INFLUENCES OF CUTTINGS ON OAK FORESTS JEFFREY B. OTICO

ABSTRACT

Oak and oak-white pine (*Pinus strobus* L.) stands in Rhode Island which had been subjected to either cordwood or sawtimber cuttings supervised by foresters were examined and compared to adjacent uncut portions of stands to determine the influence of cuttings on species composition, stem quality, and regeneration. A total of 121 plots covering 7.6 acres in 21 stands were sampled during the growing seasons of 1982 and 1983. Ages of sampled stands varied from 4 to over 90 years.

Except where release cuttings were conducted in oak-white pine stands, oaks dominated the species composition of the stands studied. Species of the black oak group (consisting of black oak (*Quercus velutina* Lam.), scarlet oak (*Q. coccinea* Muenchh.) and red oak (*Q. rubra* L.)) were more abundant than white oaks (*Q. alba* L.) in all stands. Hardwoods other than oaks were only minor components of stands.

The majority of all stems cut for either sawtimber or cordwood was oak. Most of the stems harvested belonged to the black oak group. Mean diameter of stems cut for cordwood was 6.4 inches dbh, while diameter of trees removed for sawtimber averaged 14.8 inches. Tree stems harvested in the cuttings varied from 58 to 255 per acre

in cordwood cuttings, and averaged only 30 stems per acre in sawtimber harvests.

Stem quality of most hardwoods was poor. In upland oak poletimber stands where site indices averaged 52 for red oak, less than 13 percent of the stems were categorized as being of sawtimber, or potential sawtimber quality. In such stands, thinnings did not increase proportions of high quality stems. However, pine release cuttings in oak-pine pole stands and cordwood thinnings in oak sawtimber stands on mesic sites (site index 60 for red oak) did appear to increase proportions of high quality stems.

Heavy cordwood cuttings in poletimber oak stands stimulated regeneration by stump sprouts. Eighty-four percent of all black oak stumps and 87% of all white oak stumps examined which were less than 75 years of age when the trees were cut, produced sprouts. Most other minor hardwoods cut in these stands also sprouted. Sawtimber harvests, however, tended to release advance regeneration composed of seedling-sprouts and understory saplings rather than creating regeneration dominated by stump sprouts.

All stands contained large numbers of understory stems classified as small regeneration (stems less than 1 inch dbh). Numbers ranged from 1,332 to almost 10,000 stems per acre in the sampled stands. Stems one inch or greater classified as large regeneration were less numerous than

small regeneration. Numbers ranged from 30 to over 1000 stems per acre in the stands sampled. Oak regeneration dominated over other species of the regeneration classes on dry sites in young oak and poletimber oak stands, but white pine, red maple (Acer rubrum L.), beech (Fagus grandifolia Ehrh.) and other species tended to dominate stand understories in mature oak and pine-oak stands. Red maple and beech regeneration were most prominent in the older stands on the best sites.

All oak stands sampled were partially or completely defoliated by larvae of gypsy moths (Lymantria dispar L.) in 1981 and 1982. The defoliations caused the greatest mortality among oak trees over 80 years of age, however, no mortality was observed among dominant young oaks under 25 years of age. Few white pine were killed by defoliations among pine growing in oak-pine stands. Most pine appeared to benefit from the defoliations due to the decline or mortality of mature oaks.

Oaks will likely remain the dominant species well into the future in the upland poletimber oak stands on the dry sites sampled. Heavy cuttings in these stands will tend to perpetuate similar forest types. However, as sawtimber oak stands mature, it is anticipated that species diversity will increase with the decline of the canopy oaks. Defoliation by gypsy moths, natural mortality and sawtimber cuttings will cause overmature oaks to be replaced by younger oaks, white pine, and hardwoods other

than oaks. White pine will probably become more prominent in stand canopies currently dominated by oak-pine or pine-oak mixtures, and in stands where it has become well established beneath declining oak canopies. On the best sites, mature stands will probably contain greater quantities of beech and red maple.