Science &amp; Management Specialist, and Associate Professor of Geography</i>	<b>Organization Details:</b> West Virginia Land Trust, and West Virginia University ( <i>Non-Profit</i> ) <a href="http://www.wvlandtrust.org/">http://www.wvlandtrust.org/</a> and <a href="https://www.wvu.edu/info-for/faculty-and-staff/">https://www.wvu.edu/info-for/faculty-and-staff/</a>
<b>Title:</b> Recreational Resource Mapping At the Mammoth and Piney Creek Preserves	
<b>Abstract:</b> The Mammoth Preserve and Piney Creek Preserve are former surface mine sites in southern West Virginia that are now owned by the West Virginia Land Trust, a statewide conservation organization that has 20 nature preserves across the state. Both preserves resulted from a legal settlement involving Clean Water Act violations. The settlement requires that both areas be developed for public non-motorized recreation, primarily hiking and biking trails.	

The initial step in resource planning and development involves inventorying the existing transportation systems – previous mining roads, mine benches, and logging roads – to determine what opportunities exist to transform these complex features into trails. To do this, I used a 1-meter hillshade DEM made available to the public by the WV GIS Technical Center. All ‘routes’ were assessed manually (visually), and those that appeared to fit my criteria were then digitized using ‘heads-up’, on-screen manual interpretation. Criteria included location, ‘connectivity’ with other potential routes, and grade (steepness). The initial set of routes at each preserve is being ground referenced to assess surface type, drainage, degree of erosion, and the amount of work and associated cost required to transform them into a safe and pleasant recreational trail system that will draw repeat visitors from across the region. Initial findings indicate that there are opportunities for a quality non-motorized trail systems at each preserve, but that significant funding will be required before they provide this incredibly valuable community asset. This is not surprising because mine roads, mine benches, and logging roads were not constructed with recreation uses in mind; on the contrary, these routes were strictly utilitarian and as a result they require significant investments in reconstruction, erosion control, stabilization, and grade alteration before they realize their new potential as high quality recreational assets.

Keywords: forest recreation, resource mapping, manual interpretation, ground-reference data

<p><b>Room 110</b> <b>Session 1</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 9:05 AM</p>
<p><b>Name:</b> Veronica Balcer <i>City of Morgantown GIS Intern</i></p>	<p><b>Organization Details:</b> <i>City of Morgantown (Regional and Local Government)</i> <a href="https://www.morgantownwv.gov/">https://www.morgantownwv.gov/</a></p>
<p><b>Title:</b> Outside of the Classroom: Real-World Experience in GIS for Students</p>	
<p><b>Abstract:</b> This presentation will focus on the importance of students actively engaging with GIS outside of the classroom. Emphasizing how real-world experiences and one on one mentoring greatly supports in the transition from graduation to the workplace. With personal experience working in local government, this presentation will testify to how student work in GIS can be both rewarding to your industry sector and beneficial for the future of GIS professionals.</p>	
<p>Keywords: Student, Engagement</p>	

<b>Room 111</b> <b>Session 1</b>	<b>Estimated Start Time:</b> May 25, 2022 9:05 AM
<b>Name:</b> Jacob Darrah <i>Account Executive</i>	<b>Organization Details:</b> Teren, Inc. ( <i>Private</i> ) <a href="http://teren4d.com/">http://teren4d.com/</a>
<b>Title:</b> Streamlining the Path from Remotely-Sensed Data to Actionable Insights	
<b>Abstract:</b> In this presentation, Teren will demonstrate how we've streamlined the path from remotely-sensed data to actionable insights. We've applied geospatial know-how and machine learning to identify, prioritize and predict geohazards on a pipeline right-of-way. Our case study will examine a pipeline operator in the Appalachian region. Prior to Teren, the operator had over 250 unprioritized geohazard slips. This unmanaged risk resulted in higher slip repair costs, resulted in multiple shut-ins per year, and cost millions in non-reclaimed funds. By implementing the systematic and measured process offered by Teren, the operator dropped their unprioritized geohazards by over 90%. Subsequent mitigation cut the mitigation budget by 40%, and resulted in 0 shut-ins per year. Our approach resulted in millions of dollars saved, reduced risk, and increased safety.	
Keywords: Actionable Insights, Decision-Ready Data	

<b>Room 111</b> <b>Session 1</b>	<b>Estimated Start Time:</b> May 25, 2022 9:25 AM
<b>Name:</b> Jonathan Austin <i>Geospatial Project Manager</i>	<b>Organization Details:</b> GPI Geospatial, Inc. ( <i>Private</i> )
<b>Title:</b> Remote Sensing in GIS: Accuracies and Applications	
<b>Abstract:</b> When creating or updating a GIS database, accurate and up-to-date data are essential. This presentation provides an overview of different remote sensing technologies, their expected accuracies, and how they can benefit GIS data creation and maintenance. We will discuss best-practices for implementing LiDAR and imagery data collection including real world examples of aerial, mobile, and static terrestrial applications.	
Keywords: remote sensing, data acquisition, accuracy, LiDAR, imagery	

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<b>Room 110</b> <b>Session 1</b>	<b>Estimated Start Time:</b> May 25, 2022 9:25 AM
<b>Name:</b> Gary Edwards <i>Faculty</i>	<b>Organization Details:</b> Fairmont State University ( <i>Education</i> ) <a href="https://www.fairmontstate.edu/">https://www.fairmontstate.edu/</a>
<b>Title:</b> WoodLawn Cemetery: Pin-a-Plot App: Information Systems Management and Computer Science Capstone	
<b>Abstract:</b> The Pin-a-Plot app project involves the creation of a grave finder mobile app for the Woodlawn Cemetery, located in Fairmont, WV. With over 15,000 graves, the Woodlawn Cemetery is the resting place of many historical figures with significance to the nation, and specifically Fairmont. The walk-to-site mobile navigation provides users with biographical information, photos, and a map to the exact location of graves, and other points of interest. An intuitive interface using Global Positioning Systems (GPS) is designed for both Apple and Android phones. This application is being developed through a collaborative capstone course between Information Systems Management and Computer Science students.	
Keywords: Mobile, GPS	

<b>Room 110</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 10:30 AM
<b>Name:</b> Jeff Jalbrzikowski <i>Appalachian Regional Geodetic Advisor</i>	<b>Organization Details:</b> NOAA's National Geodetic Survey (NGS) <i>(Federal Government)</i> <a href="https://geodesy.noaa.gov/ADVISORS/">https://geodesy.noaa.gov/ADVISORS/</a>
<b>Title:</b> Replacing NAD83 - What Does That Mean for the Geospatial Professional?	
<b>Abstract:</b> Our focus for this session will be looking at the details of replacing NAD83 with NATRF2022. What will be different? What will stay the same? How does this impact State Plane Coordinate Systems (SPCS)? What can you do now to prepare? We will conclude with a few minutes on the retirement of the US Foot.	
Keywords: datums, coordinate systems, projections, geodesy, NAD83, SPCS, state plane, US Feet	

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<b>Room 111</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 10:30 AM
<b>Name:</b> Brandy Bachman <i>GIS Programmer Analyst I</i>	<b>Organization Details:</b> WVDNR ( <i>State Government</i> ) www.wvdnr.gov
<b>Title:</b> How the WVDNR utilizes ArcGIS Survey123	
<b>Abstract:</b> The West Virginia Division of Natural Resources - Wildlife Resources Section utilizes ArcGIS Survey123 in many facets of their operations. The WVDNR has completed two statewide citizen science projects in 2019-2021 dealing with fireflies and box turtles. In addition to the completed projects, the WVDNR is in the process of converting many paper surveys to Survey123 surveys including the Spring Gobbler Survey, the Mast Survey, and the Bow Hunter Survey. Personnel in other units utilize Survey123 for data collection - grouse observations, deer distance sampling, and water shrew and wood rat surveys. This presentation will cover the build of and different use cases of a selection of these surveys. In addition, I will present a preliminary 'dashboard' created through ArcGIS Experience Builder that has been created to mimic the report that is mailed to the Spring Gobbler Survey cooperators each year.	
Keywords: Survey123, natural resources	

<b>Room 110</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 11:05 AM
<b>Name:</b> Kennie Harris <i>Geospatial Rep</i>	<b>Organization Details:</b> Duncan-Parnell ( <i>Private</i> ) www.duncan-parnell.com
<b>Title:</b> Trends in Global Positioning	
<b>Abstract:</b> We will briefly review the history of GPS/GNSS technology and look ahead at the future of the industry. We'll discuss corrections-as-a-service, and how a more modular approach to receivers and data collection devices is becoming more popular. The way of the future is going to be scalable to fit your workflow. Better, more reliable and more user-friendly positioning is here. Now is a great time to jump into new solutions and update your mapping inventory.	
Keywords: GPS/GNSS, Mapping, Data Collection	

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<b>Room 111</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 11:05 AM
<b>Name:</b> Jessica Perkins <i>GIS &amp; Technical Support Program Manager</i>	<b>Organization Details:</b> WVDNR Wildlife Resources ( <i>State Government</i> ) <a href="https://wvdnr.gov/gis/">https://wvdnr.gov/gis/</a>
<b>Title:</b> StoryMap of Primeval Paths: Bison in West Virginia	
<b>Abstract:</b> Approximately 2600 km of bison and elk trails have been mapped in West Virginia using historical records, including county histories and travelers' accounts with published dates between 1876 and 1977. Most points of interest associated with these trails document European bison or elk hunting events. I will present a StoryMap that is in development based on our recently published paper in Natural Areas Journal ( <a href="https://doi.org/10.3375/21-18">https://doi.org/10.3375/21-18</a> ). This map of major bison trails (raw geospatial data available for download at <a href="https://doi.org/10.2737/RDS-2021-0055">https://doi.org/10.2737/RDS-2021-0055</a> ) is an important resource for telling a more complete story of the history of forests and woodlands of West Virginia. Citation: Melissa A. Thomas-Van Gundy, Jessica D. Perkins, Crystal Krause, Cynthia D. Huebner, Lorenzo Ferrari, and Linda S. Smith "Primeval Paths: Bison in West Virginia," Natural Areas Journal 41(4), 315-322, (18 October 2021). <a href="https://doi.org/10.3375/21-18">https://doi.org/10.3375/21-18</a>	
Keywords: Conservation, Bison, West Virginia	

<b>Room 111</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 11:23 AM
<b>Name:</b> Meryl Friedrich <i>GIS Programmer Analyst II</i>	<b>Organization Details:</b> WV Division of Natural Resources ( <i>State Government</i> ) <a href="https://wvdnr.gov/">https://wvdnr.gov/</a>
<b>Title:</b> West Virginia Stream Condition and Integrity Index	
<b>Abstract:</b> The 2015 West Virginia State Wildlife Action Plan (SWAP) broadly identified 20 aquatic stresses affecting 1,148 Species of Greatest Conservation Need. To facilitate responding to these threats through applied conservation and management actions, a spatially explicit statewide stream condition and integrity index was developed. Spatial datasets of aquatic stressors and environmental conditions for the entire area that drains into West Virginia – an approximately 70,000 square mile watershed that includes parts of Ohio, Kentucky, North Carolina, Virginia, Maryland, Pennsylvania, and New York – were developed. From these	

datasets, impacts were summarized for the approximately 60,000 stream miles, or nearly 150,000 drainages, in the state at four ecologically relevant spatial scales: the segment drainage (the area immediately surrounding and draining laterally to an individual stream segment), the basin (the catchment of the entire river network upstream of a stream segment, including the segment drainage), the floodplain (the area surrounding a stream segment, composed of the wider of the FEMA 100-year floodplain and a 100-ft buffer around the stream segment), and the floodplain-basin (the entire floodplain area upstream of a stream segment, including the floodplain of that stream segment). In addition to tabulated values of aquatic stressors and environmental conditions, WVDNR biologists with specialties in aquatic and rare, threatened, and endangered species provided expert opinion on the effects of selected impacts to inform a relative stream integrity index score. The index score was calculated for each stream segment based on a weighted sum of potential negative impacts to stream integrity. The index score may be used to compare the accumulated impacts among stream segments, which may inform management decisions such as species restoration or land acquisition prioritization.

Keywords: stream, aquatic, integrity, wildlife

<p><b>Room 110</b> <b>Session 2</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 11:25 AM</p>
<p><b>Name:</b> Jeff Jalbrzikowski <i>Appalachian Regional Geodetic Advisor</i></p>	<p><b>Organization Details:</b> NOAA's National Geodetic Survey (NGS) <i>(Federal Government)</i> <a href="https://geodesy.noaa.gov/ADVISORS/">https://geodesy.noaa.gov/ADVISORS/</a></p>
<p><b>Title:</b> Vertical Datums of the NSRS – Past, Present, Future</p>	
<p><b>Abstract:</b> We will start with clarifying the various types of vertical datums of our Nation’s geodetic infrastructure, the National Spatial Reference System (NSRS). Then we’ll venture into some of the details of NAVD88 and its numerous different geoids. The session will wrap up by explaining some of the “why” and “how” of replacing NAVD88 with a new vertical datum, NAPGD2022.</p>	
<p>Keywords: vertical datums, geoids, geodesy, floodplain, NSRS, heights, NFIP, CFM, NAVD88, NGVD29, NAPGD2022</p>	

<b>Room 111</b> <b>Session 2</b>	<b>Estimated Start Time:</b> May 25, 2022 11:41 AM
<b>Name:</b> Aaron Maxwell <i>Assistant Professor</i>	<b>Organization Details:</b> West Virginia University ( <i>Education</i> ) <a href="http://www.wvview.org/">http://www.wvview.org/</a>
<b>Title:</b> Introducing WVU's New Online MS in GIS and Spatial Analysis	
<b>Abstract:</b> The West Virginia University Department of Geology and Geography has launched a new online Master of Science (MS) program in GIS and Spatial Analysis to compliment the existing graduate certificate in GIS and Spatial Analysis. This program is completely asynchronous to offer flexibility for those working full time. It is appropriate for geospatial professionals working to advance in the field, individuals hoping to transition to the field, and recent college graduates seeking a graduate degree. This talk highlights the structure of the program along with the key knowledge, concepts, skills, and technologies that can be learned. Longtime, our goal is to develop and maintain the program to support the development of the geospatial workforce in the state and region.	
Keywords: education, graduate programs, geospatial education	

<b>Room 110</b> <b>Session 3</b>	<b>Estimated Start Time:</b> May 25, 2022 1:00 PM
<b>Name:</b> Taryn Moser <i>GIS Manager</i>	<b>Organization Details:</b> Morgantown Utility Board ( <i>Regional and Local Government</i> ) <a href="http://www.mub.org">www.mub.org</a>
<b>Title:</b> Standards and workflows from AutoCAD to ArcGIS	
<b>Abstract:</b> Understanding the needs of the design process and making data in AutoCAD that will seamlessly go into ArcGIS. Making standards to put into place will allow the design process that simplifies the way you share and synchronize GIS content between AutoCAD and ArcGIS. These standards will not only be put in place for the MUB organization but also for any 3rd Party Contractor that will do any type of design work for MUB. This will streamline the process of project work and allow better communication with a real time implementation of work done in the field.	
Keywords: Standards, Workflows, AutoCAD, GIS	

<b>Room 111</b> <b>Session 3</b>	<b>Estimated Start Time:</b> May 25, 2022 1:00 PM
<b>Name:</b> Kevin Kuhn <i>GIS Analyst</i>	<b>Organization Details:</b> WV GIS Technical Center ( <i>Education</i> ) <a href="http://www.wvgis.wvu.edu/">http://www.wvgis.wvu.edu/</a>
<b>Title:</b> WV Redistricting Using GIS	
<b>Abstract:</b> The WV Geographic Information Systems Technical Center (WVGISTC) is providing Geographic Information Systems (GIS) assistance to 28 WV County Clerk Offices and the Secretary of State's Office for the 2021 election redistricting of County precinct and magisterial district boundaries. This project was mission critical for the state; complicated by late involvement and tight deadlines. Presentation will focus on the ESRI Redistricting App and working with counties during the redistricting process; and the work performed with the Secretary of States Office using GIS for spatial audits of the State Voter Registration System.	
Keywords: Elections, WV, Redistricting, Spatial Audits, Boundary, Voting, App Builder, AGOL	

<b>Room 111</b> <b>Session 3</b>	<b>Estimated Start Time:</b> May 25, 2022 1:35 PM
<b>Name:</b> Eric Hopkins <i>GIS Analyst</i>	<b>Organization Details:</b> WV GIS Technical Center ( <i>Education</i> ) <a href="http://www.wvgis.wvu.edu">www.wvgis.wvu.edu</a>
<b>Title:</b> West Virginia Framework Layers: Aerial Imagery, Elevation, Boundaries	
<b>Abstract:</b> The majority of West Virginia counties (53) are now represented in aerial imagery dated 2018 or newer. Ideally imagery is acquired for a given location every five years. The WVGISTC coordinates with counties and vendors to distribute publicly available imagery through online services and downloadable image files. This presentation will discuss progress to date and expectations for 2022. Recent lidar point cloud data and derivative products are now available statewide at 1 meter resolution. Digital Elevation Model (DEM), Hillshade and contour data are all available via online tools and download from the WVGISTC. We'll cover this major milestone for the state. The 2020 Census resulted in updates to multiple boundary and location data sets. Voting and redistricting will be discussed in another presentation, while this one focuses on those layers routinely used in GIS analysis.	
Keywords: framework GIS layers, aerial imagery, elevation, lidar, DEM, contours	

<p><b>Room 110</b> <b>Session 3</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 1:35 PM</p>
<p><b>Name:</b> Matthew Kalcich <i>Senior GIS Analyst</i></p>	<p><b>Organization Details:</b> Larson Design Group (<i>Private</i>) www.larsondesigngroup.com</p>
<p><b>Title:</b> Case Study: Water Main Replacement Community Engagement Hub</p>	
<p><b>Abstract:</b> The Southeast Morris County Municipal Utilities Authority (SMCMUA) identified the need to improve communications with its public officials, community leaders, and customers when working on large capital improvement projects. The need was driven when planning a \$3.2 million renewal project for a water main that runs through the heart of the business district in the town of Morristown, New Jersey, which also includes high-density housing. The project includes the replacement of 1.25 miles of main and associated improvements for new service connections, water meters, meter pits, hydrants, and valves. This project provided an opportunity to improve the resiliency and reliability of the water supply and enhance water quality and fire protection for this section of the service area. Understanding the high-profile business and residential district of Morristown, SMCMUA recognized that any water supply and/or quality disruption, noise generation, and general pedestrian and vehicular traffic detours could trigger a chain reaction of inquiries from members of the general public, who would contact their elected public official and/or community leader, who would then contact the authority to address the issue. Larson Design Group (LDG) has been supporting SMCMUA on geographic information system (GIS)-related tasks around field data collection, enterprise implementation, and operational workflows. The concept of the Project Hub originated through discussions about providing a platform to effectively communicate critical project information in real time, and in a centralized platform, with the general public along with public officials and community leaders. LDG has been coordinating efforts with the various division leads throughout this project, promoting the use of GIS and looking for areas where efficiencies could be gained using Esri applications.</p>	
<p>Keywords: Hub, water, utilities</p>	

<b>Room 110</b> <b>Session 3</b>	<b>Estimated Start Time:</b> May 25, 2022 1:53 PM
<b>Name:</b> Drew Gatlin <i>Staff Engineer</i>	<b>Organization Details:</b> City of Morgantown ( <i>Regional and Local Government</i> ) morgantownwv.gov
<b>Title:</b> Opening Our Data: Leveraging OpenStreetMap for Insights into the Built and Natural Environment	
<b>Abstract:</b> OpenStreetMap (OSM) is more powerful, active, and organized than ever. Derivatives of OSM data fuel important open and commercialized tools, and the community of mappers feeding into this data are willing to dedicate incredible resources to ensuring quality assurance and quality control. Drew Gatlin is the Staff Engineer for the City of Morgantown. Hear how he has come to understand the importance of engaging OSM by encountering gaps in datasets that are quickly fixed with local, public resources. Garbage in is garbage out -- learn how you can make small changes to your data licensing that will maintain your authority, limit your liability, and ensure that OSM has the high-quality and up-to-date information they need to more accurately represent your world.	
Keywords: Open Data, Community Mapping, Public Data, Public Resources	

<b>Room 111</b> <b>Session 3</b>	<b>Estimated Start Time:</b> May 25, 2022 1:55 PM
<b>Name:</b> Maneesh Sharma <i>GIS Project Lead</i>	<b>Organization Details:</b> West Virginia GIS Technical Center ( <i>Education</i> ) <a href="https://wvgis.wvu.edu/">https://wvgis.wvu.edu/</a>
<b>Title:</b> WV Statewide Multi-Hazard Risk Assessment	
<b>Abstract:</b> Site-specific risk assessments focused on flood and landslide hazards have been conducted for all 55 counties and 232 incorporated communities in West Virginia to supplement local and state hazard mitigation plans. These studies for assessing and mitigating risks to communities in West Virginia are referred as the Total Exposure in Floodplain (TEIF) and Total Exposure in Landslides (TEIL). This statewide approach to multi-hazard risk assessments at the building or structure level for every community in the State and for a geographic area over 24,000 square miles constitutes one of the largest risk assessment studies ever undertaken in the Nation. We are in the process of implementing priority statewide mitigation to: (1) develop a standardized, comprehensive building exposure inventory that	

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includes critical facilities and state-owned properties; (2) create a statewide parcel file for hazard identification and risk assessments; (3) standardize the data analysis process so that future local and state plan updates are consistent and utilize comparable methodologies; (4) conduct a statewide Hazus Level 2 flood risk analysis with more accurate local building inventories (user-defined facilities), effective DFIRM floodplains, and high-resolution elevation data; and (5) build a statewide landslide incident database for improving landslide susceptibility assessments. Standardized risk assessments for flood and landslide hazards is being made available to Regions to integrate into local and state hazard mitigation plan updates.

Keywords: Risk Assessment, Flood, Landslide, Hazard Mitigation, West Virginia

<p><b>Room 110</b> <b>Session 3</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 2:11 PM</p>
<p><b>Name:</b> James Mayhorn <i>GIS Technician</i></p>	<p><b>Organization Details:</b> West Virginia Department of Transportation (<i>State Government</i>) <a href="https://transportation.wv.gov/Pages/default.aspx">https://transportation.wv.gov/Pages/default.aspx</a></p>
<p><b>Title:</b> Municipal Mileage Data Collection</p>	
<p><b>Abstract:</b> The Municipal Mileage Report is a yearly report based upon the reported mileage of the 230 municipalities in the State of West Virginia. The West Virginia Department of Transportation is required to report this data to the Federal Government, but the municipalities are not required to provide this data to the State. Therefore, it is our responsibility to acquire the data from all 230 municipalities.</p>	
<p>Keywords: Municipalities, Mileage, Data Collection, West Virginia</p>	

<b>Room 111</b> <b>Session 4</b>	<b>Estimated Start Time:</b> May 25, 2022 3:00 PM
<b>Name:</b> Samuel Bearinger <i>Geospatial Project Manager</i>	<b>Organization Details:</b> NRAC ( <i>Education</i> ) nrac.wvu.edu
<b>Title:</b> Natural Resources Analysis Center UAS research program.	
<b>Abstract:</b> The Natural Resource Analysis Center (NRAC) provides geospatially-based research, teaching and service focused on environmental and natural resource issues for West Virginia, the surrounding Appalachian region, and beyond. NRAC is a multi-disciplinary research and teaching facility within the Davis College of Agriculture, Natural Resources and Design, originally established in 1990. For over 20 years, NRAC research, service, and teaching activities have complemented work within the College in many fields. Areas of expertise at NRAC include landscape analysis, watershed-based modeling and applications, remote sensing, spatial decision support, energy issues, and economic development. This presentation will highlight our recent advances in UAS applications.	
Keywords: drone, uas, remote, sensing	

<b>Room 111</b> <b>Session 4</b>	<b>Estimated Start Time:</b> May 25, 2022 3:18 PM
<b>Name:</b> Anthony Mesa <i>Graduate Research Assistant</i>	<b>Organization Details:</b> West Virginia University Natural Resources Analysis Center ( <i>Education</i> ) <a href="https://www.nrac.wvu.edu/">https://www.nrac.wvu.edu/</a>
<b>Title:</b> UAV Based Remote Sensing Solutions for Pipeline Safety, Monitoring, and Management	
<b>Abstract:</b> West Virginia University's Natural Resource Analysis Center (NRAC) received a research grant through the United States Department of Transportation to discover cost-effective methodologies for pipeline safety, monitoring, and management. Pipeline corridor permit violations can cause severe environmental impacts and come with steep fines. Site compliance is assessed through on the ground inspections. Focal points of the inspections are vegetation coverage and the design and integrity of water and sediment control features such as water bars. Safety concerns are raised when inspectors are tasked with walking long sections of topographically complex terrain, like those found in West Virginia. To address these issues, NRAC explored the use of unmanned aerial vehicles (UAVs) equipped with varying remote sensors to capture, quantify, and monitor pipeline corridor vegetation and	

water management features. The oil and gas permits require a site compliance threshold of 70% vegetation coverage. To address this objective, we evaluated the use of equipping a UAV with a multispectral sensor as a complementary tool to be used in the inspection process. Using a supervised machine learning process, we generated predicted vegetation presence from NDVI and single band reflectance maps. Model accuracy was assessed against inspector graded validation plots. Our research found the most accurate model performance being derived from the NDVI calculation alone. Additional permit requirements direct the monitoring of water and erosion control features. Using UAVs equipped with color imagery and LiDAR sensors, we were able to model the surface of the pipeline in a digital space, enabling further analysis. Ongoing research in the modeling of water bars holds promise in assessing the permit compliance of the structure of these critical features. Additionally, GIS derived surface flow analyses appear to be capable of highlighting water bars which are beginning to develop diversion failures.

Keywords: UAV, LiDAR, NDVI, Pipeline, BMP

<p><b>Room 111</b> <b>Session 4</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 3:35 PM</p>
<p><b>Name:</b> Isaac Kinder <i>Graduate Student</i></p>	<p><b>Organization Details:</b> Natural Resource Analysis Center, Davis College, West Virginia University (<i>Education</i>) <a href="https://www.nrac.wvu.edu/">https://www.nrac.wvu.edu/</a></p>
<p><b>Title:</b> Locating Historic Coal Mine Refuse Piles Using Remote Sensing and Machine Learning</p>	
<p><b>Abstract:</b> The purpose of this research is to locate pre-SMCRA (Surface Mining Control and Reclamation Act) coal refuse piles. These historic coal refuse piles often cause negative environmental impacts such as reductions in water quality, fire hazards, and wildlife habitat loss. The first step in the reclamation process is to identify and geo-locate these historic refuse piles. Geospatial data is abundant for post-SMCRA refuse piles, but nearly non-existent for pre-SMCRA refuse piles in West Virginia. To locate refuse piles, geospatial analyses will be used to interrogate statewide one-meter LiDAR DEM (digital elevation model) and NAIP (National Agriculture Imagery Program) data. Furthermore, remotely sensed imagery and publicly available geographic information system data will be utilized to calculate potential refuse pile location distances from preparation plants, major roads, and railroads. Analytical terrain models such as slope, aspect, curvature, topographic wetness, and channel networks will be derived from the DEM. Moreover, a NDVI (normalized differential vegetation index) model will be generated from the NAIP data to investigate potential vegetation indicators of refuse pile presence. ESDA (exploratory spatial data analysis) methods will then be used to statistically determine useful explanatory training variables based on correlation of the analytical terrain models, NDVI model, and the distance models between each of the training</p>	

refuse piles. Finally, useful explanatory training variables will be verified and then be used to train machine learning models such as maximum entropy or forest-based classification and regression to automate pre-SMCRA refuse pile geographic locations across West Virginia.

Keywords: Machine Learning, Coal Refuse, Remote Sensing

<p><b>Room 111</b> <b>Session 4</b></p>	<p><b>Estimated Start Time:</b> May 25, 2022 3:53 PM</p>
<p><b>Name:</b> Natalie Britton <i>Student</i></p>	<p><b>Organization Details:</b> University of Pittsburgh (<i>Education</i>) <a href="https://www.pitt.edu">https://www.pitt.edu</a></p>
<p><b>Title:</b> Rural water supply vulnerability to coal mining in West Virginia: a suitability analysis</p>	
<p><b>Abstract:</b> West Virginia’s significant coal mining legacy has left a trail of abandoned mines throughout the state that threatens the safety of local water supplies, particularly threatening those of remote rural communities that lack basic water treatment infrastructure. This study used a Geographic Information Systems (GIS) suitability analysis to rank water supply vulnerability in the 138 fifth level watersheds in West Virginia that contain abandoned mines. Seven geospatial risk factors were considered that encompass both physical and infrastructure threats as well as social determinants of health, and the relative importance of these factors was weighed using the Analytical Hierarchy Process (AHP). To focus on rural vulnerability, emphasis was placed on estimating the spatial distribution of domestic wells across the state, which are classified as serving less than 25 people and are not protected by the water quality standards of the Clean Water Act. While preliminary spatial analysis suggests potential for socioeconomic status to serve as a predictor of water infrastructure quality and thus vulnerability to mining contaminants, major findings include a list of the top 10 most vulnerable watersheds, all of which were located in the southwest corner of the state. Within the top 10 watersheds, 129 abandoned mines were identified as high priority for future reclamation. The results of this study can inform future work to prioritize which of the 129 high priority mines would provide the greatest community benefit if they were to be reclaimed.</p>	
<p>Keywords: water, suitability</p>	