



Landscape Dynamics In and Around Sleeping Bear Dunes

Why and How We Monitor

- Disturbances such as fire, windstorms, and insect or disease outbreaks are an important part of how ecosystems function. These changes can affect animal movements, vegetation composition and diversity, water quality, and the carbon cycle.
- Monitoring these disturbances through time provides valuable information about historic disturbance regimes that can be compared to present conditions and be used to identify potential future trends.
- Disturbances in and around Sleeping Bear Dunes were delineated for six years (2006–2011) using Landsat satellite imagery and a program called LandTrendr. High resolution aerial photos were then used to identify the disturbance agents.

What We're Finding

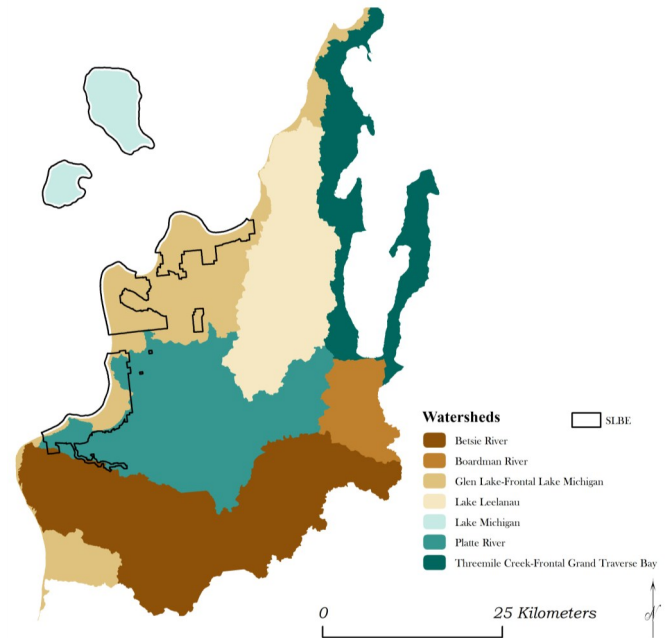
Summary analyses of the park and non-park areas showed that **disturbances inside and outside the park were dominated by a forest pathogen—the gypsy moth** (Figure 1). Although the gypsy moth affected a large amount of the landscape, it did not kill trees. Interestingly, we did not detect any disturbance occurring on North Manitou Island where we expected to see defoliation due to the gypsy moth outbreak (Figure 2).

Forest harvest was the second-most common disturbance agent outside the park's administrative boundary. Harvests were nearly equally divided between clearcut and partial harvest (Figure 1). In addition, there appears to have been a partial harvest that occurred in 2009 within the park boundary, just south of Platte Lake. Although this occurred inside the park boundary, it was likely harvested before the park acquired this parcel.

Of the watersheds within the analysis area, **the Platte River watershed had the highest percentage of land disturbed**, at nearly 15% (Figure 3). Most of the disturbance was due to forest pathogen, with the remaining disturbance coming from forest harvest and some development.

Management Implications

Identification and quantification of disturbances in and around Sleeping Bear Dunes allows park resource managers to see the locations of disturbances not only inside the park, but also on neighboring lands. The disturbance map (Figure 2) provides insight to where disturbances are occurring on the landscape, and their proximity to resources that could potentially be affected. Additionally, it may be useful to view the type (clearcut or partial) and location of forest harvests occurring near or possibly within the park boundary.



The analysis area. All or part of seven watersheds, totaling 215,974 hectares (533,683 acres), were included in the analysis of landscape dynamics in and around Sleeping Bear Dunes.

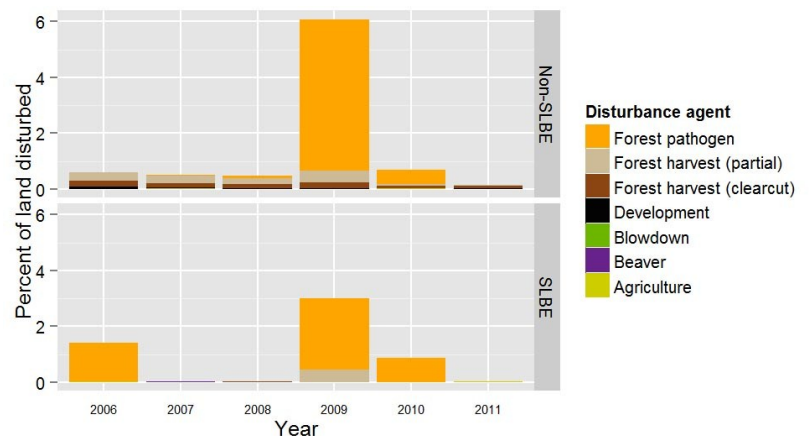


Figure 1. Percent of land area disturbed within and outside of the national lakeshore boundaries, by disturbance agent, 2006–2011.

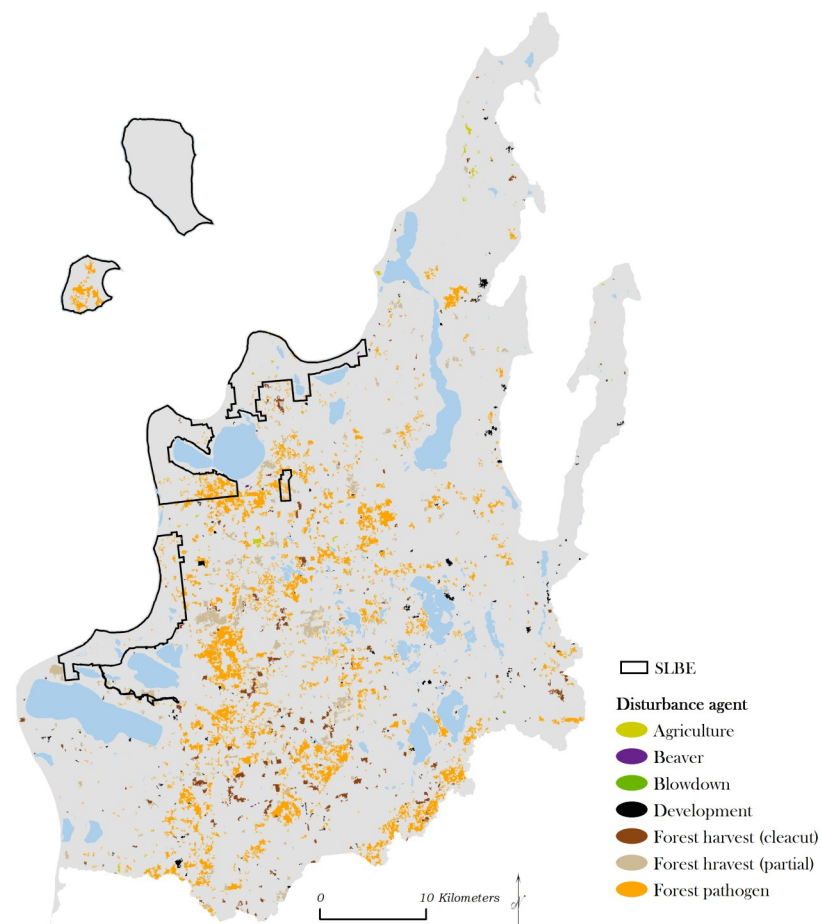


Figure 2. Disturbances detected within and outside of the national lakeshore boundaries, 2006–2011.

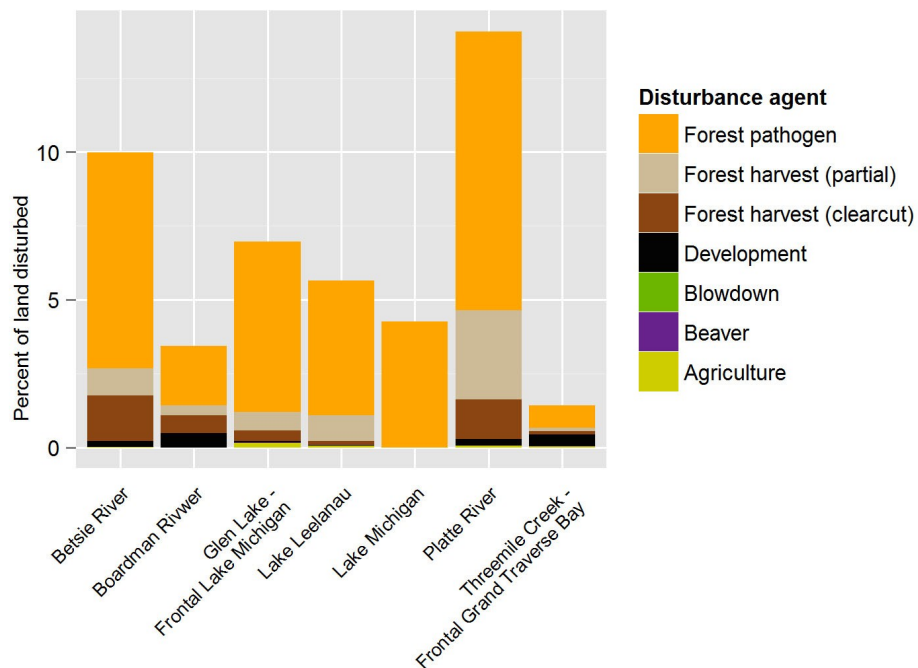


Figure 3. Percent of land disturbed within each watershed in the analysis area.