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Using Events as a Mapping Concept that Complement Existing ROS Methods

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The Recreation Opportunity Spectrum (ROS) methods have used static measures such as spatial zones for settings and activities. However, visitor perceptions, activities, and experiences are dynamic and not always localized within a single and static ROS zone. The ROS framework could be enhanced by methods that document common movements across time and space during peoples' recreation engagements. This paper adds movement as a third pillar to the ROS conceptualization. The purpose of this paper is to demonstrate the improved utility of event mapping methods over traditional ROS mapping techniques by comparing an ROS map with an event map derived from research in the Spruce Knob-Seneca Rocks National Recreation Area. Visitors were interviewed on-site using a structured instrument ($n = 176$). Six common events were mapped and compared with the ROS map. Results suggest that vectors, lines, points, and other symbols complement ROS polygons and better address movement during recreational events.

Keywords environmental perception, recreation events, recreation zoning, recreation opportunities

Introduction

Brown (1984) proposed the recreation opportunity production process and suggested that the recreation product involves a combination of opportunities, including inputs (i.e., activities and settings) that generate outputs (i.e., experiences and benefits). Both the setting and the activity play an important role in the production process because they are inputs that are recognized by visitors and can be manipulated through management. This paper expands on these inputs and demonstrates a method that can enhance the usability of recreation opportunity mapping. Usability is enhanced by adding symbols to an otherwise static map of recreation opportunities.

Environmental perception theory (Gibson, 1986) is used as the conceptual framework for this research because it complements Brown's (1984) production process by combining both setting and activity inputs into a more dynamic concept called a perceptual event. An event is operationally defined as the setting-movement-activity linkage in language (e.g.,

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hiking *to* an overlook). The type of preposition used specifies the type of movement as either locational (e.g., in or at) or directional (e.g., to or from) and can be portrayed on maps using a variety of symbols such as polygons and vectors. Because the definition of an event includes the concept of movement, more dynamic map illustrations of recreation inputs are possible. For example, hiking along a ridge is an event that can be portrayed on maps using an arrow or vector.

Description of ROS

To help recreation managers determine the existing supply of opportunities available in an area, the inputs of the production process have often been inventoried using the Recreation Opportunity Spectrum (ROS) framework (Brown, 1984; Driver & Brown, 1978; Driver, Brown, Stakey, & Gregoire, 1987). The physical, biophysical, and social components of a landscape are important factors (i.e., inputs) that contribute to the ROS classification of six settings along a continuum of opportunities ranging from Primitive (i.e., remote, large, and undeveloped settings) to Urban (i.e., easily accessible and developed settings).

ROS, developed based on Brown's (1984) production process, is used by the Forest Service and Bureau of Land Management. The Forest Service has successfully used the ROS framework for over two decades to illustrate diversity of recreation opportunities, to recognize that visitor experiences are tied to the resource, and to identify zone setting attributes representing different management objectives. However, because movement is not an input considered in Brown's production process, the resulting ROS maps are static.

Shortcomings of ROS

ROS produces static representations of recreational opportunities that are formulated on static descriptions of recreational classes (i.e., setting and activity inputs) that are used to divide the recreational area into zones. For example, viewing scenery, hiking, horseback riding, and tent camping are among the activities listed for primitive ROS zones (USDA Forest Service, 1982). Some of these activities such as tent camping are locational and often take place within a single ROS zone. But what about movement across time and space? Some activities (e.g., hiking) can take place across several zones.

The problem with static descriptions was documented in a study of visitors at Isle Royale National Park (Pierskalla, 2000; Pierskalla, Anderson, & Lime, 2000). The researchers found that 100% of visitors' localized activities such as camping and swimming occurred within the proper ROS units (e.g., primitive, backcountry, wilderness portal, and frontcountry areas). Yet more than 35% of backpacking activities on the island took place across multiple units because of movement. The realization that recreational activities can take place across multiple zones suggests that additional analysis units are needed in planning. Researching recreational opportunities further may help expand the utility of ROS.

When illustrating recreational inputs (e.g., hiking to an overlook) on maps, various symbols such as polygons, lines, and arrows might be seen that indicate the location and direction of recreational events. Although these symbols are often seen on weather, historic maps or social assessments (e.g. weather maps) (Siniscalchi, Pierskalla, Selin, & Palmer, 2006) that describe events or stories that unfold across a landscape, outdoor recreation maps have not used them. Most recreation planning maps rely heavily on polygons or spatial zones, but they rarely include vectors or other symbols that specify the spatial length and direction associated with movement across space. Since visitor perceptions and activities are not always localized within a single ROS zone, ROS tools may at times provide no options to managers. With a more developed theory of recreation that includes the concept

of an event, recreation planners will have an enhanced toolbox and language to expand their management options.

Proposed Solution

The traditional ROS framework could be enhanced by methods that document common movements across time and space during peoples' recreation engagements. To help address the current shortcoming, this paper adds a third pillar called movement to the ROS conceptualization. By adding movement to activities and settings, a more dynamic description of recreation inputs called an *event* can be operationally defined. An event was defined in this paper as the activity—movement (or preposition)—setting sequence (e.g., hiking-to-the overlook) of language that describes the relationship that exists between humans and the environment. This relationship has geometric meanings that can be illustrated on maps as either directional (i.e., vectors) or locational (i.e., polygons or points). For example, hiking (activity) to (movement) an overlook (setting) is a directional event that can be represented on a map with a single-headed arrow or vector.

The purpose of this paper is to demonstrate the enhanced utility of event mapping methods over traditional ROS mapping techniques by comparing two maps. One map was developed from ROS mapping efforts and the other map was derived from this research focused on events in the Spruce Knob-Seneca Rocks National Recreation Area (NRA). By better understanding how events are perceived, described in language, and illustrated on maps, this paper contributes to the development of an expanded toolbox that can provide managers with more options.

Literature Review

Environmental Perception

The ecological approach was first presented by J. J. Gibson in the 1950s and brought about changes in how people think about human perception and the search for information (e.g., light, sounds, smells, touch, and taste) from the environment (Gibson, 1966, 1986, 2000; Hammitt, 1983; Pierskalla & Lee, 1998; Pierskalla, Lee, Stein, Anderson, & Nickerson, 2004; Pierskalla, Grushecky, Edwards, & Stein, 2005; Reed, 1997; Shaw, McIntyre, & Mace, 1974). Gibson's theory of perception is a departure from the passive perceiver of categorical objects to a bottom-up theory involving dynamic understanding of human-nature relationships involving an active perceiver of meaning filled events. Environmental perception asserts that the human perceptual system can simply read information about the environment directly from the stimulus array, rather than having to draw inferences from incomplete cues. Further, reading information about the environment requires some type of movement from the eyes, head, or body. The recognition of movement makes this theory more dynamic. Thus it serves as the conceptual framework for our paper.

> Gibson proposed that perceiving involves, in large measure, the detection of invariant properties of the environment in the context of a changing array of stimulus information. Indeed, because we are mobile creatures, a plausible case can be made that perceiving would had to have evolved in part as a process of detecting invariant information in the context of a changing array of information rather than as a static image capturing process. Through an extensive program of research, Gibson (1979) showed in convincing fashion how movement enhances the process of perceiving environmental features; or stated more precisely, how action is a critical facet of the perceptual process (Heft & Nasar, 2000, p. 302).

With the addition of movement to an understanding of perception, environmental perception theory (Gibson, 1986) complements Brown's production process and the ROS framework by combining both setting and activity inputs into a more dynamic concept called a *perceptual event*. Two parts of the theory of environmental perception provide a foundation for an event: First, information is ecological (i.e., it is perceived "as special patterns in the energy fields of the environment" (Reed, 1996, pp. 6–7). Thus the environment provides essential context. Second, the main purpose of perception is to serve as a guiding activity (e.g., approaching a turn on a biking trail with appropriate speed), so what a person does is also important (Carello & Turvey, 2002). Gibson combined these two parts in his theoretical framework by suggesting that situations or events involving the coupling of actors and environments (i.e., production inputs) are meaningful (i.e., afford desirable or undesirable production outputs).

Events

Recreational events are the spatial and temporal units of human-nature interaction that unfold as people engage in recreational activities such as moving *to*, *through*, *around, in,* or *outside* the recreational environment. Kaplan and Kaplan (1982) explained:

> A scene or landscape setting is not merely something to perceive, but something to enter into. Implicitly at least, one must imagine one-self in the situation. One must consider how one would function if one were to enter into the space and move around in it. (p. 82)

Prepositions, therefore, imply movement in the environment and serve to define the relationship between activity and setting.

The use of prepositions in these examples supports the idea that human perception and activity usually are motivated by a basic need to go or be somewhere. Some events (e.g., hiking *to* a lake or walking *along* a stream) are directional and are associated with the need to go somewhere. Some locational events, however, are associated with being somewhere and can take place *within* or *in* spatial recreational zones (e.g., camping *in* a forest or hiking *within* a primitive area). Other examples of events examined in research include hiking to a trailhead, walking along a rural road, walking in a completely built setting, sitting indoors with a panoramic window view of a rural setting, sitting in a small but comfortable room with no views, and travel to or from a site (Hammitt, 1980; Hull, Michael, Walker, & Roggenbuck, 1996; Pierskalla & Anderson, 2001).

The possibilities of different types of events are seemingly endless given the variety of recreation activities, diverse settings, and over eighty prepositions in the English language that can be used to describe movement. Because recreation managers have relied heavily on polygons when zoning landscapes in attempt to provide diverse outdoor recreation opportunities (e.g., primitive areas, semi-primitive areas, or developed areas), they have limited their toolbox to tools that fit locational events (hiking within or in a primitive area). What are missing from this toolbox are mapping concepts that also fit directional events such as hiking through, into, across, around, or from a primitive area. Because ROS does not account for recreationists' movement across time and space, the current ROS methods are more effective at representing visitor motives associated with being somewhere rather than going somewhere. Perhaps existing ROS methods are also better able to account for *with*. This conjecture is important to note considering that the single individual in outdoor recreation is less common than group visits.

Because events involve a dynamic relationship described with prepositions, events have advantages over other static concepts such as moment or spatial zone. Harvey (1996) cited Whitehead's sentiment that "event" is a preferred word because it captures the dynamic associated with internal relations. The relevance of internal relations is dependent on the actions of a perceiver.

O'Keefe (1996) believed:

> The primary role of the prepositions is to provide the spatial relationships among a set of places and objects and to specify movements and transformationals in these relationships over time; these spatial relationships and their modifications can be represented by vectors. (p. 281)

Peterson, Nadel, Bloom, and Garrett (1996) believed using prepositions to describe events is acceptable. Prepositions can serve as vector grammar that describe the movement and relationship between activity and setting.

Events as Locational and Directional Analysis Units

The geometrical meanings associated with several examples of map symbols and their associated prepositions are provided in Table 1. These examples are based in part on the work of Landau (1996). Some of the map symbols presented in Table 1 are directional vectors and are capable of conveying information regarding the direction and distance of an event. Biking along a river, hiking to a trailhead, or walking around a lake are examples of directional events and can be portrayed on maps using single-headed arrows. Other events such as walking amid historic sites, climbing on a rock, camping between trailheads, or sunbathing at a beach are locational and can be portrayed on maps as lines, points, blobs, or various polygons.

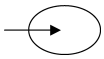
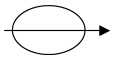
To more fully understand the definition of an event, noting how it differs from a closely related but qualitatively different concept called affordance is important. In a special issue in *Ecological Psychology*, Stoffregen (2000) wrote a target article on affordances and events to help further the development of the concepts. Attempting to motivate a new area of research, Stoffregen concluded by making the assertion that events and affordances are not identical. Gibson's (2000) response to Stoffregen's target paper sheds light on this assertion:

> Two questions have priority for a perception psychologist: What is perceived, and what is the information for it? What we perceive are the affordances of the world. Because perception is prospective and goes on over time, the information for affordances is in events, both external and within the perceiver. Hence, we must study perception of events if we would understand how affordances are perceived (p. 53).

Comparison of Affordance and Event

Recreational affordances are the relations between people and their environment that have aspects with functional consequences or opportunities for action (e.g., hiking, biking, swimming) and attainment (e.g., restorative experiences, family bonding, physical fitness). Affordances provide the meaning associated with events. "Affordances are not fully objective in that they make sense only in the context of an animal-environment system" (Chemero, 2000, p. 38). Depending on the skills of visitors, the perception of certain kinds of affordances can be enhanced or limited (Pierskalla & Lee, 1998). Affordances help define the qualities ranging from low to high of an event. By comparison, events are more objective (Chemero, 2000). Because events are countable units, they can also be quantified in terms

TABLE 1 Prepositions, Geometrical Meanings, and Map Symbols Associated with Various Locational and Directional Events

Prepositions	Geometrical meanings	Map symbols
Within, in, inside, out, outside	Volume; containment or exclusion; locational	
On	Surface; attached; locational	
Across	Intersection; linear place; directional	
Along	Parallelism; linear place; directional	
Between	Two reference objects or places; locational	
Among (more general), Amid (more specific)	More than two reference objects or places—imaginary boundary defined by outliers; locational	
From	Places at the beginning of a path; escape; push; directional	
To, into	Places at the end of a path; attraction; pull; directional	
Through, Via	Places along the way; directional	
Around	Places along a circle; directional	
At, About	A place; locational	

of eventfulness ranging from not much happened to a lot happened (Pierskalla et al., 2005). Hecht (2000) explained:

> Phenomenologically speaking, an event is something dynamic, extended over some period of time, involving some action such as burning, hitting, colliding, throwing, and so forth. A typical affordance, on the other hand, is a property. It can be a property of an object, telling us whether it can be thrown, whether it can collide with its neighbor, or whether it can be used to drive a nail into the wall or feed the fire (p. 58).

Our paper focuses on events and demonstrates the enhanced utility of event mapping methods over ROS techniques. Two maps are compared: one map developed from ROS mapping efforts and the other derived from this research focused on events in the Spruce Knob-Seneca Rocks National Recreation Area (NRA).

Methods

Study Sites

In 1965, the U.S. Congress established the Spruce Knob-Seneca Rocks NRA of the Monongahela National Forest located in Grant and Pendleton Counties, West Virginia. The two

adjacent units (i.e., Spruce Knob and Seneca Rocks) of the NRA consisted of 100,000 acres and was the first NRA to be managed by the USDA Forest Service. The special area was designated a NRA because of its outstanding opportunities for outdoor recreation, wildlife habitat, cultural resource protection (e.g., cattle and sheep grazing), timber production, natural gas production, and scientific study. This unique rural agriculture landscape existed for nearly 200 years. The USDA Forest Service is currently developing a management plan for this NRA.

To initiate the visitor study, a first priority was to identify major sites of recreational activity in the National Recreation Area. To accomplish this task, a review of major sites (e.g., campsites, picnic areas, observation points) was completed based on topographical maps of the NRA. Six zones containing recreational sites were created to facilitate transportation to the onsite interviews. This list was then shown to Forest Service personnel at the Forest Supervisor's office in Elkins and Cheat-Potomac Ranger Station in Petersburg, which was closest to the National Recreation Area to identify other areas for consideration. Based on these comments, five sampling zones containing 19 recreational sites were created across the region. Three sampling zones were in the Spruce Knob unit and two in the Seneca Rocks unit (Figure 1).

Development of the Visitor Survey

A visitor use survey was created to understand the visitor behavior and perceptions in the NRA. The instrument was pretested with six visitors at the Seneca Rocks Discovery Center, and modifications to the order of questions and minor changes to wording were made prior to the start of the study. To improve the flow of the interview, many of the Likert-type measurements were moved to the end of the instrument. As a result, two major sections of the instrument were constructed. The first section of the instrument included interview questions and the second section was comprised entirely of self-administered questions.

Sampling Procedure

An interview schedule was created to interview 200 visitors during the peak visitor use season (July and August, 2004). An interview schedule was developed using a random numbers table. To better ensure that a wide range of recreational events were examined, data were collected on both weekends and weekdays. Two weekdays per week were randomly selected and all weekends were included in the schedule. A random sampling zone was assigned to researchers for each day that visitors were contacted. The survey team composed of seven West Virginia University researchers was trained prior to the study to ensure consistent application of study methods. Instructions were given to researchers during a training session, and each researcher was required to practice administering the interview prior to the study.

Researchers visited the target zone for the day and interviewed visitors at each recreational site including trailheads, parking lots, campgrounds, destination areas, or other key access points. We attempted to contact at least one visitor from each visitor group. The sequence of study sites was determined based on visitor use patterns to maximize the number of contacts for the day. For instance, interviews at the campgrounds were often conducted in the early mornings and evenings.

During the interview process, visitors were approached and asked to participate in a voluntary study by the USDA Forest Service and West Virginia University to help direct the future management of the NRA. Participants were informed that the interview would last approximately 30 minutes and that their information was strictly confidential. Each

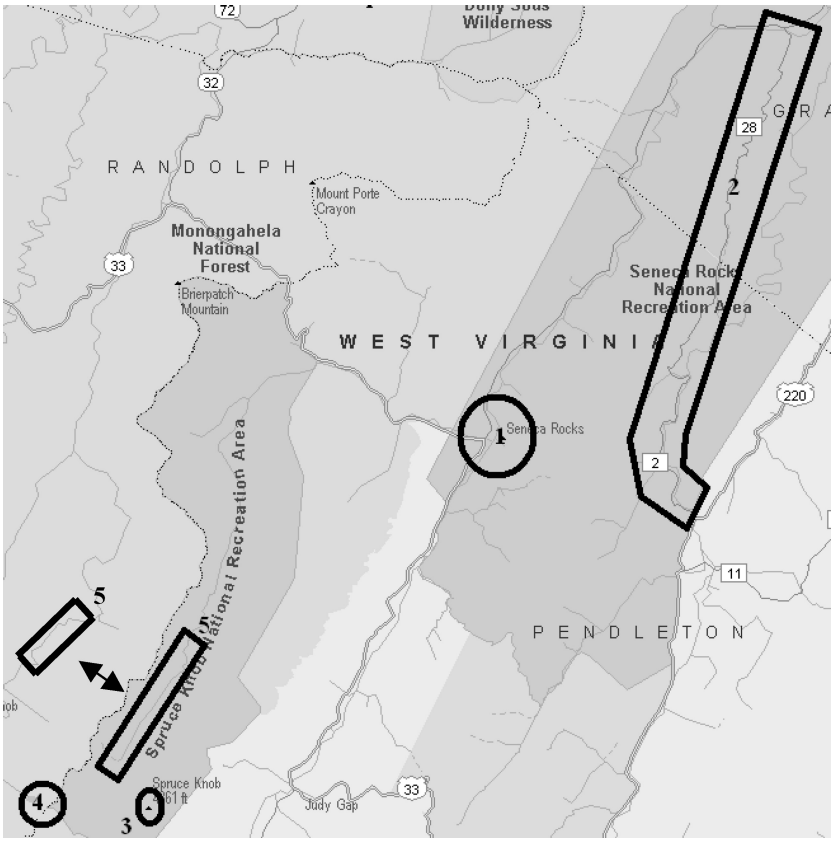


FIGURE 1 Sampling Zones in the Spruce Knob/Seneca Rocks National Recreation Area

Zone 1. Discovery Center, Seneca Rocks Hiking Trail and observation platform, Seneca Rocks picnic area, Site's Homestead, Seneca Shadows Campground

Zone 2. Smoke Hole Road, South Branch Potomac River access, trail heads to North Fork Mountain Trail, Big Bend Campground, Jess Judy group campsite

Zone 3. Spruce Knob Picnic Area, Spruce Knob observation tower and overlook, Whispering Spruce Trail, Gatewood Campground

Zone 4. Spruce Knob Lake, Spruce Knob Lake Campground

Zone 5. Judy Springs Campground (backcountry), Gandy Creek Campsites

interviewer would interview one randomly identified participant of a group. When two interviewers were available, more than one member of the same group would be asked to participate in the study. Schreyer and Lime (1984) suggested that two members of the same group partaking in the same activities at the same settings can have vastly different experiences. The interviewer read the questions and noted the visitor's answers on the survey. The interviewee was asked to complete the last three pages of the survey comprised of Likert-type measurements and questions about personal characteristics. Prior to these sections, participants were told they had the option of entering into random drawings for prizes as an incentive to complete the survey. Participants could terminate the survey at any time and still be entered into the drawing.

Events--Looking back at the activities that you participated in and settings visited up to this point on your trip to the NRA, we would like to know what combination provided the most *meaningful experiences*. Please take some time to review the card provided to help us reconstruct this combination or event. An event last from moments to hours or even days and occur at a site or across a landscape. For example:

Activity	Preposition	Place or object
Hiking	around	Seneca Rocks loop trail
Driving	to	the National Recreation Area
Climbing	up	Seneca Rocks
Camping	at	Smoke Hole Campground
Biking	through	Davis

What was your most meaningful or special event?

Select 1 *ACTIVITY* below	Select 1 *PREPOSITION* below	Select 1 *PLACE* below
Backpacking, Day use	Along	Campground
Backpacking, Overnight	About	Cave/Cavern
Berry picking	Above	Cultural Site
Biking	Across	Falls/Rapids
Bird watching	After	Historical Site
Camping, Developed area	Against	Knob/Mountain
Camping, Primitive area	Among(st)	Lookout/Observation Area
Canoeing	Alongside	Picnic area
Caving	Amid(st)	River/Stream/Creek
Educational courses	Around	Road
Festivals	At	Shelter
Fish viewing	Before	Ski Area
Fishing	Behind	State/Community Park
Floating or rafting	Below	Town/Community
Guided tours	Beneath	Trail
Hiking	Beside	Visitor Center
Horseback riding	Between	Wilderness
Hunting	By	Other_____
Jogging/running	Down	
Kayaking	From	
Motor boating	In	
Mountain climbing	Inside	
Mushroom hunting	Into	
Off-road driving	Near/Nearby	
Orienteering	Off	
Photography	On	
Picnicking	Onto	
Rock climbing	Out/Outside	
Scenic driving	Over	
Self-guided tours	Through	
Sightseeing	Throughout	
Studying nature near water	To	
Swimming, non-pool	Toward	
Visiting a cave or cavern	Under	
Visiting a historic site	Underneath	
Visiting family/friends	Up	
Visiting the visitor center	Upon	
Walking	Via	
Wildflower viewing	With	
Wildlife viewing	Within	
Other_____	Without	

FIGURE 2 Interview Question—Event Profile

During the face-to-face interview portion of the survey, visitors were asked to report the event that provided the most meaningful experience during their trip by selecting an activity, preposition, and setting from a list provided (Figure 2), each representing a separate categorical variable in our study. Next, study participants were asked to depict the event on a map using one or more symbols from a toolbar that was provided to them on a laminated

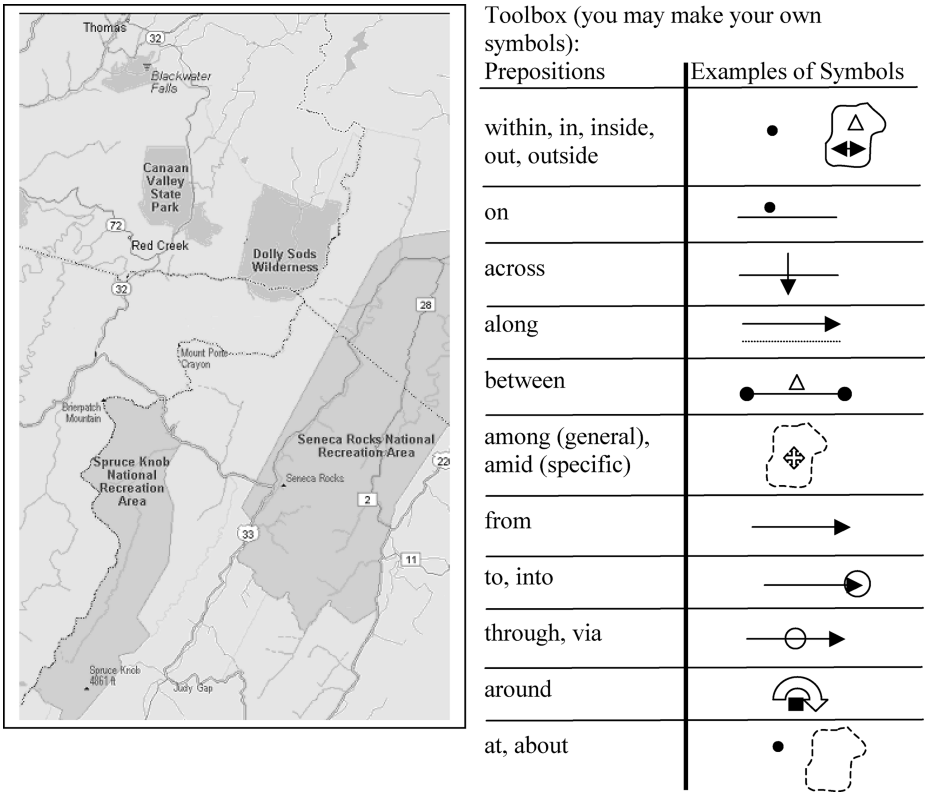


FIGURE 3 Interview Question—Event Symbols and Mapping

card (Figure 3). The symbols provided in the toolbar included polygons, points, arrows, arc lines, and straight lines. Participants could also make up their own symbol to describe their meaningful event. The symbols used by respondents on their map were later coded as a line, arrow, point, or other symbol.

About six interviews were conducted each day. Of the 235 visitors contacted, 176 (75%) agreed to participate. Researchers were able to conduct more interviews on weekends compared to weekdays due to higher use levels.

ROS Mapping

The authors gathered GIS data files from the Forest Service for mapping purposes. ROS mapping protocol (Table 2) was used within a GIS framework to classify existing opportunities available in the NRA and surrounding area. Both public and private lands were inventoried using three criteria that defined the biophysical setting: remoteness (i.e., distance from roads), size (i.e., number of acres), and evidence of humans (i.e., number of structures and land ownership).

Primitive Setting (*P*) provide the most remote recreation opportunities and were the first to be classified in this assessment. To identify potential primitive areas, a three mile buffer of all roads was used to create the first map layer. All areas identified outside the buffer were examined to identify structures or other evidence of humans that exist. Areas with structures were removed from the analysis. The remaining areas or polygons were examined for size. No primitive areas were classified in our analysis because each polygon examined did not meet the minimum size requirement of 5000 acres.

The first map overlay was used to identify potential *Semi-Primitive Non-Motorized Settings* (*SPNM*). Unimproved and improved roads were classified on the overlay. In addition

TABLE 2 ROS Criteria

	Remoteness	Size	Structures
Primitive (P)	> 3 mi from all roads	5000 acres	None
Semiprimitive Nonmotorized (SPNM)	< 3 miles from all roads > $^1/_2$ mile from unimproved roads	2500 acres (except wilderness)	Minimal
Semiprimitive Motorized (SPM)	< $^1/_2$ mile from unimproved roads > $^1/_2$ mile from improved roads	2500 acres (except wilderness)	Minimal
Roaded Natural (RN)	< $^1/_2$ mile from improved roads	None	Scattered (Public Ownership)
Rural (R)	< $^1/_2$ mile from improved roads	None	Readily apparent (Private Ownership)
Urban (U)	< $^1/_2$ mile from improved roads	None	Dominant (Developed areas)

to the three mile buffer of all roads, a half-mile buffer of unimproved roads was examined further for the presence of structures and other developments. Following the removal of areas that were substantially modified, each polygon was examined for size. Those polygons consisting of at least 2500 acres were classified as SPNM. (Dolly Sods Wilderness was classified as SPNM regardless of nearby roads).

All areas not classified as SPNM were examined as potential *Semi-Primitive Motorized Settings* (*SPM*). A one-half mile buffer of unimproved and improved roads was created on the overlay. Areas that were not substantially modified, located within the half-mile unimproved road buffer, and located outside the half-mile buffer of improved roads were examined for size. Polygons of at least 2500 acres were classified as SPM.

Roaded Natural (*RN*) *were areas not* classified as SPNM or SPM and within the half mile buffer of improved roads. There is no size requirement for RN areas. These areas are predominately natural appearing with moderate evidences of humans. Existing structures usually harmonize with the natural environment. Land ownership served as a proxy measure of land modification in our analysis. Privately owned lands such as farmlands were excluded from analysis because our observations suggested that these lands were substantially more developed and modified than public forest lands.

Rural (*R*) areas remained if they were not classified as SPNM, SPM, or RN. There is no size requirement for rural areas either. Urbanized environments such as towns and airstrips were excluded from analysis. These remaining areas classified as rural had a considerably greater density of structures than RN areas.

Urban (*U*) *areas comprised the* remaining areas of the map overlay and included substantially urbanized environments including towns and air strips. Again, there was no size requirement for urban areas.

Results

Event Profile

Events were operationally defined as an activity-preposition-setting linkage, wherein prepositions specified the type of movement as directional or locational. Each of the three

TABLE 3 Prepositions Used to Describe Directional Events

Prepositions	Freq	Percent
Around	14	24.6
Up	12	21.1
Along	10	17.5
To	6	10.5
Through	5	8.8
Down	2	3.5
From	2	3.5
Toward	2	3.5
Other	4	7.0

components of the linkage was reported by respondents and presented in Tables 3–7. Despite the large number of activities (n = 46), directional prepositions (n = 10), locational prepositions (n = 33) and settings (n = 18) to choose from in the survey instrument (see Figure 2), common trends in responses were identified.

Hiking (19.8%), camping (14.5%), fishing (12.8%), sightseeing (8.1%), and rock climbing (7.0%) were among the most common activities selected from the first column of the survey instrument presented in Figure 2. The other items mentioned less than 5% were scenic driving, swimming (non-pool), backpacking (overnight), walking, photography, caving, and visiting family or friends.

One-third (33.3%) of all respondents selected a preposition indicating that their favorite recreational event was directional. The prepositions used include: around, up, along, to, and through (see Table 3). The most common prepositions representing locational events include at, on, in, by, throughout, and near (see Table 4). These prepositions were among those options listed in the second column of the survey instrument (see Figure 2).

TABLE 4 Prepositions Used to Describe Locational Events

Prepositions	Freq	Percent
At	39	34.2
On	18	15.8
In	17	14.9
By	9	7.9
Throughout	6	5.3
Near	5	4.4
Alongside	3	2.6
Among(st)	3	2.6
With	3	2.6
Within	2	1.8
Beside	2	1.8
Nearby	2	1.8
Above	2	1.8
Other	3	2.6

The event settings reported varied in specificity and were also the most diverse event characteristics reported in the study. The most common settings included mountain observation areas such as Spruce Knob, Seneca Rocks and Smoke Hole Canyon high elevation areas (26.3%), campgrounds (12.3%), Spruce Knob Lake (4.7%), cave (2.9%), and National Recreation Area (2.9%). The other items mentioned were other lakes (2.3%), falls/rapids (2.3%), and historic sites (1.2%). These setting categories were derived from items listed in the third column of the survey instrument (see Figure 2).

Event Symbols and Mapping

When asked to draw on a map their favorite event in the NRA during their current visit, visitors used a variety of symbols. The most commonly reported symbols were not included in the toolbox of symbols provided to aid the visitor (Table 5). Symbols such as fishing boats, fish hooks, dashed lines, binoculars, cameras, plants, and animals were used 38% of the time. These symbols were generally pictorial depictions of the event and differed from those symbols presented in the literature (see Figure 2). Polygons (26.3%) and points (25.7%) were also used and support the use of polygons in planning frameworks such as the ROS. However, arrows were used 22.3% of the time and indicated a different characteristic of a recreational event that suggested directional movement, often along trails.

Six common events in the NRA were identified directly from visitor comments by combining the four most common activities, four of the five most common prepositions, and the three most common settings identified in this research. These events have been mapped in Figure 4 using five of the six most common symbols reported by respondents. The events identified include camping at the Seneca Shadows campground, hiking around Whispering Spruce Trail (i.e., Spruce Knob looping trail), fishing at Spruce Knob Lake, hiking along North Fork Mountain Trail (i.e., Smoke Hole Canyon ridge), sightseeing at the Seneca Rocks at the observation platform, and climbing up Seneca Rocks.

ROS Mapping and Comparisons

Five ROS classes were identified in the NRA and surrounding area. The amount of land in each class varied: SPNM (125,267.2 acres), SPM (124,887.4 acres), RN (113,603.0 acres), R (230,068.7 acres), and U (668.0 acres) (Figure 5).

A comparison of the event and ROS maps indicated that four events (67%) fit fairly well within a single ROS zone and included camping at the Seneca Shadows campground (R), hiking around Whispering Spruce Trail (SPM), fishing at Spruce Knob Lake (SPM),

TABLE 5 Symbols Used to Map Recreational Events

Symbol	Example	Percent[a]
Other symbol		38.5
Polygon		26.3
Point		25.7
Arrow		22.3
Arc line		16.2
Straight line		14.0

[a]Totals do not sum to 100 percent due to multiple responses.

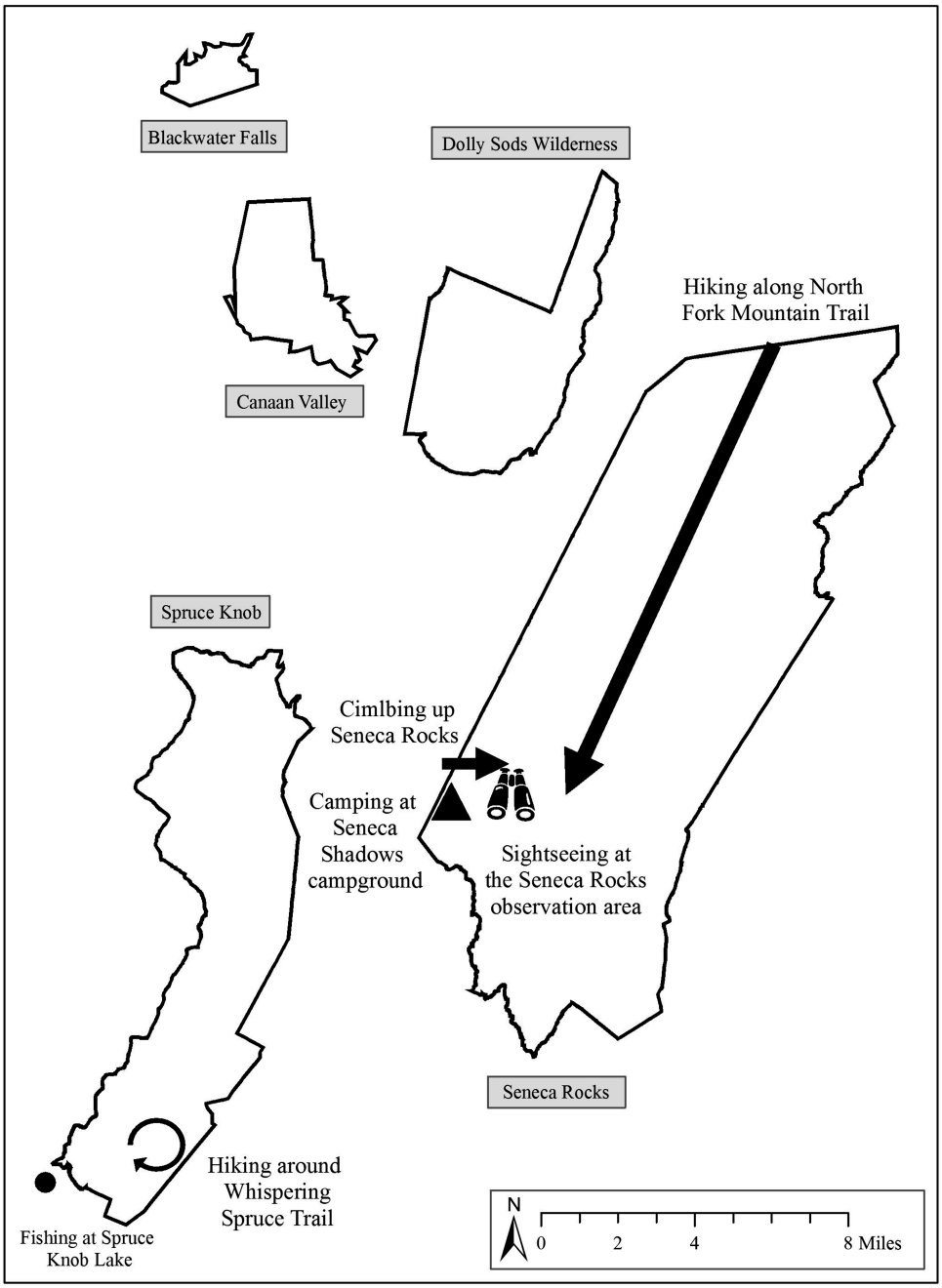


FIGURE 4 Event Map for the National Recreation Area.

and climbing up Seneca Rocks (R). Two events (23%) went beyond several ROS spatial boundaries and included hiking along the North Fork Mountain Trail (SPNM, SPM, RN, and R) and sightseeing at Seneca Rocks (SPNM, SPM, RN, R, and U). The latter two events both involved scenic viewing opportunities from high elevations, but they were perceived during two different activities. As discussed later, the addition of various events improved the usability of the ROS map through the addition of information.

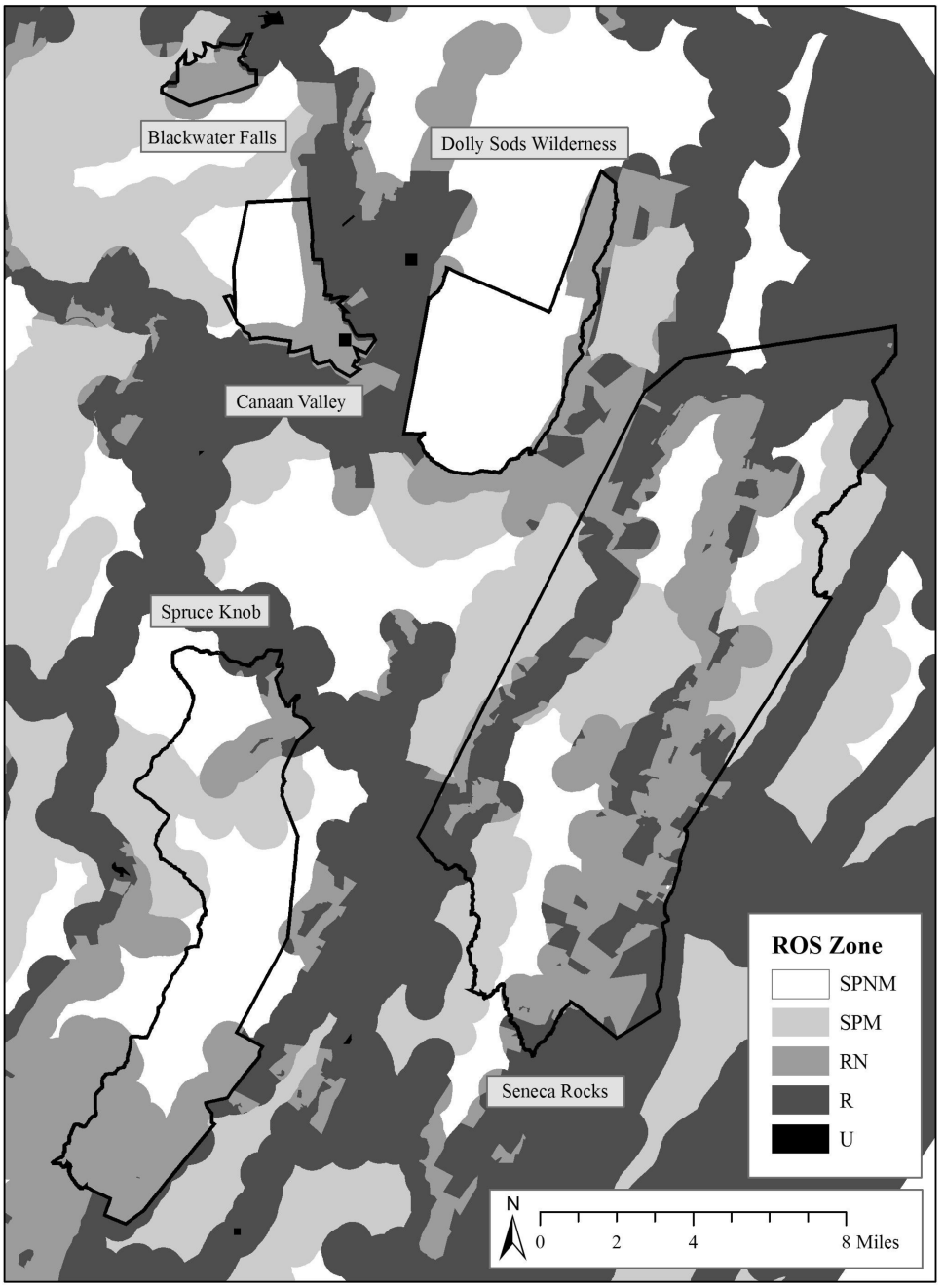


FIGURE 5 ROS Map for the National Recreation Area.

Discussion

This paper added movement as a third pillar to the ROS conceptualization of activities and settings. By adding movement, a more dynamic description of recreation inputs was possible. An event was operationally defined as the activity—movement (preposition)—setting sequence of language that described the relationship that existed between humans and recreational settings. The application of this definition can enhance the usability of ROS

maps by adding information to maps, and it supports Gibson's (1986) theoretical framework by suggesting that events are meaningful to visitors and involve the coupling of actors and environments.

Our findings suggested a need for additional mapping symbols that can complement the use of ROS polygons. One-third of all respondents reported a preposition characteristic of a directional event. The percent of respondents reporting a directional event was consistent with a visitor study of Isle Royale National Park visitors (Pierskalla et al., 2000). The remaining respondents in our study reported locational events that were represented as polygons and points. The frequent use of vectors, points, and other symbols by visitors when mapping important recreation opportunities suggested that events as an alternative analysis unit can enhance the usability of ROS by adding information regarding motivations associated with going and being somewhere. The ROS and event map provided a more complete picture of the opportunities available in the area and filled a void in the land manager's planning toolbox.

By using a combination of polygons, points, arrows, and other symbols, six common events were added to the ROS map. Although camping at the Seneca Shadows campground was one of several examples of an event identified within a RN zone, the campsite symbol added usability to the ROS map by directing attention to a specific activity and recreational resource in the area. Hiking around Whispering Spruce Trail also took place within one zone (RN), but by understanding that hiking often takes place around rather than to and from certain sites, managers can better develop interpretive signage and implement other management tactics that enhances visitor experiences. Fishing at Spruce Knob Lake was an example of a locational event that took place within the RN classification. Once again, by adding a point to a zone and specifying the recreational activity, this analysis unit added specificity and focused more attention on a high-use fishing area. Hiking along North Fork Trail was a directional event along a ridge trail and did not fit within a single ROS zone. This event traversed across several zones within the viewshed representing three different ROS classes. Using a vector as the analysis unit for this hiking event can promote integrated management across several ROS zones (e.g., promoting land use zoning on public and private lands). Sightseeing at Seneca Rocks was a locational event realized within a single ROS zone (RN), but was influenced by all four ROS classes within the scenic vista. The development of partnerships with local landowners, businesses, and elected officials played a particularly important role when managing this event, given the significance of surrounding land uses. Finally, climbing up Seneca Rocks was a directional event that took place within a single ROS zone (RN), but likely afforded a much different experience when compared to the more passive event of sightseeing at Seneca Rocks. Differentiating the two events within the same zone allows managers to develop specific management objectives and target problems unique to each event.

Although this study demonstrated the improved utility of ROS mapping, it did not demonstrate improved validity. However, we hypothesize that stakeholders would likely consider a planning system based on recreation events as analysis units to be more valid than the current ROS system. By including several commonly reported events as analysis units, decision making regarding the development of management objectives, management prescriptions, and indicators and standards of quality was likely to be considered more valid by stakeholders because the event was more meaningful to them. With the information offered by research that uses an expanded toolbox, managers can benefit from more options and flexibility when trying to meet diverse needs especially in adaptive management systems that depend on flexibility. These assertions could be tested empirically by asking stakeholders to evaluate and compare both static and dynamic maps similar to those presented in this paper.

The events identified in the NRA study represented visitors during the peak use season. Future research is needed to identify and map common events that are perceived during the shoulder seasons as well. However, since mapping events simply adds information to a map, these adaptations would seem more feasible when compared to changing the ROS zoning scheme.

The map symbols provided in the toolbox (see Table 1) can be used in future research as a reference for visitors and managers. Although ROS maps visually portray the diversity of recreation opportunities, they fail to represent common events that do not always fit within a single spatial ROS zone—a more static representation of the motive "to be somewhere." Representation is also needed for other recreational movements involved with the motive "to go somewhere." Perhaps the greatest challenge to managers when applying research that uses the proposed toolbox is identifying the scale that captures these common events. In some cases they are site specific (e.g., fishing at Spruce Knob Lake), but in other cases events can have a much broader spatial and temporal scale (e.g., hiking along the Smoke Hole Canyon ridge).

Traditional zoning that relies entirely on spatial zones or polygons as the primary analysis unit utilizes a small fraction of the available prepositions and mapping symbols. If collaboration requires the integration of ideas and resources so that all stakeholders gain, events might be used to better integrate people and places during a collaborative planning process. As Daniels and Walker (2001) suggested, collaborative learning "is a means of designing and implementing a series of events. . . to promote creative thought, constructive debate, and the effective implementation of proposals that the stakeholders generate" (p. 15). The collaborative learning process could be extended to mapping exercises provided at workshops and conferences by asking stakeholders to tell a story through use of map symbols and prepositions. Mapping exercises could add more event detail to ROS maps presented in this paper.

In a summary of knowledge on environmental psychology, Williams (2004) presented several arguments and challenges to outdoor recreation managers and researchers. He argued the appropriateness of viewing human-environment relationships in historical and geographical contexts, and added that both spatial and temporal dimensions are needed in the analysis. Gibsonian theory provided a concept that combined both dimensions and was operational defined to permit better interpretation of geometrical meanings associated with those directional and locational events reported by visitors. If events are ecological units of the world, then they can provide managers with a space-time unit that can be illustrated on maps with a variety of symbols. They also can be more easily packaged by other tourism providers when providing visitors with eventful and high quality opportunities.

In conclusion, by improving mapping techniques used to illustrate recreation inputs in more dynamic ways, managers will be better able to document and demonstrate the supply and diversity of recreation outputs. Consequently, events can be added to the recreation planner's toolbox and used in situations where other zoning tools may fail.

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