Regeneration of northern white cedar deeryards in Upper Michigan

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Northern white cedar is important deer yarding habitat in the Upper Peninsula (U.P.) of Michigan, but overbrowsing or natural pruning can decrease the habitat quality of these stands. Therefore, deer yards must be rehabilitated to be able to continue accommodating deer. Historically, many well-stocked stands of northern white cedar in the U.P. developed after wildfires burned through logging slash. Previous management recommendations suggested using clearcutting to produce a series of five even-aged stands (16-64 ha each), to successively provide deer food or cover over a 100-year rotation. However, clearcutting produces heavy slash that can inhibit the establishment of cedar seedlings, or may favor hardwood species or shrub establishment. Because prescribed fire may not always be an available management tool, this study by Verme and Johnston (1986) evaluated the effectiveness of slash disposal through prescribed burning versus mechanical removal after clearcutting, relative to no treatment after clearcutting.

This study was conducted on the Petrel Grade deeryard in Shingleton, MI. The tree species on site included northern white cedar, black spruce, balsam fir, tamarack, red maple, paper birch, black ash, and balsam poplar. Total basal area was approximately 44 m2/ha. The treatments tested were burning slash, skidding full trees and de-limbing at the landing (mechanical removal), and a control treatment where no slash was removed. The seedbed and understory vegetation were sampled before treatments, and at two, five, and ten years after treatments were applied. Vegetation characteristics sampled include stem density of northern white cedar, other conifers, and hardwoods by height classes (≤60 cm, 61-210 cm), and percent stocking of each category. Relative densities of shrubs, herbaceous vegetation, and

MANAGEMENT IMPLICATIONS

1. Clearcutting should only be conducted on productive soils to ensure successful white cedar regeneration.

2. Conducting a prescribed burn following clearcutting in northern cedar deeryards can maximize the regeneration of white cedar, but the abundance and condition of the regenerating seedlings ultimately determines whether the site should be burned or not.

3. The authors suggest that there is no need to burn a harvested site if substantial white cedar regeneration is already present.

4. Deer herbivory will severely hinder white cedar regeneration, so deer populations must be closely controlled to ensure regeneration success.

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seedbeds were also measured.

The authors found no significant pre-treatment differences in overstory density among treatments, and most regeneration in the pre-treatment period occurred by vegetative reproduction. By Year 2, 54% percent mortality of the cedar advanced regeneration occurred in the control treatment, whereas mechanical removal resulted in 70% mortality of advanced regeneration, and no advanced regeneration survived in the burn treatment. However, post-fire cedar regeneration was observed. Regeneration of conifers was similar across treatments, but there were more hardwoods on the burned site. In Year 5, burned sites had the highest seedling density, whereas mechanical removal sites had the lowest. This was likely due to the fact that fire prepared the seedbed better by burning the moss ground cover, whereas the mechanically treated sites retained grasses, sedges, and mosses, which impeded regeneration. The difference in density of white cedar stems was still evident in Year 10. There was annual regeneration in the burned sites, but significant mortality occurred in some years because of drought and herbivory. Growth of existing white cedar seedlings was stunted on mechanically treated sites due to overtopping by other species, particularly quaking aspen. Quaking aspen did not survive in the burned plots, so existing white cedar seedlings did not experience inhibiting competition. After year 10, all plots for all treatments were well stocked with white cedar.

This study showed that white cedar is not difficult to regenerate, but it is slow growing and experiences significant mortality for several reasons. The researchers suggest that clearcutting should only be conducted on productive soils, and a prescribed burn following clearcutting can maximize white cedar regeneration. However, the abundance and condition of existing white cedar seedlings after clearcutting ultimately determines whether the site should be burned or not. If sites already have many existing white cedar seedlings, there is no need to burn. Existing white cedar seedlings indicate successful site regeneration, so it is important not to damage these seedlings if they are present. For clearcut stands that have few existing white cedar seedlings, substantial amounts of slash or deciduous brush, or a significant conifer component, broadcast burning of the slash is an appropriate treatment. For sites to be sufficiently reseeded, the authors recommend that logging should be conducted in 2-4 hectare patches, with mature trees retained on the edges of the patches. Adequate seeding should occur naturally, but artificial seeding can be used in the interior of patches if necessary. If high stocking of hardwoods is present, the hardwood species should be killed at least 5 years prior to clearcutting to prevent suckering and competition with white cedar regeneration. Lastly, it is important to minimize impacts from deer in these areas until trees are free to grow, so deer populations in the area must be closely controlled.

Reference

Verme LJ, Johnston WF (1986) Regeneration of northern cedar deeryards. J Wildl Manage 50:307–313.