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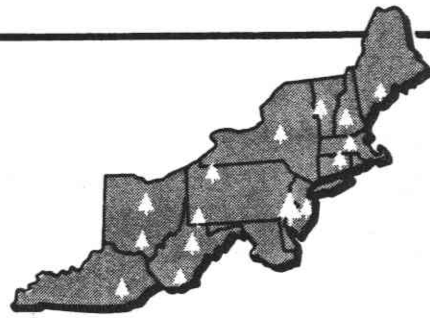

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RELATIONSHIPS OF FOREST VEGETATION TO HABITAT ON TWO TYPES OF GLACIAL DRIFT IN NEW HAMPSHIRE

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Abstract.—Species composition and site index were determined on nine tree habitats in an area of schistose drift and compared with previous findings on habitats with granitic drift. Habitats on schistose drift supported more sugar maple and had somewhat higher site indexes. Compact tills in schistose drift supported northern hardwoods, and the site indexes for yellow birch were 66 to 71 feet. Compact tills in granitic drift supported softwood-hardwood mixtures and had a softwood climax; the site indexes for yellow birch were 56 to 57 feet. Species composition and site index for a given habitat may vary between glacial drifts with different mineralogies.

Previous research on tree habitat in the White Mountains of New Hampshire showed the relationship of habitat to species composition and site index (Leak 1976, 1977). This work was done in areas covered with glacial drift derived from coarse granitic bedrock.

To explore the possibility that the relationship between habitat and vegetation might be different in areas with drift of a different mineral composition, a small study was conducted during the summer of 1977 on the Hubbard Brook Experimental Forest. Much of this forest is covered with glacial drift derived from crystalline schist (Goldthwaite 1948).

Twenty plots were chosen at Hubbard Brook in essentially even-aged stands about 50 to 100 years old. On each plot, basal area by species was measured for all stems greater than 6 m in height, using a 3-m^2 prism factor. Age at breast height (from an increment core) and total height (from several measurements with a clinometer) of about one tree per plot were determined, and later converted to site index (base age 50 years), using curves by Curtis and Post (1962) and Hampf (1965).

One or two pits were dug on each plot—to a depth of 1 m where possible. The habitat on each plot was determined primarily on the basis of soil materials or substrate. Table 1 shows the number of plots and site-index trees by habitat. These habitats have been fully defined elsewhere (Leak 1976, 1977), and can be briefly described as:

Poorly drained. Flat, wet areas with gray or heavily mottled subsoil.

Table 1.—Numbers of plots and site-index trees by habitat

Habitat	Plots	Site-index trees
Poorly drained	1	1
Rock	3	2
Outwash	1	1
Wet compact till	1	1
Dry compact till	6	6
Sediment	2	1
Coarse till	3	3
Fine till	2	2
Enriched	1	1

Rock. Areas with bedrock, boulders, or weathered rock fragments at 65 cm or less below the top of the mineral soil.

Outwash. Sands or gravels. Stones, if any, are without silt caps.

Wet compact till. Compact tills that are moderately to somewhat poorly drained.

Dry compact till. Well-drained compact tills.

Sediment. Fine sands and silts.

Coarse till. Loose, washed till.

Fine till. Till deposits with no evidence of washing.

Enriched. Coves or benches with organic matter incorporated into the mineral soil.

RESULTS

Species composition varied in certain respects between areas with schistose and those with granitic drift. This variation is shown in Figures 1 (schistose) and 2 (granitic) where the habitats are listed in the approximate order of decrease in basal area for red spruce and hemlock, and increase for sugar maple and white ash.

Habitats in both the schistose and granitic areas that were characterized by outwash, rock, poor drainage, and sediments supported appreciable amounts of softwoods along with red maple and paper or yellow birch. However, sugar maple was more abundant on those habitats with schistose drift.

All habitats with coarse till were dominated by beech, red maple, and birch.

With either type of glacial drift, fine-till habitats were characterized by sugar maple, and enriched habitats by sugar maple-white ash.

The wet and dry compact tills with schistose drift supported northern hardwoods—beech, birch, and sugar maple. In areas with granitic drift, both types of compact till supported softwoods, red maple, and birches with very little sugar maple. Earlier research had shown that softwoods are the climax vegetation on compact tills with granitic drift (Leak 1976). The work at Hubbard Brook indicates that hardwoods probably will be the climax vegetation on the compact tills with schistose drift.

Site index for a given species in schistose drift tended to be lower on strong softwood habitats than on the strong hardwood habitats; however, the range in site index for a given species is not great, especially for red maple (Table 2). (Similar trends are evident on granitic drift.) Site index of paper birch, sugar maple, and white ash tended to be slightly higher in habitats with schistose drift than in those with granitic drift; but the reverse appears true for red maple. The site index of yellow birch on the compact tills appears to be 10 to 14 feet higher in schistose drift than in granitic drift. Remember that northern hardwoods predominated on schistose compact tills, whereas, softwoods were abundant on granitic compact tills.

DISCUSSION

Although the study consisted of only 20 plots, observations in additional areas on the Hubbard Brook Forest supported the findings. The habitat classes developed for granitic drift were sufficient for describing the conditions found in schistose drift. However, the schistose drift (1) supported more sugar maple on several habitats, (2) supported northern hardwood stands on the compact till in place of the softwood- hardwood stands found on the compact granitic till, and (3) often exhibited higher site indices than those measured on granitic drift—especially for yellow birch on compact till. The present habitat descriptions based primarily on soil materials probably can be applied to many glaciated areas in New England. However, species and site relations will be somewhat different on drifts with different mineralogies.

Habitat classes should be useful in natural stand management because they indicate the range of species that are likely to grow in a certain area, and which species grow best. However, additional information still is needed on the relationships of

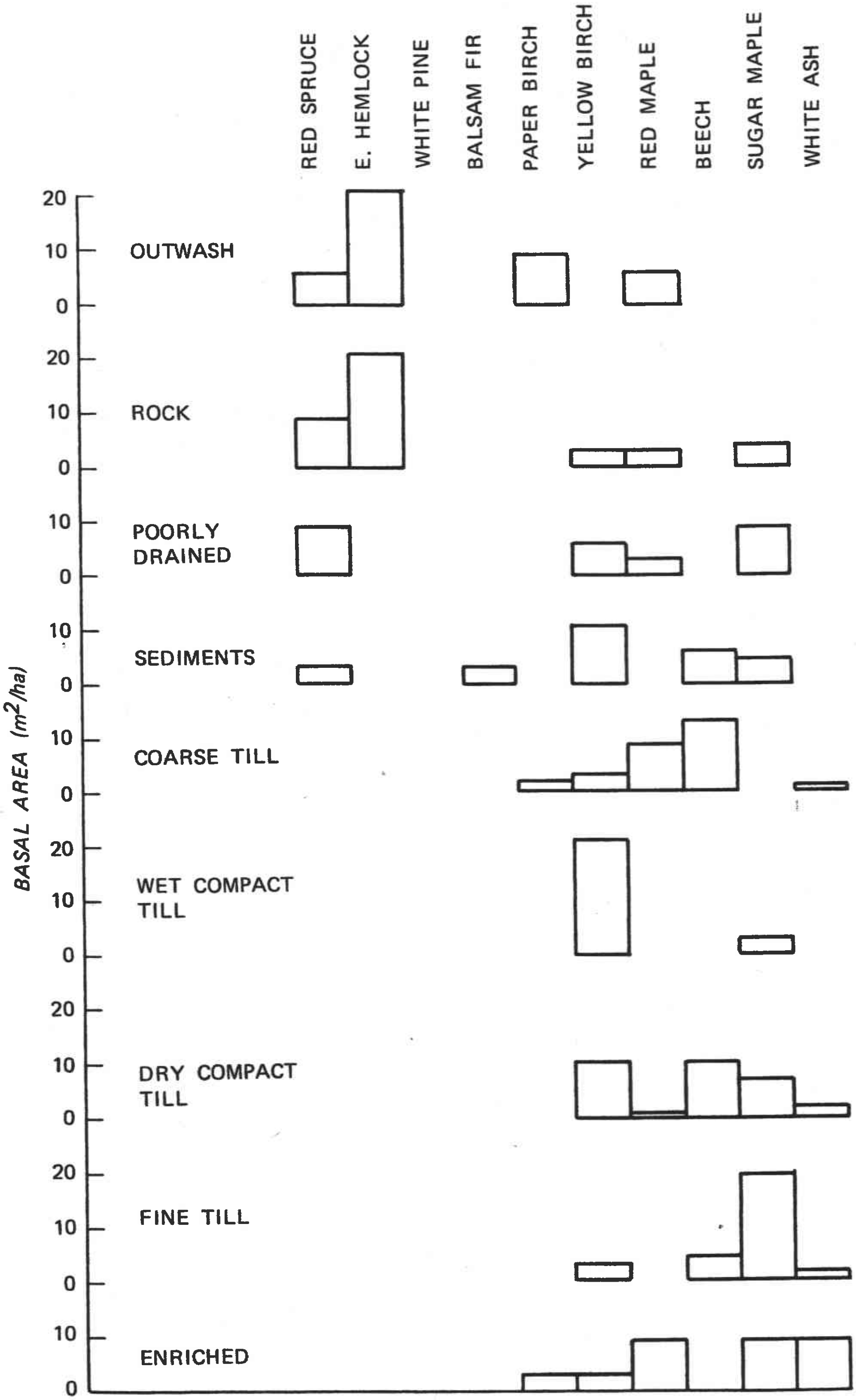

Figure 1.—Basal areas by species and habitat in schistose drift at Hubbard Brook (m^2/ha).

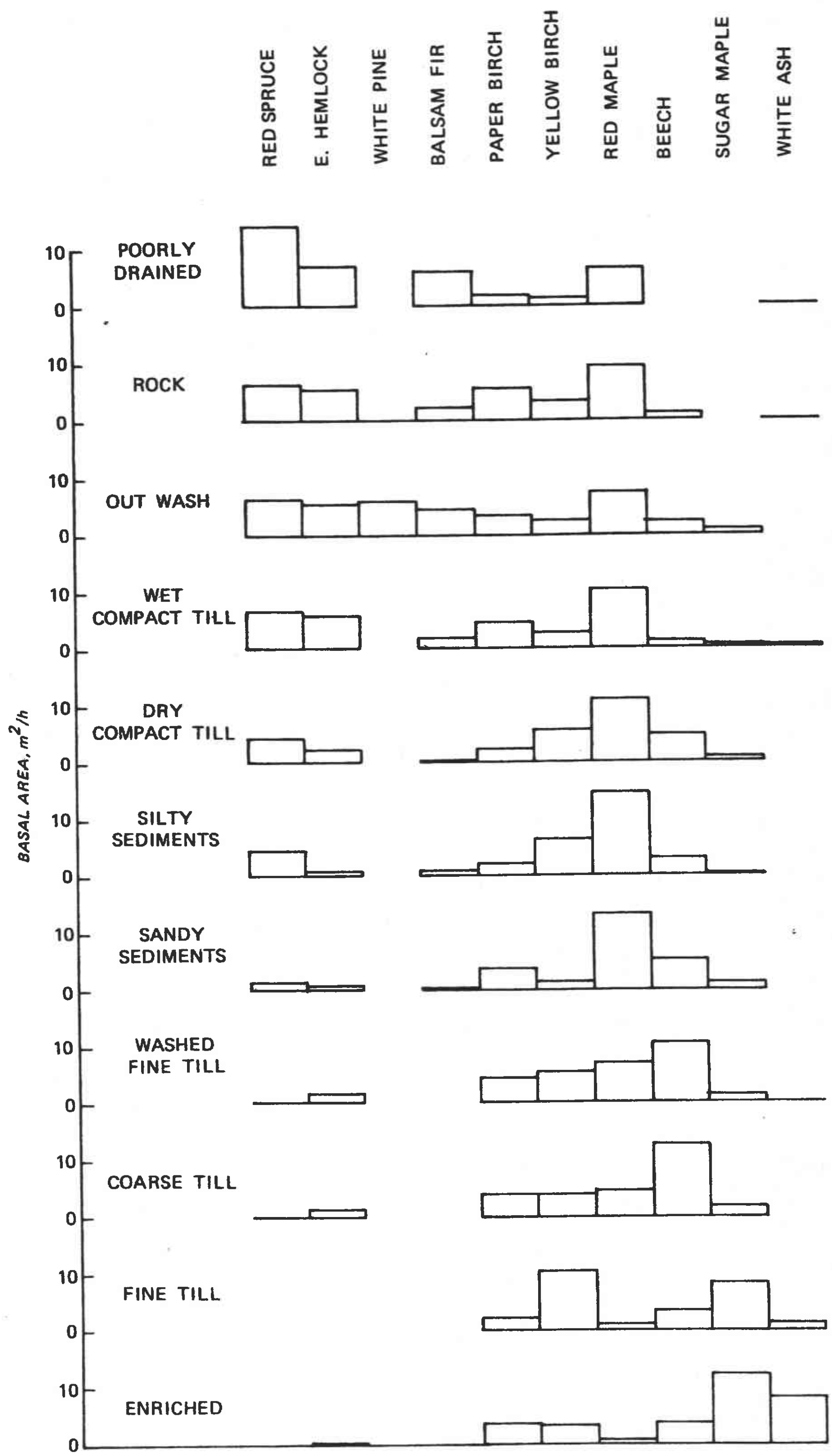

Figure 2.—Basal areas by species and habitat in granitic drift (m^2/ha).

Table 2.—Site index (base age 50) by habitat and species on schistose drift, with some comparative figures for granitic drift (in feet)

Habitat	Red maple		Yellow birch		Paper birch/sugar maple/white ash	
	Schist	Granite	Schist	Granite	Schist	Granite
Outwash	—	63	—	60	—	—
Rock	56	60	—	48	62	56
Poorly drained	—	—	—	48	65	48
Sediment	—	64	69	62	—	62
Coarse till	54	—	—	55	71–74	50–66
Wet compact till	—	52	71	57	—	54–70
Dry compact till	—	60	66	56	62–80	70
Fine till	—	—	—	68	69	68–77
Enriched	—	—	—	63	85	72–81

habitat to the occurrence of competing weed species and the response to intensive cultural practices such as scarification, planting or seeding, fertilization, and precommercial thinning.

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