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Dancing With Pines • Pine Hyacinth • I Remember Rosemary • A Conversation With Ellie Whitney



Pinus serotina.

Dancing With Pines Perils and Joys of Ecosystem Restoration

NO. 1 IN THE SERIES

BY DR. FRANCIS E. PUTZ

**WHEN CONTEMPLATING THEIR
LAWNS, GARDENS, OVERGROWN PASTURES,
AND DEGRADED WOODLOTS, AN INCREASING
NUMBER OF FLORIDIANS WANT TO RESTORE
THESE LANDSCAPES TO A MORE NATURAL
AND ECOLOGICALLY VIABLE STATE.**

Some people commence this process by ceasing to mow their lawn, which does reduce pollution and allows some diversity to creep in, but will not miraculously result in any semblance of a natural ecosystem and is likely to annoy the neighbors. Planting native species in more-or-less traditional gardens is a more socially acceptable way to start, especially in wildlife friendly arrangements, but restoring entire ecosystems to their historical condition is a much more substantial undertaking.

This article and several to follow are intended to help Florida's elite group of "backyard restorationists" and "ecosystem gardeners." I first cover some of the basics but subsequent installments discuss starting points and successional trajectories, planting, burning, and tending operations. Many common problems are discussed, but the focus is as much on the philosophical dimensions of ecosystem repair. Emphasis is on restoring the open-canopied, pine-dominated, fire-maintained, and incredibly species-rich savannas that once graced most

of our region, but other ecosystem options are considered as well. I feel qualified to provide advice on this topic because during more than two decades of active restoration I have made lots of mistakes, have frequently set and just as frequently changed my goals, and have generally learned the hard way. Although I offer no sure-fire recipes, my hope is that these articles encourage others to rise to the restoration challenge.

Given that appreciation of restoration projects in progress requires a rare aesthetic sense, be prepared to defend abandonment of your lawnmower and replacement of your flourishing flowering crepe myrtles with scrubby looking scrub plants (Gobster and Hull 2000). When questioned you might point out that half of the agricultural chemicals used in the USA are applied to lawns (Bormann et al. 2001) and that our sandy soils permit the 18-6-4 with broadleaf herbicide spread on monospecific swards of exotic turf grasses to leach rapidly into the aquifer, thus polluting our treasured springs and contaminating our drinking water. If you are feeling zany, you might opine that the lawn mania gripping your interlocutor and much of the USA is the result of a nefarious conspiracy involving lawn seed and lawn chemical companies, working hand in hand with lawn mower manufacturers, in cahoots with lawn care service companies, advised by turf grass department faculty from land grant universities, and all coordinated by golfing associations (Jenkins 1994, Robbins and Birkenholz 2003). After that diatribe, they might acknowledge that although your external combustion approach to yard

Figure 1: Restorationists in Florida can select from variations on the themes of scrub, pine savanna (including flatwoods and sandhills), and hardwood hammock.

maintenance is sometimes smoky, it is quiet and involves no fossil fuel burning. Finally, if pressed, it might help to emphasize that pine savannas are more threatened than tropical rain forests. With nearly 1,000 people moving to Florida every day and even locals lacking a sense of place, restoration may be a hard sell, but is always worth the effort.

Before elaborating on the various objectives or “reference state” options for your restoration campaign, the subject of ecological humility should first be broached. Ecosystems are complex and so is their restoration; once destroyed, ecosystems can never be entirely restored. While it is generally possible to replant the dominant species, getting the ecosystem to function without further intervention is nigh on impossible; to assume otherwise represents dangerous ecological arrogance insofar as this attitude can be used by the forces of evil to justify ecosystem destruction. In the case of pine savanna restoration, for example, if the site is sufficiently open, the first step might be to plant pine trees and wiregrass, but what about the other 100 plus other plant species that constitute most savannas, not to mention all the pollinators, seed dispersers, seed predators, pathogens, symbionts, and etc.? And what about the frequent growing season fires needed to maintain the ecosystem?

Although I teach and preach restoration, my own efforts remind me often that it is easier said than done. For me there has been a surprise at every bend of the restoration path – this time it might be native vines that for unknown reasons start to proliferate, next time it is deer rubbing the velvet off their antlers on the best of the young pines, and then in response to some mysterious stimulus, the site is overwhelmed by an exotic herb presumably germinating from long-dormant seeds. A lot can be learned from fixing what is broken, but if it’s an ecosystem that is broken, do not expect to have it running on its own, at least not in this lifetime. Nevertheless, trying to restore a natural community is an unequaled gardening experience and the best way to learn the ecology of our place.

RESTORATION DESTINATIONS

The first step on the road to restoration is deciding on a destination, the sort of ecosystem you wish to emerge from your efforts. Selecting the appropriate reference state from the palette of possibilities is challenging because there are so many choices and so many factors that should be considered. At the broadest, and disregarding the wettest options, restorationists in Florida can select from variations on the themes of scrub, pine savanna (including flatwoods and sandhills), and hardwood hammock (Fig. 1; Myers and Ewel 1990). Factors to consider in making this selection include current vegetation composition and structure, soil fertility and drainage, available time and funds, and the neighborhood in which the restoration site is located. For example, restoring pine savanna might not be the best choice for a small suburban lot with a closed canopy of hardwoods in a development where the homeowners’ association prohibits open fires, especially if



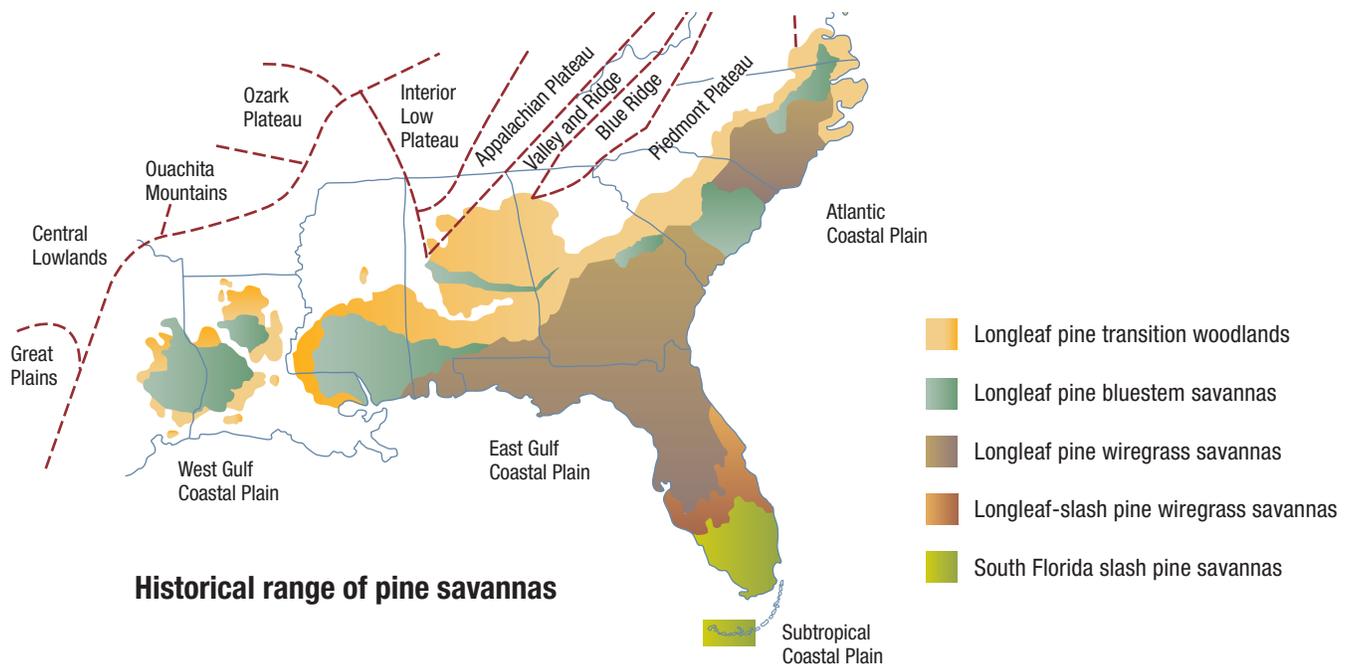
SAND PINE SCRUB



PINE FLATWOODS



SANDHILL, LONG UNBURNED
Photos by Dr. Anne Cox



Historical range of pine savannas

you want continuous shade, hate stumps, loath chainsaws, despise herbicides, and do not necessarily prefer fox to grey squirrels. Under such conditions, you might be better off enriching the hammock with gap plantings and exotic species control, even if historically the area was splendid savanna.

The major upland ecosystems in Florida – scrub, pine savanna, and hammock – actually blend into one another, share species, and can replace one another on the same site if the fire regime is right (Whitney et al. 2004). Scrub, sand pine dominated and otherwise, develops mostly on deep sands and always where fires are infrequent but terrifying when they do occur. Given the difficulty of replicating and then controlling these stand-replacing fires, scrub restoration is more focused on replanting the appropriate species than with resuming the natural disturbance regime. At the other extreme of soil moisture availability and fertility, hardwood hammocks do not burn readily, do not require fire for their maintenance, and mostly now occur on former savanna lands where fires were suppressed (Ware et al. 1993). Hammock restoration mostly involves species reintroductions, exotic species control, and fire suppression rather than using fire as a management tool. Pine savannas, in contrast, are naturally maintained by frequent and consequently low intensity fires. Although there are handy chemical and mechanical fire surrogates, controlled burns are generally used in savanna management as well as for hazardous fuel reduction (Winn 1996).

My bias towards pine savanna conservation and restoration can be justified on the basis of their current scarcity; over the past century the pine savannas have been reduced to less than 3% of their historical range. I might also mention their fantastic floristic diversity as well as their gopher tortoises, fox squirrels, and red cockaded woodpeckers, but might as well admit that I genuinely like carrying out controlled burns. Finally, it may be a stretch, but cross-cultural comparisons of ecosystem

preferences as well as studies of the evolutionary history of our species suggest that savanna loving is genetic (Heerwagen et al. 1993).

Whichever ecosystem option is chosen, you also need to consider the level of ecological purity for which you wish to strive. If you will settle for outward appearances and hammock is your goal, then do not bother reducing laurel oak domination and perhaps even leave that camphor tree alone. And if it is the “feel” of a savanna you want, then just thin the loblolly pines, burn the bahia, and do your botanizing elsewhere. But if every sprig of centipede grass bothers you, then you might consider seeking counseling or at least get ready for a long haul.

WHERE HAVE ALL THE PINE SAVANNAS GONE?

The first written descriptions of the coastal plain, dating back about 500 years, tell of vast, open landscapes with sparse canopies of pines, scattered hardwoods, and a phenomenally species-rich ground cover of flowering plants. The savannas that once stretched over 12 degrees of latitude and from Texas around to Virginia flourished under conditions ranging from seasonally flooded flatwoods in sub-tropical Florida up onto the distinctly non-tropical foothills of the Smoky Mountains but all were frequently burned and mostly grew on nutrient-poor soils that were at least seasonally subjected to severe drought (Fig 2. – Map of historical range of pine savannas, redrawn from Platt et al.; Platt et al. 1998). Given this wide geographical and ecological range, it is not surprising that pine savannas vary a great deal in structure, species composition, and dynamics. Even use of the term “savanna” to describe some of these ecosystems is questionable insofar as some more resemble pine forests, but when fires were frequent, canopies were open, and savanna ruled.

The dominant pine species in much of Florida was longleaf (*Pinus palustris*), but the combined effects of centuries of hog rooting, cattle grazing, turpentine tapping, logging, and finally fire suppression (usually in that order) substantially reduced the abundance of this prince of pines. Historically, loblolly pine (*P. taeda*) was mostly restricted to rich alluvial soils but is now common on abandoned agricultural lands. The case of slash pine (*P. elliotii*) is a bit more complex because there are two distinct varieties. South of Highlands County slash pine occupies a wide range of habitats and behaves much like longleaf pine, whereas the North Florida variety is a wet flatwoods tree favored by foresters and planted widely. The other wet flatwoods species is pond pine (*P. serotina*), which occurs where drainage is even more seriously impeded; unfortunately little known about this species or the ecosystem it dominated, it is never planted and is currently scarce. With due respect for these other species, I pay particular attention to longleaf pine but believe that most of my comments also pertain to the southern variety of slash pine and the habitats it dominates. Wetland restoration deserves more attention than I can give, but the hydrology of most backyard restoration sites has been disrupted by ditching and draining, rendering moot the great tolerance of slash and pond pine for soil flooding. Finally, it is hardly worth dancing with these other pines (Fig. 3).



Figure 3: The author's daughter waltzing with a young longleaf pine.

STARTING MODESTLY

To avoid shocks to your system and too many bad repercussions in your neighborhood, I suggest that if you are going to convert your lawns and gardens to something more natural, like a pine savanna, you start gradually and perhaps out of plain view. Consider a sunny 10 x 10 foot area of St. Augustine grass in the corner of your backyard. If your intention is to replace that mono-specific sward of exotic turfgrass with a patch of pine savanna, the first step might be killing the grass. As hard as it is to keep alive, lawn grass is surprisingly hard to kill. If you eschew herbicides in favor of muscle power, be ready for hundreds or even thousands of weeds to sprout from formerly dormant seeds exposed by your hoe. While dealing with these weeds and Lazarus grasses over the next several years, you can be tending the 50-80 planted wiregrass plugs, promoting the establishment and growth of the half dozen other species you planted from seed, and encouraging the surviving bare-root longleaf pine seedlings to emerge from the grass stage and start on their way up to the canopy. While native species theoretically require less care than introduced species, theory and practice do not always agree on this issue. If this sounds like gardening, it is, but gardening with hundreds of natives and gardening with ecological not just aesthetic or alimentary goals.

THE ZEN OF RESTORATION

There is a Zen of restoration that derives in part from the fact that no one can tell you exactly how to re-create a pine savanna, a patch of scrub, or a hardwood hammock. It is impossible to specify exactly how the restored ecosystems should look, what species they should contain, or how they should function ecologically. Given the variety of factors that influence them, Platonic forms of these ecosystems have simply not developed. The restoration challenge is made even greater by the scarcity of well maintained sites upon which restoration goals can be modeled (but see Whitney et al. 2004 for some suggestions). Furthermore, species native to Florida are little studied ecologically and even less well known horticulturally.

Your restored ecosystem should be what you want it to be. Large or small, diverse or simple, fire maintained or hand weeded, your assistance in ecosystem recovery should be venerated. Guidebooks for restoring other ecosystems generally advise setting goals, developing specific management plans, structuring timetables, and monitoring progress (Packard and Mutel 1997). I would give the same advice with a few modifications appropriate for the South; keep your goals somewhat vague or at least let your management plan change with experience, keep your timetable flexible, let your landscape aesthetic evolve, and celebrate the successful establishment of each new species as your labor heals the land and engenders a heightened sense of place. 🌞

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ABOUT THE AUTHOR: *Dr. Francis E. "Jack" Putz conducts research and teaches courses on ecosystem management but then goes home to his 100 acres and less successfully practices what he preaches. He is the Prince Bernhard Professor of International Conservation at Utrecht University in The Netherlands and a Professor of Botany at the University of Florida, Gainesville, Florida 32611-8526.*

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