Documenting America's Scenic Treasures: The National Park Service Visual Resource Inventory

Submitted by

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ABSTRACT

In response to concerns arising from potential scenic impacts from renewable energy, electric transmission, and other types of development on lands and waters near NPS units, the U.S. Department of the Interior (USDI) National Park Service (NPS) has developed a new visual resource inventory (VRI) system to facilitate the management of scenic resources in high-value views both within and outside NPS unit boundaries.

The NPS VRI system is similar in some respects to other U.S. federal agency VRI systems, such as the USDI Bureau of Land Management VRI, and the U.S. Department of Agriculture Forest Service Scenery Management System, in that it assesses scenic quality; uses formal design qualities such as form, line, color, and texture to describe and assess scenic quality; and incorporates viewer sensitivity in what is ultimately a judgment-based quantitative ranking of relative scenic value. However, the NPS VRI differs from other federal agency approaches in several major respects, reflecting important differences between the federal land management agencies with multiple-use mandates and the NPS, which is charged with preserving scenic resources for the enjoyment of current and future generations. First, the NPS inventory unit of analysis is a predetermined view from a specified viewpoint, rather than a polygon based on physiographic properties (e.g., a valley floor or a mountain range). The view-based inventory unit was chosen because NPS is concerned with specific landscape areas seen from specific viewing locations, which is how many NPS visitors experience the landscape. A view is defined as consisting of a viewpoint, a viewed landscape, and viewers. Second, in addition to scenic quality, the NPS VRI scenic inventory value (SIV) includes view importance, a measure of the non-scenic values of the view. Because historic and cultural resources are essential to the scenic experience of NPS visitors, the view importance score incorporates historic and cultural elements and values, as well as the value of both the viewpoint and viewed landscape to NPS interpretive goals and visitor experience.

The NPS VRI system includes an online database for storing inventory data for NPS units, as well as an associated geographic information system for semi-automated production of inventory maps. The database generates a variety of reports for inventory data.

To date, NPS VRIs have been conducted (or initiated) at 17 NPS units, ranging from large units with predominantly natural-appearing landscapes in the western United States to smaller units with heavily altered historic/cultural

landscapes such as battlefields and recreation areas in the Midwest and eastern United States. The VRIs have proven useful for landscape management within park boundaries and for addressing concerns related to development outside NPS units.

1 INTRODUCTION

One hundred years ago, in 1916, the National Park Service (NPS) Organic Act identified scenic resource protection as a fundamental purpose of the NPS, when it established the agency to "conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The NPS manages the 409 units of the National Park System, and helps administer dozens of affiliated sites, as well as the National Register of Historic Places, National Heritage Areas, National Wild and Scenic Rivers, National Historic Landmarks, and National Trails. These include not only scenic landscapes that draw visitors from all over the world, but also historic and cultural sites of great importance. In 2014, there were more than 290 million recreational visits to National Park System areas (park areas) (NPS 2015), with scenic resources being a fundamental driver for visitation. In 67 visitor surveys performed at a wide variety of park areas between 1998 and 2011, involving more than 31,000 visitor groups, scenic views were identified as important or extremely important by 90% of visitors, and were consistently rated at or near the top of park attributes worthy of protection (Kulesza et al. 2013).

Within the past decade, a variety of factors—including increased demand for energy, the need to update aging and increasingly inadequate energy transmission systems, desire for reduced dependence on foreign sources of energy, and a need to address climate change—have resulted in an expansion of energy-related infrastructure in the United States. While the expansion of energy infrastructure involves both fossil and renewable energy sources, the rapid development of utility-scale renewable energy projects and associated electric transmission lines is of special concern to NPS because the large size and unique visual characteristics of these facilities may cause significant scenic impacts on NPS park areas and other visually sensitive areas (Sullivan and Abplanalp 2013, 2015; Sullivan et al. 2012a, 2012b, 2013a, 2013b, 2014). Some renewable energy projects and transmission lines have been built, or are proposed to be built, adjacent to or crossing national parks and national scenic and historic trails, and these facilities are or will affect scenic views within these park areas (Sullivan et al. 2013b; Sullivan and Abplanalp 2015).

NPS has recognized the need to develop a comprehensive approach to assess scenic values of landscapes in and near NPS park areas, and to develop strategies to protect them as a resource for future generations. The Air Resources Division in the Natural Resource Stewardship and Science directorate is developing a Visual Resource Program (VRP) that provides service-wide support to parks for managing this important resource within the context of the NPS mission (Meyer and Sullivan 2016).

The NPS VRP is a comprehensive inventory, planning, and park assistance program covering all aspects of visual resource management. The VRP is described in greater detail in Meyer and Sullivan (2016). There are four major components to the program:

- Inventory—A systematic method to identify and describe views, and to assess their scenic quality and importance to visitors and to NPSs interpretive themes and other goals.
- Planning and Protection—Support services to parks for incorporating visual resources into NPS planning framework documents including Foundation Plans, State of the Park reports, and Resource Stewardship Strategies.

- Technical Assistance—Assistance to parks in understanding and responding to potential visual impacts of proposed projects, developing comments on environmental documents, and identifying mitigation measures that may help reduce impacts.

- Policy and Guidance—Development of service-wide documents, such as guidance to help parks better understand visual impact documents, and policies to help assure consistency in addressing visual resource management concerns across NPS.

Although each component of the VRP has its own distinct purpose and tasks, together they present an integrated approach to addressing visual resources. The VRP helps parks identify and understand their visual resources to better enable them to develop protection strategies through best management practices and collaborative efforts. The NPS VRP includes a visual resource inventory (VRI) process that is the focus of this paper.

The concept of inventory of the visual landscape, and its subsequent management as a resource, has been in place at the federal agency level since the 1970s. The BLM and the U.S. Forest Service (USFS) have developed and implemented visual resource programs to manage the scenic values of the large areas of lands they manage, and both of these programs include an inventory process (BLM 1984, 1986; USFS 1995). These inventory processes were developed to meet the needs of their respective agencies' resource management missions; similarly, the NPS VRI process was developed to meet the unique mission of the NPS, which focuses on conservation rather than multiple uses, as is the case for both BLM and USFS (Sullivan and Meyer 2015).

2 THE NPS VISUAL RESOURCE INVENTORY (VRI)

The VRI is the primary tool in the VRP that helps park areas understand their visual resources and communicate their value to partners and stakeholders in a consistent and credible way. The inventory process is a systematic description of the visual elements, scenic quality, and importance to NPS visitor experience and interpretive goals for important views inside and outside NPS areas. The descriptive information gathered in the VRI process and the scenic quality and view importance results can be used in the development of plans for the management of scenic resources in conjunction with other NPS resources.

The NPS VRI is based on the fundamentals of visual resource inventory developed by the BLM and USFS, as well as systems developed for specific NPS units; however, the VRI was developed specifically to meet requirements dictated by the unique mission of NPS. It is designed to work for many types of National Park System areas, and in multiple types of landscapes and visual settings. Park areas often encompass specific scenic places or historic settings, but are also part of the broader landscape. The VRI considers the context of a park area's visual setting and provides a framework for understanding and protecting the scenic values within that context.

Park areas range from nearly pristine wild landscapes to intensely developed urban areas, and park landscapes often have cultural and historic values in addition to scenic quality. Any or all of these values could be diminished if a park is subject to management or development activities that negatively affect the condition of its scenic resources and the quality of the visitors' scenic experience. NPS often does not own or manage adjacent lands in the shared viewsheds; however, that does not diminish the value of the adjacent lands for the visitor or the park area. Numerous park resources including air quality, water quality, night skies, soundscapes, wildlife corridors, and cultural landscapes have documented cross-boundary impacts, and scenic resources are subject to cross-boundary impacts as well. The inventory approach of including lands visible from but outside park areas in the inventory process (where appropriate) helps conserve scenic values for park areas and their visitors while retaining NPS support for the economic health of nearby communities and for the responsible development of energy and other resources.

2.1 GOAL AND GUIDING PRINCIPLES

The NPS inventory process was developed to enable the NPS, its partners and other stakeholders to better understand NPS scenic resources inside and within view of park areas, and to assist NPS and its partners to protect these resources through effective inventories and protection strategies. The inventory capitalizes on elements of existing visual resource inventory and management systems developed by other agencies, but includes procedures and guiding principles suited to the unique mission of the NPS. The following principles serve as a frame of reference for the overall inventory process as well as the individual inventory components:

- The VRI should help parks answer four key questions:

  - Where are the important views?
  - What are visitors looking at in these views, and what are the characteristics of the viewed landscapes?
  - Why are these views important to NPS?
  - How could NPS promote protection of important views, especially on lands it does not administer?

- The NPS approach should be able to include the inventory and evaluation of views from the entire park area, regardless of whether the viewed landscapes are inside or outside park boundaries.

- The VRI should incorporate cultural and historic values.

- The scenic values of a park area should be considered in the context of the park area and its immediate surroundings and landscapes; park areas should not be compared to one another.

- The approach should be designed to be suitable for wide application in NPS, without the need to rely solely on visual resource specialists for implementation. With proper training, the system should be able to be implemented at the park level using park staff and volunteers.

2.2 OVERVIEW

In the NPS VRI inventory, the unit of inventory is a *view*, rather than a polygon based on physiographic properties (e.g., a valley floor or a mountain range). A view consists of a *viewpoint*, *viewed landscape*, and the *viewers*. Scenic values of NPS views are based on not only the aesthetic qualities of the scenery, but also its value to the visitor experience and the NPS mission. As shown in Figure 1, the inventory includes two primary processes that lead to ratings for scenic quality rating and view importance: the *landscape description and scenic quality assessment* and the *view importance assessment*. The landscape description and scenic quality assessment process identify and describe visible elements of the viewed landscape and assess the scenic quality of the view. The view importance assessment identifies and describes key attributes of the viewpoints, viewed landscape, and the viewers that determine the importance of the view to NPS and to the visitor experience. The landscape description and scenic quality assessment is done in the field, but the view importance assessment is done in the office.

The scenic quality and view importance are both scored in separate rating processes. The two scores are combined into a Scenic Inventory Value (SIV) for the view that is a primary product of the inventory process, and useful to develop protection strategies. The SIV is mapped to the viewshed of the view and, where views overlap, a composite SIV value is developed that reflects the scenic quality and view importance of the contributing views. The information gathered in the VRI process is stored in the Enjoy the View Database, a geospatial database available to parks.

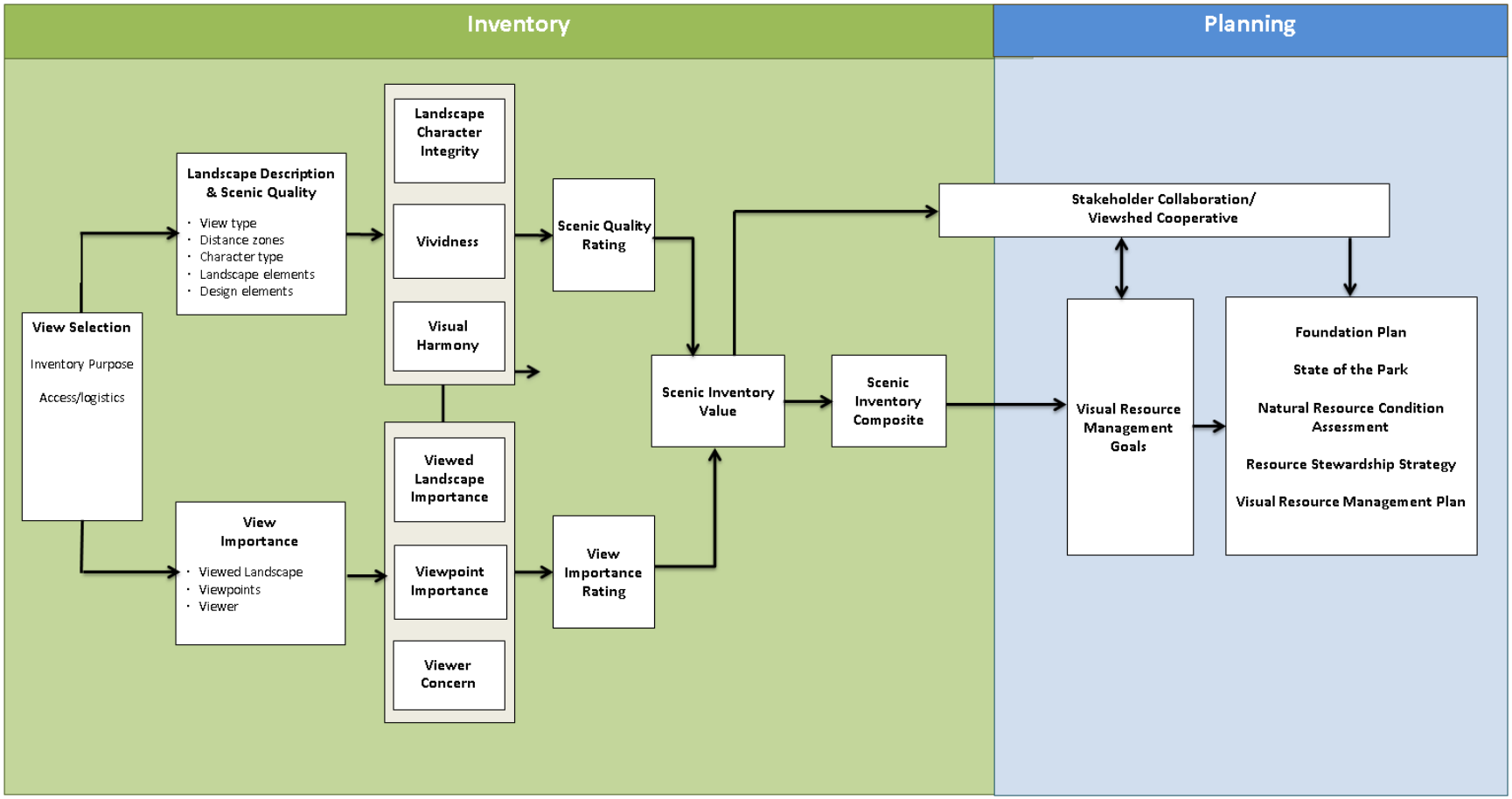


FIGURE 1 Integrated VRI and Planning and Protection Components of the NPS VRP

When the VRI is combined with the planning and protection component of VRP, the two become integrated into an overall process for understanding and protecting scenic views (Figure 1). Park areas that use the inventory methodology gain a systematic and defensible inventory of scenic values. The VRI data can be used in National Environmental Policy Act (NEPA) assessments, park planning, and ultimately for internal scenic resource management, as well as advocacy with external partners.

Using the VRI information in planning activities can help park planners identify effective strategies for conserving important views. The VRI can identify viewed landscapes outside park areas that are visible from popular visitation areas or viewpoints that have historic or cultural values that are important to the park area's key interpretive themes. Although the results of the VRI are designed to form the foundation for developing strategies for protecting scenic views in park planning documents, they can also be a valuable tool for working with park resource management and local partners and other stakeholders:

- The documented and mapped inventory information can be very helpful in discussions with developers and other stakeholders about potential development within shared viewed landscapes.

- The inventory can also identify areas outside park area boundaries that are less important to the NPS visitors' scenic experience that may be good alternative sites for development.

- Additional outcomes of the VRI process include:
  - Systematic descriptions and photo documentation of scenic views;
  - Documentation in both text and map format; and
  - Inventory information accessible in a spatial database for park use in analysis and planning.

2.3 THE VRI PROCESS

2.3.1 View and Inventory Point Selection

The first step in the inventory process is to identify key views and viewpoints to include in the inventory. The decision about which views and viewpoints to include considers the inventory objectives (e.g., conservation of views outside vs. inside the park area) and available time, budget, and human resources to conduct the fieldwork and other tasks associated with the inventory. For smaller park areas, there may be only a few important views, and the inventory may be accomplished in as little as one day or a few days. For much larger park areas, there may be tens or even hundreds of potential views, and multiple fieldwork and office sessions may be required for a complete inventory; however, it is important to understand that the inventory can be an iterative process, and it is not necessary to complete the full inventory at one time. Various methods can be used to prioritize inventory points, such as inventorying by zone, or by perceived importance. In some park areas, there may be reasons to conduct multiple inventories over time,

either seasonally (e.g., leaf-off and leaf-on conditions) or repeating inventories over longer time frames for areas subject to development or other major changes over time.

2.3.2 Landscape Description and Scenic Quality Rating

The inventory process includes a field-based description of the visual elements in the viewed landscape, and an assessment of scenic quality of the view. The landscape description part of the process records basic data about the viewpoint and observation for future reference updates, as well as recording the visible landscape elements of the view. The data are descriptive, not evaluative. The scenic quality assessment that follows the landscape description is conducted as a group discussion and consensus exercise that assigns a single scenic quality value for the view. The front and back sides of the Landscape Description and Scenic Quality Rating Form are shown in Figures 2 and 3, respectively.

Data collected and activities undertaken as part of the landscape description process are described in the following sections.

2.3.2.1 Observation Data

These include data about the observation, such as date, viewpoint coordinates, the direction and width of the view, and the names of the evaluating team members.

2.3.2.2 Landscape Description

These data include the view type, landscape character, and other key descriptive elements of the viewed landscape:

- View Type—The view type is a general descriptive term for the viewing experience of the landscape, based on the spatial relationship of elements within the viewed landscape, and the spatial relationship of the viewer to those elements. The view types in the inventory process are Panoramic, Enclosed, Focal, Feature, Framed, and Canopied.

- Landscape Character Type—Landscape character is an overall visual and cultural impression of the landscape, and embodies distinct landscape attributes that exist throughout an area. It is a product of both the natural and human influences on the landscape. The landscape character types in the inventory are Natural/Natural Appearing, Pastoral, Agricultural, Rural, Suburban, Urban, and Industrial.

- Distance Zones—The delineation of distance zones—foreground, middle ground, and background—for a view is related to the visibility of landscape elements and the degree to which landscape details can be discerned. At

NPS Visual Resource Inventory

View Description & Scenic Quality Form

Viewpoint No.:

Observation Data

NPS Unit Name:	Date:	Time:
Viewpoint Name: No.	Recorder:	
Viewed Landscape Name:	Evaluators:	
GPS Coordinates: /		

Weather: ☐ Sunny/Clear ☐ Mostly Sunny ☐ Partly Cloudy ☐ Mostly Cloudy ☐ Cloudy/Overcast ☐ Cirrus

Observer Position: ☐ Looking down at scene ☐ Looking at eye level ☐ Looking up at scene

Primary View Direction: ☐ N ☐ NE ☐ E ☐ SE ☐ S ☐ SW ☐ W ☐ NW ☐ N/A (360) Bearing:

Approximate Width of View: Left Bearing: Right Bearing:

Photo Record

Photographer:	Camera/Lens 1:	Camera/Lens 2:

Camera	Photo Number(s)	Pano	Notes

Landscape Description

Viewed Landscape Type: ☐ Panorama ☐ Feature ☐ Framed ☐ Focal ☐ Enclosed ☐ Canopied

Landscape Character Type: ☐ Natural/Natural Appearing ☐ Pastoral ☐ Agriculture ☐ Rural ☐ Suburban ☐ Urban ☐ Industrial

Are seasonal/ephemeral effects (e.g., wildflower displays, snow, dramatic clouds) important to the vividness rating? ☐Yes ☐No
If yes, please describe:

Notes:

Distance Zones

Foreground Extent:

Middleground Extent:

Background Extent:

Landscape Elements

	Distance				Distance				Distance				Distance		
Landform*	F	M	B	Landcover*	F	M	B	Land Use*	F	M	B	Structures*	F	M	B
Mountains				Development				Natural Areas				High Rise -Residential			
Hills				Barren				Timber				Low Rise -Residential			
Buttes				Forest-Deciduous				Grazing/Rangeland				High Rise -Commercial			
Mesas				Forest-Evergreen				Agriculture				Low Rise -Commercial			
Valleys				Forest-Mixed				Mining				Farm Buildings			
Cliffs/Bluffs				Shrub/Scrub				Industrial				Warehouses/Factories/etc.			
Canyons				Grassland				Office/Retail				Nuclear/Conven. Power Plants			
Plains				Pasture/Hay				Urban Residential				Wind Turbines			
Beaches				Cultivated Crops				Suburban Residential				Solar Facilities			
Sand Dunes				Wetlands/Bogs				Rural Residential				Communication Towers			
Islands				Ocean				Transportation				Warehouses/Factories/etc.			
Headlands				Lake/Pond				Parks/Recreation				Oil/Gas Wells			
Water				River/Streams				Urban Center				Local Roads			
								Small Town				Highways			
												Transmission/Substations			

FIGURE 2 View Description and Scenic Quality Form, Front Page

NPS Visual Resource Inventory

View Description & Scenic Quality Form

Viewpoint No.:

Prominent Design Elements

FORMS		LINES	
Descriptor	Elements	Descriptor	Elements
Rolling		Vertical	
Blocky		Horizontal	
Rugged		Curving	
Angular		Undulating	
Conical		Angular	
Pyramidal		Diagonal	
Rounded		Broken	
Circular		Irregular	
Flat			

COLORS		TEXTURES	
Color	Elements	Descriptor	Elements
		Coarse	
		Medium	
		Fine	
		Smooth	
		Rough	
		Patchy	
		Stippled	
		Uniform	
		Random	
		Ordered	

View Description

Scenic Quality

Scenic Quality Factor	Rating	Rationale
Landscape Character Integrity		
Landscape Character Elements		
Quality and Condition of Elements		
Inconsistent Elements		
Integrity Total		
Vividness		
Focal Points		
Forms/Lines		
Colors		
Vividness Total		
Visual Harmony		
Spatial Relationship		
Scale		
Color		
Harmony Total		
TOTAL		

SCENIC QUALITY	☐E (9-15)	☐D (16-23)	☐C (24-30)	☐B (31-38)	☐A (39-45)

FIGURE 3 View Description and Scenic Quality Form, Back Page

shorter distances, the details of the landscape are more visible, and changes to the landscape elements may have greater effects on the view. Conversely, landscape elements at greater distances cannot be seen in as much detail, so changes may be less noticeable.

- Landscape Elements—The landscape elements are the specific features of the view that give it its unique characteristics and contribute to its value as a scenic view. Landscape element types include landform, land cover, land use, and structures. For each of these landscape element types, a list of possible landscape elements is provided in a checklist format.

- Design Elements—The design elements of form, line, color, and texture are used to describe the primary visual attributes of features in the landscape. The inventory process identifies the most prominent design elements in view to provide a baseline for identifying the important elements that could be affected by changes to the viewed landscape, for example, as the result of development.

2.3.2.3 Scenic Quality Rating

For the NPS VRI, scenic quality is defined as the value of the viewed landscape based on its perceived visual attractiveness, as determined by the aesthetic composition of the visual elements. Scenic quality is a primary reason (but not the sole reason) for conserving scenic values in a viewed landscape; it is well established that high-quality scenery attracts NPS visitors and enhances the visitor experience.

Assessing scenic quality involves field-based assessments of Landscape Character Integrity, Vividness, and Visual Harmony. Each factor is assessed by a group of raters while viewing the landscape from the viewpoint. The assessment evaluates three equally weighted components for each factor. Each of the individual components is assigned a rating of one to five points according to a predetermined scale and rating criteria and the total score indicates the scenic quality rating. Each rater uses an Individual Scenic Quality Rating Form with structured questions and possible responses that correspond to the rating values as an aid to rating the scenic quality of the view. The ratings fall into five classes, from A to E. Class A views have the highest scenic quality and Class E the lowest.

2.3.2.4 Landscape Character Integrity

Landscape character integrity indicates the degree of intactness and wholeness of the landscape character identified in the landscape description section. The highest integrity ratings are given to those landscapes which have little or no deviation from the identified landscape character type. The rating process assumes that in order to have the

highest degree of integrity, i.e. to be a high-quality example of the identified landscape character, the view must:

- Have most or all of the key elements of landscape character present;
- Have elements that are of high quality and in the appropriate condition for the landscape character (i.e., well built, well cared for, or, for historic/rustic landscapes, appropriately worn/aged); and
- Be relatively free of elements that are inconsistent with the landscape character.

2.3.2.5 Vividness

Vividness is the degree to which landscape elements are distinctive or striking enough to make a view memorable. The rating assumes that to have a high degree of vividness, the view must:

- Contain one or more dominant visual features or focal points;
- Contain striking forms and/or lines; and
- Contain striking colors, textures, or visible motion.

2.3.2.6 Visual Harmony

Visual harmony is the extent to which there is a pleasing array of visual elements in a landscape, usually as a result of a sense of visual order, compatibility, and completeness between and among the land forms, water forms, vegetation, or built elements visible in the landscape. The approach assumes that a high degree of visual harmony is achieved when:

- The spatial relationship of the landscape elements creates a clearly recognizable structure, pattern, or order;
- The landscape elements display pleasing scale relationships; and
- The landscape displays pleasing color relationships.

2.3.3 VIEW IMPORTANCE

As noted earlier, the unit of inventory in the NPS VRI process is a view, and the view importance rating is an office-based assessment that identifies NPS and visitor values for the view through a rating process for each of the view components. As part of the process, key descriptive information about the viewpoint and viewed landscape is gathered that helps inform the rating process.

2.3.3.1 Viewpoint and Viewed Landscape Description

Information collected about the viewpoint identifies whether the location is associated with designated scenic or historic cultural features or locations, such as National Scenic or Historic Trails, designated scenic overlooks, historic properties, cultural landscapes or other specially designated areas. Similar information is identified for the viewed landscape so that it is clear whether the landscape in the view—whether inside or outside the park—includes special features or designations that are important to the park and its visitors.

2.3.3.2 View Importance Rating

The View Importance rating process assigns a numeric rating to the importance of the three view importance factors: viewpoint, viewed landscape, and viewer. The assessment is performed by an interdisciplinary team that could include staff from natural and cultural resources, interpretation, operations, and law enforcement. Similar to the scenic quality rating, the view importance assessment evaluates three equally weighted components for each view importance factor. The final rating for each component is determined through discussion and consensus. View importance ratings fall into five classes from 1 to 5. Class 1 views have the highest view importance and Class 5 the lowest.

Viewpoint Importance

Viewpoint importance assesses the extent to which the viewpoint is publicized and managed for visitors. The rating system assumes that to have the highest importance rating the viewpoint must:

- Be extensively publicized, especially for its scenic views, in NPS or external communications and media (e.g., hiking guides, websites, movies).
- Have facilities that have been added or are planned for the viewpoint area to enhance the visitor experience; and
- Have a high level of interpretive services that contribute to the visitors' enjoyment of scenic, historical, cultural scientific or other NPS values of the unit.

Viewed Landscape Importance

Viewed landscape importance assesses the extent to which the elements in the viewed landscape are publicized and used for interpretation. The assessment also evaluates how important special designations such as congressionally designated Wilderness or National Historic Sites are within the view. The viewed rating system assumes that to have the highest level of importance the viewed landscape must:

- Be extensively publicized, especially for its scenic views, in NPS or in external communications or media (e.g., hiking guides, websites).

- Consist completely or mostly of specially designated areas, or nationally/regionally significant scenic, historic, cultural, or scientific features or landmarks (e.g., wilderness areas, cultural landscapes).

- Strongly illustrate the NPS unit's scenic character or important interpretive themes and/or be connected to the unit's goals for visitor experience.

Viewer Concern

Viewer concern assesses the usage and value of the view to visitors for purposes related to scenic enjoyment. The evaluation of viewer concern relies primarily on the knowledge and professional judgment of NPS staff, and the rating system assumes that to have the highest level of viewer concern:

- The viewpoint must have a high level of visitation in relation to other viewpoints in the park;

- Viewers generally spend an extended period of time at the viewpoint; and

- Most visitors would be unusually sensitive to potential changes in a view because they are seeking views of natural character or historic significance.

Figures 4 and 5 show the front and back pages, respectively, of the View Importance Form. The group uses a set of structured questions and possible responses that correspond to the rating values as an aid to rating the view importance.

2.3.4 SCENIC INVENTORY VALUE

The Scenic Inventory Value (SIV) is the combination of the Scenic Quality Rating (SQR) and View Importance Rating (VIR) into a single measure. The SIV is derived using a matrix (Table 1) to arrive at one of five possible SIVs ranging from Very Low (VL) to Very High (VH).

The SIV represents a scenic conservation value for each view relative to other inventoried views. The SIV is the final visual resource value for an individual view that is recorded in the *Enjoy the View* spatial database for further interpretation, analysis, and visualization.

2.4 SCENIC INVENTORY COMPOSITE

Frequently, inventoried views will overlap, that is, an area within the viewed landscape may be visible from two or more inventoried viewpoints. To account for such areas of overlap, the inventory process determines a Composite Scenic Inventory Value (Composite SIV). Where viewsheds overlap, Scenic Quality and View Importance ratings are combined to generate a new composite SIV that reflects the highest ratings of each overlapping view. Composite SIVs are derived using a geospatial analysis in a geographic information system (GIS) by mapping visible areas from each viewpoint (i.e., viewsheds) and combining them to identify and map areas of multiple view overlap. A portion of a sample Composite SIV map from Gates of the Arctic National Park and Preserve is shown in Figure 6.

2.5 VISUAL RESOURCE INVENTORY DATABASE

All inventory data, including viewshed maps and photos, are stored in a spatial database available to all park areas. The spatial database integrates semi-automated mapping capabilities with the data storage and retrieval capabilities of traditional database systems. The database uses the inventory data to map viewsheds, assign SQR, VIR, and SIV ratings to individual views, and to derive composite SIVs through overlay of overlapping viewsheds. The database also has reporting capabilities, and several types of standardized reports can be run for individual views or the park area as a whole.

NPS Visual Resource Inventory

View Importance Form

Viewpoint No.:

NPS Unit Name:	Recorder:	Date:
Viewpoint Name:	Viewed Landscape Name:	
Evaluators:		

VIEWPOINT DESCRIPTION

VIEWPOINT TYPE

Viewpoint Value Type(s) (Choose all that apply): ☐ Scenic ☐ Historic/Cultural ☐ Other

Viewpoint Spatial Type (Choose one): ☐ Point ☐ Linear ☐ Area

VIEWPOINT SUBTYPE (Complete for selected viewpoint value type)

Scenic

☐ Designated scenic overlook ☐ National Scenic or Recreation Trail ☐ Other trail
☐ National Parkway ☐ National Scenic Byway/All American Road ☐ Other designated scenic road
☐ Wilderness Area ☐ Wild & Scenic River [☐ Wild ☐ Scenic ☐ Recreational]
☐ Natural feature (e.g. peak, promontory) ☐ Other

Describe:

Historic/Cultural

☐ National Historic Trail [☐ Visual Setting Important ☐ Not Important]
☐ High Potential Site or Segment ☐ Not High Potential Site or Segment
☐ Historic Property (NRHP-listed) [☐ Visual Setting Important ☐ Not Important]
☐ Site ☐ District ☐ Landmark ☐ Structure ☐ Object
☐ National Historic Landmark ☐ National Historic Site ☐ Traditional Cultural Property
☐ Historic Property (NRHP-eligible) [☐ Visual Setting Important ☐ Not Important]
☐ Identified Cultural Landscape
☐ National Heritage Area
☐ Cultural Resource (not-evaluated for, or listed on NRHP)
☐ Traditional Cultural Property (not evaluated for, or listed on NRHP; but identified by cultural group)
☐ Other

Resource Identification No.: _____ Resource Name: _____
Describe:

Other

☐ Park entrance [☐ Major ☐ Minor] ☐ Day use area (picnic area, visitor center, etc.)
☐ Day/night use area (lodge, cabin, campground) ☐ Other

Describe:

VI-F 1 06/26/2014

FIGURE 4 View Importance Form, Front Page

NPS Scenery Conservation Program

View Importance Form

VIEWED LANDSCAPE DESCRIPTION			
Designated Scenic Components within Viewed Landscape (Choose all that apply)			
☐ National Scenic or Recreation Trail		☐ National Scenic Byway/Road	
☐ National Park	☐ National Monument	☐ National Rec. Area	☐ Wilderness Area
☐ Wild & Scenic River	☐ National Nat. Landmark	☐ National Seashore	☐ Component(s) not present
☐ Other			
Describe:			
Designated Historic/Cultural Components within Viewed Landscape (Choose all that apply)			
☐ Historic Property (NRHP-listed): ☐ Site ☐ District ☐ Landmark ☐ Structure ☐ Object ☐ National Historic Landmark ☐ National Historic Site ☐ Traditional Cultural Property ☐ Identified Cultural Landscape ☐ National Heritage Area			
☐ Historic Property (NRHP-eligible)	☐ National Historic Trail	☐ Other	
☐ Traditional Cultural Property (not evaluated for, or listed on NRHP; but identified by cultural group)		☐ Component(s) not present	
Resource Identification No.:		Resource Name:	
Describe:			
Non-Designated Components within Viewed Landscape (Choose One)			
☐ Nationally/regionally significant scenic, historic, cultural, or scientific feature or landmark		☐ Component(s) are not present	
Describe:			

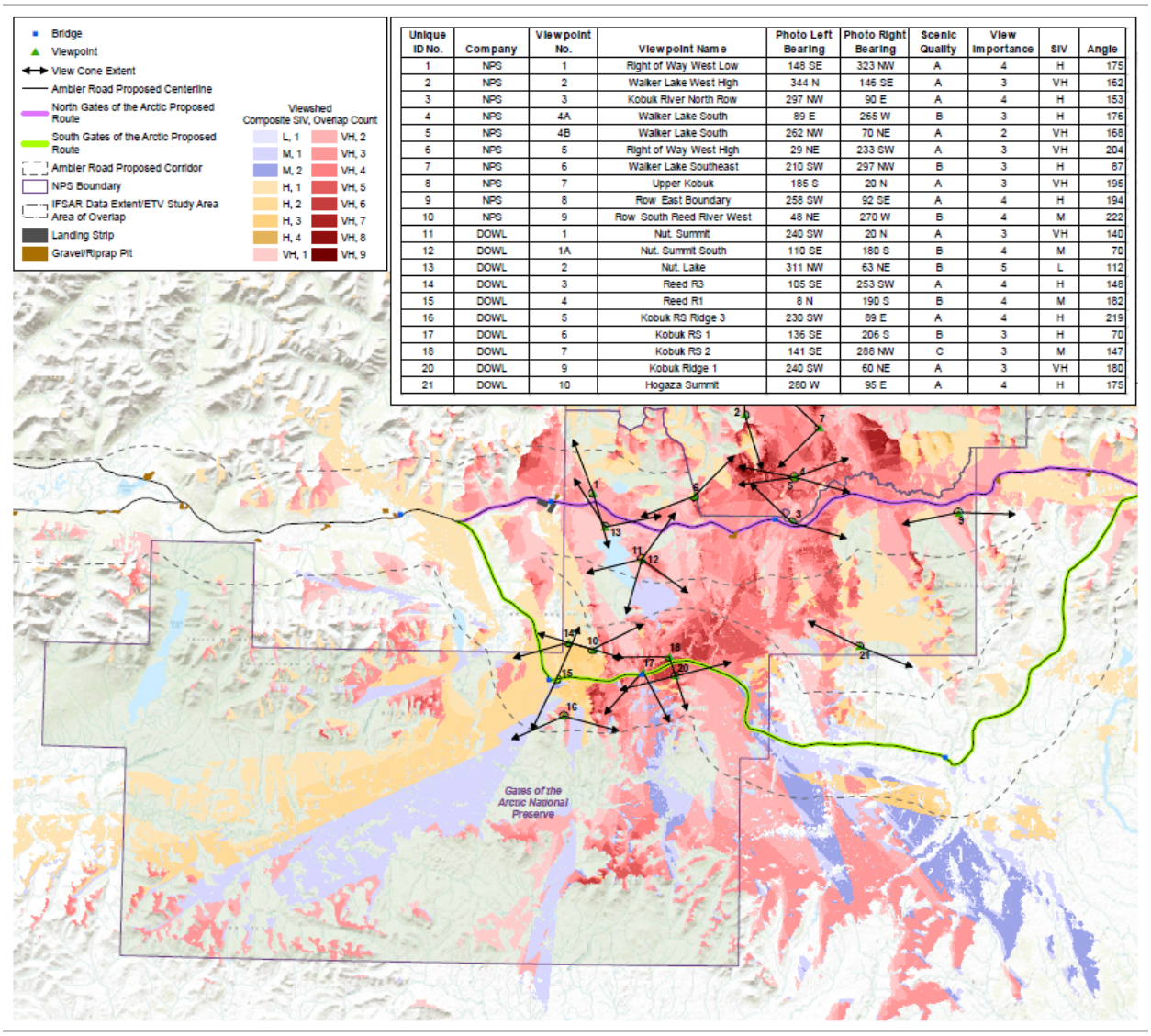
VIEW IMPORTANCE						
Importance Factors	Rating	Rationale				
Viewpoint Importance						
Publicity						
Facilities and management						
Interpretive Services						
Viewpoint Total						
Viewed Landscape Importance						
Publicity						
Specially Designated Areas						
Interpretive Themes						
Viewed Landscape Total						
Viewer Concern						
Daily Visitation						
View Duration						
Viewer Sensitivity						
Viewer Concern Total						
VIEW IMPORTANCE TOTAL						
VIEW IMPORTANCE RATING	☐5 (9-15)	☐4 (16-23)	☐3 (24-30)	☐2 (31-38)	☐1 (39-45)	

SCENIC INVENTORY RATINGS	Scenic Quality	View Importance	SCENIC INVENTORY VALUE (from SIV matrix)	

FIGURE 5 View Importance Form, Back Page

TABLE 1 Scenic Inventory Value Matrix

Scenic Quality	View Importance Rating				
	1	2	3	4	5
A	VH	VH	VH	H	M
B	VH	VH	H	M	L
C	H	H	M	L	L
D	H	M	L	VL	VL
E	M	L	VL	VL	VL



Unique ID No.	Company	Viewpoint No.	Viewpoint Name	Photo Left Bearing	Photo Right Bearing	Scenic Quality	View Importance	SIV	Angle
1	NPS	1	Right of Way West Low	148 SE	323 NW	A	4	H	175
2	NPS	2	Walker Lake West High	344 N	146 SE	A	3	VH	162
3	NPS	3	Kobuk River North Row	297 NW	90 E	A	4	H	153
4	NPS	4A	Walker Lake South	89 E	265 W	B	3	H	176
5	NPS	4B	Walker Lake South	262 NW	70 NE	A	2	VH	168
6	NPS	5	Right of Way West High	29 NE	233 SW	A	3	VH	204
7	NPS	6	Walker Lake Southeast	210 SW	297 NW	B	3	H	87
8	NPS	7	Upper Kobuk	185 S	20 N	A	3	VH	195
9	NPS	8	Row East Boundary	258 SW	92 SE	A	4	H	194
10	NPS	9	Row South Reed River West	48 NE	270 W	B	4	M	222
11	DOWL	1	Nut. Summit	240 SW	20 N	A	3	VH	140
12	DOWL	1A	Nut. Summit South	110 SE	160 S	B	4	M	70
13	DOWL	2	Nut. Lake	311 NW	63 NE	B	5	L	112
14	DOWL	3	Reed R3	105 SE	253 SW	A	4	H	148
15	DOWL	4	Reed R1	8 N	190 S	B	4	M	182
16	DOWL	5	Kobuk RS Ridge 3	230 SW	89 E	A	4	H	219
17	DOWL	6	Kobuk RS 1	136 SE	206 S	B	3	H	70
18	DOWL	7	Kobuk RS 2	141 SE	288 NW	C	3	M	147
20	DOWL	9	Kobuk Ridge 1	240 SW	60 NE	A	3	VH	180
21	DOWL	10	Hogaza Summit	280 W	95 E	A	4	H	175

FIGURE 6 Example Composite SIV Map, Gates of the Arctic National Park and Preserve

3 RESULTS AND CONCLUSION

3.1 SCS IMPLEMENTATION RESULTS AND DEVELOPMENT STATUS

At the time of this writing, VRIs have been undertaken at 17 park areas, ranging from large parks with predominantly natural-appearing landscapes in the western United States to smaller units with heavily altered historic/cultural landscapes such as battlefields and recreation areas in the Midwest and eastern United States. Many of these park areas are faced with potentially significant scenic impacts from utility-scale renewable energy or transmission facility, or urban development beyond park boundaries. VRIs have been undertaken at the following park areas:

- Agate Fossil Beds National Monument,
- Captain John Smith Chesapeake National Historic Trail,
- Catoctin Mountain Park,
- Chaco Culture National Historical Park,
- Chattahoochee River National Recreation Area,
- Chimney Rock National Historic Site,
- Death Valley National Park,
- Delaware Water Gap National Recreation Area,
- Gates of the Arctic National Park and Preserve,
- Grand Canyon-Parashant National Monument,
- Homestead National Monument of America,
- Joshua Tree National Park,
- Mojave National Preserve,
- Monocacy National Battlefield,
- Potomac Heritage National Scenic Trail,
- Redwood National and State Parks, and
- Scotts Bluff National Monument.

Several additional inventories are planned for Fiscal Year 2016. Results so far indicate that the VRI process can be implemented successfully by NPS staff and volunteers who are not visual resource experts. VRI results have been used to address a variety of concerns related to development near the inventoried park areas, including potential oil and gas, solar, and wind development, as well as mining-related infrastructure and industrial facilities.

Current VRI development activities include refinements to the database mapping and reporting capabilities, and development of comprehensive documentation and training materials. Work is also underway to incorporate VRI results into various NPS planning efforts, as described in Meyer and Sullivan (2016).

3.2 CONCLUSION

This paper describes the NPS VRI and its application to visual resource concerns of NPS park areas. NPS initially developed the VRI in response to concerns arising from potential scenic impacts from renewable energy, electric transmission, and other types of development on lands and waters near NPS units; however, the VRI can be used effectively to help manage viewscapes within NPS units as well. Like other visual resource inventory systems, the design of the VRI reflects the agency's unique mission and its management objectives. Because historic and cultural resources are essential to the scenic experience of NPS visitors, the VRI incorporates historic, cultural, and other values in a measure of view importance, in addition to scenic quality, into the scenic resource inventory process. VRIs have been conducted at a variety of NPS units, and have demonstrated that the VRI can be used successfully by park staff and volunteers. The VRI provides a variety of information that is useful for park planning to protect visual resources both within and beyond park area boundaries.

4 ACKNOWLEDGEMENTS

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5 REFERENCES

BLM (Bureau of Land Management), 1984, *Visual Resource Management, BLM Manual Handbook 8400, Release 8-24*, U.S. Department of the Interior, Washington, DC.

BLM, 1986, *Visual Resource Inventory, BLM Manual Handbook 8410-1, Release 8-28*, U.S. Department of the Interior, Washington, DC, January.

Kulesza, C., Y. Le, and S.J. Hollenhorst, 2013, *National Park Service Visitor Perceptions & Values of Clean Air, Scenic Views, & Dark Night Skies; 1988-2011*, Natural Resource Report NPS/NRSS/ARD/NRR-2013/632, National Park Service, Ft. Collins, CO.

Meyer, M., and R. Sullivan, 2016, "The National Park Service Visual Resource Program: Supporting Parks in Scenery Conservation," presented at the National Association of Environmental Professionals Annual Conference, April 11–14, 2016, Chicago, IL.

NPS (National Park Service), 2015, *National Park Service Overview*, U.S. Department of the Interior. Available at http://www.nps.gov/aboutus/upload/NPS-Overview-2015-update-11-16-15-2.pdf. Accessed February 10, 2016].

Sullivan, R., and J.M. Abplanalp, 2013, *Utility-Scale Solar Energy Facility Visual Impact Characterization and Mitigation: Project Report*, Argonne National Laboratory, Argonne, IL.

Sullivan, R.G., and J.M. Abplanalp, 2015, *Visibility and Visual Characteristics of the Ivanpah Solar Electric Generating System Power Tower Facility: Project Final Report*, ANL/EVS-15/4, Argonne National Laboratory, Argonne, IL.

Sullivan, R.G., and M. Meyer, 2015, "The Scenery Conservation System: Incorporating Historic and Cultural Values into Scenic Resource Inventories" presented at the National Association of Environmental Professionals, 40th Annual Conference, April 13-16, 2015, Honolulu, HI.

Sullivan, R.G., L. Kirchler, T. Lahti, S. Roché, K. Beckman, B. Cantwell, and P. Richmond, 2012a, "Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes," presented at the National Association of Environmental Professionals 37th Annual Conference, May 21–24, 2012, Portland, OR. Available at http://visualimpact.anl.gov/windvitd/docs/WindVITD.pdf.

Sullivan, R.G., L. Kirchler, C. McCoy, J. McCarty, K. Beckman, and P. Richmond, 2012b, "Visual Impacts of Utility-scale Solar Energy Facilities on Southwestern Desert Landscapes," presented at the National Association of Environmental Professionals 37th Annual Conference, May 21–24, 2012, Portland, OR. Available at http://visualimpact.anl.gov/solarvis/docs/Solar_Visual_Impacts.pdf.

Sullivan, R.G., L. Kirchler, J. Cothren, and S. Winters, 2013a, "Offshore Wind Turbine Visibility and Visual Impact Threshold Distances," *Environmental Practice* 15(1):1–17. Available at http://visualimpact.anl.gov/offshorevitd/docs/OffshoreVITD.pdf.

Sullivan, R., Abplanalp, J., Cantwell, B., and K. Beckman, 2013b, *Potential Visual Impacts of Utility-Scale Solar Energy Development within Solar Energy Zones on Selected Viewpoints in Death Valley and Joshua Tree National Parks, and El Camino Real De Tierra Adentro National Historic Trail*, ANL/EVS/R-12/6, Argonne National Laboratory, Argonne, IL, June.

Sullivan, R., J. Abplanalp, S. Lahti, K. Beckman, B. Cantwell, and P. Richmond, 2014, "Electric Transmission Visibility and Visual Contrast Threshold Distances in Western Landscapes," *Proceedings, National Association of Environmental Professionals, 39th Annual Conference*, April 7–10, 2014, St. Petersburg, FL. Available at http://visualimpact.anl.gov/transvctd/docs/TransmissionVCTD.pdf.

USFS (United States Forest Service), 1995, *Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701*, U.S. Department of Agriculture, U.S. Government Printing Office, Washington, DC.