Using time-lapsed photography for monitoring backcountry crowding conditions at Pinnacles National Park

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A road map...

- Monitoring and the Visitor Experience and Resource Protection (VERP) planning framework
- An example project at the Pinnacles National Park
- Considerations for using time-lapsed photography
Monitoring and VERP

• Maintain the quality of the visitor experience and protect resources in the face of increasing visitor use.

• Nine steps (NPS, 1997; 2000)
  – Identifying indicators and standards for natural/cultural resources and the visitor experience. Indicators are measurable, manageable variables that help define the quality of desired resource and experiential conditions. Standards define the minimum acceptable condition of indicator variables.
  – Developing protocols for monitoring indicators to ensure standards are not violated.

• While the VERP framework has been implemented in different parks, few have consistently applied monitoring protocols for indicators (Leung et al., 2002; Monz & Leung, 2003, Newman et al., 2001)
  – WHY?
    – Labor intensive
    – Expensive
    – Requires monitoring during peak use when staff are busy
    – May result in inconsistencies and observer error
    – Assumes limited monitoring is representative of seasonal conditions
    – All of which may be exacerbated in backcountry spots
As part of the VERP process, we sought to explore how time-lapsed photography at Pinnacles National Park could be used for monitoring crowding conditions at backcountry attraction sites.
Pinnacles National Park

• 1908 to preserve the incongruent and beautiful rock formations
• Initially 2,060 acres and now contains 26,000 acres
• 343,000 visitors annually
• Designated as the 59th NP in February 2013
Indicators and standards

• Developed during a two-day workshop
• People and vehicles at one time at notable front-country and backcountry visitor attraction sites
• Number of encounters with other groups per day while hiking
• Wait times inside or outside of caves
• Wait times for parking
Visitor survey
– Visual approaches
  (Manning & Freimund, 2004; Manning, 2007)
– Stratified random sampling in the Spring of 2012 ($n = 393$)
Cameras

- **Moultrie Plot Stalker Time-Lapse Camera**
- 8 megapixel
- 16 GB
- Battery operated
- Programmable
- Weather resistant
- $57.99
Placement

- Broad view of attraction site
- GPS coordinates
- Pad lock
- Cable lock
- Every 10 minutes, 7 a.m. to 7 p.m.
- Peak season
Data management

• Periodic download
• 15,000 photographs for 3 attraction sites
• Visually inspected independently by 2 research assistants for inter-rater reliability
• Time, location, weather, light conditions, camera malfunctions, and people at one time
• Entered into MS Excel and transferred to SPSS 20.0
Figure 3.11a. Social norm curve for the acceptability of PAOT at Scout Peak Overlook with current conditions and displacement shown.

Notes:
\[ a = \text{visitor reported average conditions that are not adjusted;} \]
\[ EA = \text{estimated acceptability of the PAOT based on ratio relationships} \]

Acceptability levels:
- Average weekday condition (EA = 3.43)
- Average Sunday condition (EA = 2.65)
- Average Saturday condition (EA = 2.14)
- Unacceptable (EA = 0.00)
Perception vs. Reality?

• Generally visitors tended to report higher *average and maximum* daily PAOTs than observed by the HBC

• Adjustment calculations
Time-lapsed photography considerations

• Expect camera malfunctions, check frequently
• Probably requires development and use of an adjustment calculation
• Ethical considerations: Context specific
Other applications...

• Arcsoft photo studio visual detection software
• Haar Cascade software and codes
• Picasa detection
• Real-time remote monitoring
• Rapid resource change
• Visitor-resource interactions
• Visual weather conditions
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