

Fragile Dune Environments: Managing for Human Impacts

By Wendy Z. Hultsman

Human impact on fragile dune environments is a management concern at Indiana Dunes National Lakeshore. As the available space on beaches becomes limited, due to rising water levels on Lake Michigan, visitors to many of the Lakeshore parks are moving into the foredune and backdune areas. After years of such unstructured use, the dunes are showing the effects. Vegetation that once held shifting sand in place has been trampled and replaced by blowouts and barren footpaths.

In 1984 the National Park Service made its first assessment of visitor impact on three dune environments: Indiana Dunes National Lakeshore (IDNL), Pictured Rocks National Lakeshore, and Sleeping Bear Dunes, all along Lake Michigan. A hierarchy of mitigation measures was identified, based on levels of control. They consisted of:

- educational efforts — using interpretive signing to describe the effects of human impact on the environment;
- directional signing — indicating areas along roadways and trails where use of the dunes is permissible;
- improved trails — providing well-defined pathways, including boardwalks;
- exclusion — designating certain areas as "out of bounds" to visitor use through signing and physical barriers;
- prohibition — disallowing trespassing of any kind through designated park areas surrounding sites which can be harmed significantly by human impact; and
- sanction — issuing warnings and fines to those who trespass through prohibited park areas.

The first three measures, (positive, less authoritative techniques), were formulated into strategies to modify visitor behavior. The 1984 study indicated visitor use focused on sunbathing and dune climbing, and that knowledge of dune environments was low. A proposal aimed at altering the previously unrestricted use of the dunes took into account that any single element of the hierarchy would not likely provide adequate mitigation without simultaneous use of other measures. This article focuses on Indiana Dunes NL, where the following measures were instituted in the summer of 1986:

1. Implementation of an educational program about



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the fragile nature of dunes and the effects of human impacts;

2. Development of boardwalks through the most heavily used portion of the dunes, with observation and sitting areas, and;
3. Installation of signs encouraging use of designated trails in heavily used dune areas and posting of "no hiking" signs where use was prohibited.

The 1984 study also recommended increased enforcement and/or physical barriers to stop traffic into the foredunes surrounding heavy use zones, such as near the bathhouse.

To assess the effectiveness of these measures, a replication study was conducted at IDNL in 1986 at West Beach, the most heavily used. Both formal interviews and unobtrusive observations were used; the study ran from late May through early September.

VISITOR RESPONSE TO MITIGATING TECHNIQUES

Education

Large, professionally designed interpretive signs were placed along the 1/4 mile entrance walkway and on wooden decks by the bathhouse. Messages described the dunes and resource protection and a small interpretive area was set up inside the bathhouse.

Field observations found that few people read the interpretive signs, and visitor awareness of resource concerns did not appear to increase. However, visitors indicated they favored an increase in educational programs.

Formal Trail System

A one-mile boardwalk was constructed through a fragile portion of the dunes, providing a means of reaching scenic vistas and serving as a self-guided interpretive trail. Reaction was favorable and use was evident throughout the summer. Most popular uses were privacy-seeking young couples escaping the crowded beach environment, older adults observing birds and boats through binoculars, and young children using the boardwalk as a play environment.

The boardwalk escaped vandalism during the summer, but after Labor Day, when patrolling decreased, signs of vandalism appeared, particularly as graffiti and damage to railings along remote sections.

Signing

In an attempt to modify negative use of the dunes, signing and fencing were employed. Small "Trail Closed" signs were installed at the head of volunteer footpaths and synthetic mesh fencing impeded access to protected areas. On the boardwalk "Protect the Dunes" and "Stay on the Boardwalk" signs were erected where users might be tempted to leave.

Response to the signing varied. Small signs prohibiting access were not effective. However, size of the signs may have caused them to be overlooked. Similarly, the boardwalk messages did not stop all visitors from leaving the formal trail system. However, some vegetative revitalization was evident by summer's end, indicating that impact on fragile environments was lowered.

Additional Mitigating Measures

Small gauge wire mesh fencing was attached below the boardwalk and anchored in the sand in an attempt to thwart visitor movement from the crowded beach



Since boardwalk users must choose their own route back to the parking lot, several footpaths exist when one could serve the purpose.

into the foredunes. However, wind patterns caused the sand to shift, exposing the bottom of the fencing and allowing easy access to the foredunes. The principle was sound, but environmental conditions limited effectiveness.

A final mitigating measure designated one of the foredunes as a specific Dune Climb Area. The area was easily accessible, provided excellent vistas, and was broad enough to allow use by several visitors at once. Observation indicated the area was well used and kept fairly free of debris.

MANAGEMENT IMPLICATIONS

Results of the 1986 study suggested several factors occurring at West Beach have implications for management. These included:

1. The size of the beach is decreasing due to rising water levels and visitor movement into the foredunes may increase. Designating certain areas as permissible for use or enforcing a no-use policy are options.
2. Dune use continued heaviest around the bathhouse, but with addition of the boardwalk, vegetation was beginning to reappear.
3. Visitor knowledge of human impacts and the fragile nature of the dune environment remained low although most beach users desired an area that is natural in appearance.
4. Most visitors followed boardwalk routes rather than volunteer trails. Where boardwalks are not financially feasible, marked trails may be effective in funneling visitor traffic.
5. More abusive use of the dunes appeared after the season ended and close patrolling ended. The small percentage of users (5%) that did wander through the dunes during the summer was enough to maintain the network of volunteer trails. Use of these trails would need to be eliminated completely for total revegetation to occur.

RECOMMENDATIONS

Several recommendations appear warranted, based on the effectiveness of existing measures coupled with the likely effectiveness of new techniques found successful in similar environments.

Boardwalk and Trails

Continue maintaining the boardwalk, possibly extending it to the paved parking lot. Currently, the southernmost segment of the boardwalk ends on the summit of a backdune. Boardwalk users must then choose their own route to the nearby parking lot. As a result, several footpaths exist when one could serve the pur-

pose. If the boardwalk were extended to the parking lot, it would provide a hard-surfaced trail loop.

Signing

Reword the boardwalk signing to provide a more personalized message, such as "Dunes are fragile areas; protect your dunes; please stay on the boardwalk" or "Dunes are fragile areas; protect your dunes; use the dune climb area in front of the bathhouse."

These messages would stress the visitor's connection with the natural resource area. Similar signing should be located along the entrance route to the park and in the parking lots, informing about the fragile environment before they enter it.

Alternate Activity Options

Some negative dune use may occur out of boredom. Recreation for group use should be provided on the beach; e.g. portable volleyball standards with nets at the far ends of the beach zone providing activity alternatives and helping reduce congestion in the central beach areas.

Controlling Dune Use

Media coverage and on-site information about responsible use of the resources would help. Since a majority of the visitors live within a one hour drive of the park, the need for environmental protection can be carried in articles and public service announcements in local and regional news media.

From the viewpoint of matching management and visitor perspectives, the most favorable approach appears to be continue maintaining and extend the boardwalk; maintain mesh fencing used to channel visitors through those areas where there is no boardwalk; modify the signing along the boardwalk to include a more personalized approach to keeping visitors off the dunes, and retain the existing level of interpretive educational signing. In an environment primarily recreation activity-oriented, the most effective measures probably will be those that modify visitor behavior through physical changes in the environment rather than through educational messages. However, efforts to educate visitors before they reach the park also may prove effective.

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