Secondary succession (soil already present)
Changes in biotic environment

Presence of insects, birds, and mammals (pollinators, dispersers, fertilizers)

Shade and litterfall from trees
Plant Succession on Coastal Sand Dunes

Joe Simonis
IB 447

www.life.uiuc.edu/cheeseman/ib447/MichiganPPT/DuneSuccession.ppt
Primary succession: soil development

Soil organic material

WITHOUT EARTHWORMS

WITH EARTHWORMS

http://en.wikipedia.org/wiki/Soil_profile
Changes in abiotic environment

Stabilization of sands
New windward dunes (windbreaks)
Water!!!
Organic horizon development
Nutrients: nitrogen, phosphorus, potassium
Early species

Characterize primary dunes (ages 0 - 50 years)

Beach grass and sand reed grass are crucial early colonizers of coastal dunes

http://techalive.mtu.edu/meec/module09/

www.dnr.state.wi.us
Middle species

Characterize open secondary dunes (55-175 years old)

The environment is still harsh as water and nutrient levels are not very high

Evergreen shrubs (common bearberry and juniper) and bunchgrasses (little bluestem) become the dominant species
Late species

Mixed pine forests dominate dunes 200 years old and older

Common species: white and red pine, white spruce, balsam fir, white cedar, and paper birch
Hardwood trees

Red maple and red oak are present by 225 years, but aren’t important components until after 440 years.

Eastern hemlock, sugar maple, and beech are only really present and abundant on undisturbed old (1445+ years) dunes.
Textual Sources

Coastal Dunes.  [www.michigan.gov/dnr](http://www.michigan.gov/dnr)


Terrestrial Ecosystems: Coastal Dunes.  [www.techalive.mtu.edu](http://www.techalive.mtu.edu)