A Cumulative Look at Michigan Dune Management

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Abstract

Often dune management is a trial-and-error process focused on a specific site, but cumulative knowledge of multiple sites and management experiences is essential for making good regional management decisions. This study aims to build a more comprehensive understanding of dune management in Michigan by collecting and applying data on the prior experiences of dune managers. Methods included using an online questionnaire to collect responses from managers in private and public dune areas. The survey contained questions regarding what strategies (sand fences, use of vegetation, boarded walkovers, etc.) are being used where, and with what level of success. The survey also questioned dune managers about their career and educational history related to managing dunes. Results showed that the most popular dune management strategy was a boarded walkover, followed by use of vegetation. Sand netting was rated to be the most effective strategy. Most dune managers had a bachelor's degree and ranked themselves at a moderate level of efficacy. Many dune managers responded that they did not expect to be managing dunes when they took their current position. These results suggest a statewide lack of accessible, formal, and organized training in the field of dune management.

Introduction

Dune management can be defined as "all measures aimed at the preservation and restoration of the natural values of a coastal sand dune area" [1]. However, dunes are managed for a myriad of economic and ecological reasons, and Often managers find themselves mediating between the dune and the public, using numerous strategies to do so (Fig. 1). This project investigates the cumulative strategies and experiences of managers for dunes along Lake Michigan.

Figure 1: Example of a dune management strategy (boarded walkover) at North Beach Park.

Study Objectives:
1. Create a questionnaire focused on dune management strategies and manager experiences.
2. Use the questionnaire to collect data from managers of Lake Michigan dunes.
3. Analyze the responses for cumulative trends.

Study Area

The study area of our survey focused on state parks and national parks with dune areas around Michigan (Fig. 2). Some private beach/dune areas were also surveyed. The managers who were contacted worked adjacent to Lakes Michigan and Superior.

Figure 2: Map of Michigan with coastal dune areas highlighted in black [2].

Methods

We developed a questionnaire from existing knowledge and literature review (Table 1). After inviting dune managers to contribute their knowledge, we analyzed results in order to build an understanding of cumulative patterns.

Objectives	Methods
Create a questionnaire focused on dune management strategies and manager experiences.	• Consulted literature on dune management strategies. • Consulted examples of Lake Michigan dune management. • Created questions for use and effectiveness of management strategies. • Created questions for manager background and experiences.
Use the questionnaire to collect data from managers of Lake Michigan dunes.	• Gained IRB approval for survey and online format. • Distributed the survey via email to Michigan dune managers.
Analyze the responses for cumulative trends.	• Analyzed survey responses in Microsoft Excel. • Created visuals to better understand the data.

Table 1: Methods used for each study objective.

Results

The Questionnaire:
The survey included questions about the prevalence and effectiveness of certain dune management strategies (Table 2). The survey contained questions about the managers' professional/educational experience in dune management and what they would like to see in the future.

Section	Specific Topics	Example Questions
Management Strategies • Use of • Efficacy	• Boarded walkovers • Sand netting • Sand fencing • Protective fencing • Use of vegetation (planting, removing native/invasive species)	• "Does your park use sand fences for slowing wind and sand movement?" (Yes/No/Other) • "Rate the effectiveness of sand fences as a management strategy." (Participants could select from a scale of 1-5)
Dune Manager Experience	• Comfort level with dune management • Prior experience and expectations upon entering current position • Educational and professional background • Perceived self-efficacy • Desire for information regarding dune management	• "Did you expect to manage dunes when you started your current position?" (Yes/No) • "What information could make your work more effective? (Check all that apply.)" (Participants were given a list of options, or the choice to type their own).

Table 2: Breakdown of questionnaire sections and content.

Dune Management Strategies:
Our survey received eight responses. The most common management strategies are boarded walkovers and use of vegetation (Fig. 3). These strategies were also rated as the most effective by managers (Fig. 4).
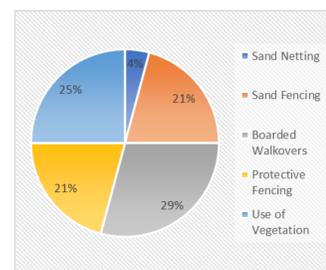

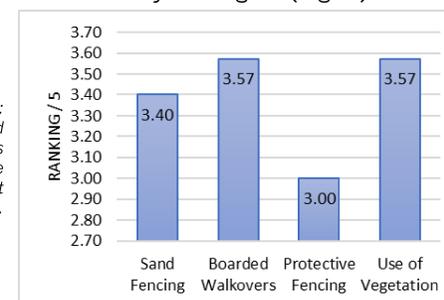Figure 3: Implementations of each dune management strategy.

Figure 4: Average rated effectiveness of dune management strategies.

Dune Manager Experience:
The 8 responding managers worked in diverse park settings (national, state, county, township) and private dune areas. Manager backgrounds and experiences varied (Tables 3 and 4) but all were interested in more information about dune management.

Expected to be managing dunes before position began	Had educational or professional experiences relating to dunes prior to employment	Expressed a desire for more information about dune management in general
3/8 managers	4/8 managers	8/8 managers

Table 3: Dune manager experiences.

	Minimum	Average	Maximum
Education level	Highschool diploma	4- year bachelor's degree	Advanced degree
Years in current position	1-5 years	5-10 years	>20 years
Comfort level with managing dunes	3/10	6.6/10	9/10
Perceived self-efficacy	3/10	5.8/10	8/10

Table 4: Range of dune manager backgrounds and self-evaluations.

Discussion

The responses showed a general variability in managers' philosophies. Some were more hesitant to overmanage, preferring to let nature take its course, while others managed for commercial or economic reasons. Similarly, comments by dune managers suggest that "hard" tactics like built trails are easier to understand and implement than "soft" or dynamic tactics, like use of vegetation (Fig. 5). However, existing literature notes the effectiveness of a natural, "dynamic approach" to dune management in settings worldwide [3].

Although the total number of responses is low, the results suggest some interesting patterns and directions for future study. In general, the variance among managers' education and experience suggests a lack of standard, statewide training related to dunes. Many managers expressed an interest in information relating to big-picture dune management, as well as specific strategies (vegetation and protective fencing being among the most popular). While every dune area is unique, standardized information or trainings could help improve the general confidence and perceived efficacy of dune managers.

Figure 5: Successful use of vegetation in restoring a dune area in North Park.

Conclusions

Survey results show that boarded walkovers and use of vegetation were the most used and most effective strategies. Most managers were not expecting to manage dunes as a part of their work, or had little experience surrounding dunes prior to their employment. They rated their efficacy at a moderate level and expressed interest in more pragmatic and applicable information on dune management. The results indicate a desire and need for more cumulative information, education, and research on dune management strategies.

Acknowledgements

Works Cited

[1] Van Der Meulen, F., and A. H. P. M. Salman. 1996. "Management of Mediterranean Coastal Dunes." *Ocean and Coastal Management* 30 (2-3): 177–195.

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[3] Martínez, M. L., M. A. Maun, and N. P. Psuty. 2008. "The Fragility and Conservation of the World's Coastal Dunes: Geomorphological, Ecological and Socioeconomic Perspectives". *Ecological Studies of Coastal Dunes*, 171(21): 355-369.