

Mullins Head: Silviculture and Ecology Walk for the NHLCP July 17

Outline:

1. Geology
2. History of Land Use
3. Species
4. Forest Stand Dynamics
5. Forest Health

Geology and Soils

New Haven Greenstone – formed when basaltic lava erupted on the ocean floor and cooled quickly, forming “pillows” that can be seen today on the coast. It reacted with sea water to form the mineral chlorite, giving it its namesake green color.

This is the dominant geology of North Haven, and is ultimately what shaped its divergent land use history from its neighbor to the south, Vinalhaven. The basaltic bedrock made the soil of North Haven much more amenable to farming, while the granite bedrock of Vinalhaven created an infertile, acidic soil, and ultimately was the foundation of its major industry – quarrying.

Of note, however, there is a small dike of intrusive granite on Mullins head. This is the only such granite on the entire island.

These bedrocks were formed millions of years ago. However, more recently, glaciation played an important role in the landscape we see today. The Wisconsin Glaciation began roughly 75,000 years ago and reached its maximum roughly 22,000 years ago, and ended only 11,000 years ago. During this time, North Haven was under a layer of ice thousands of feet thick. It scraped the bedrock and accumulated rocks, gravel and soil as it descended down. When it melted, it left behind various types of glacial till, that form the basic soil of North Haven Island. How this material was deposited, however, plays an enormous role in predicting what types of plants grow where, and the land use history. The soil on North Haven is predominantly of two origins: 1: direct deposition of rock, sand and soil after melt-out, known as till. 2: Glacial marine sediments deposited during a short period when sea level was much higher than today. On Mullins Head, the majority of the soil is of till origin.

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Land Use History

Prior to European arrival, **Native Americans** would set up seasonal fishing camps on the island. Middens contained sturgeon bones and oyster shells found on Southern

Harbor/ Maccombers' land (Doug Record) and the Turner Farm beach on the Thorofare (NY Times). Little information is available on their land use practices on the islands, but they almost certainly practiced **agriculture and burning** in order to produce berries the following summer and maybe to plant crops.

Upon **European arrival**, however, land use on North Haven started to change. James Rosier's account of Charles Weymouth's exploration of coastal Maine has greatly informed what North Haven may have been like. He mentions great quantities of high quality oak, beech, cherry, birch, ash maple, spruce fir and pine. (Islands in Time by Phil Conkling). First settler recorded 1752 (Nan Lee). Settlers came from Marshfield Mass in 1760s (religious reasons) and more after the Revolutionary War when records were kept. (Marshfield near Plymouth ie. Mayflower descendants amongst settlers). Logging went to heat the homes of the settlers and the timber to build their homes and barns. Of course timber was hand cut on island by the farmers themselves.

For the British, whose homeland had been almost completely denuded by demand for wood, the bountiful shores of New England promised almost unlimited supplies. Of utmost priority were the white pines, whose tall straight and strong trunks made for the perfect masts for the increasingly dominant British Navy. A "broad arrow" marked pines to be used for the King's Navy, and by 1690 it was a crime to cut down a pine of 24" in diameter. Settlers in New England of course became increasingly resentful of this plundering of their natural resource.

As the **ship building industry** grew, hardwoods, oak, ash and cedar, were used for the planking, ribs, and hulls of ships in addition to the white pine for masts. But for North Haven, it was the lime industry on shore that would seal the fate of its forests. By 1870, the island had been completely cut over to feed the kilns that produced lime mortar in the Rockland area.

With the island pretty well cleared, **sheep and hay** became cash crops. By 1860, there were 2000 sheep on North Haven. This favored the aspen, birch and white spruce explaining their presence on much of North Haven.

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Red spruce, oak, ash, yellow birch also came in on the interior. Beginning in the 1920s the last wave of cutting came: **pulping**. Paper mills in Bucksport had a huge thirst, and French Canadian and Indian cutting crews working for St. Regis came to the island and pulped much of the easily accessible timber close to shore – mostly white spruce. The logs were rafted together and pulled by boat to Bucksport. Some remember logs

dragged by animals from campground to the "vista". And then dropped down a chute to waiting barge. (Kenneth Hopkins)

After over 200 years of intensive land use and repetitive deforestation and burning, North Haven, along with many of Maine's islands, has lost the tree diversity it once had. Rosier mentioned a wide variety of species, but it's likely that the heavy seeded tree species had a difficult time repopulating the islands. Beech, Oak, Walnut and Hickory have heavy seeds that would need to float over from the mainland to seed back in. The wind blown seeds of birch, aspen, and spruce have been much more successful in repopulating the island of trees. Those species that are shade tolerant (beech, maple and hemlock) remained viable in small quantities.

Mullins Head became a park in 1956-57 when the town (thanks to Ira "Cuddy" Curtiss and Lewis Haskell lobbying the towns people and their reps to buy the old 250 acre McMullens' farm. Interest grew after a road was cut in so the people could see just how nice a place it was. (see Historical Society interview with Haskell). The town paid what amounted to just over \$50 for the two parcels, the amount the family owed the town in taxes. (Janice Hopkins).

Clear-cutting the wooded patches was performed in 70s and 80s and in the 90s. A forester was hired by town in 70s according to Kate Quinn who declared the place a desert forest. He recommended clear cutting; after that Kate and others planted 500 trees of which maybe a third survived. (Many white oak at campground!) Elliott Brown and George Beverage remember 97 and 98 as years they cut for firewood. Not profitable as it turned out. The regrowth of birch and poplar and some white spruce can be seen along the entrance road.

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Tree Species, attributes and conditions for regeneration:

WHITE SPRUCE: *Picea glauca*. Fibre is good for pulp. Cones pendant. Shade intolerant but can tolerate salt, thus it grows well on the shore line, where it easily replaces itself after blowdowns from storms (more common along the shore) . If you want white spruce to come in you **clear-cut** which simulates blowdowns. Also called "Cat Spruce" due to its pungent odor. **Must** be open grown or in full sunlight. It is the

“old field” tree of Maine – colonizing old fields in the same way juniper and pine do so in CT.

RED SPRUCE: *Picea rubens*. Shade tolerant and will regenerate in moderate shade. More in center of island. To regenerate, you thin and then “**release**” by removing mature trees. To distinguish from white spruce: twigs of red spruce have small (need hand lens) hairs, white spruce twigs are hairless and needles are thinner. Red Spruce cone's apical margin of scale is toothed instead of smooth like white spruce. Cones also pendant and rounder than the white's cylindrical ones. Examples visible on Bushes' S. Shore Road where blowdowns reveal the tall straight more wind resistant trunks. Also a good stand on the Dows' land.

BALSAM FIR: *Abies balsamea*

Shade tolerant. Cones erect. Resin pockets on trunk. Flat (not four sided) needles. Need moisture but too much (ie fog!) makes them susceptible to fungi. And does better on more inland or drier sites here. (Eg along the north and west side of Great Spruce Head you see a lot of small balsam fir. Here on the interior I have seen larger specimens.

AMERICAN WHITE ASH: *Fraxinus Americana* Only somewhat shade tolerant, needs light but not so much as true pioneers like birch, white pine or poplar. Hence, it is known as a “long lived pioneer”. Very hard wood, excellent for handles and baseball bats. Opposite, pinnately compound leaves. Lovely examples - Mullin Head field – planted probably.

RED OAK – *Quercus rubrum* . Competes best on mesic glacial till. Long lived pioneer. Needs sunlight to regenerate well. Does well on southern aspects. Since lots of light is needed, but a seed source is needed as well; **shelter wood systems** regenerate oak most effectively, as they leave half of the trees standing to serve as a seed source. The condition imitates a large storm. Obviously tolerant of salt - see Mullins and Lowenthals, all south-facing. Kate Quinn occasionally cuts around new seedlings to promote their growth.

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WHITE OAK: *Quercus alba*. Makes a good mast and serves as a **keystone** species. Does well on dry sites. Many in the campground and on hillside of open field planted by volunteers on way to trail. If trunk is exposed to lots of sunlight, it can be prone to epicormic sprouting. Check epicormic sprouts on the field examples and they have died on the campground specimens. Deers browsed making two trunks but they are surviving.

WHITE PINE; *Pinus strobus*. Regenerates in light shade but need light to take off. Pines compete best in sandy glacial outwash soils but are true site generalists. Are

canopy emergent (meaning they stick out above the rest of the canopy). Regenerate via **Seed tree system**: Leave a few big trees (25-30% mature trees) that will scatter their seeds.

White Pine Weevil is an insect which gets into the apical bud on the leader. Therefore the young tree will not develop straight and the leader dies and the branches below take over. This typically happens when grown in an open setting, leading to the term Cabbage Pine, as the wild wide branches resemble cabbage. Those that develop in dense stands of other regenerating pines will be less susceptible to the weevil. Historically used for ship masts.

BIRCH AND POPLAR – *Betula papyrifera*, *populus tremuloides*, *populus grandidentata*. True pioneer species. Come in sun after a burn for instance in a farmer's field. Seeds are **Wind dispersed** - widely cast.

Big tooth and quaking and white and grey. On the entrance road note the early stage of regeneration where Browns' crew clear-cut.. called "**Stem Exclusion**". Healthy competition going on. Eventually the stronger ones will win out and the others die. One leaves them for compost and animal food.

Yellow Birch – Long-lived pioneer, prefers mesic to wet soil conditions.

CHERRIES – *Prunus*. Pioneer species, disturbance adapted.

HEMLOCK *Tsuga canadensis*– Shade tolerant, do best on cool, wet northern aspects. Rare on NH. Some on D.Stone's woodlot, Moores and Bushes lands. Probably won't regenerate because there is not enough disturbance where they grow.

AMERICAN BEECH *Fagus grandifolia*. Shade tolerant, late successional species. Likely much more common pre-settlement than today. Bartlett's Harbor Road on right.

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RED MAPLE - *Acer rubrum*. Grows in moist areas but will tolerate dry conditions.

SUGAR MAPLE - *Acer saccharum* near golf course clubhouse, Ames Point Road, Hamlin's lawn and about 4-5 new ones planted near exit road from Park and near the old school house towards Indian Point.

MOUNTAIN MAPLE – *Acer spicatum*. examples near water Mullins Head.

STRIPED BARK MAPLE – *Acer pennsylvanicum*. Kent Farm graveyard.

BAYBERRY – *Myrica pennsylvanica* - Northern Bayberry is a shrub that grows typically along the coasts but also is widely cultivated. On north haven it grows most commonly on the rocky shorelines. It can tolerate salt spray and a variety of growing conditions. Bird dispersed. Important source of winter soft mast for birds, along with sumac and winterberry.

STAGHORN SUMAC – *Rhus typhina* – Staghorn sumac is the largest of the north American sumacs, and is known for its distinctive “staghorn” red fruiting body/inflorescence. A true pioneer, it requires full sunlight, and grows on the edges of forests, roadsides, and on the rocky slopes and shores of North Haven. Similar species: Winged and Smooth sumac. Is distinguished from these by its tomentose leaves.

COMMON JUNIPER – *Juniperus communis* . The local subspecies of this global site generalist is a prostrate shrub that specializes in the rocky, sandy exposed sites of the rugged Maine shoreline.

ATLANTIC WHITE CEDAR - *Chamaecyparis thyoides* grows in swamps and silty soils near tidal areas in north haven.

ARBORVITAE – *Thuja occidentalis* – Swamp specialist, unclear if native to North Haven, but Native to Maine.

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Forest Stand Dynamics

Forests are constantly changing. Understanding how forests respond to disturbances allows us to understand the past, present, and future of a stand. Common examples of such disturbances include clearing for agriculture, beavers, windstorms, and logging. After a disturbance the forest begins to regrow and as it changes, it follows phases of ‘stand dynamics’ that can also be thought of as ‘successional pathways.’ These phases are outlined below:

Stand Initiation

This is the first phase of stand dynamics and is considered early successional. It occurs just after a disturbance and is characterized by few, if any, trees from before the

disturbance. Instead, new trees and shrubs that thrive in high light will emerge and grow quickly. These plants will form a dense understory. Common species of this phase include white spruce, members of the rose family (cherry, Rubus, etc) paper and grey birch, aspen. Red maple can also be present. Oak, ash and yellow birch will be present but can be out-competed by the true pioneers.

Stem Exclusion

At this point, growing space is fully-occupied, and trees begin competing with one another for resources. It is still considered an early successional phase. This often means that trees are competing for light and they begin to crowd each other out. Less dominant trees that are receiving less light will eventually perish and dominant trees will adjust to occupy that light. Species that dominate this phase are the ones that grew before disturbance. Oaks, Ash, and yellow birch tend to compete well in this stage, as will the pioneers. The difference is that oak, ash and yellow birch will outlive the paper birch and aspen.

Understory Reinitiation

This phase is now considered a mid-to-late successional phase. The dominant trees from the past stand phase begin to die (poplar, paper birch, white spruce). As they do, new trees begin to grow and take up that space (shade tolerants). For some time, there is a mixture of both old trees from the original disturbance and new trees from the new growth. Shade tolerant canopy dominants start to come up during this phase to join the long-lived pioneers in the canopy. Shade tolerant dominants: beech, maple, red spruce, and fir. Already in the canopy are ash, oak, and yellow birch that remain as long lived pioneers.

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Old Growth

This phase is late-successional. Trees that established during understory reinitiation have taken their place and the original trees have died. Beech, Red Spruce, and Fir become the dominant stand components. Because understory reinitiation does not occur at the same time across the landscape, trees in old growth stands represent many different ages.

Harvest Types

Clear-cut – total lethal action including to the ground story to imitate devastating natural disturbance. Works for species that need bare mineral soil to regenerate and open conditions

Seed Tree – imitates severe blow down or other natural disturbance in which roughly ¼ of the trees remain after harvest – to serve as seed sources. Commonly done to regenerate white pine.

Shelterwood – imitates storm related natural disturbance by removing roughly 1/3-1/2 of the trees. Usually this is done with species that have heavy, gravity-dispersed seeds such as oaks and hickories. An abundant seed source is necessary to ensure abundant regeneration of desired species.

Forest Health issues on North Haven:

Witches broom is a virus that only grows in spruce, causes intense branch growth that resembles a witches broom. Associated with the invasive pest: spruce budworm.

White Ash is healthy here (and Vermont) but all over southern New England the Emerald Ash borer has decimated the white ash. (Invasive from Asia).

Common Buckthorn (*Rhamnus cathartica*) is a very aggressive invasive species on North Haven, due to its favorable soil conditions. It has berries that are attractive to birds and dispersed by them far and wide. Their seeds can survive in the buried seed bank for five years, and the plant, once established, will vigorously resprout if cut. It displaces native vegetation, at great cost to the local ecosystem. Aggressive action is necessary to eradicate it from the island.

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Conclusions

The forest seen on Mullin's head is of fairly recent growth, given that trees are still relatively short and competing for growing space (in "Stem Exclusion"). There is no sign of understory re-initiation, with the exception of the occasional fir and red spruce seedling. To restore other species such as beech, sugar maple, and hemlock, **restoration plantings** of seedlings in the forest would be necessary. If there were natural regeneration it is likely that the extensive deer browse would prevent maturation.

With the arrival of aggressive invasive species such as buckthorn, the way forward for forest management here on the island is hard to approach, especially for more mature stands. (In immature stands such as on Mullins head, buckthorn is less of a concern given the already intense competition for light.) But as mortality increases, enough light will reach the forest floor to allow the somewhat shade tolerant buckthorn to establish, at which time it will become a major issue.

Maintenance capacity and interest of land owners are critical to solving the buckthorn issue on the island.

Jody Bush with help of Tyler Gibson, Yale Forestry
Doug Record, Maine forester, Elliott Brown, logger, Kate Quinn, planter and Nan Lee, historian, Kenneth Hopkins, trail maintenance.