SARE Project LNE93-37

FOREST STEWARDSHIP TIMBER HARVEST DEMONSTRATION AREA

Stone Valley Experimental Forest

More than half of Pennsylvania is covered by forests. Most of these are "working" forests, continuously supplying the people of Pennsylvania and people all over the world with essential natural resource amenities and forest products. Because Pennsylvania's extensive forests contain high quality hardwoods, timber harvesting is an important reality and a significant part of our state's economy. Most everyone depends on the forest for wood products, and many people depend on the forest for their livelihood. Others simply enjoy the many forms of recreation and natural beauty the forest provides.

All this "taking" from Pennsylvania's woodlands, particularly timber harvesting, can have a large impact on the sustainability of the forest and its resources. However, with proper planning and careful management, timber harvesting can be beneficial, helping maintain vigorous, healthy, and productive forests. Therefore, it is essential that timber harvesting be employed as part of a professionally prepared management plan that recognizes potential consequences and avoids resulting negative impacts, including erosion and sedimentation, soil compaction, and damage to residual trees.

The forest provides many different benefits, and the preference for how it should be used or not used varies from person to person. For this reason, timber harvesting is frequently a controversial issue. Because most people (forest landowners and the general public) know so little about timber harvesting and its role in maintaining sustainable forests, the controversy is often magnified. To reduce the potential for conflict, we have developed this site to demonstrate alternative methods of timber harvesting along with both their benefits and consequences. With responsible forestry, which may include timber harvesting, we can ensure that biodiversity, wildlife habitat, and aesthetics are maintained.

This site in the Stone Valley Experimental Forest is one of eight areas established across the state to demonstrate and study alternative timber harvesting practices. One of the primary objectives of this project is to encourage responsible forest resource management. We want all visitors to embrace the forest stewardship ethic. Because many people visit the Stone Valley Recreation Area and Experimental Forest, this site provides us access to a large number of people who care deeply about forests and who want to form educated opinions about natural resource management.

FORESTRY TERMINOLOGY:

In order to facilitate understanding of the project, the treatments, and the considerations involved, we offer the following definitions of some of the terms frequently used in forestry.

- ***Forestry*** : the art and science of establishing and managing forests and their associated resources for a variety of benefits and values.
- ***Regeneration*** : the replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.
- ***Residual stand*** : trees that remain following any cutting operation.
- ***Silviculture*** : the art, science, and practice of establishing, tending, and reproducing forest stands with desired characteristics. **Cutting** is the primary tool of silviculture and can either promote growth of desirable species or the establishment of new trees.
- ***Stand*** : a grouping of forest vegetation sufficiently uniform in species composition, age, and condition to be distinguished from surrounding vegetation types and managed as a single unit.
- ***Stewardship*** : the wise management and use of forest resources to ensure their health and productivity today with regard for generations to come.

The Treatments

Each of the six treatment blocks is two acres. The treatments include various types of thinnings and regeneration harvests.

NO HARVEST

The major objective of this project is to encourage the responsible management of forests by showing the results of alternative timber harvesting treatments. However, our demonstration would be incomplete without first permitting you to see how the forest would appear without a treatment. In many circumstances no cutting may be a preferred alternative. Please keep in mind though, that forests, even without cutting, are dynamic, and ever-changing.

Block 1. Control... For comparison, nothing is removed from this plot.

THINNINGS

Tree mortality (death) is a natural, ongoing process in the forest. Young forests with small trees support many thousands of individual trees per acre. As the forest matures and individual trees become larger, many of those thousands of trees are crowded (by faster growing neighbors) and die. The trees in this forest began to grow around the turn of the century, and there were nearly 500 per acre before treatments were applied.

Thinning is a forestry technique used to "capture" some of the potential mortality by harvesting selected trees. Thinning reduces crowding and, by redistributing the growth potential to the most desirable trees on the site, the overall health, vigor, and growth of the remaining stand is increased. Those "residuals" or remaining trees may have been selected for one of many reasons, including wildlife habitat (a "cavity" tree), timber, or aesthetics. Thinning also provides some intermediate return on a landowner's long-term forest investment.

Three of the treatments are thinnings. These sites were fully stocked before harvesting. That is, there were no openings in the forest. Viewed from above, the crowns or branches of the trees seemed to touch one another in a continuous, green carpet. There was no room for individual crowns to grow and expand. The purpose of our thinning treatments was to reduce the stocking or density to 60 percent to give the residual trees additional room to reach out, thus increasing their rate of growth.

Block 2. Diameter-Limit from Below... A diameter-based thinning-from-below reduces the stocking (to 60 percent) by removing all trees smaller than a calculated diameter. Because the decisions about which individuals to remove are driven by diameter alone, there is no opportunity to deliberately allocate growing space to meet objectives. For instance, if all the trees on the site are of approximately the same age, a common condition in Pennsylvania, the smaller ones are growing slowly and competing poorly with their larger neighbors. Removing them typically provides little additional growing space to the larger ones. Also, by removing all the trees of similar size, we may actually eliminate one or more tree species that happen to grow and develop naturally at a slower rate. Although the resulting forest can look almost park-like, which is pleasing to many people, the treatment can have important negative effects. Small trees and shrubs provide food, homes and hiding places for wildlife, and their removal may significantly reduce wildlife use of the area. Also, a diameter-based cut from below will likely not be an economically viable option, in terms of both immediate cash flow and ultimate financial return.

Block 3. Diameter-Limit from Above... A diameter-based thinning-from-above reduces the stocking (again, to 60 percent in this case) by removing all trees larger than a calculated diameter. Those largest trees are selected on the basis of diameter alone, regardless of their location with respect to other trees. Neither of the diameter-based thinnings shown in this demonstration is rooted in sound forestry. The results are generally undesirable. Once again, when all similarly sized trees are removed, certain tree species can be completely eliminated from the remaining stand, and in an even-aged stand (most in Pennsylvania are), the burden of ultimately regenerating the forest falls on the smaller and possibly genetically inferior residual trees. Because the remaining trees are not younger, but instead are slower-growing, damaged, diseased or less vigorous species, they may not be able to respond to the increased growing space made available to them by the thinning. This is a negative impact on long-term forest health and diversity. In addition, this treatment allows no consideration for wildlife habitat. A diameter-based cut from above probably yields the highest immediate cash return of any thinning, but the long-term financial yield is drastically reduced. The residual stand, dominated by low value and poor quality trees, is simply unable to generate much future income potential.

Block 4. Improvement Thinning... An improvement thinning represents the professional forester-recommended silvicultural treatment for this forest stand. It was designed to meet a set of specified objectives, including production of timber for income, maintenance of wildlife habitat, and protection of the soils and related resources. In an improvement thinning, the resource professional balances the landowner's management objectives with forest conditions the site and markets, and then selects individual trees to cut or to leave on the basis of species, spacing,

and tree quality. The result is that trees of many sizes are removed and growth is redistributed by making growing space available to desired trees. In this way, the overall quality of the forest is improved for whatever objectives were chosen. Typically, the immediate cash return from this type of thinning does little more than cover its costs, but the treatment serves as an investment in the future of that particular forest.

REGENERATION HARVESTS

Forests are a renewable natural resource. Forests left completely undisturbed do not live forever. Once a tree becomes "mature," growth slows, resistance to insects and disease is reduced, and its ability to respond to injuries diminishes. Old trees are eventually harvested naturally, dying and then crumbling or crashing to the forest floor to donate their nutrients to the soil where they can be used by other living organisms and new seedlings. In a **regeneration harvest** we are mimicking this slow natural process to ensure long-term forest sustainability. Old trees are removed as efficiently as possible in order to supply the space and access to resources (light, moisture and nutrients) needed for the establishment of a new crop. When making decisions regarding a regeneration harvest one must consider the characteristics of the site, including soil and topography, the species of trees in the forest and their specific regeneration requirements, as well as possible impacts on wildlife and water resources.

Block 5. Clearcut... A **clearcut**, as defined by foresters, removes all the trees in one cutting, mimicking a natural disturbance like a fire or windthrow. In our hardwood forests, care must be exercised to make sure that naturally occurring regeneration is adequate **before** the cut is made. Otherwise, establishment of the new forest can be delayed significantly, and the site may become occupied by grasses and ferns or trees that do not meet the landowner's objectives. When applied appropriately, this treatment will lead to a forest of similarly aged trees, the most abundant being those that grow best in high levels of sunlight. The financial returns associated with this treatment can be high, but the aesthetic value of the forest for most observers is diminished until the new forest becomes established. Although the term "clearcut" imparts a very negative image to most people, harvesting a mature forest may be a good option for a landowner, depending upon the growth patterns of involved species, the timber market, and the conditions of the site.

Block 6. Shelterwood... A shelterwood cut removes both small trees and some large trees, the exact treatment varying from site to site. This regeneration treatment, which is less visually disruptive than the clearcut, favors tree species that require less than full sunlight to regenerate or trees that grow best under the shade or ***shelter*** of other trees. In addition to their sheltering function, the trees left after the first cut serve as seed sources for the new forest. Therefore, a shelterwood cut has the added benefit of allowing new tree seedlings to become established over time, reducing the risk of having no new growth. The first cut of the shelterwood treatment offers only limited initial cash flow. Much higher returns are realized when the new stand is established and the larger, residual trees are removed. This treatment will be re-evaluated in 10 years and if sufficient regeneration is present it will be harvested, if not, a second cut may be applied to stimulate additional regeneration establishment and growth.

The Impact of Whitetail Deer

The whitetail deer was hunted nearly to extinction around the turn of the century. Their remarkable recovery since that time can be attributed to factors including the elimination of natural predators (mountain lions and wolves) by early settlers, abundance of favorable habitat provided by young forests and agricultural fields, and protective game laws. But the resulting overpopulation of deer has negative consequences for our forest resources. The diversity of woody and herbaceous ground cover is reduced as is the diversity of forest songbirds and other wildlife. There is a delayed recovery of forests after disturbance due to deer overbrowsing. Often, commercially valuable tree species have failed to regenerate.

Many differing perspectives and opinions surround the issue of deer overpopulation. Whitetails certainly are beautiful animals, and a park-like forest that is easy to walk through results from their browsing of shrubs and seedlings. Therefore, actions to reduce the deer herd in Pennsylvania will only by taken when landowners, hunters, legislators and the general public understand the negative consequences of overpopulation.

Within the Stone Valley Experimental Forest, deer are expected to have a large impact on the growth of new seedlings and other vegetation after harvesting. We also anticipate tree regeneration under different harvesting treatments to vary. To demonstrate the effect of different light levels in combination with deer populations, paired fenced and unfenced regeneration plots have been established in each of the six treatment blocks. Differences in plant species abundance and composition will be monitored.

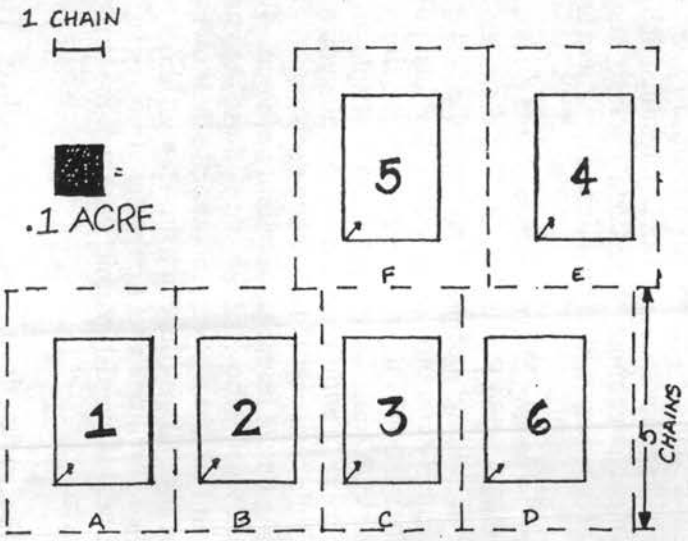
Summary

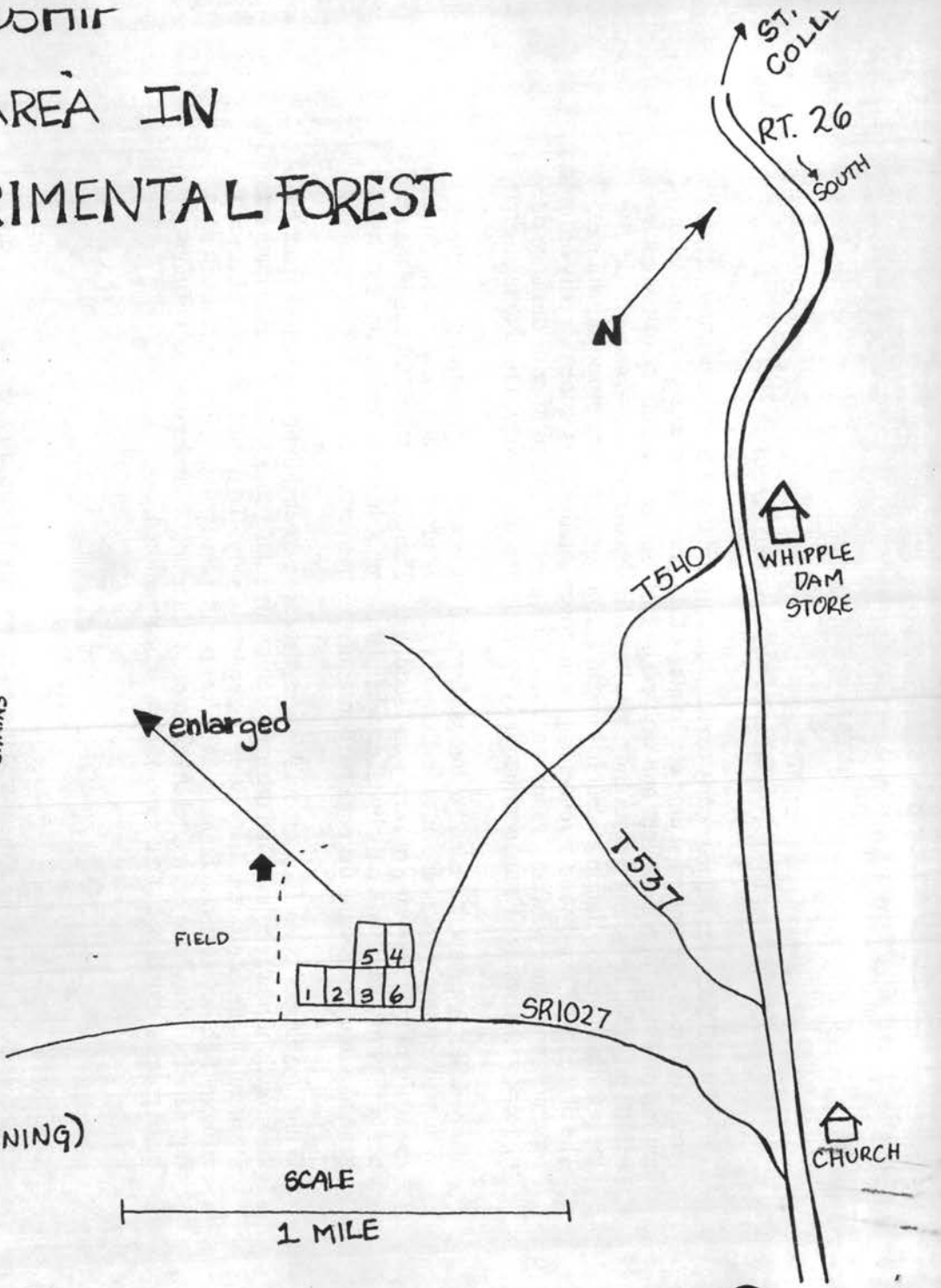
Each research plot will be remeasured three years and ten years after harvesting. We will monitor factors related to plant and animal species diversity, residual and new growth, mortality, and economic value of each treatment. Additional harvests may be conducted in the future to maintain density at 60 percent within the thinned treatment areas.

As we've pointed out, the timber harvesting alternatives presented do not all represent good forestry, but regardless, they are all used in Pennsylvania. The diameter-based thin-from-above treatment, also called "high-grading" because it removes the best or highest grade trees and leaves the rest, is particularly common on private, individual properties in the state. The purpose of this demonstration is to provide landowners, timber harvesters, foresters, and concerned citizens with some harvesting options, displaying both their positive and negative consequences. In addition, we hope to make you aware of some of the many considerations that should be a part of harvesting decisions. After all, our actions today have a great deal of bearing on the future sustainability of Pennsylvania's forests. As a result, we hope that forest landowners who visit the site will use the knowledge gained and, with the help of professional forest managers, incorporate their own objectives into a forest management plan. We believe all visitors can learn enough about responsible forest management to help form educated opinions about important forestry issues. Finally, we encourage you to embrace the forest stewardship ethic and share the spirit of responsibility for our renewable natural resources.

Please remember that all of us use, in fact depend on, forest products. Timber harvesting is an essential practice that can serve as an effective, environmentally sensitive tool of forest management. Join us in encouraging responsible management of all forests, public and private.

FOREST STEWARDSHIP DEMONSTRATION AREA IN STONE VALLEY EXPERIMENTAL FOREST





TREATMENT BLOCKS:

1 = CONTROL
2 = THINNING FROM BELOW
3 = THINNING FROM ABOVE
4 = SILVAH (IMPROVEMENT THINNING)
5 = CLEARCUT
6 = SHELTERWOOD