FORMATION OF GLACIAL KETTLE PONDS

Friends of Deer Pond

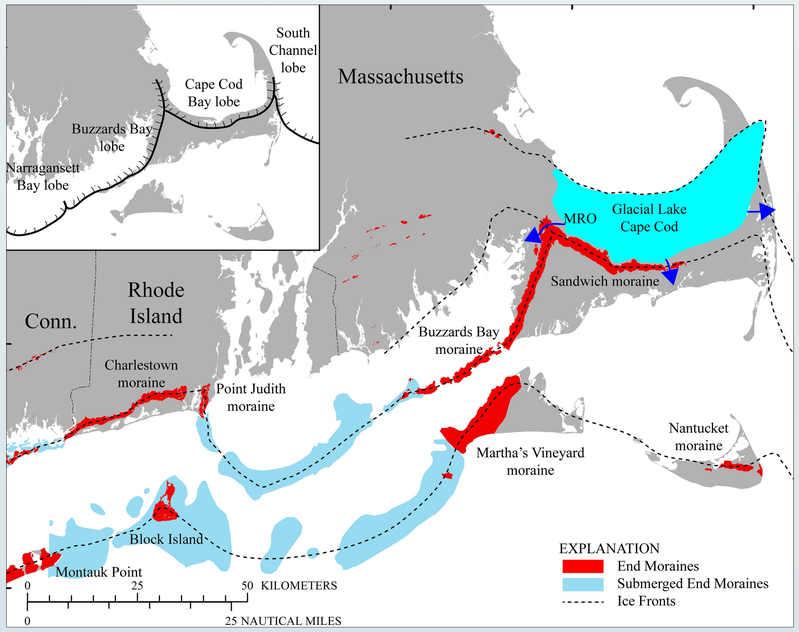
SUSTAINABLE REDBROOK

SUMMARY

- Continental glaciation covered much of northern North America in a series of four glacial events. The most recent (Wisconsinan) event lasted from approximately 75,000 to 11,000 years ago.
- Maximum ice thicknesses reached greater than a mile over Canada and northern New England.
- Glaciation profoundly impacted the form of coastal, southeastern New England.
- Advancing glaciers eroded the land surface and deposited glacial till as ground moraine and as end moraines.
- Melting glaciers in the South Plymouth area, and elsewhere, left thick layers of glacial outwash sand dotted with kettle ponds.

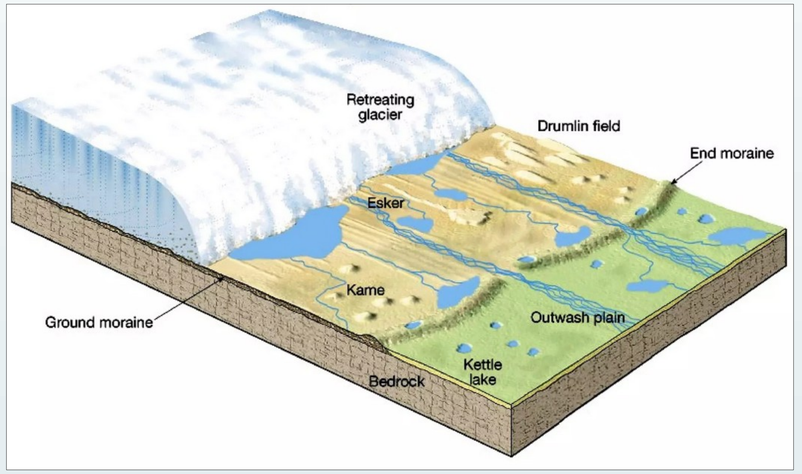
Glacial Advances in Southeastern New England

- The maximum extents of glaciation in southeastern Massachusetts were reached approximately 22,000 years ago.
- The apparent relative stability of the glacial front over a given time reflected an equilibrium of the forward ice movement and melting back of the ice front.
- Ice thickness thinned considerably as it neared it's southern margin in southeastern New England.
- End (terminal) moraines were formed at the maximum extents of glacial advances. These are ridges of accumulated debris deposited by a stable glacial front..
- Major geographic landforms in coastal southeastern New England and New York are formed by end moraines.



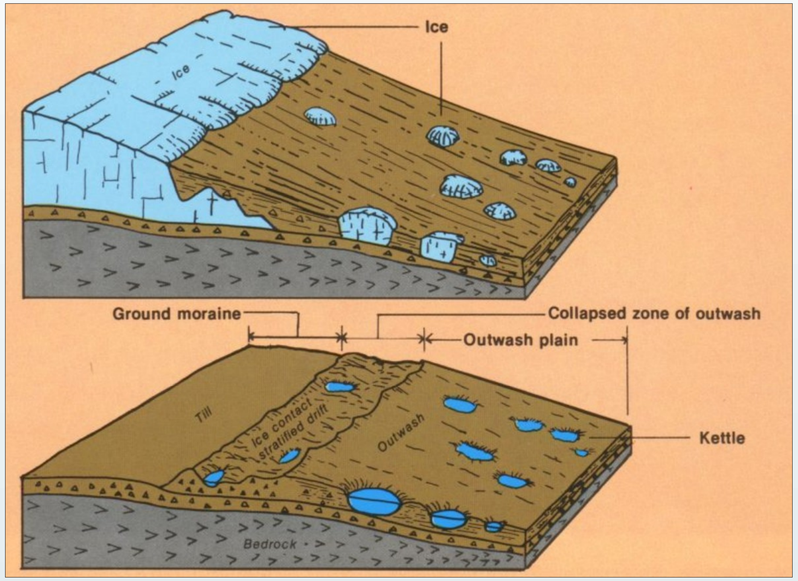
Landform Modifications Following Glacial Retreat

- Erosion and deposition of geologic material over large areas.
- River systems modification.
- Creation of lakes and ponds.
- Sea level changes (about 400 feet lower during the maximum extent of Wisconsinan glaciation approximately 22,000 years ago)
- Isostatic changes in crust elevation due to the weight of the ice.
- Retreating (melting) glaciers left debris including ground moraine (till), outwash sand, glacial lake clay & silt.
- The glacial materials remained in many landforms including drumlins, kame, eskers, kettles, end and terminal moraines.



Kettle Formation

- Ice blocks left behind by melting glaciers were buried by sand deposited by glacial meltwater.
- A depression remains in the sand when each ice block melts.
- This leaves a hummocky (dimpled) land surface referred to as knob & kettle topography.
- "Kettle holes" that are sufficiently deep to be below the water table become filled with groundwater and are known as kettle ponds.



Acknowledgments

1 Open-File Report 2014-1220 (USGS, 2016).
2 Loria, A., (2022).
3 Oldale, R.N.., Geologic History of Cape Cod, MA, (USGS, 1981).
4 Frank, J.W., (National Park Service, 2018).

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