

EFFECTS OF GYPSY MOTH DEFOLIATION

IN

STANDS CONTAINING WHITE PINE

AND

EASTERN HEMLOCK

BY

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ABSTRACT

Impacts of the 1981-1982 gypsy moth infestation on white pine and hemlock were studied in several forest types located in western Rhode Island and eastern Connecticut. The study analyzed the effects of defoliation on tree mortality, tree growth and stand species composition.

White pine and hemlock were severely defoliated where they occurred as understory stems in oak stands. Defoliation of overstory white pine and hemlock was less severe in comparison to understory stems and was minor in stands where oaks were not present in the overstory. Recovery of understory white pine was slower than for overstory stems. By the end of the 1986 growing season, 46.6% of defoliated understory pine in stands where pine occurs as an understory (oak-pine), and 43.0% of the understory pine in stands where pine shared the canopy with oaks (pine-oak), displayed vigorous refoliation. In contrast, defoliated dominant and codominant (overstory) pine stems exhibited great recuperative abilities.

White pine mortality was greatest in defoliated oak-pine stands where stem and basal area losses were 29.3 and 15.7%, respectively. In defoliated pine-oak stands, white pine losses were 22.1 and 5.3% of stems and basal area, respectively. Losses in pure pine stands were substantially below those experienced in other stand types (10.1 and 2.1%

expressed as lost stems and basal area, respectively). Basal area losses in nondefoliated (control) stands were negligible.

Hemlock was more susceptible to mortality following gypsy moth defoliation than white pine. Hemlock losses were greatest in the defoliated oak-hemlock stands (74.1 and 65.5% expressed as lost stems and basal area, respectively). Mortality was also substantial in hemlock-oak stands where hemlock shared the canopy with oaks. Stem losses were 46.9% and basal area losses totaled 44.4%. In contrast to white pine, substantial losses of dominant and codominant hemlocks occurred in hemlock-oak stands. Losses were negligible in defoliated pure hemlock stands and in oak-hemlock, hemlock-oak and hemlock stands.

Based on paired comparisons t tests, both height and radial growth of defoliated understory pines for the postdefoliation period (1981-1985) were significantly less than predefoliation (1976-1980) height and radial growth. The greatest decreases in growth occurred 1 to 3 years following defoliation.

Changes in species composition were evaluated based upon predefoliation and postdefoliation Importance Values generated for species occurring in plots in defoliated stands. In oak-pine stands, the Importance Value of white pine decreased as a result of gypsy moth defoliation. The relative importance of species other than pine or oak slightly increased. In both oak-hemlock and hemlock-oak

stands, the relative importance of hemlock decreased dramatically following defoliation. Commonly occurring hardwoods in stands containing hemlock which were less-preferred by gypsy moths, experienced substantial increases in Importance Values.