Integrating Recreation Monitoring, Simulation, Planning and Management

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Outdoor Recreation Short Course

Utah State University
February 29-March 19, 2004
More Information

- [http://www.srnr.arizona.edu/~gimblett/RBSimBibliography.htm](http://www.srnr.arizona.edu/~gimblett/RBSimBibliography.htm)
As native of Phoenix, I grew up loving the surrounding desert and mountain areas, and I often took people from other parts of the country on tours of the state. I’d heard people say that folks possessed a different mentality if they grew up in a large city, but I never experienced it until I took some visitors from New Jersey out on a spring morning to see the desert outside Phoenix.

As they walked among the cactuses and other blooming foliage, one women suddenly stopped and spoke in a frightened tone. “You know, we should be careful out here, there might be snakes.” Before I could answer, her husband reproached her, saying in a rather disgusted manner, “Don’t be ridiculous, Mary. If there were snakes out here, there would be signs.”
Your Turn First!

- What are the recreation management issues that you are faced with in your public land setting?
- How are you currently addressing these issues?
- What are the techniques you currently use to assess visitor use and associated impacts (ie. permits, counters, surveys/diaries etc.)?
More Questions?

• What are the types of information that you would like to have and/or need to collect to effectively manage recreation use?

• What type of management prescriptions that could be tested that are would effectively balance protection with recreation use?
Outline for This Afternoon

- Visitor Monitoring
  - Why and what it provides for you!
- Examples of Visitor Monitoring studies and results
- Linking Visitor Monitoring with Simulation to:
  - Describe current conditions
  - Test and Evaluate Alternatives
  - Interactively working with the public on workable solutions
- Discussion on the Future of Monitoring and Simulation Methods and your projects
Visitor Monitoring and Simulation Applications

- Broken Arrow Canyon, Arizona
  - Mountain biking, hiking, commercial jeep tours

- Grand Canyon River Management Study, Arizona
  - River Rafting Trips on the Colorado River

- Misty Fjords National Monument, Alaska
  - Visitor Use/Wildlife Interaction study (floatplanes, kayaks, recreational and commercial fishing, helicopter tours and cruise ships)

- Port Campbell National Park, Australia
  - Transportation/Visitor Management Study
Visitor Monitoring and Simulation Applications

- Joshua Tree National Park, California
  - Rock Climbing Study
- Frank Church – River of No-return Wilderness, Idaho
  - Backpacker/Recreation and Commercial Stock
- Las Cienegas Conservation Area, Arizona
  - Visitor Monitoring and Impact
- Ironwood Forest National Monument, Arizona
  - Visitor Monitoring and Impact (illegal Activity)
Visitor Monitoring and Simulation Applications

- Inyo National Forest – John Muir and Ansel Adams Wilderness, California
  - Overnight Backpack Use, Day Use and Commercial Stock
- Saguaro National Park, Arizona
  - Day and Overnight use (including recreational horseback riding, hiking, mountain biking, backpacking, ultra running, driving etc.)
This framework illustrates monitoring and simulation in the context of the overall planning and management process.
<table>
<thead>
<tr>
<th>Project/Location</th>
<th>Monitoring and Simulation Projects</th>
<th>Generate Management Objectives</th>
<th>Monitoring and Inventory</th>
<th>Baseline Model / Simulation</th>
<th>General Statistical Simulation Model</th>
<th>Generate Management Scenarios</th>
<th>Simulate / Evaluate Scenarios</th>
<th>Select Preferred Alternative</th>
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<tbody>
<tr>
<td>Frank Church Wilderness of No Return Wilderness (USFS)</td>
<td>Complete</td>
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<td>Joshua Tree National Park (NPS)</td>
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<td>John Muir / Ansel Adams Wilderness (USFS)</td>
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<td>Misty Fjords National Monument (USFS &amp; USFWS)</td>
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<td>Grand Canyon National Park (NPS)</td>
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<td>Sedona - Coconino National Forest (USFS)</td>
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What is currently happening with Recreation Use of Public Lands?

- Visitor numbers are increasing;
- Recreation modes of travel are diverse;
- Conflicts between visitors are increasing;
- Increasing visitor use is causing environmental impacts;
- Management actions can have complex, cascading, unpredictable consequences;
- Management interventions can be costly;
- There are many interacting alternatives for managers to choose from;
- Data collection has been inadequate to base management decisions (Guesswork- underestimates/overestimates etc.);
- Recreation Management is NOT trivial
What needs to be done to improve recreation management?

- Understanding recreation use requires knowledge of the spatial and temporal patterns (ie, where they go, how long they spend etc.); - Conventional Survey Methods to not cut it!

- Recognized need to collect baseline visitor use data and develop more sophisticated tools to help understand human-environment interactions;

- To use this information on patterns of visitor use to derive and justify management actions;
What needs to be done?

- The challenge is to develop methods to collect visitor use pattern data that is reliable, systematic, statistically valid and defensible for making management decisions.

- In addition, this type of information can be used as input to simulation models to test out management scenarios and/or prescriptions.
Traditional methods for collecting and using visitor information

- Traditional instruments for collecting visitor data include:
  - Pedestrian and Vehicle counters – provides volume of users through time, peak use and trend information if collected over a long enough time;
  - Guest books, registration logs, suggestion boxes, provides sporadic, informal information about visitors;
  - Back Country Permits – provides time in/time out, planned itinerary, number of nights;
  - Special Use Permits – provides information on guided trips;
Traditional methods for collecting and using visitor information

– Visitor Surveys/Diaries
  - Ethnographic – Ethnicity, age, sex, education, income, location (zip/postal codes)
  - Activity/Reason(s) for visit
  - Willingness to pay
  - Service/Amenity questions
  - Overall satisfaction
  - Perceived issues/problems
  - Frequency of visit
  - Special attributes of park
  - Mode of travel
  - Party size
  - Date/time of entry
New Methods for Monitoring Visitors

- **Global Positioning Systems (GPS)**
  - *GPS technology for recreational use can save the location and time of an individual at regular time intervals to record a complete record of a user’s trip;*

- **Pedestrian counters**
  - *are constantly improving with modern units designed to operate in a wide range of environmental conditions. Pressure pad counters can be configured in pairs to not only give simple counts with a time stamp, direction of movement and discern modes of travel;*

- **Race timing technology**
  - *works like pedestrian counters except that instead of using pressure to count a radio antenna is coiled in the pad to receive signals from a chip in an ankle bracelet or chip which records a unique identification for each runner in the race;*
New Methods for Monitoring Visitors

- Infrared motion detectors and counters integrated with hidden cameras;
  - are useful in a wide range of applications where infrequent use by people and or animals may be of interest.

- Hybrid systems which combine a number of different monitoring devices and methodologies can be used to gain a more complete understanding of visitor behavior under complex or unusual conditions.
Examples of Monitoring Projects
In May 1999, a study was undertaken in nine different study areas in the John Muir Wilderness in the Sierra Nevada Mountains in California. Data existed on levels of use by entry acquired by observation and permits at trailheads. Little known on distribution, congestion points, or patterns of use and encounters.
Identifying areas of potential congestion in combination with visitor use impact data such as campsite conditions, trail use, or trail conditions aids in evaluating appropriate management prescriptions.
Features of Map Diary

- **Part I - Trip Satisfaction Questions**
  - Campsite and trail conditions, solitude etc.

- **Part II - Map (trails, lakes, destinations, contours etc.)**
  - Duration of visit
  - Number in party
  - Type of activity
  - Day in/Day out
  - Physical encounters with other parties
  - Type and numbers
  - Nightly destinations (i.e. campsites).
  - Entry/exit Locations
Map Diary Approach in Backcountry Settings

Instructions:

We would like you to use the following map to keep track of your journey. Please indicate on the map where you camped, the number and type of encounters you had, and any note at the edge of the map along the route you followed. Check off your encounters on the map. A 'C' beside the campsite and a 'E' that indicates the night of the trip that you camped at the junction (Example C2 = 2nd night of trip) and an 'F' at any lake where you fished.

In addition, we would like you to indicate the number and type of encounters you have with other parties throughout your trip. Place an 'E' to mark any encounters you have along the trail as they occur or while at camp at the end of the day. Associated with the 'E' provide one or more of the following notes to denote the type of encounter(s) you had.  □ (Other Party Camping), 2 (Backpack out) or 3 (Other Backpacker) followed by 'n' which indicates the number of people in the party encountered. (Example EPo = Encounter with a backpack trip with 10 people in party). Any other notes on encounters with others would be appreciated.

If you leave the wilderness boundary or somewhere not designated on the map, please indicate the day you leave, where you go and the day you return to the wilderness area.

At the conclusion of your trip, please provide us with a notation of the map of the location of the best "E" and worst campsite "E" you visited and where you experienced the strongest "S" and least "L" sense of solitude.

Questions:

1. How often have you visited this wilderness area? (Check One)
   □ Frequently
   □ Often
   □ Once
   □ Never before

2. How often do you experience solitude? (Check One)
   □ Never
   □ Seldom
   □ Often
   □ Frequently

3. How often do you go out and experience the wilderness? (Check One)
   □ Never
   □ Seldom
   □ Often
   □ Frequently

4. How often do unacceptable campsite conditions affect your experience? (Check One)
   □ Never
   □ Seldom
   □ Often
   □ Frequently

5. Overall how many people did you expect to see while visiting the wilderness? (Check One)
   □ Less than you actually saw
   □ About as many as you saw
   □ More than you saw
   □ Didn't know what to expect

6. Overall, how would you rate your trip? (Check One)
   □ Poor
   □ Fair
   □ Good, but it just didn't work out very well
   □ Good
   □ Excellent

7. In the following table, please record your planned itinerary:

<table>
<thead>
<tr>
<th>Day</th>
<th>Location</th>
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<tbody>
<tr>
<td>6/19</td>
<td>Silver Lake TH - WALL Lake</td>
</tr>
<tr>
<td>6/18</td>
<td>WALL Lake - Male Lake ORANGE</td>
</tr>
<tr>
<td>6/17</td>
<td>Male Lake ORANGE, MALE LAKE DRAINAGE</td>
</tr>
<tr>
<td>6/16</td>
<td>OUT TO SILVER LAKE TH</td>
</tr>
</tbody>
</table>

8. Did you deviate from your planned itinerary? (Check One)
   □ Never
   □ Seldom
   □ Often

9. If you did deviate from your planned itinerary, could you please indicate why? (Check One)
   □ Campsite occupied
   □ Physical terrain greater than expected
   □ Seek more challenging areas
   □ Encounter with black bears
   □ Weather
   □ Too many parties in vicinity
   □ Site conditions unacceptable
   □ Other ____________________________

WILDERNESS TRIP REPORT

NAME: ____________________________

WILDERNESS PERMIT NUMBER: ______

NUMBER OF PEOPLE IN PARTY: ______

SERVICE BY AN OUTFITTER, PACKER OR GUIDE: __________ (Yes/No)

NAME OF OUTFITTER, PACKER OR GUIDE:

TYPE OF SERVICE: GUIDED/SPONTANEOUS/BUMPED/PACE TRIP (Circle One)

Trailhead Entry Location | Date Entered Wilderness Area | Time In | Time Out | Trailhead Exit Location
--------------------------|-----------------------------|---------|----------|--------------------------
Silver Lake              | 08-01-99                    |         |          | Silver Lake              |

Thank you for taking the time to fill out this trip report for your recent trip to the John Muir/Amiel Adams Wilderness. The Inyo and Sierra National Forests are gathering information to improve management of the wilderness.

This Trip Report contains a map and a few questions that we would like you to answer as you travel through the wilderness. The map is a representation of the wilderness area you will be visiting.

Please take the time to make sure that you have filled out this front page and double check that all camps and encounters are documented for each night you were in the wilderness. Record the trail entry, the date and time you start and finish.

Thank you for your participation.
Map Diary Approach in Backcountry Settings
Impact Monitoring in Backcountry
Distribution of Diary to Backcountry Users

- Issued to Wilderness Permit holders and Outfitters
- Distributed at Trailheads
- Intercept on trails with Rangers and University Team
- Observation at Trailheads
- Drop-Off or Mailback
- Follow-up cards to Permit Holders
Over 60% of All Trips Reported Experiencing Solitude Often
Relational Data Compilation

- Overall 90% Visitors to Study Areas Satisfied with Trip
• 18-20% Commercial Use of Areas Studied
• Entering Spatial and Relational Data from Trip Reports
Spatial Data Compilation

- Spatial Association of Reported Nights Camped
Spatial Data Compilation

Spatial Association of Backpackers, Parties Camping and Stock Outfitters
What does Monitoring Data tell us we did not already know?

- Identify Visitor Use levels by Month, Week, Day and hour on trails or at campsites (if done with some type of diary and counter combination)

- Campsite Occupancy or Vacancy

- Entry/exit times for estimating parking capacity and facility development
Ironwood Forest National Monument – Tucson, Arizona

- Self-Administered Survey
- Intercept interviews and observations
- Trail and traffic counters
Visitor Counts over the Sampling Period

Number of Visitors Recorded

Counter Number

Series 1
Day versus Night Time Use

Hourly Arrivals by Year

Difference Between Hourly Arrivals between 2002 and 2003
Day versus Night Time Use

Hourly Arrivals by Year

Difference Between 2002 and 2003 for increase nighttime use
Commercial and Private Rafting Trips on the Colorado River

- Travel Logs or diary
Number of Trips camped by River Mile
Visitor Use Levels by Location

You may specify any of the following for a New View:

- **Location:** 136.2 R DEER CREEK
- **YAxis:** People
- **XAxis:** TimeScale
- **Beginning Date:** 6/1/98
- **Ending Date:** 8/31/98
- **Activity:** Activity Only

The chart shows the visitor use levels at 136.2 R DEER CREEK from June 1, 1998, to August 31, 1998, with peaks in July 1998.
So visitor monitoring that targets spatial and temporal aspects of the trip can provide us with information about:

- Where visitors enter and to what destinations they travel to;
- How long they spend at those destinations;
- Who they are with;
- What activity they are engaged in;
- Peak periods of use;
- How much use is going on at destinations;
- The most heavily used trails and destinations;
- The type of encounters;
What questions can visitor monitoring not address?

Or

What questions can simulation address that visitor monitoring cannot?
Simulation can address questions like these:

- If changes to access and circulation patterns are needed in some areas of the park, how could these changes affect use patterns and associated impacts in other areas of the park?

- How could these changes affect park neighbors and resources adjacent to the park?

- What kinds of management strategies (area closures, use limits, additional facilities or access, for example) could be most effective in achieving desired modifications in visitor behavior and use patterns while keeping within the ranges of acceptable impacts on experiences and overall park visitation?
Simulation can address questions like these:

- If alternative modes of transportation are explored in some alternatives, what are some scenarios (size and scope of systems, for example) that could achieve desired visitor experience and distribution results?

- How will changes in visitor use types (e.g. increased mountain biking and stock opportunities) affect visitor experiences?

- How would closing the roads in the park to commuting traffic or slowing traffic through design features affect local communities?

- How would these alternatives improve protection of wildlife and visitor safety?
What are the benefits of Simulation?

- A more comprehensive and dynamic understanding of visitor behavior, interactions between visitors and interactions between visitors and the resource base.

- Simulations provide a framework for a more holistic and comprehensive way of incorporating visitor information into the planning and management process.

- Simulation model incorporating visitor information into the planning and management process.
What are the benefits of Simulation?

- A way of measuring visitor interactions that are difficult or expensive to do in the field;
- A way of testing alternative management scenario’s and putting management into an exploratory and experimental framework;
- A way of communicating complex inter-related issues in recreation management to the public and decision makers;
Simulation Applications

- **Broken Arrow Canyon, Arizona**
  - *Mountain biking, hiking, commercial jeep tours*
- **Grand Canyon River Management Study, Arizona**
  - *River Rafting Trips on the Colorado River*
- **Misty Fjords National Monument, Alaska**
  - *Visitor Use/Wildlife Interaction study (floatplanes, kayaks, recreational and commercial fishing, helicopter tours and cruise ships)*
- **Port Campbell National Park, Australia**
  - *Transportation/Visitor Management Study*