

The Factors Involved in the Formation of the Moving Dune System: Napeague

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The Montauk peninsula is considered to be a recessional moraine extending from Amaganset to Montauk Point (Sirkin, 1982). The peninsula is intersected by a series of glacial melt water channels that have completely sealed off along the Atlantic coast and partially along the Gardiner's Bay coastline. These former melt water channels are marked by areas of low relief and linear coastal dunes on both the north and south coasts of the Montauk Peninsula (Black and Welch 1997). Although these former melt water channels have identical geological origins, they differ significantly in their present morphology.

Location and Site Description

Figure 1, shows the location of the melt water channels on the Montauk Peninsula. The westernmost melt water channel, immediately to the east of Napeague Harbor is the site of a migrating dune system. Two additional melt water channels are present further to the east, these, however, show no evidence of a migrating dune and are characterized by linear coastal dunes fronting on both Gardiner's bay and the Atlantic Ocean.

Melt water channels are also present in the vicinity of Fort Pond and Lake Montauk.

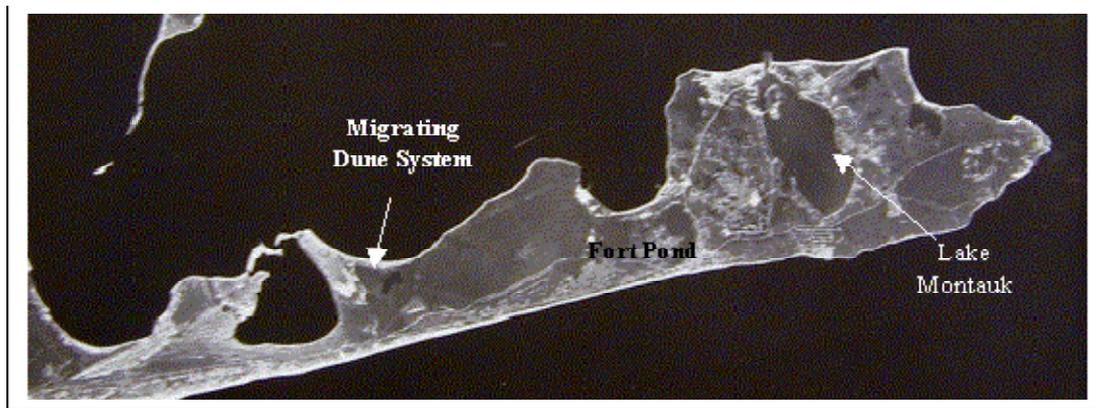


Fig. 1

The Migrating Dune System at Napeague is characterized by three bilobate, parabolic dunes, migrating in a southeasterly direction under the influence of the prevailing winds from the northwest. The specific geomorphology of this area has been discussed by Black (1993, 1997).

The dune system at Fort Pond has been, for the most part obliterated by development in the immediate area,

while the former melt water channel immediately to the east of Lake Montauk has an identical geologic setting as that at Napeague, yet consists only of linear dunes.

Discussion

In order to explain the presence of a migrating dune system at Napeague, and the absence of such systems elsewhere along the Montauk Peninsula, it is necessary to consider the land forms to the north of the Montauk Peninsula. The pertinent landforms are Orient Point/Plumb Island, Gardiner's Island and the headland to the west of Napeague (Figure 2).

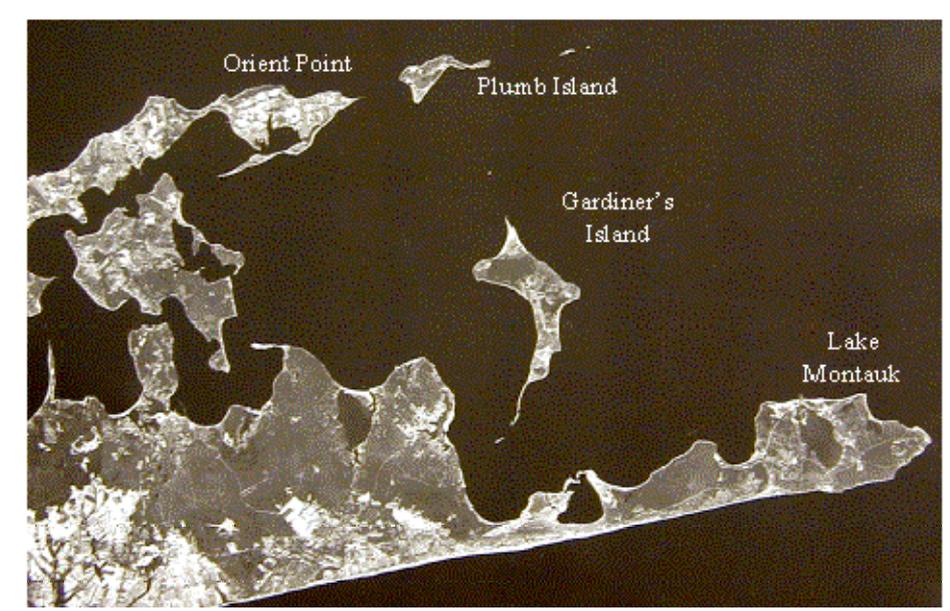


Fig. 2

As noted previously, the prevailing winds are from the northwest. These winds are thought to be the major factor involved in the formation and migration of the parabolic dunes at Napeague. These winds also strike the coastline to the east of Napeague, yet, as noted previously, migrating dunes are absent. It is believed that the offshore landforms play a major role in focusing the wind's energy on the coastline to the west of Gardiner's island, which is that portion of the Montauk peninsula containing the Moving Dunes.

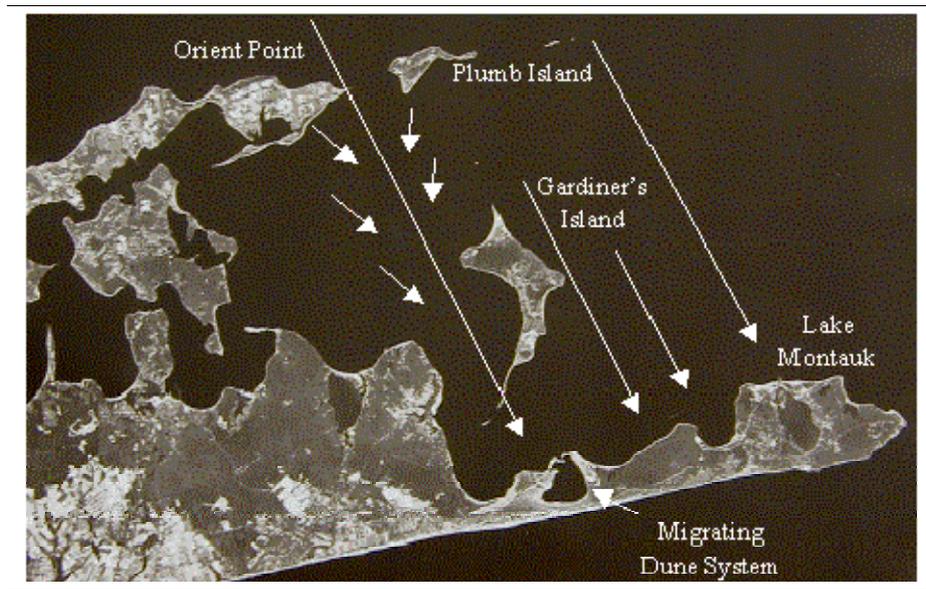


Fig. 3

The absence of any major landforms to the east of Gardiner's Island precludes the possibility of the winds focusing on any particular section of the eastern portion of the Montauk Peninsula. As a result there is no mechanism to focus wind energy sufficient enough to form a migrating dune anywhere else along the peninsula.

Summary

This paper illustrates the importance of offshore landforms as a mechanism to focus wind energy on a particular portion of a coastline, thereby forming migrating dune systems. In the absence of such landforms, migrating dune systems have not formed in similar geographic regions.

References

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