Symposium By the Sea

2nd LiDAR Symposium

Presented by the South Coast GIS Users Group, Oregon Chapter of URISA *and the* South Slough National Estuarine Research Reserve

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Program

What Can LiDAR Do For You?

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An overview of LiDAR technology including standard LiDAR deliverables, applications and GIS. This presentation reviews how remotely sensed data leverages unparalleled efficiencies and derives cost effective solutions at all project sizes. Bare earth surface models, highest hit models and feature extraction will all be discussed in the context of Oregon and Pacific Northwest projects. This presentation will bring an increased awareness to field scientists and GIS professionals of the multiple applications that one LiDAR data set can yield.

Over the past 20 years Melissa Christie's geospatial career has evolved from photogrammetric map editing and orthoimagery creation and quality control to project planning and business development. The favorite part of her job now is flying all over the West, grabbing a window seat and being able to point out geographic landmarks to strangers sitting nearby.

Study of the Hooskanaden Slide Using LiDAR Technology

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The Hooskanaden landslide occurred in late February, 2019, taking out a segment of Highway 101 between Gold Beach and Brookings. Movement along this section of highway is a recurring issue and even continued days later at a rate of two feet per hour. This presentation discusses the coordinated efforts taken to collect highly accurate data in order to define the impacted area and the location of the road prior to the slide for redesign purposes using terrestrial, mobile and UAS LiDAR scanning, total station measurements, and structure from motion through aerial imagery. Resulting digital terrain models illustrate the total impact of the slide and aided in identifying additional threats.

Audrey McHugh-Britton 's work involves monitoring bridge clearances but much of her time is spent working with LiDAR and imagery for a variety of state projects. She earned a B.S. in Geological Sciences from the University of Oregon and an M.S. in Applied Geosciences from the University of Washington. She has spent the last 4-5 years in LiDAR technologies processing both airborne and mobile data for topographic and bathymetric studies.

NOAA's Digital Coast Helps Communities Address a Variety of Coastal Issues With Downloadable LiDAR Data, Tools, Online Viewers, and Trainings

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The importance of LiDAR in today's coastal management field has become more and more critical to coastal mapping applications of all shapes and sizes. The list of LiDAR uses along the coast is ever-growing and can be a challenging topic for those unfamiliar with its uses. Many coastal mapping processes require precise, three-dimensional information about the shape of the Earth and its surface characteristics, LiDAR is often the best answer. NOAA's Digital Coast provides the resources you need—from where to get it, to accuracy specifications, to different formats—to get the most of out of coastal LiDAR.

Matt Pendleton holds a Bachelor's Degree in Marine Science from Coastal Carolina University and a Master's Degree in Environmental Studies from the College of Charleston Graduate School. He has been with the NOAA Office for Coastal Management in Charleston, S. C., for 13 years. He works on a variety of geospatial topics including working with the coastal resource management community to build GIS and mapping capacity

in the areas of coastal hazards and climate change.

Unexpected Uses of LiDAR in Transportation
<u>Sidebar</u>: Mobile LiDAR Program at ODOT

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Through Oregon Department of Transportation's internal work and with other Oregon agencies, numerous unintended uses for geospatial data have been discovered. We will explore some of the ways that ODOT has found to utilize mobile LiDAR data. The precision and density of the mobile LiDAR data collected biennially along state highways has been used for more projects than originally anticipated. In addition to using point clouds for engineering design, mobile LiDAR has aided in pavement marking analysis, precision vertical clearance measurements and collision reconstruction.

Rhonda Dodge provides statewide LiDAR processing and data management. She received Bachelor of Science degrees in Geomatics and Applied Mathematics from the Oregon Institute of Technology in 2016 and a Masters degree in Civil Engineering - Remote Sensing from Purdue University in 2017. Rhonda has a passion for all aspects of surveying and reaching out to the younger generation about STEM professions.

Peeling Back the Urban Landscape with LiDAR

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As urban centers grow, densify and develop more intricate and interrelated infrastructures, the characteristics of their original landscapes grow more obscure. What was once common knowledge is becoming lost to some degree, leaving modern urban planners and engineers with less and less understanding of that original landscape and the possible impacts that their decisions may have on local hydrology, hydrogeology, and geomorphology. This presentation explores the methods used to increase awareness of both vestigial landscapes and the impacts of future urban development planning and engineering using advanced imagery, including LiDAR and other analytically derived raster data. The methods have met with some success in informing and redirecting development and management decisions. This presentation will share some of those methods and tools and show specific examples where significant, yet hidden landform features and geologic complexity would have otherwise been overlooked.

Mark Liebe is responsible for supervising the technical integration of the section's modeling and GIS support services for the Bureau. Mark has 34 years of engineering experience, the majority of them in water resources involving the development of computer applications in support of water resources work. Exceptions to this were two years in the aerospace industry, where he worked on military satellite applications. More recently Mark consulted for both private and municipal clients on a number of national and international projects, many involving GIS.

Enhancing Classified LiDAR LAS Files Using ArcGIS Tools – motivations and resultant products

Kevin Ramey
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The City of Portland's Bureau of Environmental Services has used LiDAR since 2004.It was one of the first adopters of the technology in the Portland region. Since then, the Asset Systems Management GIS team has cultivated substantial knowledge and experience base around its use. Recently, after working with the most recent 2014 LiDAR dataset, several limitations became known and the team

The Asset Systems Management GIS Team has provided GIS advanced mapping and analytical functions since 1998. The team has responded to and completed nearly 10,000 GIS related mapping and analysis requests while looking for

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decided to reclassify the latest data to increase its resolution and accuracy. That allowed for even broader use across the entire enterprise for engineering, environmental, and other applications with improved products resulting for bare earth, feature height, slope models and contour line data sets. The effort involved the reprocessing of the raw LAS files using ArcGIS tools to enhance the classification of the data and making it more usable in the model.

opportunities to integrate state-of-the-art GIS technology with BES' mission of protecting both human health and the environment. The team supports a wide range of programs and projects involving engineering design and construction, system maintenance, watershed health, regulatory reporting, asset management, and other vital functions for the city.

Capturing Topo-bathymetric LiDAR to Understand Eelgrass Decline in Morro Bay National Estuary, California

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The once abundant eelgrass beds of Morro Bay, California are an important coastal habitat for many marine species and provide a range of essential ecosystem services. Since 2007, more than 95% of eelgrass in the bay has disappeared. The loss of eelgrass is of great concern to the Morro Bay National Estuary Program and the National Oceanic and Atmospheric Administration's Office for Coastal Management, which teamed with Quantum Spatial, Inc., to acquire airborne topo-bathymetric (or green wavelength) LiDAR and interferometric side scan sonar to create a seamless topographic-bathymetric digital elevation model across the bay. Our presentation will highlight the use of new generation topo-bathymetric LiDAR sensors to accurately map shallow water habitats and provide a comprehensive overview of the sensor specifications and performance for the project.

Cassie Meigs describes herself as a scientist who fell into the geospatial world 12 years ago. As a member of the Quantum Spatial Business Development team she honed her scientific training (MS degree in Ecology from Oregon State University) combined with a deep understanding of LiDAR and other remote sensing technologies to bring a unique perspective to her clients when scoping out prospective projects. Cassie grew up in the temperate rainforests of southeast Alaska (Ketchikan) which fueled her love of nature, especially coastal ecosystems.

Making the Case – Importance of LiDAR to Oregon

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The increased use of Light Detection and Ranging (LiDAR) technology has the potential to make Oregon a safer and more prosperous state. As more Oregonians discover and understand the importance of LiDAR, the broader the impact this technology will be on everyday life. The Oregon LiDAR Consortium's (OLC) mission is to cover the state with high quality LiDAR data and provide the data to the public. The OLC will be highlighting the methods used to fund current LiDAR collections in Oregon, and improvements in making LiDAR data more accessible to a wider audience.

Jacob Edwards has been the Oregon Lidar Consortium coordinator for six years. Jacob works for the Oregon Department of Geology and Mineral Industries (DOGAMI) as a Natural Resource Specialist 4. Jacob is the chair of the Elevation Framework Implementation Team (E-FIT) that advises the Oregon Geospatial Information Council on elevation data.

Inland Riverine Topo-Bathymetric LiDAR Surveys: Latest advances, a historical perspective, and an overview of a project to monitor the replenishment of the Elwha River estuary and the coastline

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The presentation will review the latest in riverine topo-bathymetric LiDAR mapping and technology and presents a historical overview of inland riverine topo-bathymetric LiDAR projects ranging from one of the first of its kind in the early 2000s, which led to the initial development of the shallow water algorithms used for data processing, and spanning nearly two decades of projects. The presentation will discuss the latest topo-bathymetric LiDAR sensors, technology improvements, and lessons learned.

Additionally, the author will discuss a successful inland riverine topo-bathymetric LiDAR project following the largest dam removal project in U.S. history. Removal of the Elwha and Glines Canyon Dams in northern Washington State began in 2011 and was completed in the summer of 2014. Dam removal, like many projects in the west, was intended to restore fish habitat. It also allowed sediment to be carried freely down the river to replenish the beach at the river mouth along the Strait of Juan de Fuca. Woolpert acquired bathymetric LiDAR and multiple collections of topographic LiDAR to assist in monitoring changes to the river and shoreline. This part of the presentation will discuss the project specifics, challenges, and how the data is being used within the U.S. Geological Survey.

Carol Lockhart is a well-known and highly respected expert in the hydrographic and bathymetric surveying profession. Her strong technical background in all aspects of hydrographic and bathymetric surveying is unparalleled in the industry as her expertise includes working with numerous airborne topo-bathymetric LiDAR sensor systems since 2001.

Use of PhoDAR Collected Via UAS/Drone to Assess Canopy Cover in Timber Harvest Units

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The Medford District BLM and the Oregon Department of Forestry have been using UAS/Drones to collect PhoDAR data to measure forest canopy cover in timber harvest units. UAS/Drones are proving to be an effective way to quickly and accurately assess canopy cover. There are many ways to calculate cover from LAS files generate from the PhoDAR data using FUSION or ArcGIS software but little exists in published literature to guide the selection of optimal techniques. We are testing 20+ canopy cover assessment methods in FUSION and ArcGIS to evaluate the differences and identify preferred techniques. Preliminary results will be presented as well as some emerging lessons learned and best practices.

John Guetterman is the District GIS Specialist for the Medford District of the Bureau of Land Management. He has worked as a GIS specialist or wildlife biologist for BLM for nearly 30 years.

Current monitoring of steam habitat done by the Oregon Department of Fish and Wildlife measures

Morgan Davies is an ecologist originally from Montana. He has

Monitoring Fish Habitat in Large Streams Using LiDAR and Boat-mounted Sonar

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at a unit scale (e.g. pool, riffle, pool) along a 1,000 meter segment. Data that is collected at each unit includes depth, width, length, slope, substrate, shade cover, and presence of habitat structures. These surveys are conducted on foot in wadeable streams. Large systems, though equally important habitat, are often not surveyed if they are at a coarser scale. This study looks at the feasibility of using LIDAR and boat mounted sonar to monitor these systems. These methods should provide as high a resolution of current habitat as walking surveys provide and in some cases (e.g. riparian cover) higher quality data.

lived in Oregon for nine years and has worked for the Oregon Dept. Fish and Wildlife working on anadromous fish for most of that time.

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