Visual Resource Stewardship Conference
Seeking 20/20 Vision for Landscape Futures
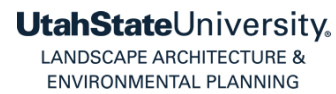
October 27 – 30, 2019   **Argonne National Laboratory**   **Lemont, IL**

Conference Program

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Visual Resource Stewardship Conference:
Seeking 20/20 Vision for Landscape Futures

October 27 – 30, 2019

Argonne National Laboratory
Lemont, IL 60439
Advanced Photon Source (APS) Conference Center
Building 402
http://vrconference.evs.anl.gov/

vrconference@anl.gov

Come together as a community to share ideas and discuss the issues we face in assessing and protecting visual resources in an era of major landscape change, and at the dawn of an unprecedented change to our national and regional landscapes.

Conference Steering Committee:

Robert Sullivan, Environmental Scientist, Argonne National Laboratory (VRS Conference Host)

Richard Smardon, Distinguished Service Professor Emeritus, SUNY College of Environmental Science and Forestry (Co-chair)

Robin E. Hoffman, Associate Professor, SUNY College of Environmental Science and Forestry (Co-chair)

Chris Bockey, Environmental Planner, SWCA Environmental Consultants

Brent Chamberlin, Assistant Professor, Utah State University

Lynn Crump, Scenic Resources Coordinator, Virginia Department of Conservation and Recreation

Paul Gobster, Research Landscape Architect, United States Department of Agriculture, Forest Service, Northern Research Station

John McCarty, Chief Landscape Architect, United States Department of the Interior, Bureau of Land Management

Mark Meyer, Visual Resource Specialist, Program Manager, Air Resources Division, United States Department of the Interior, National Park Service

James Palmer, Scenic Quality Consultants

GETTING TO ARGONNE

Argonne is easily accessible by car or public transportation from downtown Chicago, as well as from Chicago's two airports. To reach Argonne from **O'Hare International Airport**, take I-294 south to I-55. Exit west on I-55 (toward St. Louis) and continue for about four miles to Cass Avenue. Exit south on Cass and turn right at the Argonne sign on Northgate Road, immediately south of I-55. Follow Northgate Road to the Argonne Information Center.

To reach Argonne from **Midway Airport**, take Cicero Avenue north to I-55. Enter I-55 south and continue for about 14 miles to Cass Avenue. Exit south on Cass and turn right at the Argonne sign on Northgate Road, immediately south of I-55. Follow Northgate Road to the **Argonne Information Center (Building 224).**

Please note: If using GPS directions, use the intersection of Cass Avenue and Northgate Road, Lemont, IL, as the destination (using Argonne's mailing address may not result in the correct location).

Taxi and limousine service from O'Hare and Midway airports is also available. One option is American Taxi: https://www.americantaxi.com/ATOnlineOrderWeb/main.htm

All visitors must check in at the Visitor's Center to pick up their visitor badge/gate pass. Visitor gate passes are available for pickup at the Argonne Information Center (Building 224) at the Main Gate entrance off Cass Avenue between the hours of 6:30 a.m.–5:00 p.m. Monday–Friday. Once you have checked in at the visitor's center and obtained your pass, you will proceed to the main security gate. If you arrive outside those hours, your gate pass will be available at the main security gate (open 24-hour) after you show identification. Please note that all vehicles are subject to search prior to entry.   Security can direct you and there are signs on site for locating **Building 401 (APS/Advanced Photon Source)** and **Argonne Guest House (Bldg. 460).**

For location and other visitor information, please see https://www.anl.gov/visiting-argonne

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A valid driver's license is required to pick up your visitors pass at the visitors center. In addition, Argonne accepts the following alternate access control options:

- U.S. passport
- State-issued ID
- Federally issued identification
- HSPD-12 credentials
- IDs from other DOE/NNSA Laboratories
- Original school- or university-issued ID, PLUS a birth certificate or Social Security card (if under the age of 18)

Badge and Gate Pass Requirements:

- Wear your badge or gate pass conspicuously, photo side out, in a location above the waist and on the front of the body while you're on Argonne property.
- Protect your badge or gate pass against loss, theft or misuse.
- Badges and gate passes should not be altered, photocopied, counterfeited, reproduced, photographed or posted on the internet.
- When not on U.S. Department of Energy-owned or leased property, badges should be removed or obscured from visual access.
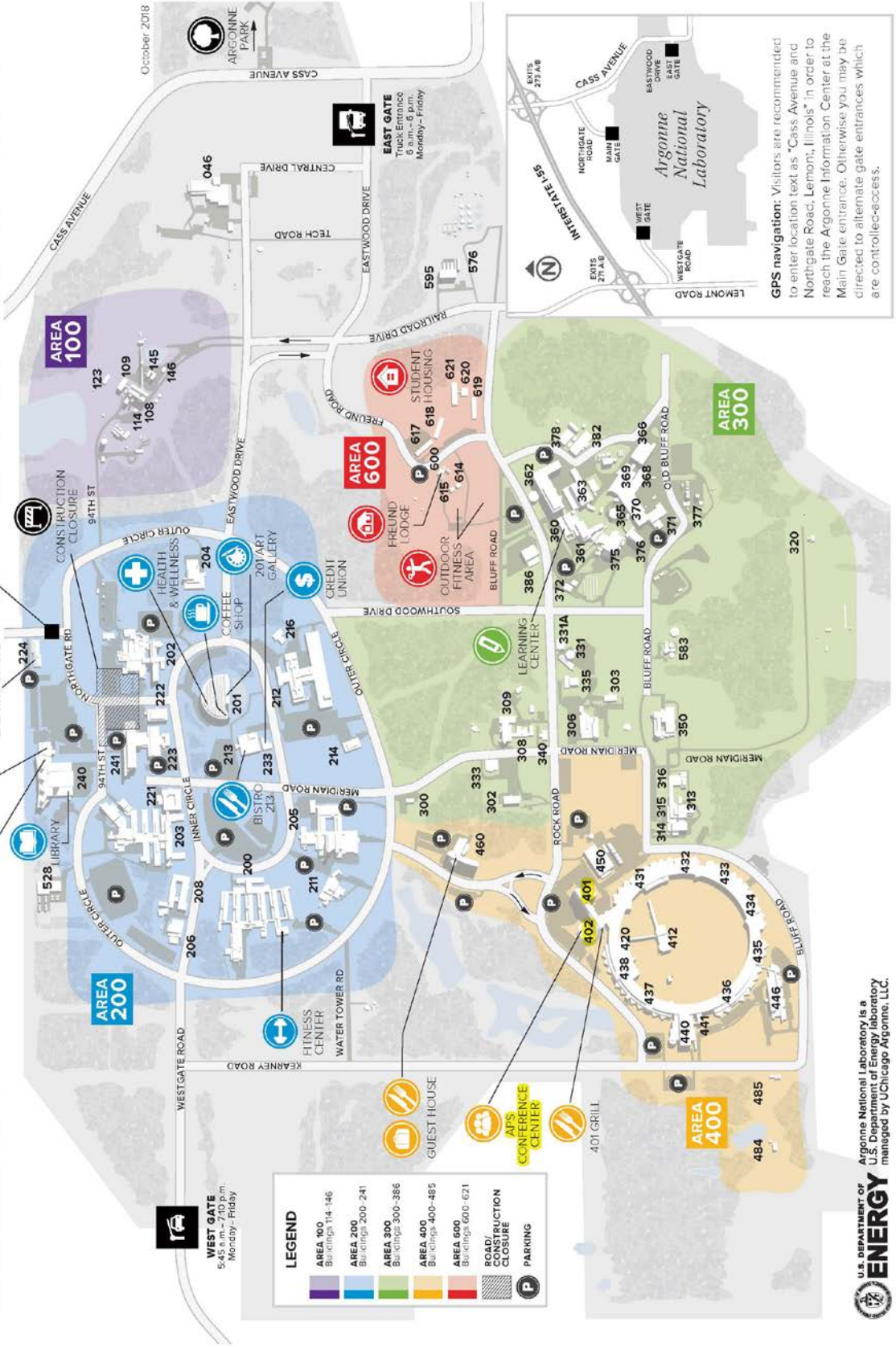- Report lost or stolen badges immediately to Argonne Protective Force

Getting Around Campus

Argonne National Laboratory is a controlled-access facility. All visitors must be pre-authorized before they will be allowed on the site. A visitor registration form is available at apps.anl.gov/registration/visitors.

Visitor gate passes are available for pickup at the Argonne Information Center (Building 224) at the Main Gate entrance off Cass Avenue between the hours of 6:30 a.m. and 5:00 p.m. Monday–Friday. The lab is closed to visitors on weekends and holidays except for pre-arranged gate passes or tours.

October 2018

WEST GATE
5:45 a.m.–7:10 p.m. Monday–Friday

MAIN GATE
24 hours a day, 7 days a week

EAST GATE
Truck Entrance
6 a.m.–6 p.m.
Monday–Friday

ARGONNE PARK

GPS navigation: Visitors are recommended to enter location text as "Cass Avenue and Northgate Road, Lemont, Illinois" in order to reach the Argonne Information Center at the Main Gate entrance. Otherwise you may be directed to alternate gate entrances which are controlled-access.

Argonne National Laboratory

EXITS 27H A/B
CASS AVENUE
EASTWOOD DRIVE
EAST GATE
NORTHGATE ROAD
MAIN GATE
INTERSTATE I-55
WEST GATE
WESTGATE ROAD
LEMONT ROAD
EXITS 27H A/B

LEGEND

AREA 100 Buildings 114–146
AREA 200 Buildings 200–241
AREA 300 Buildings 300–386
AREA 400 Buildings 400–485
AREA 600 Buildings 600–621
ROAD/CONSTRUCTION CLOSURE
P PARKING

AREA 100
AREA 200
AREA 300
AREA 400
AREA 600

CASS AVENUE
CENTRAL DRIVE
TECH ROAD
EASTWOOD DRIVE
RAILROAD DRIVE
FREUND ROAD
EASTWOOD DRIVE
94TH ST
OUTER CIRCLE
INNER CIRCLE
MERIDIAN ROAD
WATER TOWER RD
WESTGATE ROAD
KEARNEY ROAD
OUTER CIRCLE
NORTHGATE RD
SOUTHWOOD DRIVE
BLUFF ROAD
OLD BLUFF ROAD
ROCK ROAD
MERIDIAN ROAD

CONSTRUCTION CLOSURE
HEALTH & WELLNESS
COFFEE SHOP
ART GALLERY
CREDIT UNION
LEARNING CENTER
BISTRO 213
FITNESS CENTER
LIBRARY
TCS CAFÉ
TCS CONFERENCE CENTER
ARGONNE INFORMATION CENTER / BADGING OFFICE
GUEST HOUSE
APS CONFERENCE CENTER
401 GRILL
STUDENT HOUSING
FREUND LODGE
OUTDOOR FITNESS AREA

U.S. DEPARTMENT OF ENERGY

Conference Workshops

Sunday, October 27, 2019

Noon to 1:00	**REGISTRATION**
1:00 to 3:00 Room A1100	Workshop: **Viewer Surveys and Visual Impact Assessment** *James Palmer, Scenic Quality Consultants and Brian Robertson, Market Decisions Research*
1:00 to 3:00 Room E1100/1200	Workshop: **Conducting Viewshed Assessments with the ArcGIS Visual Magnitude Plugin** *Brent Chamberlain and Foster Cook, Utah State University*
3:00 to 3:15	**BREAK**
3:15 to 5:15 Room E1100/1200	Workshop: **Using Google's Tools in Visual Impact Assessment** *Amy Bell Segal and Danielle Matkoskey, TJD&A*
3:15 to 5:15 Room A1100	Workshop: **Mobile-based Augmented Reality Development and Brainstorming** *Micah Taylor, The University of Georgia*

Conference Schedule

Monday, October 28, 2019

7:30 to 8:30	**REGISTRATION**
8:30 to 8:45 Auditorium	**WELCOME** *Robert Sullivan, Argonne National Laboratory; Richard Smardon and Robin E. Hoffman, SUNY College of Environmental Science and Forestry*
8:45 to 9:45 Auditorium	Plenary: **Visual Resource Stewardship – An International Perspective** *Dr. Andrew Lothian, Scenic Solutions* Author, The Science of Scenery: How we see scenic beauty, what it is, why we love it, and how to measure and map it. (2017)
9:45 to 10:45 Auditorium	Panel: **Virginia's Scenic Landscape Assessment Project** *Lynn Crump, Virginia Department of Conservation and Recreation; Leighton Powell, Scenic Virginia and Patrick Miller, Virginia Tech College of Architecture and Urban Studies*
10:45 to 11:15	**BREAK**
11:15 to 12:15 Auditorium	Guided Discussion: **The Landscape Institute's Visualisation Guidance** *James Palmer, Scenic Quality Consultants and Robert Sullivan, Argonne National Laboratory*
12:15 to 1:30	**GROUP PHOTO** Front steps of APS Conference Center (Auditorium – rain location) **LUNCH** Argonne Guest House Restaurant, Bldg. 460
1:30 to 3:15	Technical Breakout Sessions 1a (Room A1100) and 1b (Room E1100/1200)
3:15 to 3:45 Auditorium	**BREAK**
3:45 to 4:45	Technical Breakout Sessions 2a (Room A1100) and 2b (Room E1100/1200)
5:15 to 7:30	**EVENING RECEPTION** Freund Lodge, Bldg. 600. Shuttle bus from APS Conference Center will be provided.

Conference Schedule

Tuesday, October 29, 2019

7:30 to 8:30	**REGISTRATION**
8:15 to 8:30 Auditorium	**WELCOME** *Robert Sullivan, Argonne National Laboratory; Richard Smardon and Robin E. Hoffman, SUNY College of Environmental Science and Forestry*
8:30 to 9:30 Auditorium	Panel: **Taking a Pulse: Intercept Surveys as a Tool to Evaluate Continuing Use and Enjoyment of Scenic Resources** *Terry DeWan, TJD&A; James Palmer, Scenic Quality Consultants; and Brian Robertson, Market Decisions Research*
9:30 to 10:00 Auditorium	**BREAK**
10:00 to 11:30 Auditorium	Panel: **Review of the Current Status of the 2015 FHWA Guidelines for Visual Impact Assessment** *Tom Priestley, Jacobs; Mike Banovich, Colorado Department of Transportation; Craig Churchward, HDR; Juli Hartwig, Washington Department of Transportation; Tim Tetherow, Felsburg Holt and Ullevig; Rod Vaughn, United States Department of Transportation, Federal Highway Administration*
11:30 to 12:30 Auditorium	Plenary: **Managing the National Landscape: Opportunities and Challenges** *Martin Pasqualetti, Arizona State University* Co-editor and author, The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future. (2017)
12:30 to 1:45	**LUNCH** Argonne Guest House Restaurant, Bldg. 460
1:45 to 3:30	Technical Breakout Sessions 3a (Room A1100) and 3b (Room E1100/1200)
3:30 to 4:00	**BREAK**
4:00 to 5:00	Technical Breakout Sessions 4a (Room A1100) and 4b (Room E1100/1200)

Conference Schedule

Wednesday, October 30, 2019

8:15 to 8:30 Auditorium	**WELCOME** *Robert Sullivan, Argonne National Laboratory; Richard Smardon and Robin E. Hoffman, SUNY College of Environmental Science and Forestry*
8:30 to 9:30 Auditorium	Plenary: **The Community Preferences Method for Landscape Quality Assessment** *Dr. Andrew Lothian, Scenic Solutions*
9:30 to 10:15 Auditorium	Guided Discussion: **Victories in Scenic Conservation and the Road Ahead** *Mark Falzone, Scenic America*
10:15 to 10:45 Auditorium	**BREAK**
10:45 to 11:45 Auditorium	Guided Discussion: **Proposal for a Visual Resource Stewardship Specialist Certificate Program** *Robin E. Hoffman and Richard Smardon, SUNY College of Environmental Science and Forestry*
11:45 to 12:15 Auditorium	Panel: **Closing Remarks** *Terry DeWan, TJD&A, Brent Chamberlain, Utah State University and Mark Meyer, United States Department of the Interior, National Park Service*

Sunday, October 27

1:00 to 3:00   Room A1100

Workshop: **Viewer Surveys and Visual Impact Assessment**
James Palmer, Scenic Quality Consultants and Brian Robertson, Market Decisions Research

Surveys conducted at potentially effected viewpoints can be a valuable contribution to visual impact assessments. This workshop will provide an introduction to the primary steps in conducting view surveys: planning, questionnaire and simulation design, training interviewers, conducting the interview, preparing and analyzing the data, and reporting the results. The instruction will involve a mixture of case study presentation, role-plays, and discussion. The authors have extensive experience conducting and reviewing viewer surveys for renewable energy projects as part of state agency permitting processes.

1:00 to 3:00   Room E1100/1200

Workshop: **Conducting Viewshed Assessments with the ArcGIS Visual Magnitude Plugin**
Brent Chamberlain and Foster Cook, Utah State University

This workshop was developed to support you in understanding how to apply the ArcGIS Visual Magnitude Plugin to your projects and help you understand the implications and benefits. Additionally, the workshop will provide a platform for improving the software, tutorials and identifying potential issues that need to be remedied. It gives an opportunity for us as developers and you as users to engage in improving the software so, collectively, we can improve our planning and assessment process in hopes to reduce project costs and mitigate negative visual impacts to our landscape.

3:15 to 5:15   Room E1100/1200

Workshop: **Using Google's Tools in Visual Impact Assessment**
Amy Bell Segal and Danielle Matkoskey, TJD&A

Visual Impact Assessments (VIAs) are characterized by several specialized types of analyses, including determining a project's viewshed, preparing visualizations of how the project will appear, and studying the effectiveness of certain types of mitigation measures. These analyses usually require access and skill using expensive software, often with a steep learning curve.
However, most of us have some familiarity with Google Earth (GE) tools that can be used to perform many of these tasks. This workshop is designed to be a hands-on opportunity to see some of these tools in action, improve your skill set, and learn new ways to present and analyze data. Some of the topics that will be covered include: 1. Google Earth (GE) Basics, 2. Viewshed Analysis, 3. Virtual Fieldwork, 4. Project Visualization, 5. Verifying Project Visibility, 6. Sharing an Analysis, and 7. Preparing Photo-simulations. The workshop will conclude with a discussion of the pros and cons of using Google Earth in VIA and when participants think it's most appropriate and inappropriate.

3:15 to 5:15   Room A1100

Workshop: **Mobile-based Augmented Reality Development and Brainstorming**
Micah Taylor, The University of Georgia

The development part of this workshop will include instruction on how to navigate the Unity Gaming Engine and to develop basic mobile augmented reality (AR) applications on the participants' phone. AR applications come in three varieties with different development needs. The first is target based AR in which a printed paper or physical object is registered as a 'target' and the user's phone camera recognizes it and augments *digital* content (3D models, buttons, floating images/graphics, sounds) onto the *real* target. The second is a ground-recognition AR in which the user can move, scale and rotate digital content freely along the landscape through the phone's camera by registering the ground in relation to the user in the mobile device. Lastly, GIS point data can be registered in AR to place digital content at a geographic location through the phone's camera (Pokémon Go style) by using ArcGIS online feature services and a basic AR development kit. All three variations of AR will be covered followed by a brainstorming session. This will be more informal/open-ended so workshop participants can explore ideas for using mobile AR in visual resources, landscape design, planning, and more. The participants can work together, time permitting, to develop one of these ideas and test it locally during the conference

Monday, October 28, 2019

8:45 to 9:45   Auditorium

Plenary: **Visual Resource Stewardship – An International Perspective**
Dr. Andrew Lothian, Scenic Solutions
Author, The Science of Scenery: How we see scenic beauty, what it is, why we love it, and how to measure and map it. (2017)

An international perspective to visual resource stewardship is presented in this paper. It first examines the long history of Great Britain's love affair with its landscapes, then summarizes the more recent development of the European Landscape Convention, which has been embraced across much of Europe. The recognition of outstanding landscapes under the World Heritage Convention is then covered and the international Protected Areas program, which includes landscapes, is briefly summarized. Programs in several countries are reviewed and then as a finale, I provide a landscape map of the US and comment on possible directions for the United States. As the United States is very adequately covered in this and the 2017 conference I concentrate on countries other than the US. The key message I wish to impart is that most of the provisions I cover focus on the character of the landscape, not its quality. Because it has been decided, particularly in Britain, that it is too difficult to measure scenic quality, landscape character has become the subject instead of the subjective entity of scenic quality. Authorities have stayed clear of subjectivity and applied objective-based analysis to landscape character. The approach is well described by a council in Britain: "Landscape character assessment is an objective, value-free assessment of landscape concerned with character rather than quality or value."

9:45 to 10:45   Auditorium

Panel: **Virginia's Scenic Landscape Assessment Project**
Lynn Crump, Virginia Department of Conservation and Recreation; Leighton Powell, Scenic Virginia
and Patrick Miller, Virginia Tech College of Architecture and Urban Studies

Scenic Virginia strives to identify and highlight Virginia's 'scenery' and Virginia has a 'scenic' component in their new Conserve Virginia land conservation effort. As such the development of a universal assessment tool that can be used by citizens and professionals to identify and rate the value of scenic viewsheds is needed in Virginia. The goal of this presentation is to discuss how, using scientifically supported research, a protocol based on grassroots input can identify significant scenic resources in Virginia. The presentation will introduce scientific studies, based on an extensive literature review, that were used to develop an assessment tool. This new tool will be used by communities to help them understand and highlight their scenic resources. The goal is to get more awareness and support for protecting scenery in Virginia using careful planning and preservation techniques.

Scenic Virginia will talk about the need for identifying and protecting scenic viewsheds. Virginia's Scenic Coordinator will talk about why it is important to the state and how it could fit into the statewide planning efforts for land conservation. Virginia Tech will talk about their research and protocol development for identifying and rating viewsheds in Virginia.

11:15 to 12:15   Auditorium

Guided Discussion: **The Landscape Institute's Visualisation Guidance**
James Palmer, Scenic Quality Consultants and Robert Sullivan, Argonne National Laboratory

In June 2018 the Landscape Institute (UK) completed a review of a proposed update to their photography and photomontage guidance. In the USA we have not struggled with preparing a similar guidance. We propose to facilitate a discussion with the audience on this document and the issues it considers. The focus will be on the technology currently being used in permit applications and filed impact assessments. While more VR, AR and other technologies may be very exciting, they will not be considered during this discussion. To find out more and to download the LI Visualization Guidance draft, go to: https://www.landscapeinstitute.org/news/photography-photomontage-guidance-update/

Download a pdf of the draft LI Visualisation Guidance document at: https://www.landscapeinstitute.org/wp-content/uploads/2018/06/draft-tin-2018-XX-photography-photomontage-lvia.pdf

Tuesday, October 29, 2019

8:30 to 9:30   Auditorium

Panel: **Taking a Pulse: Intercept Surveys as a Tool to Evaluate Continuing Use and Enjoyment of Scenic Resources**
Terry DeWan, TJD&A; James Palmer, Scenic Quality Consultants; and Brian Robertson, Market Decisions Research

In 2018, after 10 years of experience with the Wind Energy Act, the Maine Legislature enacted several far-reaching changes that are having an effect on the way visual impact assessments are conducted. One of the key provisions is the use of intercept surveys:

When evaluating potential impacts to scenic character, the Department will take into consideration all relevant evidence, including but not limited to user intercept surveys and/or systematic field observations conducted and recorded using generally accepted professional standards.

This panel will explore the continued evolution of intercept surveys and how they have become an important tool in the VIA process. In working on a number of high-profile transmission line projects, it has become apparent that there has been very little, if any, research into the effect that transmission lines have on public perception of visual quality, and the effect that their presence may have on continuing use and enjoyment of scenic resources. Panelists have several generations worth of experience in this area, and are eager to share their insights.

The presentation will also focus on a new approach to assess the visual impact of man-made features that was developed for a study on the impact of transmission lines on recreational users of the Kennebec River in Maine. We will discuss how it differs from more traditional intercept surveys, its advantages, and how it can be applied in a wide range of research to assess scenic value, impact on use and enjoyment. The session will wrap-up with an open discussion on the future of intercept surveys, where they may or may NOT be appropriate, the use of new tools in their administration, and a host of other issues.

10:00 to 11:30   Auditorium

Panel: **Review of the Current Status of the 2015 FHWA Guidelines for Visual Impact Assessment**
Tom Priestley, Jacobs; Mike Banovich, Colorado Department of Transportation; Craig Churchward, HDR; Juli Hartwig, Washington Department of Transportation; Tim Tetherow, Felsburg Holt and Ullevig; Rod Vaughn, United States Department of Transportation, Federal Highway Administration

In 1981, the Federal Highway Administration published *Visual Impact Assessment for Highway Projects*, a set of guidelines for the preparation of analyses of the visual impacts of federally funded highway projects. In the ensuing years, these guidelines or variants of them were applied by the departments of transportation of many states and became the primary paradigm for the analysis of the visual effects of proposed highways and other linear transportation facilities. Along with the visual impact assessment systems unique to the US Forest Service and the US Bureau of Land Management that are required for use on federally managed lands, the 1981 FHWA methodology for visual impact assessment has become established as one of the major methods for visual impact assessment in the US.

In 2013, the National Cooperative Highway Research Program (NCHRP) of the Transportation Research Board (TRB) published NCHRP Report 741 *Evaluation of Methodologies for Visual Impact Assessments.* The report documented the results of a systematic review of the methods of visual impact assessment used by all 50 states and selected foreign transportation agencies. From this review a set of ten evaluation criteria for evaluating the effectiveness of a VIA were developed. The goals of that review included documenting proven successful methods, describing best practices as illustrated by model case studies, and documenting promising new developments and lessons learned. Based on the results of the review, the research report identified 12 best practices for preparing visual impact assessments of proposed highway projects. In the wake of the NCHRP review, the Federal Highway Administration engaged ICF International in association with Avenue Design Partners to develop a revised set of guidelines for the assessment of the impacts of highway projects that incorporates the best practices identified in the NCHRP review. The results of this effort were published in *Guidelines for the Visual Assessment of Highway Projects,* which was released online by the FHWA in 2015.

Now that the revised guidelines have been in circulation for over four years, it is a good moment to review the current status of the guidelines and the efforts that have been made to apply them in project assessment. This panel presentation will provide a review of the new method's background and objectives, an understanding of their current status with the FHWA, a review of the efforts that several state departments of transportation have undertaken to apply the guidelines to project assessment, and a discussion of how the application of the new guidelines has been working out in practice and in light of this experience, what the next steps may be in putting the concepts that underlie the guidelines to further use.

11:30 to 12:30   Auditorium

Plenary: **Managing the National Landscape: Opportunities and Challenges**

Martin Pasqualetti, Arizona State University

Co-editor and author, The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future. (2017)

This presentation will summarize the principal landscape challenges and opportunities that are linked to the human need for energy. Drawing from 50 years' examining what I call "energy landscapes" this presentation will focus on land use conflicts that resulting during the development of four types of renewable energy (solar, wind, geothermal, hydro), fossil fuels (particularly coal), and nuclear power (particularly siting of waste repositories and the decommissioning of generating stations). Many of the challenges derive from inherent resource characteristics, some from differences to cultural mores and histories, varying public perceptions of risk and fairness, demographic patterns, as well as jurisdictional and political differences. Many of the opportunities to better manage landscapes will result from more meaningful and calibrated public involvement, the growth of demand in developing world and totalitarian countries, rising worries about personal and national security, competition for water resources, and climate change. Recommendations will be offered as to how to move forward, given these challenges, to simultaneously meet our resource needs while serving as caretakers of landscape quality.

Wednesday, October 30, 2019

8:30 to 9:30   Auditorium

Plenary: **The Community Preferences Method for Landscape Quality Assessment**
Dr. Andrew Lothian, Scenic Solutions

For centuries, philosophers of aesthetics believed that beauty lay in the object, a physical entity. It was not until the 18th century, that British and German philosophers realized that beauty lay in the eyes of the beholder, in our mind rather than in the object. Contemporary theories of landscape aesthetics derive from an evolutionary perspective; what humans prefer is survival enhancing.

The rapidity of aesthetic judgments, and the similarity of judgments across different individuals, reinforces its innate basis. Yet early attempts to measure scenic quality relied on measuring the characteristics of the landscape in the belief that somehow its scenic beauty would emerge, but it never did. Based on psychophysics, the science of measuring the effect of external stimuli via our senses on the brain, researchers in the United States have achieved understanding of aesthetic preferences. Common elements include use of a rating scale, a rating instrument, and participants to rate scenes. The Community Preferences Method (CPM) is based on these elements and has been applied to 14 projects in Australia and England. CPM involves photographing the area, classifying the scenic character, selecting photographs representative of its character, having the photographs rated together with scenic components, and applying the ratings to areas of the region with similar character.

This plenary will present criteria for the use of photographs, the determination of scenic character units, benchmark photos to relate the project to the wider landscape, and the contents of an Internet survey instrument to measure scenic quality. The analysis of the survey results is discussed, covering demographics, familiarity, overall ratings, the influence of scenic components with many examples, the derivation of scenic quality models, and the mapping of scenic quality. Scenic quality maps derived from various projects are included. Based on the findings of the projects undertaken, a draft scenic quality map of the United States was prepared. The simplicity, adaptability and robustness of the CPM demonstrate its utility and value in measuring and mapping scenic quality.

9:30 to 10:15   Auditorium

Guided Discussion: **Victories in Scenic Conservation and the Road Ahead**
Mark Falzone, Scenic America

This presentation will give an overview of legislative victories and efforts in scenic conservation. Topics covered will include the Reviving America's Scenic Byways Act of 2019 and the upcoming surface transportation reauthorization. What ideas do you think should become law, regulation, or policy? This session will be interactive and solicit your feedback. Scenic America is the only national nonprofit dedicated solely to preserving and enhancing the visual character of the country.

10:45 to 11:45   Auditorium

Guided Discussion: **Proposal for a Visual Resource Stewardship Specialist Certificate Program**
Robin E. Hoffman and Richard Smardon, SUNY College of Environmental Science and Forestry

The Visual Resource Stewardship (VRS) Conference gathers visual resource stewardship professionals from around the world. Their expertise includes methods, theories and policies that inform the practice of visual impact analyses (VIA). Therefore, the 2019 VRS Conference provides an ideal forum to gather input for the development of a Visual Resource Specialist Certification Program.

The idea for a VRS specialist certification program came out of conversations with landscape architecture practitioners. They shared that there has been an increase in the number of VIA projects - either part of their current project portfolio or included in Requests for Proposals – yet, they noted, there is a shortage of practitioners with VIA experience. A certification program would allow college students and practitioners to gain VIA training while concurrently completing degree requirements or maintaining their current employment, respectively. Also, a certification credential in visual impact analysis would lend credibility to VIA methods.

This guided discussion looks to gather input from attendees of the 2019 VRS Conference. The discussion will focus on three areas: 1. proposed program content, 2. delivery methods, and 3. instructors. A set of broad content areas will serve as the starting point for the discussion.

11:45 to 12:15   Auditorium

Panel: **Closing Remarks**

Terry DeWan, TJD&A, Brent Chamberlain, Utah State University
and Mark Meyer, United States Department of the Interior, National Park Service

Observations on key contributions during the conference plus the path forward for visual resource practice, research, and training.

1:30 to 3:15   Room A1100

Technical Sessions 1a

Historic and Cultural Visual Resources in Recreation and Urban Environments
Session Moderator: Lynn Crump, Virginia Department of Conservation and Recreation

- **Tales from the Field During the Grand Staircase-Escalante National Monument Visual Resource Inventory**
Allysia Angus, United States Department of the Interior, Bureau of Land Management

  The BLM has a responsibility to manage the quality of the public lands' visual environment and to reduce the visual impact of development activities. This responsibility for scenic values is established in the BLM's "organic act", the Federal Land Policy and Management Act of 1976 (FLPMA), which requires the agency to manage scenic values with consideration equal to that given to other resources as well as in the National Environmental Policy Act of 1969 (NEPA) which establishes the federal government's responsibility to "assure for all Americans safe, healthy, productive, and aesthetically and culturally pleasing surroundings". In order to address this responsibility, BLM needs to understand the scenic values of the lands it manages and the method for accomplishing that task is to do a visual resource inventory.

  In 2012, an effort to inventory the scenic resources in and around the almost 1.9 million acre Grand Staircase-Escalante National Monument (GSENM) began as an internal effort with BLM staff, interns and stakeholders. The inventory was finally completed in 2019 with the assistance of Logan Simpson Design who was brought on via contract in late in 2016. This talk will present the methodologies and results of and the many lessons learned along the way. And, we will reveal details about the landscape that holds the honor of receiving BLM's highest scenic quality rating score.

- **Cultural Landscape Studies in New Hampshire**
Nadine Miller, New Hampshire Division of Historical Resources

  Public interest in understanding and preserving the intersection between New Hampshire's built and natural environments was precipitated as part of a large proposed transmission project known as the Northern Pass that would traverse close to one-third of the state. Section 106 of the National Historic Preservation Act was initiated through the Department of Energy, which served as the lead federal agency along with partners at the White Mountains National Forest and US Army Corps of Engineers. Much of the project was located in some of New Hampshire's most scenic areas, such as the White Mountains, extensive agricultural areas, river frontage and small historic town centers and villages – all known for their natural beauty and cultural import.

  This presentation will provide an overview of the development of Section 106 survey needs for the Northern Pass Project, our work with a wide variety of constituents throughout the process, brief presentation of the cultural landscapes studies (their characteristics, historic background, and significance), and future work that has the potential to bring this story to a broader audience in New Hampshire.

- **Observations from a Pilot Scenic Resources Inventory for the Appalachian National Scenic Trail**
Marian Orlousky, Appalachian Trail Conservancy and Jim Von Haden, Appalachian National Scenic Trail; plus volunteers Tony Barrett, Maine Appalachian Club and Bill Van Horn, Nantahala Hiking Club

  The Appalachian National Scenic Trail, referred to by many simply as the "A.T.", is a long-distance hiking trail first proposed in 1921 by the visionary forester and regional planner Benton MacKaye, and later established as America's first national scenic trail through the National Trails System Act of 1968. The A.T. spans some 2,189 miles as it winds its way from Maine to Georgia through 14 U.S. states, crossing eight national forests, two national wildlife refuges, six national parks, and dozens of state parks, forests, and other protected areas along its rugged and winding path. The trail is administered by the National Park Service in cooperation with the U.S. Forest Service and other federal agencies, states, the Appalachian Trail Conservancy, 31 officially-designated trail maintaining clubs, and other trail management partners through a unique and formalized Cooperative Management System comprised of government agencies, non-profit organizations, and various other partners including several thousand dedicated volunteers. The Appalachian National Scenic Trail was recently determined eligible for listing on the National Register of Historic Places, with vistas and viewpoints called out specifically as contributing resources.

  In this presentation, trail management partners will reveal the outcomes of that inventory and discuss the means through which this volunteer-supported effort was organized and managed, with attention to the scale and scope of the A.T. and its

cooperative management framework. Future considerations for documenting and managing scenic resources of the A.T., through and beyond the trail's 100th Anniversary in 2021, will also be discussed.

- **Using Sections to Assess Sequential Experience Along the Baltimore-Washington Parkway**
  Paul Kelsch, Alex Schiavoni, Amanda Pedersen and Jake Fettig, Virginia Tech College of Architecture and Urban Studies

The Baltimore-Washington Parkway was constructed in the early 1950s and is considered a transitional parkway, a hybrid of earlier scenic parkways and later modern highways. It is historically significant for its role in the preservation of significant tracts of forest and because it shows that through careful design of structures, vegetation and small-scale features a conventional modern highway alignment can become a *parkway* rather than a mere highway. Spatial sequencing is also part of this parkway vocabulary, but it is harder to document than the other aspects like bridges, guard walls and forests.

This paper presents a study of the spatial experience of the Baltimore-Washington Parkway through the use of repetitive and systematic cross-sections as an analytic tool. The sectional study is part of a cultural landscape report for the parkway, and it complements map-based and plan analyses that examined regional contexts, forest character, planted vegetation, structures, and small-scale features.

1:30 to 3:15 Room E1100/1200

Technical Session 1b

Visual Resource Management Approaches and Applications
Session Moderator: James Palmer, Scenic Quality Consultants

- **What Is Scenic Concern, and How Do We Measure It?**
  James Palmer, Scenic Quality Consultants

It is time we stopped using "common sense" and began a program of empirical research investigating Scenic Concern. What other natural resource is managed primarily through professional guess-work? Scenic Concern is a central concept to VRM and VIA; in this paper I will discuss some of the issues and research that may help us understand it and point to future research needs.
A landscape assessment model for visual impact assessment will be introduced. The basic principles of this model are:
- The Visual Impact part relies on intrinsic attributes; it is considered more Objective and Denotative.
- Scenic Impact results from adjusting Visual Impact by the level of Scenic Concern.
- Scenic Concern relies on attributes that are not intrinsic to the landscape; they are Subjective and Connotative attitudes and judgments made by individual or society.
- The use of Scenic Concern in VRM and VIA is poorly researched. The attitude has been that everyone knows what it means—it's obvious. We need to bring this out into the open and talk about how to measure the components of Scenic Concern.

The "visual impact" or "objective" portion of the model was applied to a transmission line case study. The new transmission line was largely proposed within an existing transmission line corridor. The model was validated using field observations of the existing conditions, and evaluations of simulations at key observation points. The findings support the GIS-based model's results.

- **How Do We Rate? Taking a Look at Data from the National Park Service Visual Resources Inventory**
  Melanie V. Peters, Ksienya A. Taylor and Mark E. Meyer, United States Department of the Interior, National Park Service; Robert G. Sullivan, Argonne National Laboratory

The national park system preserves and protects a wide variety of landscape types and visual settings enjoyed by over 300 million visitors every year. To understand and help protect these special places, the National Park Service (NPS) developed a visual resource inventory (VRI) system that identifies the visual quality (through a Scenic Quality Rating), and the values that make views important to the parks and their visitors (though a View Importance Rating). The Scenic Quality Rating and View Importance Rating are combined to create a Scenic Inventory Value (SIV) for the view. The VRI helps parks establish baseline values about their views and can help parks communicate those values to partners and stakeholders. The VRI also lays a consistent groundwork to use for visual impact assessment to determine how potential changes in the views might affect the baseline values and the visitor experience.

The NPS visual resource program initiated its first inventory in the summer of 2014. As of January 2019, over 35 parks have conducted VRIs and collected data on more than 650 views. This presentation will review the VRI results to date and examine the distribution of SIV values across the national park system and the relative contribution of scenic quality and view importance across all inventoried locations and landscapes.

- **UK Landscape Policy, Landscape Character Assessment and Landscape Impact Assessment – Intentions vs. Practical Application**.
  Andrew Linfoot, Jacobs

The European Landscape Convention (ELC) is the treaty devoted to all aspects of European landscape. It provides the legislative context where landscape is encouraged to be a valuable asset in its own right. It sets out requirements for the generation of landscape policy, quality objectives, protection, management and landscape planning. Landscape Character Assessment (LCA) is the process of identifying the character of the landscape, with the landscape as the environmental resource. It seeks to identify, describe and explain the unique combination of elements and features that make landscapes distinctive. The aim is that by establishing a robustly developed landscape character baseline, such a baseline can help us to understand our landscapes, to generate policy and assist those in informing judgments and making decisions concerning the potential changes to our landscape by proposed development. The National Landscape Character Areas (NCAs), and those produced at a local government level, seek

to provide this baseline. However, their value in the production of landscape and visual impact assessments associated with environmental impact assessments, which are then used to inform decisions, is less clear.

This paper explores some of the challenges presented to professional landscape architects in England undertaking landscape and visual impact assessments for development projects when they seek to use national and local character assessments in their work. It provides a brief outline of the European Landscape Convention, Landscape Character Assessment, the National Character Areas, the Guidance for Landscape and Visual Impact Assessment in the context of the Environmental Impact Assessment regulations. It then uses the impact assessments from two recent projects undertaken by the Author to explain how useful, or otherwise, the policy and objectives set out in the ELC and NCAs are in the assessment of effects on landscape character.

- ▪ **A Visual Impact Assessment Methodology for the National Park Service**
  Mark E. Meyer, Melanie V. Peters, and Ksienya A. Taylor, United States Department of the Interior, National Park Service; Robert G. Sullivan, Argonne National Laboratory; and James Palmer, Scenic Quality Consultants

As the National Park Service (NPS) set out to build a visual resource management program, the first major component was the development of a robust visual resource inventory (VRI) process to identify, locate, and assess high value views, both within and near NPS units, based on both scenic quality and the importance of the view to the visitor experience. The next component in the program has been the development of a visual impact assessment (VIA) process to understand how changes in the landscape—whether inside the park or beyond its boundaries—could impact the scenic quality of valued views and visitor experience of those views. This presentation will discuss the NPS VIA process and highlight results of field-testing.

3:45 to 4:45   Room A1100

Technical Session 2a

Mitigating Visual Impacts of Artificial Light
Session Moderator: John McCarty, USDI Bureau of Land Management

- **Technologies and Practices to Reduce Impacts of Artificial Light at Night on Nighttime Scenery**
  Cynthia Lapp and Randy Larson, Meteek & Co.

Artificial light at night adversely impacts nighttime scenery values. Current standards for LED lighting have led to brighter nighttime lighting, using color temperatures that are more harmful to human and ecological health, and which create an exponentially larger landscape impact than historical lighting technologies. Less-harmful LED lighting and other existing technologies can be used to control artificial light at night, creating safe and pleasing perceptual nighttime experiences while minimizing ecological impacts. Minimizing the impact of artificial light at night requires understanding new lighting technologies, and management practices that extend beyond current lighting standards. This is crucial in order to sustain and protect the visual qualities of the landscape, and the ecological functions that we enjoy and depend on.

- **Mitigating Social and Ecological Impacts of Artificial Lighting at Night on BLM-Administered Lands**
  Robert G. Sullivan, Argonne National Laboratory; Noelle Glines-Bovio and John McCarty, United States Department of the Interior, Bureau of Land Management

The United States Department of the Interior Bureau of Land Management (BLM) manages approximately 1,001,000 km2 (247.3 million acres) of publicly owned land, primarily desert and open rangeland in the western U.S., about one eighth of total landmass of the U.S. BLM-administered lands include the darkest skies in the U.S., and much of the land managed by BLM has very dark skies and abundant natural darkness. BLM lands also surround or are directly adjacent to many U.S. national parks, monuments, and historic sites, as well as sensitive tribal lands and major and minor population centers.

BLM faces increasing interest in the use of BLM-administered public lands for differing types of activities, developments, and visitor services. The increase in development activity has led to an increase in outdoor artificial lighting at night (ALAN). In response to the increasing public concern over potential impacts associated with ALAN on BLM-administered lands, the BLM will soon publish *Best Management Practices for Reducing Impacts of Outdoor Artificial Lighting at Night on BLM-Administered Lands* (hereafter referred to as the "ALAN BMPs publication"). In addition to extended discussions of night sky/darkness values, light pollution, ALAN impact mechanisms and impacts, the ALAN BMPs publication presents more than 60 BMPs to avoid or reduce potential impacts associated with the use of ALAN for facilities or activities located on the public lands. The ALAN BMPs publication is intended for ecologists, recreational planners, landscape architects, project managers, realty specialists, and cultural resource specialists as a comprehensive information source to learn about night sky/darkness values, ecological and human impacts of ALAN, and strategies to mitigate those impacts. It will provide agency staff, industry, and other stakeholders with proven, effective, and vetted BMPs to address a wide range of potential impacts from outdoor lighting. The expected publication date is early 2020.

- **Multipurpose Infrastructural Landscape Design**
  Hanna Szumilas-Kowalczyk, Warsaw University of Life Sciences and Nicholas Pevzner, University of Pennsylvania

The critical necessity of scaling up renewable energy to meet the challenge of climate change implicates vast swaths of American landscape. Renewable energy infrastructure has long concerned itself with minimizing its visual impact, in order to decrease opposition from local landowners and users of the landscape. As energy facilities proliferate across the landscape, their visual impact can be expected to grow as well—both in terms of the scale of installations, as well as the amount of territory affected.

This presentation will present several examples of infrastructure-driven landscape transformations that actively incorporated public input and visual assessment considerations, at municipal and regional scales, in order to develop energy planning frameworks with high social acceptance. Incorporating views of experts in the fields of visual impact assessment, land management, and infrastructure planning, we identify promising examples of energy planning processes that deployed design methodologies to manage visual landscape impact. We demonstrate how these case study projects garnered positive public perception and minimized conflict between social and ecological stakeholders, despite significant landscape alteration.

3:45 to 4:45   Room E1100/1200

Technical Session 2b

Visual Resource Stewardship in Holistic Land Planning
Session Moderator: Brent Chamberlain, Utah State University

- **Evaluating the Aesthetic and Seasonal Quality of Bioretention Areas**
  Kelsey Broich and Jon Calabria, University of Georgia

Often landscape design approximates a "fixed vision," yet landscapes are not static and do change throughout the seasons. Even if other landscape designs plan for dynamic landscapes, they are maintained in a static state instead of a dynamic state that promotes ecological health and function. Calls for those who emphasize seasonality and other ecological processes by advocating the role of the gardener or manager may direct these processes in order to contribute to their visual quality as opposed to the "fixed vision". Therefore, it is important to consider the combination of seasonality and human intention, especially as it relates to green infrastructure.

Green infrastructure, such as bioretention cells and bioswales, is designed to improve ecosystem services such as wildlife habitat and improve water quality. However, if these beneficial functions are not visible, then they may not be managed properly or be removed. If bioretention areas had year-round seasonal interest, then we wonder if the public would see them as more aesthetically pleasing and would be more likely to take care of them. We tested seasonality by conducting a visual assessment to evaluate the aesthetic quality of bioretention cells in coastal plain areas of the Georgia, USA. Respondents to an online questionnaire were asked about seasonality, design, cues to care and perceived management. Participants indicated their preferences and we will report those findings and speculate on how these finding may contribute to ecological aesthetic theory and inform design so that the aesthetics can contribute to successful management of green infrastructure.

- **Planning for Views: Integrating Visual Resources into NPS Resource Stewardship Strategies**
  Jim Cheatham and Mark E. Meyer, United States Department of the Interior, National Park Service

Conservation of scenery is fundamental to national parks and many have demonstrated needs for management of their visual resources. The National Park Service (NPS) is developing Resource Stewardship Strategies (RSSs) to help park managers set goals and track progress in achieving and maintaining desired conditions for priority resources, including visual. As part of a park's planning portfolio, the RSS serves as a bridge between existing planning documents and every day management of park natural and cultural resources, including annual work plan development. Out of approximately 192 parks needing a RSS, there are at least 157 interested in understanding and management of visual resources. Since 2017, about 15 park RSSs have been developed each year, most of which include strategies for visual resource management to address this planning need.

The RSS takes an integrated approach to resource stewardship by capitalizing on overlapping opportunities among and within disciplines, identifying activities that benefit multiple resources, and addressing larger park-wide issues. Visual resource stewardship can be integrated with related natural and cultural resources, and through cooperative conservation efforts for other cross-boundary resources including air quality, night sky, and natural sounds. The approach to integrating visual resources into RSSs and stewardship of other resources will be examined through several case studies from national parks.

- **Visualization for Evaluating and Responding to the Implications of Sea-level Rise**
  Brian Orland, Meredith Welch-Devine, Stephen Berry, Micah Taylor, Jingxian Li, Laurel Schafer, and Gretchen Bailey, University of Georgia

Visualization of the impacts of urban development, energy infrastructure and forest harvest practices has become a key element in the discussion and approval or rejection of development plans. Great efforts are expended to achieve accuracy and repeatability in representation to ensure that decision-making is well informed. Professional ethics on the part of those creating the visualizations requires that they minimize appeal to the emotions and focus instead on fact-based representation. In the case of proposed development, the existing situation is known and understood, and development plans, departures from the expected, can be rejected in favor of the status quo.

In contrast, the planning and design of responses to the effects of climate change is about providing information that will help people to act wisely in the face of unavoidable and unwanted change. There is substantial evidence that faced with science-based data and powerful incentives to move away from flood and damage-prone areas, people will choose to stay in place—for many reasons but importantly because of attachment to place, an emotional response. In addition, while the need for direct engagement of "the people of the place" in decision-making is repeatedly aired, the vast majority of public engagement comprises

"arms-length" showing of the results of technical analysis, with little opportunity for critiquing those results, nor expression of the emotional implications of the proposed changes. For these reasons we believe that visual representations alone may be inadequate to stimulate action. We have been exploring the roles that immersive visualization and social media tools might have in communicating such issues and deliberately engaging the emotions to stimulate action, based on a rich array of examples from the health sciences and digital humanities and have developed some guidance and prototypes for achieving appropriate citizen engagement.

1:45 to 3:30   Room A1100

Technical Sessions 3a

Renewable Energy Impact Assessment and Mitigation 1
Session Moderator: Terry DeWan, TJD&A

- ### Public Appraisal of the Visual Impact of a 30 MW Solar Project from Mount Monadnock
  James F. Palmer, T. J. Boyle Associates

The Solar Project is a 30-megawatt (MW) solar electricity generation facility proposed in New Hampshire. This study investigated a configuration with a work limit boundary of approximately 186 acres; subsequent design revisions have reduced the Project work limit to approximately 157 acres. The Project may be visible at a distance of just over 5 miles from the summit of Mount Monadnock, a scenic resource of state and national significance. Eighty-four viewers were interviewed on October 13 and 21, 2017 to determine their perceptions of the proposed visual change, in conformance with the New Hampshire Site Evaluation Committee (SEC) Administrative Rules (301.05(b)(6)). The primary findings are reported as: 1. Effect on expectation, 2. Effect on enjoyment, and 3. Effect on future use.

The scenic value rating of an existing view from the summit of Mount Monadnock was statistically the same as a simulation of the proposed change. Only half of the respondents could identify the visual change in the simulation, indicating that the Project fit harmoniously into the existing landscape context, as seen from the summit of Mount Monadnock. No one could identify it as a solar development project.

- ### Seascape, Landscape, and Visual Impact Assessment Methodology for Offshore Wind Energy on the Outer Continental Shelf of the United States
  Robert G. Sullivan, Argonne National Laboratory and Richard Warner, Bureau of Ocean Energy Management

The United States Department of the Interior, Bureau of Ocean Energy Management (BOEM) manages offshore energy resources on the U.S. Outer Continental Shelf (OCS). As the United States begins large-scale deployment of offshore wind energy facilities, an important challenge developers and regulators face is the assessment of potential seascape, landscape, and visual impacts on important coastal scenic, historic, and recreational resources; tribal properties and treasured seascapes; commercial interests dependent on tourism; and the private property of coastal residents. BOEM has developed a methodology for seascape, landscape, and visual impact assessment (SLVIA) to identify the potential impacts of offshore wind energy developments in federal waters on the OCS of the United States. BOEM anticipates using this methodology for any offshore wind energy development proposed for the OCS, which would be approved by BOEM. This presentation will discuss BOEM's SLVIA methodology and its major advantages over the use of visual impact assessment (VIA) alone.

- ### Visual Impact Assessment of 1,000 Miles of Alternative Transmission Line Routes in Montana and Idaho Using Three Visual Impact Assessment Methodologies
  Mark Greenig, Jacobs

With the transition of the US electric system to one that is more heavily based on renewable sources of power, there will be an increasing need to upgrade existing electric transmission lines and build entirely new lines to transport electricity to load centers from the highly dispersed and sometimes remote areas where wind, solar and other renewable energy resources are being developed. The prospect of development of additional transmission lines in existing and entirely new corridors is certain to raise concerns about their effects on the landscape's aesthetic values, particularly when they are proposed for landscapes with high levels of visual quality and visual sensitivity. .

In 2009, the visual resources team at CH2M was invited by PBS&J to join it in preparing the environmental assessments required for the planning and permitting of the Mountain States Transmission Line, a new 440 to 500-mile transmission line that Northwest Energy was proposing to connect the Townsend Substation in Broadwater County, Montana, with the Midpoint Substation in Jerome, County, Idaho. The challenges posed by this assignment were many. Because of the large number of route miles requiring evaluation, it was necessary to mobilize and then effectively manage a large team that by working concurrently on the line's various segments could complete the work on a tight timeline. To provide a point of departure for the evaluation of the impacts of the proposed transmission line, field studies were undertaken to assess the relationships of existing 500 kV transmission lines in Montana to their landscape settings, their visibility at varying distances, and their impacts.

This presentation will provide an overview of the project and of the analysis strategy employed, with special emphasis on the analyses of existing 500 kV transmission lines in Montana. And, the value they added to the impact assessment process, and the challenges and benefits of conducting the analysis using the FHWA impact assessment methodology as well as the visual impact assessment methodologies specific to the BLM and the USFS. The analysis will conclude an identification of the takeaways from this project that have potential relevance for the coming wave of transmission line visual impact assessment efforts.

- **2019 Case Study Investigation: A Landscape Performance Post-Occupancy Review of Two Wind Farms**
  Aidan Ackerman, Meaghan Keefe, Robin Hoffman and Maren King, SUNY College of Environmental Science and Forestry

Post-occupancy analysis provides the opportunity to investigate the accuracy and effectiveness of a project's initial visual impact assessment materials. In Spring and Summer 2019, students and faculty from SUNY College of Environmental Science and Forestry's Department of Landscape Architecture received funding from the Landscape Architecture Foundation to perform post-occupancy analysis of two wind farms. In partnership with the landscape architecture firm Environmental Design and Research, the researchers quantified the ecological, economic, and social performance two wind farms: Block Island Wind Farm off the coast of Block Island, RI, and Hardscrabble Wind Farm in Fairfield, NY. Findings from the project will be shared, along with reflections on the post-occupancy review process.

1:45 to 3:30   Room E1100/1200

Technical Session 3b
Visualizations and Simulations
Session Moderator: Mark Meyer, United States Department of the Interior, National Park Service

- **How Photography Works: Understanding Photographic Subjectivity in Visual Resource Assessment**
  Anne Godfrey, SUNY College of Environmental Science and Forestry

Photography is the primary tool of visual resource assessment (VRA) and visual impact assessment (VIA). But does the discipline truly understand how photography works? Certainly, we understand the technical aspects of this tool, with extensive discussion and debate about the use of particular lenses, focal lengthens and aspects ratios. Yet often a passive unexamined assumption that photography "shows us what we see" underlies our use of it to assess visual characteristics of a landscape. Photography is treated as a window onto the landscape, or a stand-in for being there. It is casually assumed that photographs show us what we would see if we would be in that place. And, it is accepted that photography can be an objective document, especially in the context of VIA. Though many of the authors cited understand in conversation that photography is far more complex, we do not commonly discuss the conceptual relationship between viewer and image, or photographer and subject-matter, and how highly subjective and influential these relationships are in interpreting photographs. Thus, viewing and making photography is a very complex *subjective* process and relationship. The author presents her theory of "photographer + subject matter + viewer + context = meaning" as a means towards better understanding this subjective relationship. The goal of this discussion is to create critical awareness and engagement in embracing the influence and implications of photographic meaning as a multi-part relationship that is always highly influenced by dynamic external factors.

- **Viewshed Analysis Technology in Visual Impact Assessment**
  Gordon Perkins, Environmental Design & Research

One of the first steps in any visual impact assessment is to determine the preliminary area of potential effect (APE). To determine this, we must understand the geographic range of potential visibility. To answer this question a zone of visual influence (ZVI), or viewshed analysis, is completed. Traditionally, this analysis is performed by establishing a receptor (or viewer) and a target(s) (the viewed object or proposed feature) which are both assigned a position and a height on a digital elevation model (DEM). A geographic information systems (GIS) application then scans every cell in the DEM and completes a mathematical algorithm to determine whether a direct line of sight exists between each receptor and the target(s).

The case study includes specific examples of how the analysis is used to predict visual impacts by quantifying a set of known visual considerations, including distance, exposure, sensitivity to visual change. While this desktop analysis is not being used to determine potential visual impacts, it is a powerful tool in predicting where impacts are likely to occur and the degree to which they should be further investigated. The viewshed analysis allows for a more focused application of field review, photography, visual simulations, and expert evaluation. The case study will demonstrate how LiDAR viewshed analysis allowed for a massive reduction in the investigation area which allowed the stakeholders, government agencies, and consultants to focus on the most likely affected resources, which produced a substantially refined visual impact assessment.

- **Public Versus More "Expert" Perceptions of Different Modes of Landscape Simulation: Reliability of Scenic Beauty, Preference and Coherence Ratings**
  Robert Ribe, University of Oregon and Justin Kau, Murdoch DeGreeff Landscape Architects

When landscape simulations are subjected to legal contest, attention naturally and intuitively turns to their mainly technical 'accuracy' or validity in representing how landscape change will appear, and whether the viewpoint(s) are representative. The former validity criterion is usually not testable, without the impractical and legally backwards construction of the project for comparison to the simulation. An alternative is to focus on reliability. If a simulation elicits basic, shared perceptions that many people agree upon, as opposed to wildly divergent ones, this is evidence that it conveys relevant qualities well. This is a mainly cognitive kind of accuracy. Two broad attributes of landscape simulations, among many, that are often considered relevant to their quality are degree of realism and dynamic exploration, as opposed to simple static views. Another issue is how well simulations serve as evidence to support or elicit expert assessments of scenic impacts as opposed to public perceptions. These two issues interact in complex ways with the type of perception that is considered legally or politically relevant when simulations support permitting or design decisions.

Our pilot study explored these issues via four different digital simulation modalities of the same design of an urban park landscape. These simulations were stratified to include two substantially different levels of technical realism and two modes of experience: static views versus dynamic exploration. These simulations were rated by respondents from the general public, and by others with design training. They rated an experience of the park via each modality for three different qualities: (1) scenic beauty, (2) preference for the park as a visit choice, and (3) coherence in understanding the park's configuration to find features and places to sit. Analysis of another quality (perceived realism) is not reported here pending completion. The most notable findings from this pilot study that related to the evidentiary merit of simulations regarded ratings by designers versus non-designers for different qualities will be presented.

- **Visual Resource Analysis and Management Pedagogy Evaluation**
  Nikolas Smilovsky, Allyce Hargrove, and Kenneth Brooks, Arizona State University; and Justin Azevedo, Coffman Studios

  Inventorying, evaluating, and planning for the management of visual resources is a domain of professional knowledge, skill, and activity expected of landscape architects. Characterization and the treatment of scenery has been a core skill from the early eras of the profession. Significant advancements in the theory, practice, and policies related to Visual Resource Management (VRM) were stimulated by the environmental movements of the late 1960s, culminating with the passage of the National Environmental Policy Act (NEPA). Although views and scenery were considered important and visual resource management became a significant part of practice, there has been limited subsequent development of appropriate pedagogy. This situation seems to exist even when these topics and specialty areas are within the curricula of professional landscape architecture programs that utilize celebrated textbooks in their inventory, analysis, and site planning classes that make mention of visual resources. Previous standards set by the Landscape Architecture Accrediting Board (LAAB) before 2016 did not explicitly reference visual resource management as an identified component of an accredited curriculum. In 2016 as part of LAAB's systematic updated standards, visual resource management was explicitly identified as a component expected in professional curriculums.

  This paper explores the current state of visual resource analysis and management by 1) summarizing how different organizations conduct visual analysis, 2) reviewing how visual analysis is currently being taught at various educational institutions, 3) evaluating the implementation and efficacy of visual resource management instruction in a design studio, and 4) proposing a framework for a visual analysis pedagogy that closes the instructional gap and practice.

4:00 to 5:00   Room A1100

Technical Session 4a

Renewable Energy Impact Assessment and Mitigation 2
Session Moderator: Terry DeWan, TJD&A

- **Landscape Visualization State of the Art**
  Tony Coggan, Truescape

This presentation will start with a brief outline of the traditional photo simulation techniques currently used to support Visual Impact Assessments today. It will also provide some oversight on how we can the assess the accuracy of these visualizations by asking a series of very specific, yet simple, questions. We will then look at some of the latest technologies being utilized to communicate things such as the shielding effect of foreground vegetation and topography, and the ability to communicate projects under a range of different lighting conditions. We will conclude the presentation by sharing some of the latest technologies being utilized to communicate offshore energy projects under a range of varying conditions.

- **Integrating Visual Resource and Landscape Character Assessments for Landscape Planning for the Central Appalachians – A Region of Intensive Energy Development**
  Charles Yuill, Davis Michael and Stefania Stanascia, West Virginia University

The Central Appalachians, with a focus in Southwestern Virginia, West Virginia, and Kentucky has been and continues to be a region of intensive energy development. This began in the later-half of the 19th century with underground coal mining and oil development and continues today with large scale surface mining (often mountaintop mining) and hydraulic fracturing for natural gas recovery – primarily in West Virginia and Pennsylvania. Mountaintop mining (MTM) continues throughout West Virginia, Eastern Kentucky, and Southwestern Virginia despite MTM remaining a controversial process of energy extraction because of its unusually destructive nature. The practice, which began in the early 1970's, greatly expanded in the 1990's with the introduction of large-scale earth-moving equipment into the Appalachians, and continues today. There have been periods of concern with regards to mountaintop mining's impacts. These concerns resulted in EPA completing a programmatic EIS that addressed mountaintop-mining regulation, and subsequently with EPA's moratorium for mountaintop mining regulation and permitting in 2011, which focused on particularly large mountaintop mines. However, recent changes in applicable surface water and land protection regulations have for the most part removed most major regulatory hurdles for pursuing continued mountaintop mining.

Major impacts of mountaintop mining include: the loss of topographic and landscape complexity; forest and land use fragmentation; loss of forested landscapes; biodiversity declines; and impacts on community health. This presentation will focus on one of the most heavily mined watersheds in the Appalachians – the Coal River in West Virginia where over 15% of the entire watershed has been and continues to be subject to mountaintop mining. We are currently examining these overlooked terrestrial impacts through the lens of landscape and landscape pattern attempting to link landscape ecology, character and visual aspects. To do this, the work is using current methods from visual resource and landscape character assessment to identify mine specific as well as regional and cumulative impacts of the past, as well as the continuing mining activity. The presentation will also provide some potential key linkages between these methods and the provision of cultural ecosystem services.

- **Visual Impact Assessment Case Study: Surry-Skiffes Creek-Whealton 500 kV Electric Transmission Line**
  Robert G. Sullivan, Argonne National Laboratory and Mark E. Meyer, United States Department of the Interior, National Park Service

In 2013, Virginia Electric and Power Company ("Dominion") applied to the U.S. Army Corps of Engineers ("the Corps) for a permit to construct a new a 500 kV transmission line - the Surry-Skiffes Creek-Whealton project ("Project"). The proposed project included a four-mile segment crossing the James River with seventeen 250-or-so-foot steel-lattice transmission towers, several of which were taller 250 feet in height—taller than the Statue of Liberty. The proposed eight-mile line cut through the middle of the historic district encompassing Jamestown and other historic and scenic resources, including Captain John Smith Chesapeake National Historic Trail, Carter's Grove National Historic Landmark, and the Colonial Parkway, a National Scenic Highway. This case study presentation discusses the multiyear, ongoing battle between Dominion and project opponents over the potential visual impacts of the proposed project, and the nature, level, and quality of the visual impact assessment (VIA) required to satisfy the requirements of the National Environmental Policy Act of 1969 ("NEPA").

While the Project is built and possibly will not be removed, this case is nonetheless important from a visual resources standpoint for several reasons. First, from a technical standpoint, an important distinction was made between a VIA conducted for scenic resources and a VIA conducted under Section 106 of the National Historic Preservation Act. Second, the necessity of a thorough VIA based on credible methodology was recognized. More importantly, potential visual impacts, on their own, have been found by a higher court to be sufficient to trigger an EIS. Furthermore, the issue of preserving the visual landscape has been raised in the public's eye by this high-profile case. Lastly, a variety of organizations worked together successfully to protect visual and cultural resources of national significance.

4:00 to 5:00   Room E1100/1200

Technical Session 4b

Visualizations and Simulations

Session Moderator: Mark Meyer, USDI National Park Service

- ### An Empirical Assessment of the ArcPro Visual Magnitude Viewshed Plugin
  Brent Chamberlain and Foster Cook, Utah State University

Numerous viewshed analyses have been developed over the past few decades, but the uptake of these variations within industry has largely remained stagnant. This project involves ground-truthing one of the more recent viewshed analysis variants to highlight reliability and application. This viewshed analysis has been developed as a plug-in for the ArcGIS Pro software application from ESRI making it readily accessible by anyone with a basic ArcGIS license. The plug-in provides a far more nuanced analysis than the viewshed tool that comes standard in ArcGIS software. Whereas the viewshed analyses provide only a binary outcome (what you can and cannot see), the plug-in provides a degree of visual magnitude from one or more key observation points. Visual magnitude provides a metric for visual relevancy, which can help professionals mitigate negative visual effects from development, prioritize the placement or arrangement of new infrastructure or optimize recreational routes for scenic vistas amongst numerous other applications.

While several viewsheds have been developed over the past few decades, this study represents one of the few cases that has been empirically ground-truthed and has been made as a free plug-in to the ESRI suite of analysis tools.

- ### Immersion vs. How It Sounds: Comparing the Effect of Virtual Reality and Sound On Landscape Perception
  Mark Lindquist, University of Michigan

This paper presents preliminary results of exploratory empirical research investigating the effect of viewing 3D landscape visualizations in virtual reality compared to a computer monitor, and how sound impacts perception. Five landscape types were paired with three sound conditions (no sound, generic sound, realistic sound). Perceived realism, preference, recreational value and biodiversity were evaluated in a controlled laboratory environment. Results indicate that sound has a larger perceptual impact than display mode regardless of sound source across all perceptual measures. The results are considered to assess how sound can impact landscape preference and spatiotemporal understanding. The paper concludes with a discussion of the impact on designers, planners and the public, and targets future research endeavors in this area.

- ### Conserving Scenic Views and Viewpoints in Portland Oregon
  Robert Ribe, University of Oregon; Mindy Brooks, City of Portland and Dean Apostol, MIG

Scenic resource inventories are typically conducted for rural and wildland areas where natural features are the primary focus. But cities and towns also include important scenic resources and views of value to local communities and visitors. Portland Oregon, a city known for its setting that includes abundant natural and scenic resources, recently updated its Central City plan, incorporating provisions to protect and enhance iconic views through use of an adapted methodology. This paper will summarize the methodology and process used to inventory, assess, and balance scenic view protection.

Over 150 views from 144 separate viewpoints were photographed using standardized protocols, described and assessed. Views and viewpoints were selected based on previous inventories, responses from the public, and fieldwork by city staff. Views were ranked by independent experts and placed into tiers, with separate rankings for upland views and views of the Willamette River. The ranking process included criteria about view features to help build an understanding of why particular views were ranked and to understand what about the view could or should be conserved. Each viewpoint was geocoded, the primary view directions and cones of vision were mapped and, together with LiDAR-derived topography, used to document how building or vegetation heights could impact intersecting views. The results of the analysis informed decisions about where to apply building height and/or bulk limits and where to allow vegetation removal to preserve or restore particularly important views.