The Forestland Group's Approach to Hardwood Silviculture

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The Forestland Group

ABOUT THE COMPANY

TFG is a TIMO which was formed in 1992 by four young men, two foresters (Yale and Duke) an officer of TNC and an officer of The Conservation Fund. It was their belief that, counter to the conventional wisdom of the time, the management of eastern hardwood forests posed a sound investment and particularly so for institutional investors. As a result the company has specialized in the purchase and management of eastern hardwood forests and, except for rare occasions, is committed to natural regeneration and the production of high value hardwood logs. The overall silvicultural objective is, given site limitations, the creation of maximum value as opposed to maximum volume per acre. Our goal is to so manage the investor's property that at the end of an investment fund the forest purchased is of equal or greater value while there have been decades of positive cash flows from timber harvests. Although there are many ways to accomplish this, the application of a conservative but creative silviculture is certainly an important method.

Operationally we are organized into four regions; the Northeastern, the Lake States, the Appalachian, and the Southern. Each region is directly overseen by a senior forester and his staff plus the contracted services of one or more of the larger forest consulting firms.

TFG currently manages about 3 million acres in 20 states, Canada, Costa Rica and Belize. The location of these properties is testimony to our commitment to hardwood forestry. Note the lack of ownership in the Loblolly Kingdom of the South. Only in northern Maine where

spruce-fir and mixed woods predominate does softwood play a major role. The great span in both latitude and longitude of this ownership permits, even requires, the application of the full range of silvicultural practices. From classical single tree selection in the northern hardwood types to stand restoration in the Southern Appalachians to intensive clonal cottonwood plantations in Missouri to mahogany regeneration in Belize there is a full array of colors on our silvicultural palette.

In addition TFG is a FSC Certified Resource Manager and the constraints and requirements therein often can be conducive to silvicultural innovation. For example, the Appalachian FSC Standards forbid a clear-cut of greater than 10 acres unless a residual basal area of 20 square feet per acre is retained. This has somewhat deviously resulted in perhaps the World's only hickory retention cut which was roundly applauded by the squirrels of the county as very innovative.

Similarly a recent whole tree harvest in Pennsylvania was designed to leave 50 feet of basal area of the best quality stems, mostly cherry, as a residual, basically a shelterwood designed to create a two aged stand. We were faulted by the FSC auditor for not leaving sufficient large woody debris. This year for a similar harvest cut on the same property the Timko operator was instructed to cut, drop, and leave each fifteenth stem. As the harvest was largely hardwood pulpwood this did not represent a large financial cost but let us maintain our "white hat" image. This created a situation wherein we required an action which normally would have resulted in a reprimand to the logger. This inexpensive action calms the FSC relationship and to some degree has a beneficial effect on habitat but certainly qualifies as innovative.

By this is meant the cost saving obtained by using traditional equipment to accomplish two diverse goals at the same time.

Examples:

Traditional single tree selection which is so successful in the northern hardwood forest if carried on long enough without natural disturbances inevitably tends to reduce both biodiversity and economic potential as the extremely tolerant sugar maple and beech increase their dominance at the expense of other less tolerant but valuable species (yellow and white birch, white pine, ash). Research ecologists have been simulating windthrow by bringing in heavy equipment to push or pull over dominant stems, often in clumps. This works but is quite expensive. Our managers in the Upper Peninsular of Michigan have begun to employ what they call “tip ups”. This involves locating seed producing stems of mid-tolerants and marking them in a unique manner. Then a minimum of 4 trees between 8 to 12 inches in dbh within 50 or so feet of the seed tree or clump are marked differently to be pushed over when logging crews enter for the cutting cycle. Using a buncher or processor to do this takes much less than 5 minutes per tree. The combination of the mineral soil exposure on the pits and mounds plus the increased overhead light creates an excellent seedbed. We’ve only begun this and there are no results to report as yet.

Far away from the northern hardwood region along the southern Mississippi River a somewhat similar process is being employed to obtain natural regeneration of nearly pure, even-aged cottonwood stands which have developed on coarse textured “new land”. These depositional soils are often less than 40 years old without an A or B horizon. At maturity the cottonwoods begin succession to river front hardwoods like sycamore, ash, elm and hackberry. Cottonwood is more valuable to the Vicksburg mill. Natural regeneration of cottonwood requires a moist bare mineral soil, a seed source and full sunlight. Harvesting is timed to precede or coincide with the release of the typical massive cottonwood seed crop in the spring. Loggers are instructed to rut and scarify as much as possible over the harvest area when removing the mature cottonwood overstory. It works quite well but required many lengthy discussions with the state BMP auditors to be permitted.

Small patch cuts are an often used tool to:

(1) Maintain the even-aged status of much of the forests of the Southern Mountains and of the South in general
(2) To cope with the rapidly varying or patchy stand conditions of age, vigor, damage, density, and advanced regeneration.
(3) It provides a way to create economic value without high-grading and short of a full-scale clear-cut.
(3) To increase the attractiveness of an otherwise marginal harvest offering.
(4) Enhance and/or maintain habitat diversity.
(5)To rehabilitate a much abused stand by beginning anew

Additionally in upland mixed hardwood stands oaks, will often regenerate in small scattered clumps. In most of our regions it is recommended that when doing the initial management inventory suitable clumps of advanced oak regeneration of acceptable height are found to GPS them as candidates for release via patch cuts in future operations.

The Sassafras Ridge- West -sale #425-04-07
Middle TN

The sale area was predominately a mixed upland hardwood site dominated by white oak, chestnut oak, hickory and red oak with yellow poplar and maple along the drains. Sourwood, black gum, post oak and Virginia pine dominate the non-desirables. The soils are droughty and cherty save along the drains. Slopes are generally between 30 -50%. Advanced regeneration is inadequate but the potential for coppice and new seedlings was excellent.

Harvest specifications:

About one third of the sale area is in the commercial clear-cut patches. Cutting line is marked by the field forester. The average patch is about

5 acres (ranging from 1 to 12 in size). These ridge top stands are of low site quality and, having had one or more “selective” or diameter limit cuts, are often dominated by cull stems and poles. By contract stumps are to be low to enhance coppice. The remainder of the sale area is a marked tree operation consisting of crop tree release, TSI, and general tidying up.

This use of small patch clear-cuts is widely used through out many of our regions. If conditions are such that adequate natural regeneration cannot be expected in a patch pines may be planted at a very wide spacing to create a mixed pine hardwood stand. Such a procedure can be used when needed to rehabilitate much abused upland hardwood stands. While inexpensive it is certainly not swift.

PINE AND HARDWOODS HAPPY TOGETHER

From time to time our land acquisition activities have resulted in the ownership of significant acres of pine plantations nestled among the hardwood resource. This has occurred to a significant degree in Texas, West Virginia and Maryland. The purchased plantations were created by three different companies to supply pulpwood to their paper mills. In each insistence as our timber supply agreements permit our management is focused upon natural regeneration aimed at the creation of a second rotation of mixed pine-hardwood stands.

In east Texas the loblolly plantations were established on what had been hardwood wet flats of extremely high site index for many hardwoods particularly the lowland oaks. Despite intensive site preparation many of these plantations had, by mid rotation, developed an understory containing a healthy population of lowland oak, ash, and other valuable hardwoods. Upon comparing the likely future values of pine pulpwood and quality hardwood sawlogs in that region we are opening the stands up, releasing much of the understory and extending the rotation to create and manage mixed pine-hardwood stands. The young, pine oriented foresters who manage the property for us initially

thought that these marching orders were certainly unique if not somewhat insane. However, they now agree that this type of forestry is “more fun” than push, pile, and plant.

In West Virginia we found ourselves owning many plantation acres of the pitch-lob hybrid which was developed to do well in the cold weather of high elevations. While this was quite successful in the pulpwood sense it didn’t appear that the hybrids would be nearly as successful in the production of quality pine sawlogs. Consequently as the timber supply agreement permits we are replacing them upon harvest with seedlings in place prior to harvest or developing from seed from the side (a.k.a. yellow poplar). In those instances when there is inadequate advance regeneration of either pine or native hardwoods in place or expected we are planting white pine at very wide spacing to create and manage mixed pine hardwood stands.

A similar story occurs in Maryland where being pulled in one direction by a timber supply agreement and in another by a conservation easement we are modifying site preparation methodology to maximize the likelihood that oak will remain an important part of future naturally regenerated stands from existing plantations. This has required fine tuning the rate and timing of herbicide applications to reduce gum and maple while permitting many oaks to remain as the stand develops.

This manipulation of pine plantations has started me to begin pondering the potential value of a program of crop rotation on a very long time scale.

PLANTING HARDWOODS

While natural regeneration is our mainstay we are, however involved in hardwood plantation management.

We purchased cottonwood plantations which had been developed in MO to supply hardwood fiber to a nearby paper mill. The establishment and management intensity of these plantations exceeded that of most agricultural crops. They were on a 12 year rotation with a thinning at age 8 removing 30 tons and a final harvest volume of 51 tons were the norm. Our present intent is to manage these on a thirty year rotation thinning every four years then to reproduce them as natural stands of cottonwood. Models predict the first sawtimber removals from this plan at age 16.

On the loessal hills adjacent to the Mississippi River past experience with largely experimental and subsequently overlooked plantings of cherry bark oak have been so successful even though established on a pasture and not thinned that we are planning to pursue the concept further and to include the under-planting or encouragement of sweet gum as a trainer for the oak and earlier thinnings of both.

In Russell County VA we are providing land and cooperating with TNC in a study of the potential to use hardwood plantings on reclaimed strip mines as a carbon sequestration tool. As it has traditionally been done the soil of a reclaimed mine has been so compacted that survival and growth of planted trees has been universally poor. TFG has granted a 60 year use of 170 acres. TNC has cleared, herbicided, ripped, and planted an array of upland hardwood species including American chestnut. Sixty years was chosen as it is felt that at that age the rate of carbon sequestration will have flattened out. This project may, in addition to the sequestration knowledge, support many of us who feel that species mixtures hold the future for hardwood plantations.

Our work in both Costa Rica and Belize is very involved with the establishment and management of tropical hardwood plantations but is beyond the scope of this telling.

SUPPLEMENTAL PLANTING

In the upper peninsular of Michigan where we are facing the rapidly spreading front of beech bark disease. The silvicultural response to this often leaves often us with a residual basal area of 30-50 square feet and inadequate desirable advanced regeneration. Since 2004 we have been planting about 400 acres per year of this condition with red and white pines for future value and northern red oak to replace the hard mast of the dying beech

In the Mississippi Delta some sites are of such a high elevation relative to the major water courses that they very rarely flood and flooding is essential to effective regeneration. The aggressive growth of Cherrybark oak and Nutall oak has led us to play with under planting them prior to harvest on suitable sites which lack adequate advanced oak regeneration.

THE FUTURE

There are two primary and unprecedented challenges which are or soon will be impacting hardwood silviculture in the eastern US and one is an outgrowth of the other.

The foremost challenge is climate change. Since we routinely deal, in the production of large high quality saw logs, we deal in rotations long enough to be impacted in the near term by the ecological turmoil which shifting patterns of temperature and precipitation will create. Today I envision only two broad responses to this threat. One is to follow the historical pattern developed by agriculture throughout the world. This is to identify or create species or clones which should have a high probability of developing satisfactorily in the anticipated environmental conditions. Then to grow and manage these in as carefully controlled artificial conditions as possible. Though we have an excellent record of doing this with temperate climate pines and a number of tropical hardwoods I believe that the site specificity of many of the more valuable temperate hardwoods poses a significant hurdle to

this approach. Overcoming it will require the utmost of silvicultural creativity.

A different approach is to maintain, as conditions change, as diverse a species mix in our hardwood stands as possible and to be gentle enough in our management to allow the forest to retain its ability to change and slowly respond to new conditions. This will involve the bitter pill of downplaying the historic value of a particular species on a particular site. Past values or performances may not be a good guide into the murky future. The prized black cherry of the Alleghany Plateau may be much happier in Maine and southern Canada while heretofore undesirable even unheard-of species may be doing very well. This will require a rethinking of our current antipathy toward invasive species. Success for this approach will require region-wide, organized, and precisely reported observation of subtle changes in the field.

Both approaches—the artificial and the natural--will be required and I think that it should be the responsibility of our profession to ensure that a proper balance between the two is achieved and maintained.

The second challenge is an indirect outgrowth of the first. It is the global drive to develop alternative energy sources. Woody biomass as an energy source and as a chemical feedstock is already being increasingly utilized and more is planned.

In 2007 there were 196 wood burning power plants in the US of which 72 are 40 megawatt capacity or larger. Another 20 are currently under development half of which are destined for the eastern states. The cost of transportation of biomass dictates that these are built near the trees and not where the people are.

This potential on the one hand, as the economists are fond of saying, is the answer to the silviculturists' dreams: a dependable, even demanding, market for troublesome species, sizes and shapes of trees.

On the other hand there is in this opportunity the potential for ecological disaster in the form of habitat and soil productivity loss. The stark forest damages caused in the 1800's by the production of charcoal for iron smelters and the wood feed stock for acetone and wood gas production were highly localized in their impact. The production of woody biomass will not be nearly so localized.

While the general public has been moved from time to time raised an outcry against perceived silvicultural insults done to provide pulpwood to the mill I feel that they will be much less likely to do so against similar insults that keep the power flowing. Our profession will be required to take very unpopular stands in favor of moderation.

Heretofore non-merchantable material from traditionally harvested sites plus sawmill wastes will be woefully inadequate to meet the demand. I feel that there must be wide ranging changes in the practice of silviculture in response to this challenge.

There undoubtedly will be the development of "energy plantations" and hardwoods, given their coppice capacity, will have a distinct advantage in the economic production of woody biomass. This has already begun. In Maine for example where the biomass wood energy markets are the most developed in North America. Here hog fuel prices have increased 31% over the past year while hardwood roundwood prices have jumped 40% in the first quarter of this year. A local sales price for tree-length hardwood firewood is $125 per cord. If continued and not carefully controlled this spike in value might easily dominate hardwood silviculture. The future impact of biomass for energy can be seen in a recent study which indicates that for North Carolina to achieve 10 percent of the state's transportation fuel from biomass by 2020 would require 20 conversion plants each consuming a half million dry tons of biomass per year.

All of this powerful demand will be occurring at the same time that climate shifts are upsetting the natural biological balance of our forests.

As our projection of the future of a forest is based, directly or indirectly, upon its past development we will be flying somewhat blind into this new future.

There, hopefully, will be many approaches contributing to the solution of these problems. My favorite choice for future development is a return to the ancient practice of coppice with standards. Mixed wood coppice in England has produced 20-30 tons per acre on a 15 year rotation while a 30 year rotation yielded 40 -50 tons per acre. (Most eastern hardwoods have begun to produce seed at this age) The developing coppice acts as trainers for the standards to create large possibly quite old clear stems. If the coppice rotation is long enough for desired species to produce seeds and seedlings one could ensure sustainability and something of diversity while maintaining a tree canopy. With the development of innovative low impact machinery to harvest the small light coppice stems and the potential for genetic engineering this silvicultural system would serve the best of both worlds; low cost woody biomass and quality sawtimber. Since some coppice courts in England are reported to have been so managed for 1000 years the process is likely to be sustainable.