

Using visitors' reactions to landscape processes to manage a dynamic dune landscape

Ondrej Mitas¹, Helena Mitasova², Harry Zinn³, Gene Brothers⁴

Keywords: dunes, landscape, visitor perceptions, visitor management

Introduction

The unique topography, flora, and fauna of dunes attract visitors looking for hiking, mounted, or motorized recreational experiences. However, the processes that create dunes are dynamic and easily disrupted by natural events and human interference (Van der Meulen & Salman 1996). Therefore, managing dunes for recreation presents a unique challenge. Existing research on managing dunes for public use (e.g., Kuitel et al. 1999, Priskin 2003) focuses on detrimental visitor impacts and mitigating these impacts by limiting access. This research leaves a significant gap in knowledge about managing dunes for recreation. Some dune settings change dramatically, not because of visitor impacts, but because of natural processes that cause dunes to migrate across the landscape. These processes may complicate management for recreation. According to Van der Meulen and Salman, "the mobility of sand dunes has often been considered as a threat to human interests," (p. 187, 1996) even when considering such factors as property assets. Existing research does not bear on the question of managing dune mobility to protect recreation opportunities. In the present study, we close this gap in knowledge in the context of the largest dune system on the U.S. Atlantic coast, Jockey's Ridge. This heavily visited site is located in a North Carolina State Park and protected for the purpose of recreation (Fig. 1).



Figure. 1: a photo of visitors on top of Jockey's Ridge.

¹ The Pennsylvania State University, 811 Ford, University Park, PA 16802, oxm110@psu.edu

² North Carolina State University, Box 8004 Biltmore Hall, Raleigh, NC 27695, gene_brothers@ncsu.edu

³ The Pennsylvania State University, 701D Ford, University Park, PA 16802, hzinn@psu.edu

⁴ North Carolina State University, Box 8208 NCSU Campus, Raleigh, NC 27695, hmitaso@ncsu.edu

The Jockey's Ridge dune has changed dramatically over the past 50 years, losing over half of its elevation (Fig 2.). Recent studies show that the elevation loss is natural and primarily associated with the landforms and changes in vegetation, rather than visitation (Mitasova et al., 2009; Pelletier et al., 2009).

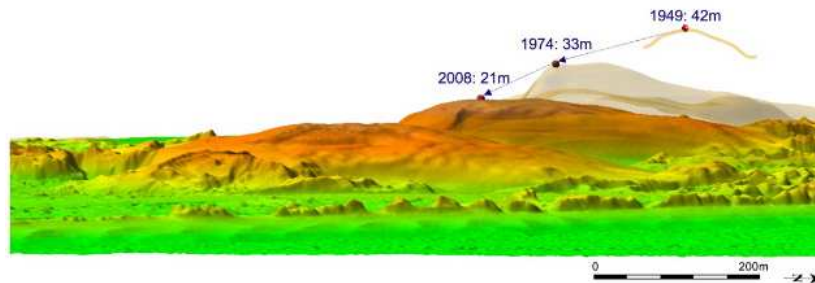


Figure 2: a computer model of 20th and 21st century deflation of Jockey's Ridge.

To help park management evaluate management options, including possible interventions to reverse elevation loss under an integrated management framework (Van der Meulen & Salman 1996), we moved beyond the existing emphasis on visitor impacts in dune research to focus on visitors' experiences. We asked the following questions: 1) What dimensions of the Jockey's Ridge dune landscape are unique and valuable to visitors?; 2) How do visitors react to the changes they see in the Jockey's Ridge landscape?

Methods

We obtained data by surveying visitors to Jockey's Ridge in the summer and autumn of 2005. We sampled on three occasions across summer and autumn, including weekdays, weekends, mornings, and evenings on each occasion, and selecting visitors systematically. Visitors took surveys (86 % response rate) upon entering the park and returned them upon exiting (99% completion rate).

The present study concerns responses to three open-ended items: "What about Jockey's Ridge makes it unique or different from the other attractions you've visited in the area?"; "How do you think time has changed Jockey's Ridge? How do you feel about these changes?"; and "Please take the opportunity to comment on other issues regarding Jockey's Ridge, which may not have been discussed above." Seventy-five percent of respondents (n=170 of 227) responded to these questions, producing over 3500 words of data. We coded the open-ended responses using iterative thematic coding (Strauss and Corbin, 1998). We read the responses several times to identify potential themes of interest. Contextual clues revealed categories of meaningful responses to our research questions, which we coded over repeated readings of the data until no new themes emerged.

Results

Visitors valued the height of the Jockey's Ridge dune, which is decreasing. However, visitors also valued features such as the peaceful natural setting, spectacular view, and the large volume of sand. We found strong emotional reactions to changes in the dune's elevation. Visitors who believed that the elevation loss was natural generally felt positive about the changes. Visitors who blamed the elevation loss on encroaching real estate development felt negative about the changes. Emotional reactions to the dynamic dune landscape, therefore, were contingent on understanding that changes to the dune were natural. A number of visitors expressed the sentiment that changes to a dune landscape over time were inevitable.

Implications

According to Van der Meulen and Salman (1996), "sand dunes are a natural and dynamic system in which there needs to be a certain mobility in an equilibrium situation" (p. 186). Our findings indicate that in such a system, visitors appreciate this mobility if it is perceived to be natural. Based on this

finding, we offered two recommendations to the Jockey's Ridge State Park management. First, we suggested that they inform visitors about the natural processes that cause the dune to change shape and decrease in height. Second, we suggested that they refrain from interfering with these processes to merely increase the dune's height.

Our findings suggest that natural changes in a dune landscape must be managed differently from human impacts. Although it is appropriate to protect dunes from visitor impacts, we conclude that changes perceived as natural contribute to dunes' recreational value and need not be restrained by management.

References

- Kuitel, P., Zhevelev, H., & Harrison, R. (1999). The effect of recreational impacts on soil and vegetation of stabilised Coastal Dunes in the Sharon Park, Israel. *Ocean & Coastal Management*, 42, 1041-1060.
- Mitasova, H., Overton, M., Harmon, R.S. (2005). Geospatial analysis of a coastal sand dune field evolution: Jockey's Ridge, North Carolina. *Geomorphology*, 72, 204-221.
- Pelletier, J., Mitasova, H., Harmon, R.S., and Overton M. (2009). The effects of interdune vegetation changes on eolian dune field evolution: a numerical-modeling case study at Jockey's Ridge, North Carolina, USA. *Earth Surface Processes and Landforms* 34(9), pp 1245-1254.
- Priskin, J. (2003). Tourist perceptions of degradation caused by coastal nature-based recreation. *Environmental Management*, 32(2), 189-204.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage.
- Van der Meulen, F., & Salman, H.P.M. (1996). Management of Mediterranean coastal dunes. *Ocean & Coastal Zone Management*, 30(2-3), 177-195.