The Land Report

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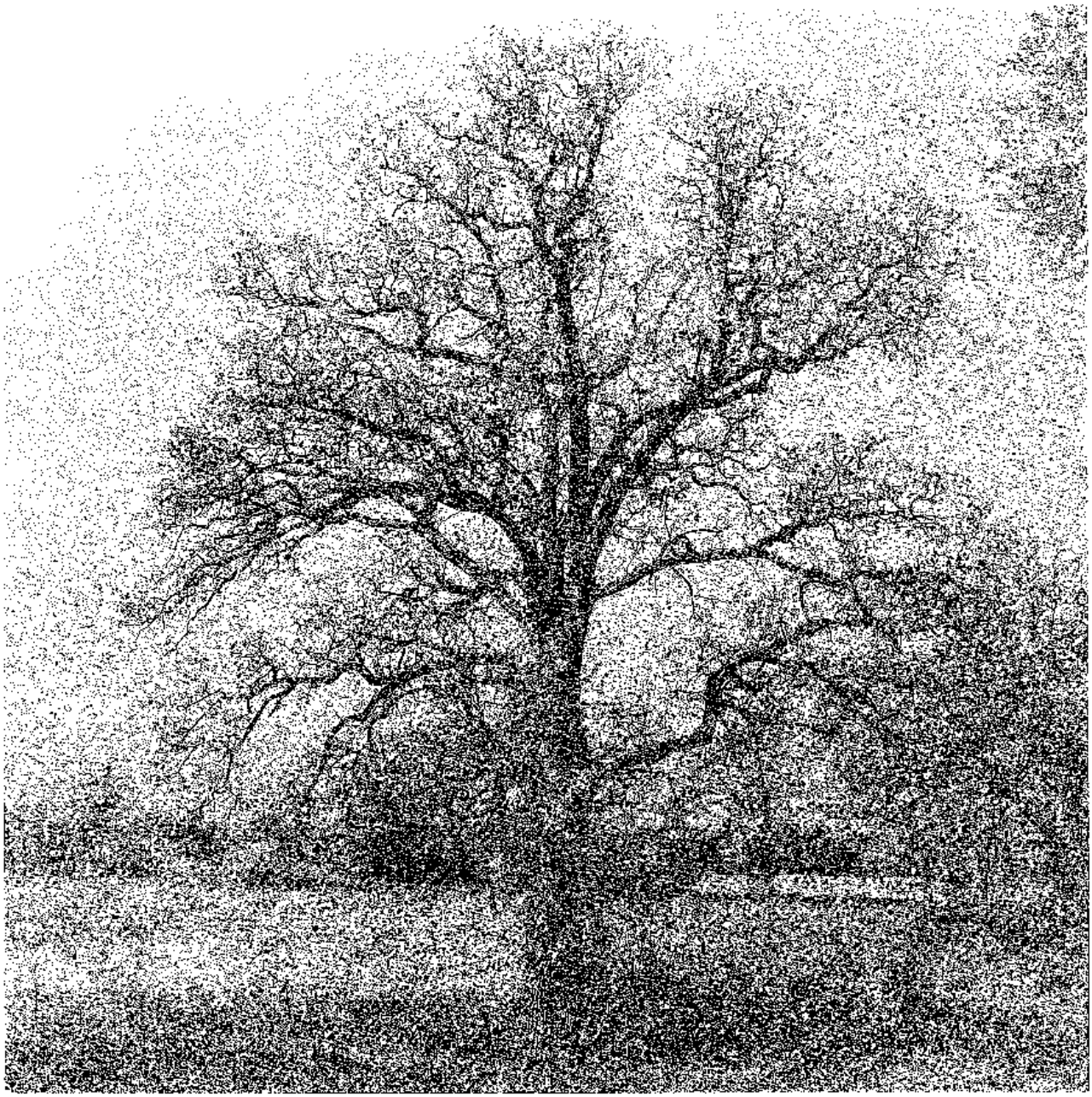

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AT THE LAND

Land Institute Research Report

When people, land and community are as one, all three members prosper; when they relate not as members but as competing interests, all three are exploited. By consulting nature as the source and measure of that membership, The Land Institute seeks to develop an agriculture that will save soil from being lost or poisoned while promoting a community life at once prosperous and enduring.

To become a Friend of the Land and support the work of The Land Institute, please turn to page 39.

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Editor: Brian Donahue
Research Report Editors: Jon Piper and Marty Bender
Assistant Editor: Karen Andersen
Graphic Design: Arrow Printing
Circulation Manager: Alice Sutton
Photo Editor: David Henretty
Arts Associate: Terry Evans
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THE LAND INSTITUTE

2440 E. Water Well Rd.
Salina, KS 67401
(913) 823-5376

Introduction

Brian Donahue

I have been a farmer and a logger for most of the past twenty years in Massachusetts, in an area where farmland has long been disappearing under forest on the one hand and suburbia on the other. I have tried to farm and log in as ecologically appropriate and sustainable a manner as I can, although I am aware that I am a long way from understanding all that this requires. I have tried to be a responsible citizen of the eastern deciduous forest, a land that I love.

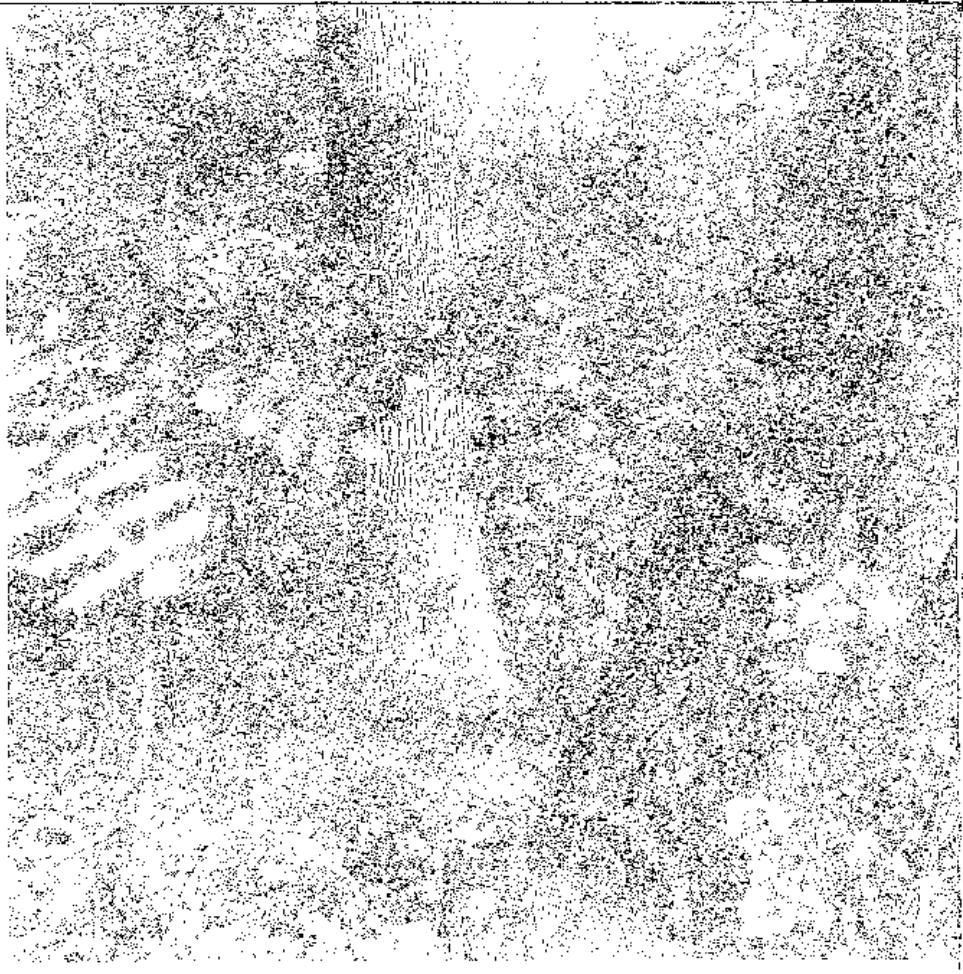
Trying to use the land sustainably puts us in a quandary: how do we make sustainable use of natural resources and preserve biodiversity at the same time? The eastern forest was shattered by excessive agricultural clearing and heavy logging during the nineteenth century. The trees grew back as agriculture declined, but now the forest is coming under pressure again. Logging is on the upswing in the East as the second growth matures and becomes valuable, and environmentally-responsible logging is unfortunately more the exception than the rule. Worse, suburban and second-home developments are cutting the forest into smaller and smaller bits, endangering many "deep forest" species that need large, unbroken tracts. Meanwhile, acid rain and ozone haze inhibit the growth of trees, and global warming threatens to leave many of them stranded in the wrong climate within the next few centuries. How do we begin to preserve biodiversity, or even define "sustainable forestry" in a situation like this?

The story is similar here in the prairie region, where I live now. From Kansas east to Illinois the tallgrass prairie was mostly converted to plowland a century ago. In places where native prairie remains, it has been heavily grazed by cattle in ways that have surely altered its composition. Once-common savanna and wetland communities have been decimated. It is the same in other parts of the country. Native ecological systems are under assault from all sides.

Alright, you may say, surely the answer to that is to limit industrial extraction, and to work to protect and restore natural areas. I am all for it, but the quandary remains. If we rely on sustainable agriculture and forestry in place of fossil-fuel subsidized production, we will probably require as much or even more land than we use today. There are some 260 million people in our country, and close to 6 billion people on the planet, and that population is unlikely to decline for several generations, barring some catastrophe. Instead, as everyone knows, it is still rising with a massive head of steam. U.S. population is projected to reach 345 million by the year 2030. It is going to take a lot of acres for so many human beings to feed, clothe and house ourselves, especially if we propose to do it using far less oil.

Dennis Avery, a food policy analyst with the Hudson Institute, claims we should protect biodiversity through *more* chemically-intensive farming and biotechnology. By removing subsidies, allowing the free market to flourish and rewarding those innovators who produce the best yields on the best farmland, we could set aside marginal land the world over for conservation, he says. The recovery of the eastern forest is a case in point. This argument is clever but has some obvious flaws. The first is that there is little chance non-agricultural land will be spared other forms of exploitation in a world ruled by global corporations. Such land is not protected today, why should it be in the free-market future? The second, closely linked to the first, is that the modern industrial food system requires very large "inputs" of chemicals, energy and equipment (including satellites, it now seems) to produce its high yields. The economy that provides these things rests on continued massive consumption of resources of all kinds, which will hardly leave most of the earth's surface unmolested. A world where billions of humans are confined to cities and fed by high-tech farms on concentrated acreage, while large parts of the earth are allowed to go wild is utterly incongruous: if we go that route, we will want it all, and we will get it.

There are some in the biodiversity and sustainable agriculture movements who look to a gentler version of Avery's technological cornucopia. Perhaps we can learn to recycle biological wastes and live on far less land, growing more of our food closer to home with intensive organic methods. Then we could let more land go wild. Without question there is enormous waste in the American food system today, in our conversion of grain to meat, in the distance we truck our produce, and in our squandering of manure. The considerable savings we can



make along these lines will be all to the good. However, unless we are planning to repeal the Second Law of Thermodynamics, we will still require the sunlight falling on hundreds of millions of acres to grow our staple grain, fiber and oil crops, and to cultivate and harvest them without heavy doses of fossil fuel. The Land Institute's experiments at the Sunshine Farm will show just how much food an organic tillage and livestock farm can produce once it has satisfied its own nutrient and energy needs internally; and we do not expect it to be anywhere close to the yields obtained by industrial agriculture. When Wes Jackson says that he believes perennial polycultures will someday equal or surpass the yields of annual grains, he means with the fossil-fuel subsidies removed. We are talking about rivaling not 100 bushel per acre corn, but 30 bushel per acre wheat. To feed the world's people, sustainable agriculture will require at least as much farmland as we currently have in cultivation, although not devoted to the same crops or consumed in the same wasteful ways. The remaining rangeland, forests and fisheries will be under similar pressure if we are to have renewable alternatives to our oil-dependence and all its ecological costs, even at a more modest standard of living.

Which returns us to our quandary: where does this leave biodiversity? We have an ethical responsibility to keep the world safe for the vast majority of our fellow species. In turn, it is likely that we need them, and the ecological systems they comprise, to keep the world safe for us to inhabit, let alone enjoy. Ultimately, we are going to have to satisfy our needs in ways that are sustainable *and* that preserve biodiversity. To fail on either side will surely doom both.

Biodiversity will not be protected solely by setting aside isolated islands of wilderness. It is important to protect species where they are living now, and to try to restore them where they have been lost, but in the long run plants and animals alike need large territories through which they can move, forming new ecosystems as conditions change. We have to learn how to build a continuous matrix of such natural land around and through our agricultural landscapes. And we have to learn how to allow a diversity of species to flourish in these natural systems as we continue to graze livestock, cut timber, and catch fish over a large part of them.

This would be a difficult enough challenge if those in power were even convinced of its necessity. Instead, we face overwhelming economic and political momentum in the opposite direction. Advocates of biodiversity and wilderness, and the champions of sustainable agriculture and forestry must learn each other's language and keep working together on a difficult problem that too often divides us. There is no middle ground between industrial extraction and pristine wilderness, but there is middle ground between biodiversity and sustainable use. We need to look at landscape after landscape, bioregion after bioregion and find that ground.

This issue of the *Land Report* presents the voices of a few people across the country who are searching for that common ground, some coming at it from the side of wilderness and some from the side of sustainable use. The front cover photo is of a bur oak, a remnant of an Illinois savanna. The photographer is Terry Evans. The rear cover shows a prairie hay meadow in Anderson County, Kansas. The photographer is Rebecca Geisen.

A Good Forest Economy

Wendell Berry

Excerpted from the essay "Conserving Forest Communities" published in the collection Another Turn of the Crank: Essays by Wendell Berry, Counterpoint, 1995.

I live in Henry County, near the lower end of the Kentucky River Valley, on a small farm that is half woodland. Starting from my back door, I could walk for days, if I wanted to, and never leave the woods except to cross the roads. Though Henry County is known as a farming county, 25% of it is wooded. From the hillside behind my house I can see thousands of acres of trees in the counties of Henry, Owen, and Carroll.

Most of the trees along the steep slopes of the river and creek valleys are standing on land that was cleared and plowed at intervals from the early days of settlement until about the time of World War II. Most of the trees, therefore, are young. These are rich woodlands nevertheless. The soil, though not so deep as it once was, is healing from agricultural abuse, and because of the forest cover is increasing in fertility. The plant communities consist of some cedar, and a great diversity of hardwoods, shrubs, and wildflowers.

Horse logging in Appalachian hardwood forest

The history of these now-forested slopes over the last two centuries can be characterized as a cyclic alteration of abuse and neglect. Their best hope, so far, has been neglect — though even neglect has often involved their degradation by livestock grazing. So far, almost nobody has tried to figure out, or has even wondered, what might be the best use and the best care for such places. Often the trees have been regarded merely as obstructions to row-cropping, which, because of the steepness of the terrain, necessarily caused severe soil losses by water erosion. If such accounting is ever done, we will be shocked to learn how much ecological capital this kind of farming invested in an almost negligible economic return: thousands of years of soil-building squandered on a few annual crops of corn or tobacco.

In my part of Kentucky, as in other parts, we never developed a local forest economy, and I think this was because of our preoccupation with tobacco. In the wintertime when farmers in New England, for example, employed themselves in the woods, our people went to their stripping rooms. Though in the earliest times we depended on the maple groves for syrup and sugar, we did not do so for very long. In this century, the fossil fuels, readily available and cheap, weaned most of our households from firewood. For those reasons and others, we have never very consistently or very competently regarded trees as an economic resource.

And so as I look daily at my home landscape, I am happy to see that I am to a considerable extent a forest dweller. But I am unhappy to remember every time I look — for the landscape itself reminds me — that I am a dweller in a forest for which there is, properly speaking, no forest culture and no forest economy. That is to say that I live in a threatened forest.

We have neglected to learn the value and the proper care of our forestlands. Moreover, we have never understood that the only appropriate human response to a diversified forest ecosystem is a diversified local forest economy. We have failed so far to imagine and put in place the sort of small-scale, locally-owned logging and wood products industries that would be the best guarantors of the long-term good use and good care of our forests. At present, it is estimated that 70% of the timber production of our forests leaves the state as logs or as raw lumber.

If we don't want to subject our forests to the rule of absentee exploiters, then we must ask what kind of forest economy we would like to have. I would like to offer a description of what I believe would be a good forest economy. The following are not my own ideas, but come from the work of many people who have put first in their thoughts the survival and the good health of their communities.

A good forest economy, like any other good land-based economy, would aim to join local human community and the local natural community or ecosystem together as conservingly and as healthfully as possible.

A good forest economy would therefore be a local economy; and the forest economy of a state or region would therefore be a decentralized economy. Here I would remind you that there is no economic or technical limitation requiring the centralization of a forest economy. The only reason to centralize such an economy is to concentrate its profits into the fewest hands.

A good forest economy would be locally owned. It would afford a decent livelihood to local people. And it would propose to serve local needs and fill

local demands first, before seeking markets elsewhere.

A good forest economy would preserve the local forest in its native diversity, quality, health, abundance, and beauty. It would recognize no distinction between its own prosperity and the prosperity of the forest ecosystem. A good forest economy would function in part as a sort of lobby for the good use of the forest.

A good forest economy would be properly scaled. Individual enterprises would be no bigger than necessary to assure the best work and the best livelihood for workers. The ruling purpose would be to do the work with the least possible disturbance to the local ecosystem and the local human community. Keeping the scale reasonably small is good for the forest. Only a local, small-scale forest economy would permit, for example, the timely and selective logging of small woodlots.

Another benefit of smallness of scale is that it preserves economic democracy and the right of private property. Property boundaries, as we should always remember, are human conventions, useful for defining not only privileges but also responsibilities, so that use may always be accompanied by knowledge, affection, care, and skill. Such boundaries exist only because the society as a whole agrees to their existence. If the right of land ownership is used only to protect an owner's wish to abuse or destroy the land, upon which the community's welfare ultimately depends, then society's interest in maintaining the convention understandably declines. And so, in the interest of democracy and property rights, there is much to be gained by keeping especially the land-based industries small.

A good forest economy would be locally complex. People in the local community would be employed in forest management, logging, and sawmilling, in a variety of value-adding small factories and shops, and in satellite or supporting industries. The local community, that is, would be enabled by its economy to realize the maximum income from its local resource. This is the opposite of a colonial economy. It would answer unequivocally the question, "To *whom* is the value added?"

Furthermore, a local forest economy, living by the measure of local economic health, might be led to some surprising alterations of logging technology. For example, it would almost certainly have to look again at the use of draft animals in logging. This would not only be kinder to the forest, but would also be another way of elaborating the economy locally, requiring lower investment and less spending outside the community.

A good forest economy would make good forestry attractive to landowners, providing income from recreational uses of their woodlands, markets for forest products other than timber, and so on.

A good forest economy would obviously need to be much interested in local education. It would, of course, need to pass on to its children the larger culture's inheritance of book-learning. But also, both at home and in school, it would want its children to acquire a competent knowledge of local geography, ecology, history, and natural history, local songs and stories. And it would want a system of apprenticeships, constantly preparing young people to carry on the local jobs of work in the best way.

Thinning firewood in New England

All along, I have been implying that a good forest economy would be a limited economy. It would be limited in scale, and limited by the several things it would not do. But it would be limited also by the necessity to leave some wilderness tracts of significant acreage unused. Because of its inclination to be proud and greedy, human character needs this practical deference toward things greater than itself; this is, I think, a religious deference. Also, for reasons of self-interest and our own survival, we need wilderness as a standard. As Wes Jackson has clearly shown, wilderness gives us the indispensable pattern and measure of sustainability.

A good forest economy would not be understood primarily as an economy. The forest would be the basis of a culture, and the unrelenting cultural imperative would be to keep the forest intact — to preserve its productivity and the diversity of its trees, both in species and in age. The goal would always be a diverse, old, healthy, beautiful, productive, community-supporting forest that is home, not only to its wild inhabitants, but to its human community. To secure this goal, forest work would always be done bearing in mind the needs of the community's descendants.

And so, to complete my description of a good forest economy, I must add that it would be a long-term economy. Our modern economy is still essentially a crop-year economy — as though industrialism founded itself upon the principles of the worst sort of agriculture. The ideal of the industrial economy is to shorten as much as possible the interval separating investment and payoff; it wants to make things fast, especially money. But even the slightest acquaintance with the vital statistics of trees places us in another kind of world. A forest makes things slowly; a good forest economy would therefore be a patient economy. It would also be an unselfish one, for good foresters must always look toward harvests that they will not live to reap.

Wendell Berry is a farmer and writer in Kentucky, and a long-time friend of the land.

Horse Logging for Sustainable Community Development

Dick Austin

Adapted from a talk given at Prairie Festival 1995.

Southern Appalachia once had the finest temperate hardwood forest in the world. When my son was in forestry school, he took me for a walk on our farm and was able to identify thirty-eight hardwood species without much effort. This is typical of the region. These amazingly diverse and beautiful forests were almost all cut as a prelude to the mining of coal in the early parts of the century. It was not quite clearcutting then, because there were no pulp mills to use the low-grade stuff. But it was abusive. They took anything that had any value to them and left the hills denuded, generating huge soil erosion. The second growth had much less to

work with and is not as beautiful as the first, although for those of us who didn't know the first it's very beautiful indeed.

At the beginning of the 1930's the hills of Appalachia were barren. The most abused lands were bought up for the National Forest system in the East and have been allowed to heal. Much of the rest was on small farms or in coal lands. As large commodity production became dominant in this country and farming declined in the East, more and more of this hilly farmland was also allowed to reforest. As a result, today we have a great deal of forest in the Southeast, much more than we had several generations ago.

My farm is typical of a mountain farm: about one third mature forest, one third land that we use for either tilling or hay, and one third land that is in transition from grazing back to woodland. The only thing that keeps small farming going in my part of the country is tobacco, and the government program of tobacco payments to small farms in the Southeast that began in the '30's. Now the handwriting is on the wall: the tobacco program will probably phase out in a decade. That could mean the end of small farms altogether. The story I want to tell you concerns the survival of small farms as well as to how we treat the woods.

There's an enormous upswelling of logging in the Appalachian hardwood forest right now for two reasons. One is that the second growth is now becoming mature: sixty, seventy, and eighty year-old trees are back, not as large as the originals, but large enough to make lumber. The second is that hardwood prices are very good. A lot of our wood is exported to Europe. The logging trucks just get thicker on our mountain roads every day.

About 1986 Louisiana Pacific Corporation, a large timber company, built a plant in the town of Dungannon, where I live. They started to use massive amounts of yellow poplar to make oriented wafer-board: grind up the trees, mix it with toxic glues, and make substitutes for plywood and framing lumber. Some of this made sense, because the poplar was under-utilized, but the way it was done with an industrial technology didn't make sense. Vast clearcutting was accelerated, and working conditions were abysmal in the plant. The injury rate was high, and the toxic plume coming out of the plant from the chemicals they were using was making people sick in the neighborhood.

I got involved with some of my neighbors trying to organize adequate air pollution controls. Others were anxious that if we had air pollution controls we wouldn't have any jobs. So we had quite a tussle locally. I had the distinct honor of having a cross burned on my farm for environmental reasons. We did get some pollution controls put on, but some of us began to wonder why using our forests had to mean grinding up trees into low-grade products and abusing the land and the people, which always seem to go hand in hand. We began searching for better ways.

About 1991, in response to citizen pressure, the

local district of the Jefferson National Forest sponsored some horse-logging contracts, for the first time in the memory of anyone around. We found a wonderfully inventive horse-logger from a few counties away, a fellow by the name of Jason Rutledge. He had rethought horse-logging and made it more environmentally benign. Environmental principles weren't always part of horse-logging in the old days — they were just using horses because they didn't have bulldozers or other logging equipment. Jason hitched environmental principles to horse-logging technology and developed an art of sustainable logging: low-impact selective cutting, going into a woods and selecting not just the best trees (which in forestry is called high-grading), but taking out the worst first. Carefully snake out an array of trees with your horse equipment so that you're not causing any erosion, leave behind a forest that's healthier than the one you entered, and you can actually improve a stand.

We started running logging schools, training other people in these techniques. We live in an area where the mines are closing down and there's not enough work to go around. It's a rural area where people love to hunt and fish, and the average young person's idea of heaven is an outdoor job. We began to offer an option in horse-logging, which has much lower capital costs than industrial logging. We were trying to get our kids to imagine creative ways of surviving in the mountains, rather that just leaving.

Next, we contracted with the local sawmill to cut the lumber, and built a solar kiln to dry it. We asked craftspeople in the region whether they would be interested in wood that had an environmental pedigree that they could tell people about. Most of them were very enthusiastic and said, yes, it would be an added value if the wood we bought was local, if it was harvested environmentally, and if customers could go back to the woods to see where their furniture or musical instrument came from.

Then we got young people involved out in the woods, documenting the logging process and putting together a video story. This will go to the craftspeople with the wood, they can add their own segment about how they make their item, and then that video can be sold along with the finished product to the customer. This gives a picture of the environmentally and socially responsible context out of which the table or chair or dulcimer came. They can charge a little more, and then that added value can pass back through the chain. Horse-logging is labor intensive, so we need about a 30% premium for the wood in order to make the thing economic, but we think we can get that.

We also started holding demonstration days to show private landowners that there's another way to go. Most private landowners love their woods and refuse to have them clearcut, until someone gets sick and is in the hospital, or you have some calamity where you're up against it. Then that banked resource of the beautiful timber stand is something you can harvest to meet the crisis, so then it is clearcut and it's lost. It's a double tragedy. You're paying your hospital bills but you're also losing the beauty on your farm.

After these demonstration days, we started getting private landowners saying, yes, if I can harvest timber and get some return, and do it sensitively and actually improve the woods in the process, I want it done. Where do I sign up? We now have a backlog of landowners wanting the service on their land. A little bit of selective cutting working through a farm woodlot from year to year could be a steady income stream like another crop. For many of these farmers it could replace tobacco.

We're in the far southwest corner of Virginia, nearly four hundred miles west of Richmond, a long way back in the mountains. We were approached by a substantial wood products company in Richmond that specialized in re-processing old wood from demolished buildings into elegant flooring and cabinetry. The man who runs this business realized that old wood is also an imperiled resource — soon all of the old buildings will be torn down. He told us he would be interested in starting a line of environmentally certified hardwood flooring, and would buy as many logs as we could produce. This offer gave us a steady market. It didn't meet all of our social goals because ultimately we'd like most of the wood to be used right within the region, but you can't train loggers and put them to work unless you already have an assured market for the lumber. We now have the capacity to move from a demonstration project supported by grants, to a commercial enterprise supported by investors.

We're very fortunate where I live to be in the center of one of the so-called "Last Great Places" designated by The Nature Conservancy. They've been putting some very creative work into our region, the Clinch River Bioreserve, as they call it. They're trying to protect a river watershed which has thirty-five species of threatened and endangered mussels. They can't buy up the watershed, so they're attempting some entirely new developmental conservation strategies. They're trying to persuade a whole region that conservation-oriented development rather than destructive development is in everybody's interest.

We've been working with The Nature Conservancy. What we're thinking about is a sort of environmental McDonald's, by which I mean a franchise operation. We would set up a company which would act as the middle-person among a whole host of other entities. We would train people who want to be environmental horse-loggers. We would negotiate with landowners and help to lay out cuts that meet certification criteria. Loggers would have the opportunity to bid on a certified job provided they had training to do the kind of cutting that we would demand. We would then help market this timber to those who would pay for the added value of an environmentally-certified lumber product.

Eventually, we would move this system from southwest Virginia outward, so that we would begin to replicate it throughout the Appalachian region. We're negotiating with The Nature Conservancy to put their seal on the product, which would be a plus in selling. What we're working on is a system that captures some added economic benefit from doing the job right, and keeps the forest healthy and productive. It would be much more labor-intensive than the predominant forestry system. It would serve the small landowner. It would stimulate sawing, drying and manufacturing wood products primarily within the local community and region.

This system would use the forest as an agricultural resource in the best sense. You hear about "tree farming." That's often the very worst form of timber agriculture, where you plant monocultures of fast growing trees. Timber agriculture in the best sense enlists small farming culture to take care of the woods. Woodlots ought to be an important part of the small farm scene where I live, and in regions far beyond Appalachia. We can bring timber into the small farming culture as a productive enterprise by which the protection of the long-term integrity of the woods is ensured. This could provide an important alternative to the rapacious lumbering which is the dominant characteristic in our region right now, and which is dominant in so many parts of the country and in the world.

Dick Austin is an environmental theologian who lives at Chestnut Ridge Farm in Dungannon, Virginia.

Clear Weather

Susan Schmidt

1.

I crack my blind at dawn
to see white
or not.
I want clean seasons, extremes.
I paint my house white inside
like a blanched Abaco beach
or arctic glacial ice.
Sunbright, both burn.
Will my heart melt?
Snow dust can cover bare ground
like unconditional love.

2.

Fruit trees blossom early
in Virginia spring,
when Alaska is still night.
I worry late frost
will kill my summer fruit.

3.

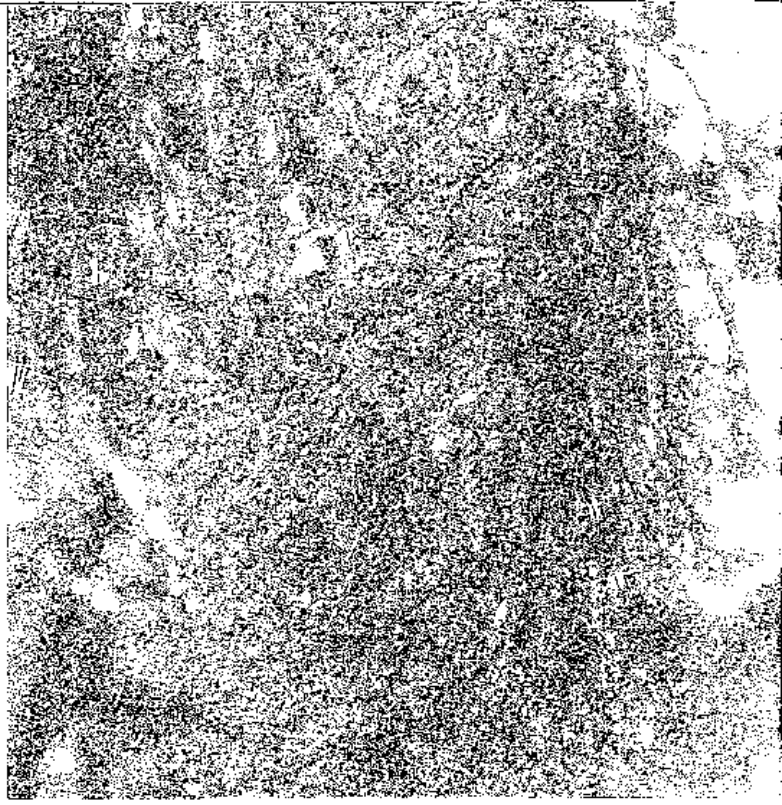
Denali, pink at Solstice,
like a conch shell,
looms high in sky and mind.
Snow birches call me north,
but I am home
where I can name the trees.
Liriodendron tulipifera.
Dogwood lights the canopy
like sunshafts in a clearing.
White petals carpet my ground
before Alaska thaws.

Susan Schmidt is helping to start the new four-year degree program in environmental studies at Brevard College in western North Carolina.

Cuttings

John Daniel

These are three parts excerpted from a ten part essay.



The rain shadow east of the Cascades is the native home of the yellowbellies, ponderosa pines that can measure up to a hundred sixty feet tall. Where they've been left alone they tilt from the earth like great orange arrows, fletched with green, parceled out in a spacious array contrived by shallow soils and periodic sweeps of fire through the centuries. Logging here is usually called selective, like the fires, and sometimes that's exactly what it is. But clearcuts aren't too hard to find. The Forest Service has called them "group selection," and little blowdown patches sold for salvage have a way of expanding into sheared squares. The pine forest stands on gentle terrain. It's easy to get at. By the thirties many of the old yellowbelly groves were gone—clean-cut, in the usage of the day, the fat logs hauled out under ten-foot wheels. Now they're skidded out on chokers behind big Cats, and in most of ponderosa country, selective logging means that every thirty years or so the Cats drag out the biggest trees.

This process is called creaming, or high-grading, and it doesn't take everything. But the forest any kid sees is lesser than the one her father saw, diminishing toward little trees and big stumps, the ancient woods gradually brought down to human scale.

Junipers are stubby trees full of branches, and they often have several trunks. In most of them the grain is twisted, a natural tendency accentuated by the big Great Basin winds. A man had to walk many dry hills and search many canyons to find a straight-grained tree, or a tree with one straight-grained trunk inside a thicket of outer trunks. He carefully stripped a length of bark to inspect the wood. With chiselstone and hammerstone he notched the top and bottom of the stave he wanted, about four feet long, two-and-a-half inches wide. He went away then, for a few years maybe, while the stave seasoned on the tree. When he came back, if it had seasoned well, without weather-checking, he split it from the tree with a tool of stone or antler. He carved and steamed and worked the stave until it curved in a deep belly and recurved at the ends. He boiled horn for glue, and glued on sinew fibers for strength and spring. He glued on rattlesnake skin to protect the backing, fashioned a grip of wrapped buckskin. He strung the bow with a length of sinew.

One juniper, a huge tree with several great trunks and limbs, shows scars of twelve staves removed. A scar heals as the tree lays in new wood, straight-grained wood laid down where straight-grained wood was taken. One scar shows clear evidence of having yielded four staves in sequence. The harvest interval was probably longer than a human life. In a crotch of one of the tree's big limbs, a hammerstone remains where it was placed.

"No, it ain't pretty," a man said to me once, "but it's the only way to harvest these trees. It don't pay to go in there just for a few." We were standing in the rainy morning outside the Weyerhaeuser time shack. His tin hat battered by years in the woods, a lunch pail and steel thermos of coffee in his hands, he spoke those words with a certainty I remember clearly—just as I remember what a good man he was, how he cussed beautifully and told fine stories and was friendly to a green choker-setter, how he worked with an impossible appetite that left me panting and cussing unbeautifully behind him. I don't remember what I or someone said that drew his response, or whether he was answering some doubt he himself had raised. I only

recall the authority of his voice, the rain dripping from his tin hat, and the idling crummies waiting to carry us out the muddy roads from camp, out through the stripped hills to another day of work.

The voice that spoke those words is my voice too. It's in all of us—the voice of practicality and common sense, the voice that understands that ugly things are necessary. It's a voice that values getting the job done and making an honest living. It has behind it certain assumptions, certain ideas about progress, economy, and standard of living, and it has behind it the evidence of certain numbers, of payrolls and balance sheets, of rotation cycles and board footage. It is not a heartless voice. It has love for

wife and children in it, a concern for their future. It has love for the work itself and the way of life that surrounds the work. And it has at least a tinge of regret for the forest, a sense of beauty and a sorrow at the violation of beauty.

I must have nodded, those years ago, when a good man spoke those words. I didn't argue—against his experience and certainty, I had only a vague uneasiness. Now, I suppose, I would argue, but I know that arguing wouldn't change his mind, just as I know he wouldn't change mine. As he defined the issue, he saw it truly. Many of us define the issue differently now, and we think we see it truly, and all of us on every side have studies and numbers and ideas to support what we believe. All of us have evidence.

The best evidence, though, is not a number or idea. The land itself is not a number or idea, and the land has an argument to make. Turn off the highway, some rainy day in the Northwest, and drive deep into a national forest on the broad gravel roads and the narrow muddy roads. Drive in the rain through one of the great forests of Earth. Drive past the stands that are left, drive past the gentle fields of little trees and big stumps. Pass the yellow machines at rest, the gravel heaps and sections of culvert pipe, the steel drums here and there, a rusting piece of choker in the ditch. Drive until the country steepens around you, until you come to a sheer mountainside stripped of its trees—you will come to it—where puke-outs have spewed stone rubble across the road, where perhaps the road itself, its work accomplished, has begun to sag and slide.

Stand in the rainfall, look at the stumps, and try to imagine the forest. Imagine the great trees spiring skyward, imagine the creatures weaving their countless strands of energy into a living, shifting tapestry, from deep in the rooted soil through all the reaches of shaded light to the crowning twig-tips with their green cones. The trees are gone. The creatures are gone. And the very genius of these hills, that gathered the rain and changing light of untold seasons, that grew and deepened as it brought forth a green and towering stillness—it too is leaving. It's washing down in gullies to a muddy stream.

John Daniel lives in the Coast Range foothills near Eugene, Oregon. An expanded edition of his book of essays, The Trail Home, was published by Pantheon Books in 1994.

A Wild, Managed Forest

Nancy Langston

The town of Enterprise lies high in the Blue Mountains of eastern Oregon, resting in a valley that bears a strong resemblance to paradise. After federal troops drove out Chief Joseph's band of the Nez Perce in 1877, whites settled rapidly, trying their hands at farming. But for all the land's lavish beauty, it was never an easy place to make an agricultural living. The valley was high and dry and cold; frosts could wither crops all summer long, and droughts were more frequent than not.

Logging, however, seemed to promise a stable future. In 1902, a Kansas City corporation called the East Oregon Lumber Company (named to sound local, like most companies operating in the Blues, even though Midwestern money financed them all) started buying land north of town. By 1914, they had purchased 42,000 acres of fine ponderosa pine, laid a railroad, and built a mill with an annual capacity of 35 million board feet---far greater than they could ever hope to meet with their own holdings.

For the next twelve years, Enterprise boomed as the mill prospered. The Forest Service pushed sales heavily, selling the company 131.5 million board feet of public timber. By 1925, East Oregon Lumber had cut the best timber off its own lands, leaving no reserve stand. Financial troubles started that year. The company was hoping to meet all its future timber needs from Forest Service sales, but accessible stands simply were no longer there. The best ponderosa was gone much more quickly than anyone expected. By the beginning of the Depression the mill closed, and "the results were tragic for the town," in the words of Gerald Tucker, a local Forest Service employee. The pine that was going to bring centuries of local stability and prosperity was gone in less than two decades.

What's so depressing is that there's nothing at all unusual about this story. A small town pinned its hopes on a single natural resource, and soon that resource was exhausted. The capital for development came from somewhere else, and that company pulled out after the lumber was cut and its investments met. The locals were left holding an empty bag. This is the story of the West over and over again: residents eagerly gave up control over the rate of resource depletion, and soon were left with very little. Money and trees both followed the railroads out of the region.

The irony is that the Forest Service was partly created to prevent this kind of tale—but instead it ended up encouraging it. Managers found it increasingly difficult to pay attention to the constraints of the particular place, as they focused on a single idea: liquidating old growth pine to bring about scientific forestry. By replacing slow-growing mature forests with rapidly growing young forests, production would be maximized, the Forest Service promised. The result would be community self-sufficiency.

All that stood in the way of this ideal future was old growth—the seemingly decadent, inefficient forests that covered 70 to 90% of the area. As George Bright, a Forest Service silviculturist working in the area complained in 1915: "In the general riot of the natural forest, many thousands of acres are required to grow the trees...that under management, could be grown on far less land." Bright went on to argue that if only he had the money, he could clearcut and plant a forest that would produce ten times the amount of useful timber this forest was producing. Eventually this is exactly what the Forest Service did. The result was a disaster, both for the forests and the human communities that depended on them. After less than a century of federal management, dense thickets of stagnated firs, spruce budworm epidemics, and catastrophic fires have taken over the grand old pine forests, and mills have closed throughout the region.

Everyone agrees that a forest health crisis now threatens the inland West, but few people agree on the solution. Many environmentalists say the only solution is to leave the land alone, stop logging, and let nature heal itself. Many government foresters say the solution is to log more heavily, replacing the unhealthy forest with genetically-perfected trees. Many locals say they no longer trust either the feds or the environmentalists. The person they do trust when it comes to trees is Bob Jackson, a tree farmer who has won numerous awards for his selectively-logged lands.

When I called him up, Mr. Jackson invited me to spend the next day with him in the woods. He is a slight, almost elfin man, white-haired, with a quiet voice and a gentle manner. He hardly seems big enough to cut a tree, but cut trees he certainly does. After shaking my hand and reeling off a list of statistics on harvest levels and growth rates, he led me into the forest, stepping over rotting logs and pushing aside ceanothus until we came to a patch of old Douglas-firs. Most of the tree farm lies on a moist north slope, where the most valuable species were

once high-graded off and soil organic matter badly depleted by heavy logging. Mr. Jackson's two primary goals have been to restore tree species diversity, and to build the soil back up. He brushed off the duff and picked up a handful of humus, spreading it out on his hand and peering at it intently.

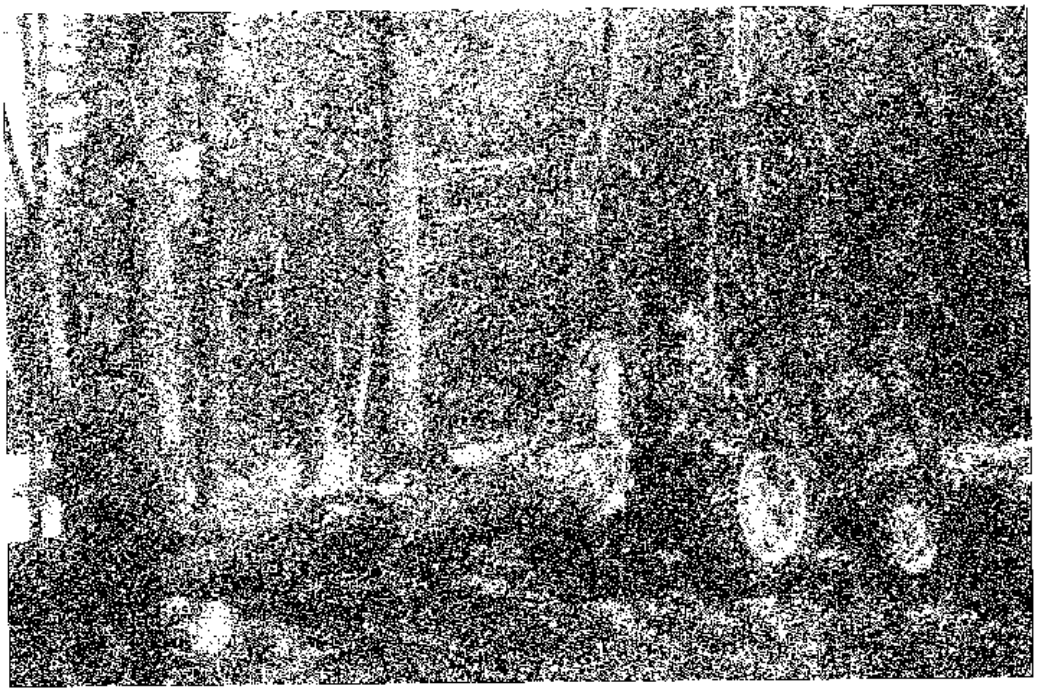
"I'm checking for spiders," he said, as one skittered across his palm. "The number of spider species drops four or five fold as soon as a clearcut opens up the canopy. If we come in and only take out a few trees, we don't see that decline."

"Why do you care about spiders?" I asked.

"We grow trees by growing soil, and spiders make the soil. Spiders, along with these millipedes, beetles, earthworms, all the critters that live down here. Growing soil means growing diversity—not just in trees, but in insects, birds, spiders, and bugs."

He led me to a carpenter ant colony harbored in a rotten log. "We're trying to keep as much dead and down wood as possible. The dead wood protects the soil, and seems to help control spruce budworm. A pair of pileated woodpeckers only needs one snag for nesting, but all winter long they live on carpenter ants. If you clear out the logs, your carpenter ants leave you. Then your pileateds go, and when they go, the other birds that nest in their cavities leave too. Over at Boise Cascade, my friends ask me why I care about pileateds, since they don't eat spruce budworm. But the secondary cavity nesters that need pileateds to build their nests—why, they certainly do eat budworm."

From snag to snag, we made our way through his land, turning over logs to check for spiders and salamanders, listening for sapsuckers, looking for bear damage on the grand firs. Mr. Jackson talked about his training at forestry school, then his years working for the Forest Service and Boise Cascade. After decades of frustration with the results of clearcuts that alternated with neglect, he went into partnership with an old friend, Leo Goebel.



Small-scale logging in a white pine stand in Weston, Massachusetts.

Over the years, Bob Jackson and Leo Goebel have developed their own vision of good forestry, a vision built out of their experience logging for different outfits, and out of a passion for a particular place and the creatures that live there. Good forestry, they feel, is simple: log selectively, thin to promote growth, wait to harvest trees until they are at least 18" dbh (diameter breast height), build the soil by husbanding dead wood, and aim for a variety of species native to the site—ponderosa pine, larch, grand fir, and Douglas-fir.

At the edge of the tree farm, we stood on the landing of a recently cut site—land belonging to a neighbor who needed money fast and hired someone to come in and clearcut. A spring's heavy rains had washed away what humus was left after the skidders ripped through. We picked our way through the slash, looking for regeneration. A few lodgepole seedlings were coming in, but very little larch or ponderosa pine.

Mr. Jackson shook his head, and then he took me to the other side of their tree farm, where the Forest Service manages public land. Cutover some 60 years ago and probably subjected to a hot slash fire, the forest had regrown into a tangle of grand fir instead of a more diverse stand of mixed conifers. No one had come in to thin the thickets of young growth that resulted, and the result was a spruce-budworm infested mess.

Right in the middle, between clearcut private land and neglected public land, is the Jackson-Goebel tree farm. Although they work the land intensively, the forest looks much like old growth—multilayered, multiaged, with numerous trees over 18" dbh, a rich soil, abundant snags, and a forest floor thick with dead wood. Trees don't grow in rows here, and there's nothing neat or tidy about the place—but it's a productive, working forest all the same.

"We don't hold with clearcutting," said Leo Goebel, a large, good-humored, big-voiced man. "It might bring more money in all at once, but then what? You've wasted all your young trees, wasted your soil, wasted your organic matter. You've got nothing for the next 80 years."

To increase growth rates, they thin young trees. To get the long, knot-free lengths that bring in the best money, they limb, lopping off low branches. To control insect damage, they grow as many different tree species as possible, and keep the dead wood thick on the ground. By doing their own work, they can keep skid trail, yarding sites and roads down to about 5% of each harvest area, reducing soil compaction. In the Forest Service, that figure is 20%.

WHAT MATTERS FOR FOREST PERSISTENCE MAY BE EXACTLY WHAT LARGE-SCALE FORESTRY HAS TRIED TO REMOVE—DEATH AND DECAY, THE DARK STINKY UNNERVING HEART OF THE WILD FOREST.

Most surprisingly, perhaps, Jackson and Goebel foster old growth by cutting old trees. As Mr. Jackson pointed out, if you only allow people to harvest trees less than 15" dbh, you won't get many trees growing much larger. But by waiting to harvest until trees are 18" dbh or larger, you end up with a managed forest that also, in many ways, mimics old growth. As Mr. Goebel said, "We grow big trees, and we cut big trees. The longer you wait before you cut, the more volume and the better wood you get."

But what is the cost of all this care? How much do they lose in timber production? The Forest Service estimates that on these north-facing slopes, under intensive, sustained management the forest could yield 100 boardfeet/acre/year. Jackson and Goebel find that they can harvest 400 bf/acre/yr—without decreasing their timber base. By fostering elements of old growth—tree diversity, complexity, arthropod diversity, dead wood—they can get four times the production, with one-fourth the soil compaction, of comparable Forest Service sites.

This approach is well-suited to moist, north-facing slopes. Throughout the Blues, sites such as this one were once largely covered with mixed-conifer forests; Douglas-fir, grand fir, larch, lodgepole, Engelmann spruce, and ponderosa pine all grew in small patches. Light fires were rare, while medium intensity fires burnt here and there about every 40 to 80 years on average, and stand replacing fires came only about every 200 years. These infrequent and irregular fires, along with insect outbreaks, windstorms, and droughts, shaped a diverse forest with different tree species and ages. Working in a high-elevation, north-slope forest, Jackson and Goebel focus their attention on organic matter in the soil, and feel strongly that prescribed fire would be a disaster. Frequent fires, no matter how light they are, deplete soil of organic matter, sulfur, and available nitrogen over the long term. Jackson and Goebel's decision to suppress fires and manage for mixed-age, mixed-species old growth forest in very small patches makes sense for their particular place.

Many details of the Jackson-Goebel model would be different in other inland forest communities. On sites once dominated by open ponderosa forests—which were once about 60-80% of the forests across the Blues—80 years of Federal fire suppression has backfired badly. South-facing slopes and lower elevations are much drier, and light fires once burnt through every decade on average, keeping the forests open and favoring ponderosa over Douglas fir and grand fir. When fire was suppressed, firs began to grow thickly in the shade of the pines. These replacement firs, growing on dry sites, are now extremely vulnerable to drought, insect epidemics, and stand-replacing fires. Wide scale forest management on these lands will have to restore surface fires somehow, an issue that the Jackson and Goebel example doesn't help with.

Yet the basic framework of the Jackson and Goebel model does apply to other forest communities. Theirs is one example of a general principle that can be adapted to many different, particular sites. Bob Jackson and Leo Goebel have turned the Forest Service model on its head: instead of transforming decadent old forests into young, intensively growing forests, they have turned cutover forests into something much more like old growth—and made a good living out of it as well.

What matters for forest persistence in the inland West may be exactly what large-scale forestry has tried to remove, and what Jackson and Goebel have encouraged—death and decay, the dark stinky unnerving heart of the wild forest. They have shown that you don't need to trade this wild core off for a living. The choice is not necessarily between untouched forests and industrial monocultures; nor is the choice between keeping people out and the kind of boom and bust economy that industrial logging has fostered in Enterprise ever since the first mill went up.

The Forest Service thought science would let its foresters leap past the constraints of local place—in this case, a cold, high land with fragile soils, fires and floods, insects and droughts, a place of extremes. Jackson and Goebel have done well not by trying to eliminate those constraints, but by paying close attention to them, blending human culture and care with wildness.

Nancy Langston teaches environmental studies at the University of Wisconsin in Madison. Her environmental history of the Blue Mountains, Forest Dreams, Forest Nightmares, is due in October from University of Washington Press.

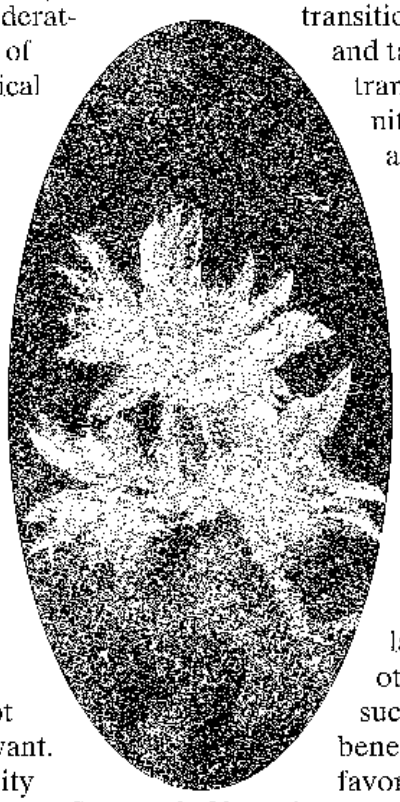
Kansas Landscape Patterns and Biodiversity

Kelly Kindscher

Adapted from a talk given at Prairie Festival 1995.

Biodiversity is defined as the variety and variability among living organisms and the ecological communities of which they are a part. Biodiversity is enormously valuable to humankind, providing food, aesthetic enjoyment and recreational opportunities. It is the source of all domesticated animals and plants, as well as many antibiotics and organisms for biomedical research, and many building materials and other products. Finally, diverse natural communities perform innumerable ecological services upon which all human life depends. These services include moderating the weather, maintaining the quality of the atmosphere, operating the hydrological cycle, producing and preserving soils, recycling nutrients, disposing of wastes, and providing biological control of pests and agents of disease.

We have greatly altered the biodiversity of our local landscapes. We need to realize that not all biological diversity is equal, especially close to home. Our most important biodiversity is the wild, natural diversity of each place. We can do a lot of things to increase biodiversity, but they may not always be wise. To use the example of a garden, we can add species to increase biodiversity, but we might not want to add ragweed or add insects that eat our vegetables, or add exotic plants that spread across the landscape. It's not just the largest total of species that we want. It is more valuable to increase biodiversity in ways that strengthen the whole system, that add more pieces that connect it. We live in a time of massive environmental fragmentation. We have been ripping apart the many interconnecting strands of biodiversity, and we don't even understand what most of those strands and connections are.



Snow on the Mountain

A good portion of my work at the Kansas Biological Survey involves inventorying native plant communities. So far, we have only inventoried 3-5% of the native prairies, woodlands, and wetlands in our state. We now recognize about forty distinct plant communities. In terms of just prairie types, we recognize differences between glaciated tallgrass prairie, Flint Hills tallgrass prairie, southeast Kansas tallgrass prairie, Smoky Hills mixed grass prairie, and shortgrass prairie in western Kansas. In addition, there are numerous wetland, woodland, forest, even sparsely vegetated communities like chalk flats out in Gove County. Some of these communities are still common today; others are not very common at all, and some are extremely rare or threatened.

One plant community that has become very rare is the savanna. Before white settlement, Saline County, Kansas was 99% prairie. The Smoky Hill River and tributary streams had cottonwoods, willows, and also bur oak along them. There was a transition zone where the fire-tolerant oak and tallgrass prairie met. This shifting transition zone was the savanna community, a combination of an oak forest and a tallgrass prairie.

Savanna communities are essentially gone from Kansas because we plowed up tremendous portions of the landscape and totally altered it. We killed off the buffalo and other large herbivores that roamed freely while grazing. We replaced part of that grazing component with the cow, which serves some of the same function, but is confined by fences and grazes differently. Of great importance, we quit burning most of the landscape, except for some rangeland areas such as the Flint Hills. But other communities that require fire, such as the savanna, no longer receive its beneficial effects. Burning savannas favored the grasses and wildflowers and discouraged trees. Bur oak trees are fire tolerant, so fire might have killed or stunted some of the young oak trees, but it didn't kill them all. It did keep out most of the other trees, producing an open oak savanna. The people who settled near savannas often plowed up close to the trees and put up fencing to graze cattle under the oaks. They did not burn the woods and the savanna area, and light grazing alone was not sufficient to discourage all woody species. So the savannas have grown up to denser woods, and the grasses and sunlight-tolerant wildflowers are gone. It's very difficult to find big bluestem, little bluestem, or prairie wildflowers underneath or between any mature or "old-growth" trees in Kansas. That community type is now very rare. In fact I know of no high-quality example of

savanna in the central part of the state.

What else have we lost? We've lost wildflowers across the state and region. Where have all the wildflowers gone? If you were sitting on almost any spot in Kansas on a spring day two hundred years ago, you would have seen a myriad of wildflowers scattered everywhere across the landscape. Even the forests were originally full of wildflowers, many of which were tender, delicate species. If they were plowed up, most of them did not come back. If cattle repeatedly grazed them to nubs, they died. If the landscape was not burned, they were overgrown by other species. We have altered the landscape so much that we no longer have most of the wildflowers that used to be here locally. This is a major loss to our local plant diversity, which also greatly affects animal diversity. Even a small but high-quality prairie remnant such as the Wauhob Prairie at The Land Institute has close to 100 species, of which two-thirds or even three-fourths are wildflowers. When you look at a piece of land—whether it is prairie or forest—and you see a lot of native wildflower diversity, you're likely looking at a natural community that's still fairly intact.

We need to think about bringing those pieces back—restoring the communities, restoring the species. One of the problems we have in restoration, though, is that to reach a high level of biodiversity is a big task. It's very hard to restore all of the pieces of a prairie. First of all, in many areas we don't have much prairie left. There are croplands all around, so how are the seeds going to get to a restoration site? They can't do it by themselves. Some seeds are windblown and can come from a long distance, but the majority of prairie seeds, unfortunately, are only dispersed short distances by gravity, insects or animals.

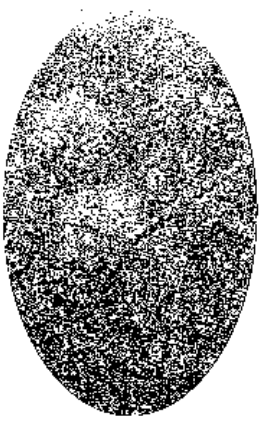
At the University of Kansas there is an experimental tract in which native grasses were planted in 1957, adjacent to a wonderful native prairie. Now, nearly 40 years later, it's still easy to see which is the native prairie, which is not. One has rich diversity, the other doesn't. There are about 170 species on the native prairie, compared to only 75 in the replanted tract. The species haven't moved more that a few feet into the edge. Even where the replanted tract now has one of these conservative prairie wildflower species, it may only have five specimens, whereas the native prairie might have five hundred, or five thousand.

What is going on? Why don't the wildflowers just move across into the restoration area? Possibly the soil eroded and lost nutrients when the land was cropped, but more likely, the wildflowers don't move into a new site for a combination of other factors. Ants distribute seeds, maybe the right ants are not there; some of the legumes need rhizobium bacteria, maybe they're no longer present; and the orchids need their own symbiotic organisms to germinate, maybe they're not there. There's a multiplicity of reasons, many of them species-specific, many of them landscape related. For whatever reasons, the majority of wildflowers don't move back.

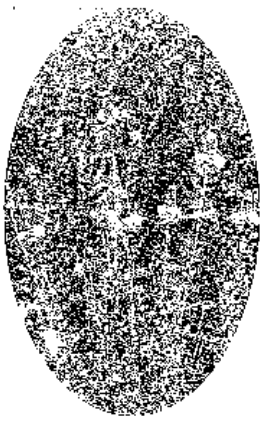
We can restore prairie on the very small scale by transplanting soil and plants, using a spade. On a small scale, planting seedlings and transplanting is fun—people really enjoy doing it. On a small scale, seedlings can be watered, watched, and tended; success can be achieved. So on a small scale we can see a return of the biodiversity. But on the big scale, the scale which we have altered the landscape, it is difficult to establish large numbers of species. I've been planting a lot of prairies on the big scale, and I haven't had much success. If I get thirty to forty native prairie species out there in a forty acre tract, I'm doing pretty well. But what I really want is two hundred. I don't know how to do that on a large scale.

Restoration should never be an excuse for losing something. We need to protect what we have left, and tradeoffs can't do that. We don't know enough to put all of the pieces back together. Since regulations are seldom adequate, and restoration usually comes after the damage is done, we need other kinds of land protection. The best way to protect land, according to an organization like the Nature

Black-eyed Susan

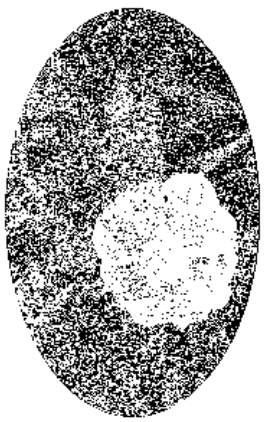


Catclaw Sensitive Briar



Purple Prairie Clover

Wild Blue Indigo



Prairie Rose

Conservancy, is to buy it. Great; if we can buy it, let's buy it. But frankly it's hard to raise environmental dollars and there is a tremendous need for land protection. So that's not the solution by itself.

Another way of protecting land is to use conservation easements. Conservation easements allow the landowner to lock in the use of their land by signing an agreement with a nonprofit organization, such as the Kansas Land Trust, the Nature Conservancy, or the State of Kansas. The landowner can ensure that nothing will disturb the prairie or forest, no matter who owns the land in the future.

AS RESIDENTS OF THE PRAIRIE BIOREGION WORKING TO RESORE BIODIVERSITY, WE NEED TO RESTORE THE USE OF WILD PLANT AND ANIMAL SPECIES, TOO.

Conservation easements can also protect land used for agriculture. I think easements are a great tool, particularly for anyone who wants to see their land maintained as it is. It allows land to remain as private property, but the right to alter the land has been donated to a group which is legally bound to never act on that right.

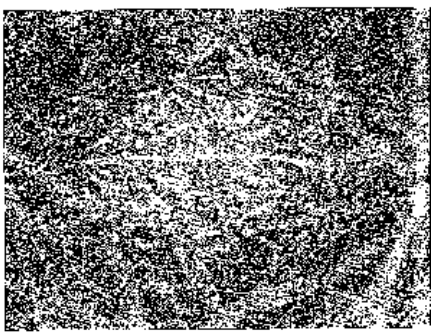
Regulations, restoration and protection are all difficult paths to protect or enhance biodiversity. I think what's most important is a change in ethics. As Aldo Leopold suggested, the public should scorn those who still despoil our natural areas. We need to instill an ethic that makes people much more conscious of their landscape-changing practices. We need to be able to identify and speak for biodiversity. To be harmonious with our environment, we need to incorporate the wild into our lives. We need to reestablish our link with native species. One simple thing we can all do is to bring some wild plants home to where we live. That is a wonderful symbolic event. If you plant butterfly milkweed or wild roses or any of the native prairie grasses in your front yard, people will ask you about it. It's amazing, but we have to educate one another about native grasses, even though the dominant landscape that most people interact with is a grass landscape. We can still call it a yard or a lawn

We also need to think about incorporating human use back into the wild landscape. Our original landscape was managed by Indians. Why did they manage it? They weren't just pyromaniacs like some of us. They lived from the prairie. When they burned off the dead grass, the tender young grass attracted the bison. The Indians also encouraged useful plant species like chokecherries and wild plums. It's a natural thing to set fires, and the place where we live has a history of being managed by people. We should honor that long-term tradition and become managers of fire ourselves, setting them in appropriate places and in ways that are best for restoring biodiversity.

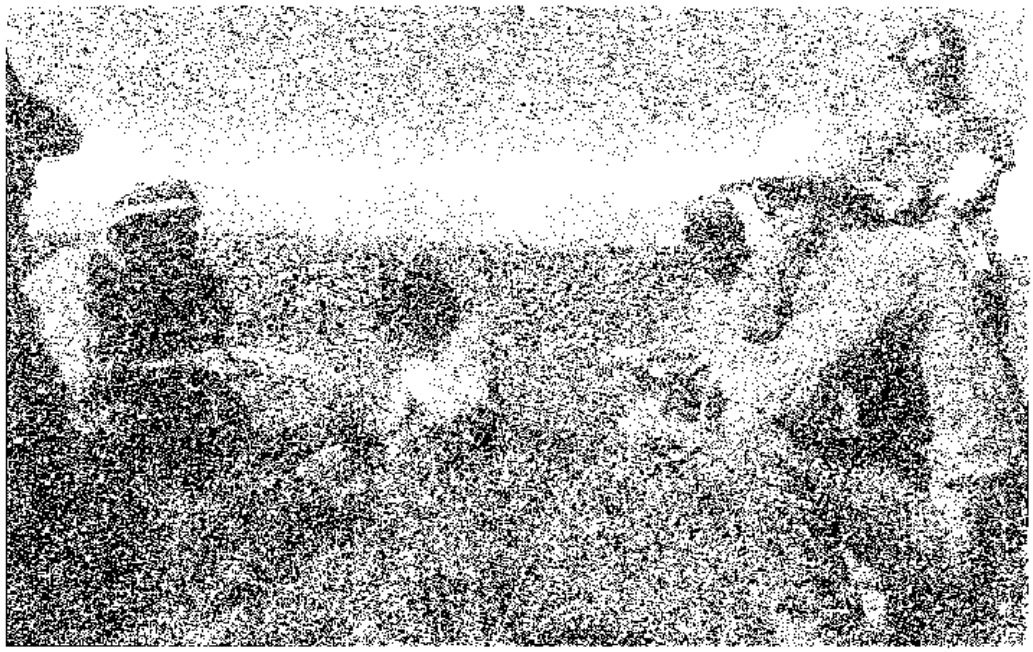
As residents of the Prairie Bioregion working to restore biodiversity, we need to restore the use of wild plant and animal species, too. We need to put plants such as prairie turnips, wild plums, or chokecherries back out there in the landscape for use as food; and to make use of purple coneflower for medicinal purposes. The most widely used plant food of Great Plains Indians was the prairie turnip. There are very few of us who have eaten prairie turnips. Why haven't more of us learned about this food plant? These practical connections to plants and landscape can help us to restore biodiversity, because they will encourage us to continue the renewal process of returning the wild to our homelands.

Each of us can speak for the value of biodiversity, and its importance in land use planning for our community or state. If we speak clearly for the value of protecting wild places and natural communities, others won't build on it, or degrade it as quickly. I see a lot of houses being built on native prairie. Why? Often people don't even know what they're building on. Also wild lands are usually cheaper than farmland. I think a lot of those houses wouldn't be built if people knew what they were destroying. They might build their house on land that has already lost its wildness. People become conscious when we educate them. That's what our task is, to actively share what we know about wildness and biodiversity.

I don't know how to restore a prairie. I know how to start restoring a prairie. I don't expect you to know how to do it either, but I would like each and every one of us to be able to speak to the possibility of restoring a prairie. Speak to the vision that we could restore enough prairie that there would be prairie chickens back in suburban areas again, or that there could be plums or chokecherries or purple coneflowers or even prairie turnip for people to harvest from our re-created wilds. Even if we don't individually know all of the pieces or all of the steps to get there, we can speak for the vision. Please join me in this effort.



Kelly Kindscher is an assistant scientist at the Kansas Biological Survey at the University of Kansas, and a former Land Institute Research Associate.



Pete Ferrell, right, talks to Land Institute interns, 1994.

Cows and Coyotes

Pete Ferrell

Adapted from a presentation at the Kansas State University Sustainable Agriculture Symposium in April, 1994. An earlier version appeared in the Kansas Rural Papers, May 1994.

My heritage as a fourth generation rancher forces me to think about the future in ways my ancestors may have not considered. Because my family has now lived in the Flint Hills for one hundred years, I cannot ignore the implications of my actions for future generations.

For two summers during college, I worked as an archaeologist in southwestern Colorado exhuming the remnants of the Anasazi culture. This was a remarkable and advanced civilization. They expressed a reverence for the living world in almost everything they did. In spite of their connection to the cycles of nature, they over-irrigated their cropland and lost crucial topsoil, which was one of several events that led to their demise. Soil loss precipitated social decay. They disappeared.

The Anasazi did not require a plastic toy with their meals. They were not mesmerized by MTV. If they could ecologically err, what does the future hold for a culture such as ours which is divorced from its place in the natural world? Modern Americans have no connection to the food which sustains them, other than consuming it.

My exposure to evidence about America before white European settlement led to other observations. There were massive herds of ruminants grazing what are now the Plains States. Zebulon Pike reported that he saw a herd of buffalo pass before him for three days, stretching from where he stood to the horizon. No one delivered their calves or vaccinated them for disease. No one sprayed them for flies or treated them for worms. No one hauled them any feed or hay. So, when I returned to ranch life twenty years ago, one of the burning questions I carried with me as I did all this work for the cattle was "what went wrong?"

It seems to me that modern agriculture tends to treat unwanted events such as insect outbreaks and disease as isolated fragments, ignoring their place within a system of ecological relationships. We concentrate high-capital and high-energy cures on these symptoms, disabling a complex set of self-regulating functions. The more we subdue nature the more work we create for ourselves, losing sight of our place.

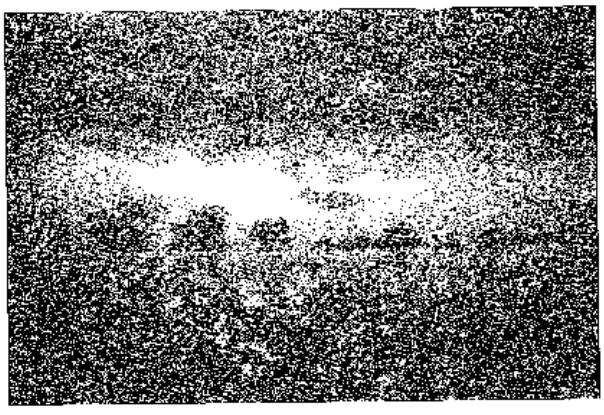
To illustrate this, let me tell you a story about

the rancher's arch-enemy, coyotes. One day in the early '80s, I was checking a set of cows and happened upon a coyote. He was not near my cattle. As is the habit of ranchers, I pulled down my big gun, took aim, and fired. I'm a good shot. I killed him with one bullet. He never knew what hit him. Change the characters involved and you might call it another senseless drive-by shooting.

I knew of no crime this coyote had committed. I killed him because he was a coyote. I did not use his carcass in any way. And so I wasted his life. I decided I would not kill another coyote nor would I allow anyone else to kill coyotes on land I manage.

My resolve was tested in the spring of 1984. I was involved with a pedigreed enterprise at the time. Not only were these cattle expensive, but I was dangerously proud of them. I was doing the sunrise check on a set of first-calf heifers when I came upon a coyote literally eating a calf alive. The calf was bawling his head off, but his mother was calmly grazing a short distance away. I did not shoot the coyote: I wanted to shoot the heifer. It was not hard for me to send her to town on the next available truck. She had complacent protoplasm. Pampered genes are not tolerated in nature, and I don't need them in my cow herd.

These incidents highlight a shift in my understanding of sustainability. We must try to understand the reason that the coyote is out there. Rather than annihilate our competitors, we must learn to co-exist with them, using their strength to fashion our role as predators. Unlike the coyote we are self-aware, weeding out cattle so genetically disabled they won't defend their young.



Some time later I read Wendell Berry's *The Unsettling of America*. He articulates this point beautifully when he discusses "an essential paradox. The natural forces that so threaten us are the same forces that preserve and renew us." I concur. I believe that it's time for agriculture to set aside its big guns. It's time for us to stop waging war on forces which are crucial to our survival.

There is an epilogue to the coyote story. In the spring of 1992, I had purchased a set of elderly cows, the "gummer herd." They were calving too early in the year, which can produce chilled-out calves. Trying to revive one such calf, I was struck from behind by its mother. She mauled me for what seemed like an hour. Broke my ribs. I recall looking up into her flared nostrils and thinking that she really was going to kill me. You know when it came time to cull the herd later that year, I remembered that cow. She took a trip to town also. She was just *too* genetically advanced for me—a cow ahead of her time. Do I have to risk my life to advance the wildness of this herd?

There is a sound a cow makes as she's claiming her calf right after it's born. It's usually a low, guttural hum although sometimes she can get really excited and bellow right in the calf's ear. I experience two things at that time. I hear the cow saying to the calf, "I am here for you." I also hear a larger voice saying the same thing to me. That wise voice tells me that grassland and cattle mean far more than pounds and dollars to us. I think that when we don't hear that sound, when we don't embrace the integrity of cows and coyotes and our relationship to them, then we run the risk of abusing our livestock, our land, and ourselves.

Pete Ferrell is a rancher in Beaumont, Kansas, and a member of The Land Institute Board. Caroline Mahon helped in the preparation of this article.

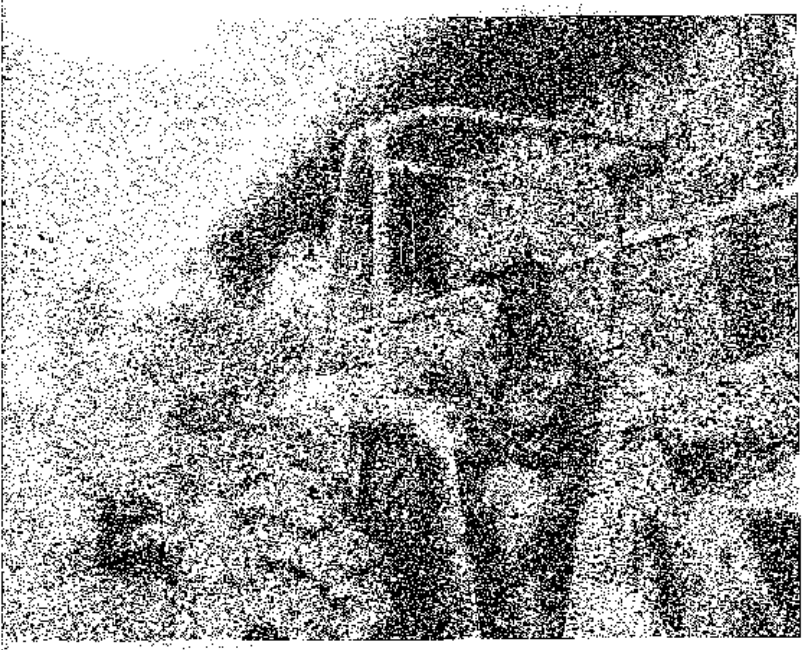
PRAIRIE FESTIVAL
1995

BECOMING NATIVE

to this place

PRAIRIE FESTIVAL VISITORS ENJOYED A WEEKEND OF WONDERFUL TALKS, MEALS AND DANCING. LAND INSTITUTE INTERNS AND STAFF ENJOYED A WEEKEND OF SNIPPETS, SOLVED A THOUSAND SMALL PROBLEMS ON THE FLY, AND MARVELED AT THE GENEROUS ASSISTANCE FROM OUR GUESTS THAT ATWAYS APPEARED AT THE RIGHT MOMENTS. HERE IS A BEHIND-THE-SCENES LOOK AT THE PRAIRIE FESTIVAL.

Material for this article was contributed by Karen Andersen, Virginia Berman, Heather Brummer, Brian Donahue and Doug Walton.



Todd, Heather and Dave move hay on Thursday

No one could remember exactly when the rains began, but we had passed the point of asking *if* it was going to rain, and were only asking *when* the next deluge was expected. The previous weeks of rain had erased our preconceived notions of a sunny and dry Prairie Festival weekend, but we clung to good humor and spirits remained high. "Build the Ark" was added to the list of last minute details, and while Noah had a previous engagement, interns and staff along with a number of invaluable friends and visitors kept preparations afloat. ***KA***

Preparation for Prairie Festival went on in spite of the rain. We fitted the outhouses with a new coat of paint, cleaned out the Big Barn, and prepared the dirt floor for a night of hard dancing. And still it rained. We gave up on the ark idea, and filled the barn with chairs instead. In the precious few moments of calm between the storms we even managed to raise several tents, motivated by visions of the delicious meals that would be served. ***HB***

"She's here!" Alice Waters and her cooks had landed in Kansas. They swept through the grounds between the showers, checking out "the site," inspecting the interns' baby lettuce beds. We had grown all the lettuce for the big Sunday lunch. Would it make the grade?

I had given Alice all the bad news the day before, just as she was leaving for the airport. Most of our lettuce had been shredded by hail. Because of the cold, soggy Kansas spring, no organic peas or potatoes were ready anywhere in the state. Half our locally-grown menu had been washed out. Mari Detrixhe from our board, Dan Nagengast of the Kansas Rural Center, Joe Vogelsberg of Kansas Organic Producers and a dozen others had been working with us for months to line up Kansas organically-grown food. Many delicacies came through and were delicious, but others even the backups of our backups couldn't supply. Not this year. When you eat greens in season, you eat beans out of season, right?

Worst of all, it didn't look like the strawberries would be ripe. The whole Festival had been planned

Prairie Festival goers enjoy May in Kansas

around strawberries.

"No strawberries? Those lovely strawberries? You promised me strawberries. Alright, we'll have to bring some wonderful peaches. Those peaches we just bought?" she asked someone in the background. "Could you get them on the plane with us?" Alice speaks softly but with unmistakable authority. A few hundred organic California peaches suddenly found themselves holding one-way tickets to Wichita for the weekend.

I had to tell her I had been unable to rent Italian-style blue-and-white-checked tablecloths in Kansas. My wife Faith had sewed up one, as a token. "That's alright. We can bring those, too."

I had to tell her that when the Arkansas farmer supplying the organic lamb took it to the slaughterhouse, the lamb ran away.

"The lamb ran away!" I heard Alice repeat to the rest of her Berkeley crew, provoking howls. We all needed some comic relief.

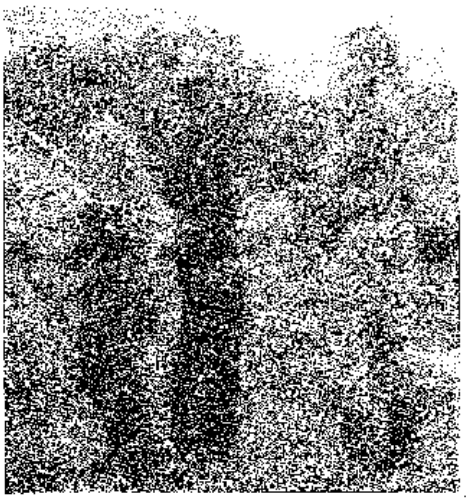
"It's alright," I assured her. "He's got another lamb."

Now, here she was, facing Kansas reality herself. "The lettuce is divine," Alice pronounced. "It's *perfect*. Don't you think it would be perfect for the lunch tomorrow?"

Everyone agreed. But this lettuce was supposed to be for Sunday. The coolers down at Kansas Wesleyan were already packed with a special salad mix for Saturday, prepared to order by the Rolling Prairie Alliance in Lawrence, I reminded Gayle Pirie, a San Francisco restaurant consultant who had flown in a day or two earlier to help with the final preparations.

"Don't worry," she consoled me. "We'll use that for some other meal." *BD*

Shortly after the first car turned in off of Water Well Road on Friday evening, I realized that what I had feared all week might possibly come true: three hundred or more autos frantically sliding and spinning about the sloped parking lot until they were thoroughly lodged in some inaccessible position. Being the intern in charge of Festival parking, I had spent a good deal of time sloshing through our grassed woodlot of young trees, thinking about all the possible scenarios: Should cars enter at the top or the bottom? Should they park facing up hill or down? Will these trees be completely flattened by out-of-control motorists? Could we bring any gravel or sand in here? If it keeps on raining, they'll never be able to drive across *that*.



Doug, Jack and Todd face a dilemma

It kept raining, and while greeting people at the parking lot entrance, I faced a dilemma. It didn't feel very welcoming to warn the arriving festival-goers that they would likely get stuck in the parking lot when they tried to leave. "But don't worry," I would say, "we've got lots of people to push you out." Perhaps it was a bit too honest. But the alternative was no better: "Oh, this shovel? It's just something to lean on...and the mud all over me, I'm not sure how that got there." No, I stayed with variations on the former salutation, and most people politely complied and drove on in. *DW*

At Kansas Wesleyan, Richard Wilson watched his borrowed kitchen being turned upside down by a wrecking gang of professional cooks and amateur helpers. Lou Jane Temple was there from Kansas City. Malley Sisson, food service director from K-State in Manhattan had come down to cook, bringing with her everything from five-gallon lemonade dispensers to a salad spinner. She was helping Charlie Rascoll of the Free State Brewery in Lawrence wrestle a huge blob of focaccia dough into a Hobart mixer. Locating a Hobart mixer in Salina is now my main claim to fame in the world of high cuisine. The Kansas

Wesleyan kitchen was the key to the whole weekend, all the cooks told me afterwards.

Alan Tangren, a former meteorologist and now chief "forager" for Alice at Chez Panisse, was showing gardener extraordinaire Cathrine Sneed how to fine-chop garlic, and I joined in so we could review what provisions still needed to be found. Cathrine and I dutifully minced our garlic down into invisible bits. Alice's head chef Peggy Smith came by—she was cooking the rest of us a late lunch.

"How we doing?" we asked, showing her our garlic.

"Oh, that's good enough: we'll just use it like that; coarse." ***BD***

The Land Institute intern, Doug, greeted me with the warmth of a longtime friend. Heavy clouds hovered over us like a wintry day and barn doors slapped in the wind. Muddy ground stuck to our boots. All-night rains snuffed out the idea of a campfire Friday night. The cool, moist evening felt nothing like the hot Kansas I expected coming from the Northeast for a summer internship. ***VB***

Late Friday afternoon, and the rain returned harder than ever. I had a quick meeting with Lisa Mosca (who actually ran the Prairie Festival while I took my crash course in catering) about our latest disaster. Somebody stranded at the airport, some new arrangement to get them here. Lisa and I spent most of the weekend shouting messages at one another as we rushed in opposite directions.

Lynne Hull had arrived from Wyoming. Lynne makes art *for* as well as about wildlife. She was hanging pictures of her work (which she sometimes shares with people as well) on the gallery walls.

Meanwhile, Cathrine Sneed met John Curtis at the classroom door. "I'm here to pick the lettuce," she said.

"I think that lettuce is for Sunday," John told her.

"Well, Alice asked me to pick some for tomorrow."

"No, I'm quite sure Brian said it's for Sunday."

And so on. Cathrine won, of course. Eventually John figured out that he was picking lettuce with Cathrine Sneed, another soft-spoken woman who is not easily turned aside. I heard they were out in the garden, soaked to the skin. I went to help, but then I looked up and saw a tall woman in a slicker slogging down the muddy road, her hand shielding her eyes from the rain, leaning into the storm like a lost pilgrim. It was Rhonda Janke, the sustainable agriculture extension specialist at Kansas State University, who had just emerged from the Sunshine Farm Advisory Committee meeting that had been going on all day. She was looking for some soil samples Marty Bender had collected for her to use in her talk that weekend. I got her out of the mud and helped her find the dry soil in one of the grain bins, where I left her happily making her preparations. I think it was the only actually useful thing I did all day, other than chop garlic. ***BD***

Throughout all of this, indeed what got me through the toughest moments, were the many people who seemed to appear out of the very wood of the big barn to help. Tasks that were difficult enough, given time pressures, were complicated by the rain and the mud, and seemed overwhelming at times. Only with the help of many volunteers, both "official" and unofficial was everything accomplished. People were willing, even eager, to lend a hand, however small the gesture. Not only did they help with the physical task at hand, but their emotional boost was what made Prairie Festival special for me.

It is often the many small hands working together that accomplish such large goals. This is applicable for any task, however insurmountable it may seem. It confirmed a belief for me best summarized by Mahatma Ghandi, "Whatever you do may seem insignificant, but it is most important that you do it." ***HB***

By Saturday morning 450 folding chairs from various locations around Salina had been hauled through torrential rains in the back of our yellow 1956 Dodge dump truck. Countless bales of hay had been strewn across pathways. Locations of events had been changed and rearranged, and we were expecting more of the same. The annual research tour had been converted to a slide show in a garage, and the woodlot-become-parking lot had been converted into a swampy mess. Bright orange staff T-shirts spattered with mud became the garb of choice for interns, and the time since last shift on parking duty could be determined

by the ratio of dried to still-wet spots of mud. ***KA***

Six o'clock Saturday morning. It had been raining all through the night. Streams of water ten feet wide were running in the swales along both sides of the road by my house. All the bottomland fields along the interstate were completely underwater. And now it was raining again, even *harder* than harder-than-ever. How could we hold a Prairie Festival in this?

The end of May, and John lit a fire in the woodstove to lift our soggy spirits. We had a quick work meeting before going about our last minute tasks, like building straw bridges over mudholes and plank bridges over moats. Eight-thirty came, and I opened the Festival as if it were actually going to take place. I congratulated the huddled visitors, many of them campers we had exiled to the back of the woodlot because the customary field behind the barn was saturated clay and totally impassable. As I introduced Cathrine Sneed, a dry west wind came gusting through the barn door behind us. ***BD***

Faith and Cathrine face lunch for five hundred

Filling the barn with warm bodies, Prairie Festival folk, was the next best thing to a wool blanket on Saturday morning. Cathrine Sneed from the Garden Project in San Francisco began Prairie Festival with her own story. Lying on a hospital bed with a kidney disease in 1982, she was told she would soon die. But a friend handed her *The Grapes of Wrath* to cure any self-pity. It was that book which gave her the inspiration to work outside, in one of the country's most violent jails.

She decided she would grow food with the inmates, and set out to learn how to garden. Without tools or gardening clothes, only thongs and their uniforms, her "students" worked their butts off. They couldn't get enough work. Mornings before she arrived they were lined up at 6:30 A.M. and ready to go, and vying for the opportunity to garden on weekends. She began to see something change: the inmates were kinder to each other and the staff, too, was kinder to them.

As the garden project blossomed Cathrine's illness went into remission. It was not the chemotherapy that saved her, she feels, but the change to the garden, producing food. She left behind a smoke-filled, windowless room, louder than the San Francisco airport. Her recovery and the fruitfulness of her project at the jail she links to the land's healing powers.

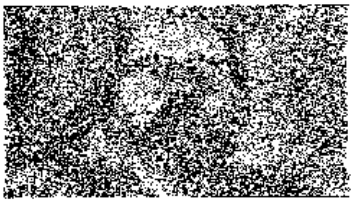
When Cathrine asked her students what they ate before coming to jail, they answered potato chips and fast foods; never vegetables. She sees a relationship between eating a diet without fresh vegetables, living in neighborhoods without trees and gardens, and going to jail. And now she sees that a second garden project on the outside, and a community tree-planting project, have kept many of her students from returning to jail once they leave.

As I sat engrossed in her story, the first sun rays crept in the barn doors, birds sang and my cold muscles loosened. The awakening sky, a spotlight on Cathrine, punctuated her words about how gardening can save lives. The morning light and warmth reminded me: the mysterious outdoor energy, and being among the plants and people absorbing it is my lifeline, too. ***VB***

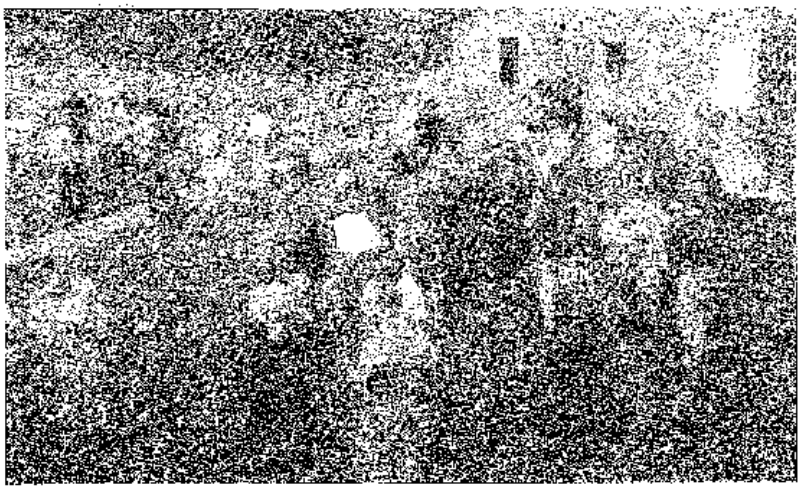
Saturday noon; the speakers lunch. The rain was gone. Now instead there was a stiff Kansas wind, and even in the sheltered yard behind the Kreihbel house, it kept flapping the

Wes Jackson poses a question

Angus Wright ponders a question



tents off the posts as they sank slowly into the soft ground. Alice and Faith and I were running around setting tables, trying to keep Alice's blue-and-white-checked tablecloths from being blown all the way back to Italy. We pinned them down with flatware we had borrowed from Paul Hemmey, farm manager Jack Worman's friend who's renovating a Salina steak house. Alice made a mental note to get tablecloth clips next year. Of course! Why didn't we think of *tablecloth clips*? My friends Kathy and Fred, who were visiting from the East Coast, found themselves rescuing tent posts and making lemonade and iced tea. Just before noon the indefatigable Gayle, Barbara Neyers and the rest of Alice's crew swept up in a fleet of white rental vehicles (do cooks always rent white cars?), and started unloading trays of foccacia and hotel pans of bean salad. I noticed that somehow Bob Russell from Lawrence had been by with a load of apple and pecan wood he donated for Sunday's grilling, and it was neatly stacked along the wall of the shed.



Gathering for the Saturday night potluck

At noon, we stole all the chairs from the greenhouse, where John Jaggers had just completed his reenactment of the early settling of central Kansas. His van was blocked in anyway, so he and his family stayed for lunch.

In the midst of the chaos, Eric Ardapple Kindberg and his daughter pulled in from Arkansas, the trunk of their old Mercedes-Benz packed full of the less fortunate organic lamb that didn't get away. We escorted it into the walk-in cooler.

As usual, nobody wanted to leave the talks on time. Over in the classroom, Flint Hills ranchers Pete Ferrell and Annie Wilson had their audience enthralled. The chefs were conferring by the shed, waiting for the speakers to dribble in.

"It's 12:01," one of them said. "Let's plate it." ***BD***

Saturday evening. I was in the Kreihbel house office, looking out at the crowd enjoying the potluck organized by John Curtis and everybody else, and on the phone to the cooks in the Kansas Wesleyan kitchen. I wanted to let them know I'd finally located some crucial missing ingredient for Sunday's meal, I can't even remember what.

"Don't worry about it," said Gayle. "Alan found it at Vita Villa."

Great. For six months I'd been scouring Kansas and six surrounding states for this stuff, whatever it was, and Alan went out and found it in fifteen minutes at the local health food store.

"Don't let it get you down, Brian. Alan's a real forager."

Thanks, Gayle. I called Kathy Collmer and Jim Scharplaz in Minneapolis to remind them to bring the hormone-free beef for the board meeting dinner in Matfield Green on Monday. I was leaving a message when I saw them right out the window, enjoying the potluck not ten yards away. "Why am I talking to your machine? I can walk outside right now and talk to *you*!" ***BD***

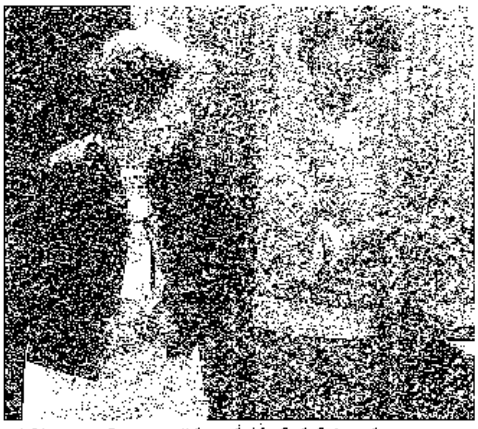
We got the grills going early Sunday morning, and Charlie and his gang from the Free State started grilling Dave and Susan Warner's free-range chicken. Down at Kansas Wesleyan the cooks were blanching a couple hundred pounds of the Land Institute's own excellent asparagus for the vinaigrette, and peeling those jet-lagged California peaches for the non-strawberry shortcake. A whole crew of volunteers missed the morning talks so they could help Alice in the kitchen. Thom Leonard cruised in with fresh bread he had baked overnight in Kansas City, using donated organic flour from Heartland Mills in western Kansas. It was all coming together at last.

Over at the big barn, returned native Angus Wright was preaching a sermon to the Festival faithful, celebrating his parents' lifelong devotion to extending hospitality to Salina natives and wander-

Jack collects lunch tickets

Charlie grills his five-hundredth piece of chicken

ing prophets alike. In his fire and brimstone peroration, Angus warned us that invaders cannot become natives until they have paid their debts to the past, and we still have many debts to pay. If we paid attention to the people making the beds in our motels, people who worked ancestral lands in Mexico for centuries until "free trade" drove them out, we might find our debts are still accumulating. The crowd emerged blinking into the fresh breeze and morning light.



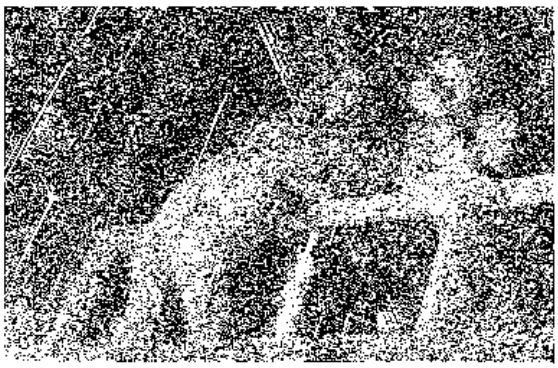
Alice and one of her helpful friends

After forty days and nights of deluge, our tears of repentance were the only rain that fell that Sunday.

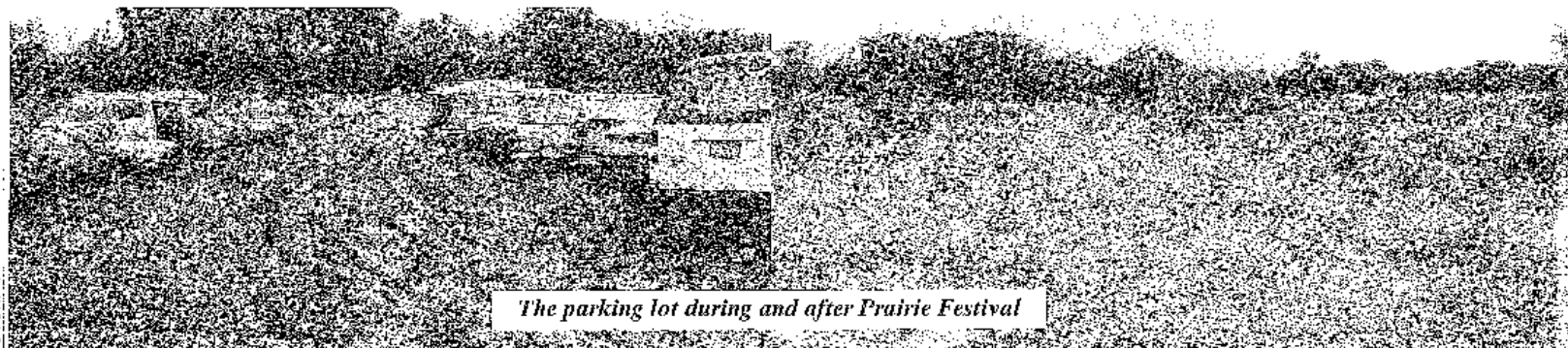
The lunch of (nearly) all organic (mostly) Kansas grown food was a great smash. Now I could start to relax, except for one last hitch: somehow in the madness I had forgotten to pick up the *wine* to accompany the after-Festival dinner for speakers, staff and volunteers—something I should have done months, if not years in advance. You cannot buy wine on Sunday in Kansas. Grilled lamb with nothing but lemonade was not an option. It is a black mark against my reputation as a caterer that shall never be erased. Fortunately, several people independently placed calls to a Salina couple known to have a well-stocked cellar, and through their generosity the celebration was saved. The lamb was devine. *BD*

Indeed, a significant majority of the cars did have some difficulty during their parking lot tenure. There were, however, many neighborly folks amidst the woodlot who, along with interns and staff (and occasionally a large tractor) eagerly pushed and pulled everyone in need. Fortunately, the rains lifted by early Saturday and the reliable Kansas wind dried things out enough by Sunday afternoon that most cars only needed a gentle shove to get them going on their way back home. My fears were dispelled and another Prairie Festival was brought to a close. *DW*

A special thanks to Southwestern Bell for a grant that helped transport speakers to the Prairie Festival. And thank you to the speakers, cooks and musicians who as usual donated their time and talents, and to the many volunteers whose names have not appeared. And thanks above all to Alice Waters for all the efforts of herself and her friends, for all the wonderful food she provided, and for being Alice.



Karen and Todd



The parking lot during and after Prairie Festival

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1995 PRAIRIE FESTIVAL

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BECOMING NATIVE to this place

Presented by
The Land Institute
May 27-28, 1995
Salina, Kansas

Quantity	*Session Title*	*Speaker(s)*
	Saturday, May 27	
____ S1	Gardening to Save Lives	Cathrine Sneed
____ S2	The Day Before America	William MacLeish
____ S3	Flint Hills Landscape and Culture – Panel (Part 1)	P. Ferrell, J. Hickey, J. Hoy,
____ S4	Flint Hills Landscape and Culture – Panel (Part 2)	D. Tepfer, N. Veregge & A. Wilson
____ S5	Mutuality and Sustainable Development	Marty Krasney
____ S6	Economics, Technology and Local Food Systems	Stewart Smith
____ S7	Journey to the Prairie: A Reenactment, 1860-1875	John Jagger
____ S8	Strangers and Sojourners	Mary Catherine Bateson
____ S9	Sustainable Cropping Systems: Feeding the Soil (or: Diet for a Small Microbe)	Rhonda Janke
____ S10	Yo Soy! Culture, Community and Ecology in the Face of Development: Stories from Venezuela and Costa Rica	Neddy Astudillo Mazueva & Tom Spaulding
____ S11	Adding New Dimensions to Dietary Guidelines: Choose Locally Grown in Season Foods	Karen Wilken & Brian Donahue
____ S12	Becoming Native to this Plate – Panel Discussion with Kansas Gardeners & Farmers (Part 1)	C. Bylinowski, K. Collmer, D. Nagengast, E. Reznicek & J. Scharplaz
____ S13	Panel Discussion with Kansas Gardeners & Farmers (Part 2)	
____ S14	Making Sustainability Practical: Developing Measures on the Last Frontier – Juneau, Alaska	Bill Leighty
____ S15	Kansas Landscape Patterns and Biodiversity	Kelly Kindscher
____ S16	Enjoying the Fruits of Our Harvest	Nancy O'Connor
	Sunday, May 28	
____ SU1	A Place for Elijah: Thoughts on Natives and Wanderers	Angus Wright
____ SU2	Natives and Newcomers: Land and Culture in Central Kansas	B. Buskirk, H. Elliott, J. Lilly
____ SU4	What Artists Offer the Environmental Movement	Lynne Hull
____ SU5	Sustainable Agriculture and the 1995 Farm Bill Panel	W. Jackson, J. Jost, P. Johnson & G. Youngberg
____ SU6	Horse Logging for Sustainable Community Development	Dick Austin
____ SU7	Permaculture: Global Grassroots Initiative	Thomas Mack
____ SU8	Skyfire: A Community Study in Sustainability	W. Pickett, P. Krum
____ SU9	Sustainable Farming Systems: What's At Stake?	Fred Kirschenmann
____ SU10	Closing Remarks	Festival Participants

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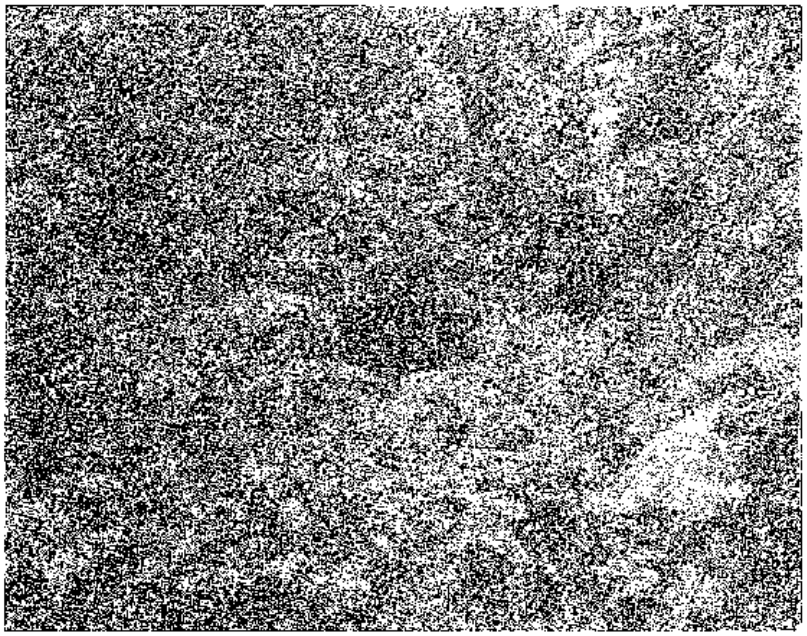
Notes from the Intern Garden

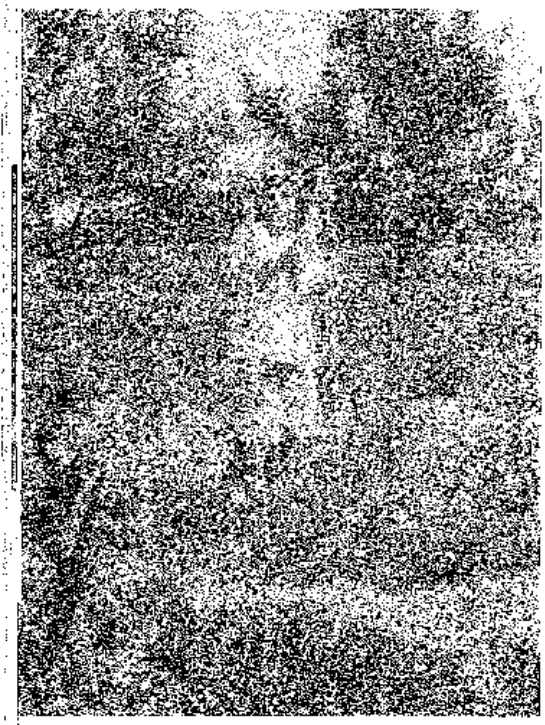
John Curtis

"The arrangement will only be correct if it looks as if the flowers have been grown in the pot." —Shen Fu.



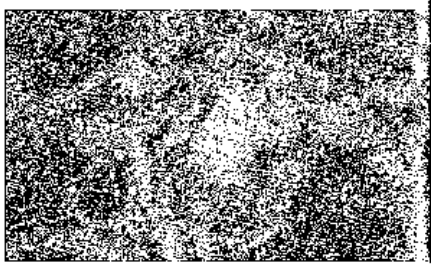
On my daily bike ride to The Land Institute, I pass through much of Salina's most recent suburban development. This new suburbia looks like suburban landscapes anywhere else. The lawns are artificially fertilized, well-watered carpets of European cool-season grasses. Exotic trees, mulched with imported wood chips, are stuck here and there. Neatly weeded beds of mostly annual flowers purchased from one of the new megastores are displayed along the front. Occasionally a section of bare soil in the back betrays the presence of a vegetable garden.

As a fledgling landscape manager, I observe these suburban neighborhoods and have to wonder at what I'm seeing. These small landscapes could be wildlife sanctuaries, intricate gardenscapes, educational playgrounds for children or any of a hundred other things. Yet, not only is suburban land use both homogeneous and nearly useless, but people are willing to pollute, waste gross amounts of water, and spend a lot of time and money in order to impose this unnatural order on the landscape.



John Curtis

The intern garden at The Land Institute is a place where this year's group of interns has the opportunity to experiment with landscape management and to test ecological principles on the land. As landscape managers we have to keep three major factors in mind. First, we depend on the garden to produce most of our food for the summer and fall months. Second, we have a responsibility to leave the soil in at least as good a condition as we found it for future intern groups. Third, as students of natural systems, we ask what we can learn from the prairie and how to apply these principles to the garden. To me, this third factor is what defines sophistication in land management.



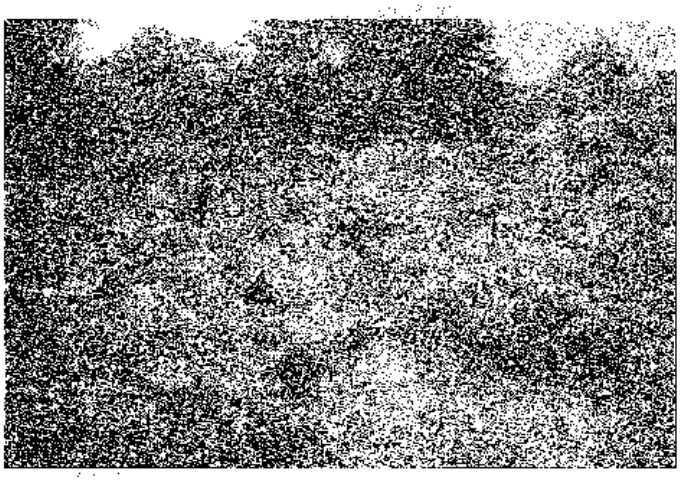
Applying ecological principles to the garden isn't as elusive or impractical as it may sound, and the prairie provides some useful models. Let's take ground litter for example. Say you're a well-established clump of big bluestem and your local ecosystem hasn't seen a good prairie fire in a year or two. The soil around your roots will be covered by a thick mat of dead plant material which protects the soil from erosion, helps retain precious water and all but eliminates any invading annuals. Apply this principle to the garden and that dead plant material (usually hay, straw or pulled weeds) is called mulch. Mulch improves the soil, reduces watering and weeding, and creates an ideal medium for young transplants out of the greenhouse.

On the prairie you won't find rows of course (unless you're at the Land Institute and accidentally

venture into a former research plot), but neither do you often find isolated individual species. The careful observer is more likely to see a grouping of one species over here and of another over there with some overlap between the two. In the north beds of the garden we've mimicked this pattern with patches of vegetables overlapping one another.

Additionally, we try to arrange plants so that they tend to complement rather than compete with each other; for example planting onions with the brassicas deters cabbage worms, corn benefits from nitrogen fixed by beans and so on.

The prairie often exhibits several species of what we commonly think of as a single plant. There are half a dozen milkweeds for example, and many more sunflowers. Certain sunflower species seed earlier than others and in given years some flourish while others decline. Again, we've tried to apply this principle to the intern garden. We have over a dozen varieties of tomatoes, and nearly as many types of potatoes, peppers, beans, sweet corn, melons and so on. Like nature, we're hedging our bets and extending the harvest by not relying on just one or two types.

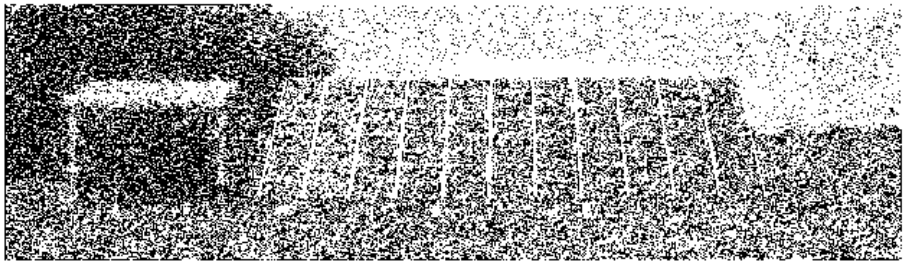


Likewise, we look to the prairie for other models to follow in landscape management such as perennialism, principles of succession, evolution and so on. Really the list could get quite long. The bottom line is that as we learn to apply the complexity of natural principles to the garden and to the landscape as a whole, beauty, diversity, fertility and productivity will naturally follow. The way people manage their land in the new suburbs of Salina indicates either an ignorance or a total disregard of local ecological realities. As such, it jeopardizes both our future and the future of nature as we know it. By using nature as measure in the intern garden, we're entering into a more intimate relationship with the natural world, ensuring that both will endure.

A Research Assistant Position and the 1996 Intern Program

The Land Institute is pleased to announce an opening for a new research position. The position, to begin 1 January 1996, will be an assistant within the Natural Systems Agriculture (a.k.a perennial polyculture) research program. It will be a full-time, 12 month position that we expect will continue for several years. For detailed job description, salary range, and application procedure, please contact Jon Piper at 913-823-5376, or theland@ge.apc.org.

Applications for 1996 Land Institute internships officially closed on October 1st, but we are unofficially holding them open until November 1st because this was the deadline in previous years. The term runs from February 12 to December 6. We have 8 intern positions available in 1996. Please call Brian Donahue at 913-823-5376 for further information.

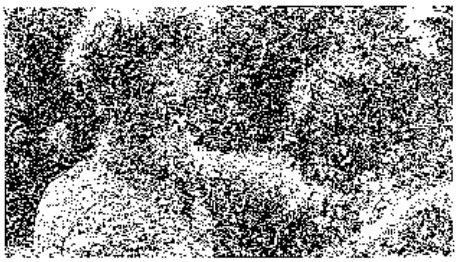


Our new solar panels are up and running at the Sunshine Farm, generating more electricity than the farm consumes. The Employee Green Team of Western Resources, our regional gas and electric utility, provided the materials and installation of this 4.5 KW system.

Summer Faces at The Land Institute

Karen Andersen

Julie Lockwood



Virginia Berman, left

Lance Davidson

Summer at The Land Institute is, among many things, a time of making connections. One important way these connections are made is through our summer interns, visiting researchers and volunteers. This summer we were joined by three people, each of whom represented a valuable link to other researchers and institutions, and brought ever-welcome new ideas and information.

Julie Lockwood, a visiting researcher, returned this year to continue her work with The Land Institute's community assembly project. A zoology Ph.D. student at the University of Tennessee, Knoxville, Julie works with Dr. Stuart Pimm, Professor of Ecology, exploring the various stages biological systems pass through on their way to a semi-stable state (see *Land Report* 51).

The Land Institute's connection with Dr. Pimm was the link that joined Julie's interests with our research. This type of collaboration with the wider scientific community is a great opportunity for us to work on joint-research projects and to share new ideas with the faculty and students of various universities.

Virginia Berman, a masters student at Tufts University, also joined us as a summer intern. While at The Land Institute she assisted with soil research at the Sunshine Farm, and also researched the history of Great Plains agriculture, accumulating many of the skills she will need to complete her own environmental land-use investigation.

Virginia's interest in The Land Institute was sparked when she met former intern Sarah Wilson at a talk given by Helena Norberg-Hodge. The connection between our work and her interests, and the opportunity to combine field work with her personal research, made this an ideal place for her to spend a summer. Virginia's advisor William Lockeretz supported her efforts, and worked to establish this link between The Land Institute and Tufts University. This is another example of cross-fertilization between The Land Institute and innovative programs in the academic world.

Lance Davidson, a native Salinan, was the third "extra" member of this summer's intern crew. A sophomore at Kansas State University, Lance worked with intern David Henretty on the ongoing plant breeding research at The Land Institute. He hopes to collaborate with Kansas State University plant breeder Paula Bramel-Cox, a member of our board, combining his university work with his efforts here. Lance's days were filled with typical intern activities which he performed with the grace and agility of a seasoned intern. There is a contagious energy that summer interns bring to The Land Institute and Lance's personality epitomizes this spirit. Through Lance and others like him, we will continue to strengthen our ties to the Salina community.

Tomoko Takagi volunteered this summer to improve some of The Land Institute's printed materials. Thanks to her efforts, we now have an updated Self-Guided Tour booklet and a handy Publication and Resource Guide. In exchange for offering us her creative talents and good humor, Tomoko filled an internship requirement and completed her degree in public relations at Kansas Wesleyan University in Salina. She has returned to her native Japan to put her skills to use (for pay this time) and to spread the word about The Land Institute.

Each of these summer sign-ons at The Land Institute symbolizes an important connection between our work and that of other researchers and universities. Affiliations with these graduate and undergraduate programs are ideal opportunities for The Land Institute to cooperate with the wider scientific community and to share new ideas. We thank these volunteers, and look forward to future collaborations.

The Impact of Chicken Grazing on Alfalfa

Jeremy Plotkin

Abstract

Intensive mobile chicken grazing pens are a promising alternative to capital-intensive broiler operations. In order to test the claim that there is a positive impact on the pasture due to manure deposits, the Land Institute compared alfalfa regrowth a month after chicken grazing to regrowth after mowing in side-by side plots. In those plots treated earlier in the study, the mowed alfalfa returned better than the grazed. In later treatments, there was no significant difference, but yields were markedly lower than for the earlier plots. This most likely was due to the alfalfa being dormant at the time of impact and therefore not growing much at all. Nitrogen content of alfalfa samples was also measured to determine whether the nitrogen from chicken manure was taken up by the plants. There was no significant difference between grazed and mowed samples, indicating that the plants had not received any nitrogen benefit from the manure. The conclusion is that intensive chicken grazing may be only appropriate for the end of an alfalfa rotation, when it is due to be plowed in anyway.

Introduction

Conventional poultry operations feature large, capital-intensive facilities designed to raise thousands of chickens at a time. The birds are crowded, stressed, and subject to disease problems. There is an overabundance of manure, which often becomes a pollution problem. Many small farms have started to use free-ranging chickens as an alternative to this method. Even in a free-range system, however, impact is concentrated around the chicken house. The Sunshine Farm is using another effective alternative, the mobile grazing pen for broilers. Our mobile pen is modeled after one designed by Joel Salatin, a Virginia farmer who raises 10,000 birds a year.

The mobile grazing pen can be moved daily, thus spreading out impact on the vegetation. Vegetation is heavily impacted for a day, then left to recover. Manure from the chickens is spread over a wide area, turning a potential pollution problem into a fertilizer source. The vegetation grazed by the chickens acts as a feed supplement, cutting down on feed costs. In addition, the level of green vegetation consumed makes for healthier chickens, which makes for healthier meat. Chlorophyll, found in all green plants, is a detoxicant, which makes the meat of the chickens lower in cholesterol than chickens raised on grain in more sedentary conditions (Salatin 1993).

Salatin claims that his mobile pens have a positive effect on the vegetation grazed. He says that by grazing and dropping the manure at the same time, the chickens cause the plants to take up more nitrogen than they could otherwise make use of, because the plant gets the nitrogen at just the time when it needs the fertilizer for regrowth (Salatin, 1993, p.89-90). To test these claims, we conducted a study comparing the impact of the chicken grazing with the impact of simply haying.

Materials and Methods

Our mobile chicken grazing pen is a 10x12x3 foot cage holding up to 100 chickens, open on the bottom so that the chickens can graze the vegetation underneath. The pen has wheels attached so that it can be moved by hand daily to fresh vegetation. The chickens were placed on a stand of alfalfa which was established in the fall of 1993, and reseeded with oats and alfalfa in the following spring. A strip approximately twenty feet wide was left standing when the surrounding alfalfa was cut for hay on August 8, 1994. The chickens were moved down one side of this strip, spending one day in each 10x12 plot. Each morning when the pen was moved, a square approximately the same size as the broiler pen was mowed on the other side of the strip, and the alfalfa raked off. We used a small mower with sickle bars similar to a hay swather, for more accurate simulation of a haying impact. This was done for several weeks to provide fourteen blocks for each treatment. After approximately one month of regrowth, three 0.56 m^2 quadrats were thrown into each block. All alfalfa in each quadrat was clipped at ground level, and dried biomass was measured. Nitrogen content of one sample from each treatment on each day was also compared to determine if the added nitrogen from the chicken manure resulted in higher protein content in the alfalfa. Analysis of variance tests were conducted to compare grazed sites to mowed sites for both biomass and nitrogen content.

As I collected samples, I noticed that there seemed to be different patterns of regrowth in those plots treated later in the study. I took as a dividing line August 23, the one date on which it rained during the entire study period, and performed the same analysis of variance for just the earlier period and just the later period.

Results and Discussion

The grazed alfalfa had a lower biomass yield than the mowed alfalfa, both for the whole study period and for the earlier impacted plots. After the rain, however, there was no significant difference between treatments (see Table 1), but yields for both treatments were much lower than the earlier dates. There was no significant difference in nitrogen content between mowed and grazed alfalfa (see Table 2) for any of the plots, but there was a trend toward higher nitrogen content in the alfalfa grazed after the rain.

Observation revealed that the grazed alfalfa tended to be stripped and pecked all along the stem, and chewed up much closer to the ground. The mowed alfalfa, on the other hand, was cut off evenly an inch or so from the ground, leaving a short but undamaged crown from which to regrow. The mowed alfalfa thus appeared to have started regrowth earlier, and grew

Table 1.
Biomass in grams of alfalfa mowed and grazed by chickens in mobile broiler pen, at earlier and later dates. *p<0.05, **p<0.01, ns – not significant

Timing	Grazed Alfalfa (g)	Mowed Alfalfa (g)	
Overall	43.9 ± 12.2	50.1 ± 18.1	*
Earlier Impacted	48.0 ± 12.0	60.3 ± 15.8	**
Later Impacted	38.4 ± 10.3	36.5 ± 10.6	ns

Table 2.
Mean percentage total nitrogen in leaf samples of alfalfa mowed or grazed by chickens in mobile broiler pen, at earlier and later dates. *p<0.05, **p<0.01, ns – not significant

Timing	Grazed Alfalfa (%N)	Mowed Alfalfa (%N)	
Overall	2.82 ± 0.28	2.65 ± 0.25	ns
Earlier Impacted	2.67 ± 0.23	2.56 ± 0.06	ns
Later Impacted	3.05 ± 0.22	2.77 ± 0.23	ns

more vigorously than the grazed alfalfa. The plants were also more patchily distributed in the grazed areas, leading me to think that the chickens had killed some of them. The later-impacted plots were a bit weedier, which could account for the lower yields – there was just less alfalfa in those plots to grow back. It could also be that the alfalfa had gone dormant, and so didn't regrow much at all from the later period of either treatment.

Since there was no significant difference in nitrogen content between the treatments, the fertilizer value of the chicken manure must have either been insignificant or somehow unavailable to the plants. Nitrogen fertilization results in higher protein and total nitrogen content in alfalfa (Lee and Smith, 1972). By estimating the amount of alfalfa and feed eaten by the chickens each day, and multiplying that by the amount that passes through the chicken (about 75%), I estimate that the manure was approximately equivalent to 70 lbs/acre of nitrogen, a small but significant fertilizer value. Since it is estimated that ninety percent of chicken manure mineralizes in the first year after application (Pratt et al. 1973), the nitrogen should have been available. However, the lack of rain during the earlier part of the experiment probably prevented the nitrogen from the manure from washing into the soil, making it unavailable to the plants. This hypothesis is supported by the trend toward higher nitrogen content in the alfalfa grazed after the rainfall.

However, it also may be that alfalfa is just the wrong plant for chicken grazing. Since alfalfa is a nitrogen-fixing legume, it is not recommended to fertilize it with nitrogen. Salatin has had great success grazing his chickens on grass, which is more nitrogen hungry than alfalfa.

One interesting sidelight is that while the alfalfa did poorly, the annual weeds interspersed in the plots did even worse. There were many more annual weeds left in the mowed plots than in the grazed. This suggests that the broiler pen could be used to graze out undesirable annuals, for example during the establishment of perennial polycultures.

The broiler pen could have a use on the Sunshine Farm at the end of the alfalfa rotation. The alfalfa would be heavily impacted, but that would not be a problem because it would be scheduled to be plowed under shortly. In fact, it would help return some nutrients to the soil by not taking a last hay crop out of the system. The repeated cropping of alfalfa each season depletes potassium and phosphorus in the soil (Lamond 1993), whereas a broiler pen would turn the last crop back onto the ground in the form of manure, with the additional the input of the animal feed.

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Cropping Systems at the Sunshine Farm

Antonio Serrano

Abstract

As part of the Sunshine Farm Project, a strip cropping system and a crop rotation program are being implemented. The various crops provide oilseeds for tractor fuel, grain for animal feed and income, and legumes in rotations for hay and for maintaining soil fertility. Crop yields for 1994 were compared between the north and south half of the farm given that they have different cropping histories. Only soybean yields were significantly higher in the south half. A linear regression of crop yields and soil properties showed a positive correlation between soybean and alfalfa yields and NH4 levels at various depths. Negative correlations between the yields of oats and milo and the levels of total N were also found. Management practices are believed to be responsible for these results. Liquid fuel energy per bushel was lower for only two of the crops when compared to estimates for some Great Plains locations. Labor requirements per bushel were always higher at the Sunshine Farm.

Introduction

Multiple cropping systems represent some of the oldest farming systems in the world. Prior to the industrialization of agriculture, monocultures were the exception rather than the rule (Vandermeer 1990). Crops are grown together or in association in order to achieve higher system yields as well as greater biological and economic stability in the system. Strip cropping and crop rotations reduce soil erosion, improve soil quality, reduce weed, insect and disease infestations, and increase diversity as well as the total system yield (Francis et al. 1986). Higher yields are also expected in strip cropping because of polyculture effects that occur along the edges of adjacent crops. These techniques reduce the need for agrochemical inputs and fossil fuels, diversify production, and hence provide the basis for a more sustainable agricultural system.

As part of the project, a rigorous energy accounting system is being implemented to estimate the direct and indirect energy requirements for all farm operations. The goal is to determine to what extent a farm can provide its own energy requirements and how much of its acreage will be required to do so. Hence, oilseeds are being raised for tractor fuel, grain crops for animal feed and income, and legumes in rotations for hay and for maintaining soil fertility.

Materials and Methods

The cropping systems research takes place on approximately 50 acres of non-irrigated bottom land with silty loam soils belonging to the Entisol order, Fluvent suborder and Haplustolls great group. The average annual rainfall is 29 inches. For the past three years, wheat was grown in the north half and alfalfa in the south half of the farm. Two five-year crop rotations, distributed evenly among the north and south halves of the farm, are as follows: milo, soybeans, oats, sunflowers, and sweet clover; and milo, soybeans, oats, alfalfa, and alfalfa again. In some strips wheat is grown in place of oats.

These crops are grown in 120 adjacent strips, repeating every five strips and advancing through the crop rotation every year. The strips are 13 ft. 4 in. wide, having four rows of crops planted 40 in. apart to accommodate draft horse cultivation. All strips are oriented east to west, and vary in length from 658 to 1151 feet.

Throughout the growing season observations were made on weeds, insects, and crop conditions in each strip. Dr. Jerry Wilde (Kansas State University, entomology) placed pheromone traps for moths in some sunflower strips and inspected sunflower heads for larvae. A survey of black bird damage to sunflowers was also conducted.

Table 1.
Sunshine Farm crop yields in bu/ac [mean, st. dv., (number of strips)] and dryland Saline County averages.

Crops (acreage)	Sunshine Farm Yield North	South		Saline Co. Yields a)	Years Average
Oats (10)	27.5 (10) 17.4	32 (23) 25.4	NS	43.5 b) 11.2	1988-93
Milo (7.3)	69.2 (8) 12.4	74.5 (8) 11.5	NS	46.8 19.4	1980-93
Soybeans (7.0)	27 (9) 4.9	36 (14) 9.5	*	24.1 10.6	1984-93
Alfalfa (2.1)	—	1.9 (6) c)		3.2 c) 1.5	1980-93
Wheat (1.4)	27 (4) 0.82	—		30.3 7.7	1980-93
Forage Sorghum (6.4)	9.1 c)			3.4 c) 1.5	1980-84

NS=not significant; *=P<0.05
a) Kansas Board of Agriculture.
b) Average for Central Kansas District.
c) Tons per acre.

For the energy accounting, the direct energy spent in farm operations was determined from the fuels consumed. FoxPro software, a relational database, was used to organize the data and to compute the energy and labor requirements.

Mean crop yields in the north and south halves of the farm were compared by analysis of variance with procedure GLM (SAS Institute 1988). To test for higher yields due to strip cropping effects, an analysis of variance was also conducted on seed yields of inner and outer rows of a soybean strip adjacent to an oat strip, and for a milo strip adjacent to an alfalfa strip. For all analysis of variance, normality of residuals were examined by procedure UNIVARIATE (SAS Institute 1988), and homogeneity of residuals by quick inspection of the ratios, variance/mean and standard deviation/mean (Sokal and Rohlf 1981). To ascertain whether crops are benefiting from better soils properties, procedure REG was used to fit linear regressions for 1994 crop yields as a function of 1994 soil properties (SAS Institute 1988).

Results and Discussion

Crop yields and soil properties

Mean soybeans yields were significantly higher ($P<0.05$) in the south half of the farm (Table 1). Mean yields for oats and milo were also higher in the south half, but not significantly so.

A regression analysis was done to compare the yields of some selected strips to their soil chemical properties (Table 2). Positive correlations were found for soybean yield and NO_3 and NH_4 levels at 30 to 60 cm depth, and for alfalfa yield and organic matter levels at 0 to 30 cm. However, significant negative correlations were found between the yields of both milo and oats and the total N levels in the soil.

No significant differences in seed yield of inner and outer rows were found for either milo or soybeans (Table 3).

Table 2.
Correlations significant at 0.05 level for 1994 crop yields as a linear regression of 1994 soil properties.

Crop	Soil Property	Depth (cm)	Correlation Coefficient
Oats	Total N	0 - 30	-0.83
	Total N	30 - 60	-0.88
	Total P	60 - 100	0.96
	CEC	30 - 60	-0.83
Milo	OM	60 - 100	-0.64
	Total N	0 - 30	-0.64
	Total N	30 - 60	-0.79
	Total N	60 - 100	-0.77
	NH_4	30 - 60	-0.85
Soybeans	NO_3	30 - 60	0.73
	NH_4	30 - 60	0.64
	NH_4	60 - 100	0.72
Alfalfa	OM	0 - 30	0.84
	NH_4	60 - 100	0.76

Table 3.
Seed yields (bu/ac) [means ± standard deviation (n=27)] of inner and outer rows of soybeans adjacent to an oat strip and of milo adjacent to an alfalfa strip.

Crop	Inner Row	Outer Row	
Soybeans	29.5 ± 6.7	31.7 ± 7.5	N.S.
Milo	90.4 ± 19.9	87.7 ± 23.9	N.S.

N.S. = not significant at 0.05 level by Turkey's studentized range test.

Pest damage and weed infestation

No serious disease or insect damage was detected in any of the crops. Some chinch bugs were found in milo, and soybean leaves were chewed by grasshoppers in August and September. Organic sunflowers were planted in early July so that the seeds would mature in October when the populations of sunflower head moths are low. However, they had to be replanted in mid-July because the first planting got buried by heavy rains. The July planting date worked well in terms of insect pests, because in six traps only four sunflower head moths and one banded head moth were found. Likewise, in a ten sunflower head count, only seven larvae were found. However, damage by blackbirds in October and November was serious. Visual assessments of the damage showed estimates of 63% seed loss (n=75 heads) in the north half and 32% (n=105) in the south half (Table 4).

Milo, soybeans and sunflowers were cultivated by horse and once by hoe. Weeds were a problem inside and on the edges of the oats strips.

Table 4.
Percent seed loss in sunflowers [mean, ± standard deviation, (n=15 heads)] due to black bird damage.

North Strips	South Strips
77.3 ± 12.9	50.7 ± 20.9
67.7 ± 21.5	29.7 ± 22.0
58.7 ± 20.4	23.1 ± 22.0
53.7 ± 21.0	20.3 ± 17.5
58.3 ± 21.4	25.0 ± 17.7
	30.0 ± 15.0
	48.0 ± 19.6
Grand Mean = 63%	32%

Energy accounting

Liquid fuels and human labor expended on crop production were calculated and compared to estimates at various locations in the Great Plains (Table 5). At the Sunshine Farm, lower energy expenditures in terms of liquid fuels were computed only for the production of soybeans and milo. However, inputs of human labor were higher for every crop.

With 1994 being the second year of the Sunshine Farm, various problems with strip cropping are still being worked out. Avoiding ridge formation at the sides of strips and keeping them level are two of the main difficulties when working the ground only in one direction (east-west but not north-south or diagonally). Also, it has been hard to find implements that are wide enough to cover the strips sufficiently to prevent weed problems in the edges, and yet not so wide that they sometimes drift into adjacent strips. It is important to try to continue to acquire such implements in order to minimize the management irregularities that have afflicted us this year.

Crop yields were probably affected by these management problems. Although various nutrient levels were significantly higher in the north half of the farm (Gerwin 1995), crop yields were not higher there. This may have been due to all field operations being started at the north end. Adjustments and calibrations were made along the way so that field operations were performed better in the south half.

The negative correlations found between the yields of milo and oats and the total N levels are baffling. Based on observations made in the field, it could be that weed competition was greater in the sampled strips which had the highest levels of N, and therefore crop yields were reduced. Weed competition during the first third of the crop cycle tends to have a great effect on crop yields (Altieri 1987).

Management problems could also be a factor in explaining the negative correlations. Planting densities varied somewhat from strip to strip and even from row to row as the planter was calibrated along the way. Hence, denser plant populations could affect yields in some of the strips. This could also explain the lack of significant differences in seed yield between the outer and inner rows of both milo and soybeans. Cultivation of adjacent strips may have also reduced the seed yield of the outer rows.

One of the benefits of crop diversity is the avoidance of pest infestation. The exception to this was the tremendous damage that blackbirds did to the sunflower crop. Because they had to be replanted, by the time they matured the Sunshine Farm sunflower strips were almost the only crop in the area. Sunflowers will be planted earlier next year to avoid blackbirds, since sunflower head moths do not appear to be a problem.

This is the first year in which strip cropping has been implemented for the entire Sunshine Farm, which could explain the high labor and energy expenditures in this year's crop production. Management practices are still being perfected and some of the strips had to be replanted. Labor requirements are also higher when chemical pesticides are not used. Over time, efficiency in farm operations can be improved and liquid fuels expenditures reduced. Human labor requirements are usually higher in organic farming, but this cost is normally offset by the lower use of agricultural inputs.

In conclusion, this has been the first year of implementing the strip cropping system and crop rotation programs in the whole Sunshine Farm. Many managerial problems are still being worked out, and the right kind of implements are still being acquired. However, there is no doubt of the great potential these techniques have for our agricultural system. I am confident that in the coming years of the project, we will begin to see very satisfactory results.

Table 5.
Energy use (liquid fuels in BTU/bushel and labor in hours/bushel) at the Sunshine Farm compared with values for some Great Plains locations [Pimentel (1980)].

	Sunshine Farm		Great Plains		
Crop	BTU	Hours	BTU	Hours	Location
Soybeans	23,300	0.187	45,300	0.081	Illinois
Milo	16,800	0.143	38,200	0.065	West Kansas
Wheat	49,000	0.254	38,700	0.089	Kansas
Oats	29,400	0.136	10,800	0.016	W.C. Minnes.
Alfalfa 1)	637,000	7.0	379,000	0.65	Minnesota

1) = per ton.

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Baseline Cover Class Analysis for the Rotational Grazing Project

David Tepfer

Abstract
Species composition was surveyed on 40 hectares of prairie to provide baseline information by which to judge the long term effects of grazing on grassland plant communities. As part of a larger integrated farm experiment, cattle will graze the prairie relying on the fertility of the ecosystem to produce the grass. Since long term sustainability is a crucial concern, plant species composition will be closely monitored. Of nine sites surveyed, four consist of multiple side-by-side plots, one to be grazed and one exclosed from grazing. At the other five sites, change in species composition over time will be monitored along transects without ungrazed controls. Sites differ widely in species composition, providing a variety of starting points from which to track change in subsequent years.

Introduction
The Land Institute has approximately 40 hectares of prairie that will be grazed as part of the Sunshine Farm Project. An initial survey of the vegetation was done in order to have baseline information by which to judge the long term effects of grazing on plant species composition.

The purpose of the Sunshine Farm Project is to explore to what extent a farm can use sunlight to provide its own direct and indirect energy requirements, supply its own fertility, and produce food (Bender and Craft 1992). As part of the Sunshine Farm, the cattle grazing project will harvest grass in the form of beef, relying on the prairie to provide the fertility to produce the grass. A crucial concern is the sustainability of this system.

Most studies of grazing systems focus on livestock performance. Not enough attention is given the actual forage or range condition (Heitschmidt and Taylor 1991). Future work on this project will involve managing the grazing to maximize beef production without degrading the prairie ecosystem which the grazing relies on. The change in the composition of plant species over time will be monitored as an indication of our impact on the ecosystem.

This paper provides a baseline description of the species composition of nine study sites on the prospective pasture. It compares the plots and discusses important features of the vegetation that should be monitored.

Materials and Methods
The pasture is located at The Land Institute, approximately 6 kilometers southeast of Salina, Kansas. It is composed of 10 hectares of never-plowed prairie with four survey sites, 22 hectares of restored prairie with four survey sites, and seven hectares of alfalfa and three hectares of restored prairie which were not surveyed. Twenty-two hectares of adjacent unplowed prairie devoted to other research will not be grazed, and has one survey site to serve as a comparison for the rest of the sites (see Table 1).

Table 1
Site history, treatment, and description

History	Site	Treatment (number of plots)	Number of quadrats	Description
never-plowed prairie				
	1	grazing (3) exclosed (3)	24	lower side slope
	2	grazing (3) exclosed (3)	24	upland, near crest of hill
	3	grazing near fence (6) grazing far from fence (5) exclosed (6)	68	flat bottom ground
	4	transect	10	gently sloping upland
	5	transect	10	gently sloping upland
restored prairie				
	6	grazing (6) exclosed (6)	48	lower side slope
	7	transect	10	high side slope
	8	transect	10	flat upland
	9	transect	10	flat lower ground

The never-plowed prairie was grazed for many years. Since 1988, except for some brief, light grazing by two horses in 1993, it has not been grazed by livestock. The restored prairie was wheat ground for many years until it was planted to native tall grasses, half in 1982 and half in 1986.

Two different types of sampling were done as summarized in Table 1. Of the nine sites, four sites were set up as multiple pairs of side-by-side plots, one of which will be grazed and the other protected from grazing by an exclosure. The four sites were chosen to represent a variety of types of plant communities to see if they respond differently to grazing. Each plot is 5 x 5 meters, on which four quadrants were randomly placed for cover class estimates. Each pair of plots was chosen so that the two plots were as visually similar in vegetative cover as possible to make future comparisons valid. One of the side-by-side sites is composed of five sets of three plots, one to be exclosed, one that will be grazed adjacent to a perimeter fence, and one that will be grazed five meters from the perimeter fence. There is a sixth set that has only grazed and exclosed plots at this site, because the plot farther from the fence fell in a different species mix. This site will allow the ungrazed plots to be compared to grazed plots both next to and farther from the fence.

The other five sites were sampled as twenty meter transects. Ten sample quadrats were placed for cover class estimate, every two meters, on alternate sides of the transect line. These sites were chosen to represent different types of vegetation in different areas of the pasture and will track change over time.

Site 1 consists of three pairs of plots on a lower side slope of never-plowed prairie dominated by big bluestem and little bluestem. Site 2 consists of three pairs of plots just below the crest of a hill on the never-plowed prairie. It is shows signs of severe overgrazing in the past and is dominated by big bluestem, western ragweed, and ironweed. Site 3 is five triplets plus one pair of plots on flat bottom ground on the never-plowed prairie. It is dominated by big bluestem and little bluestem. Site 4 is a transect on gently sloping never-plowed prairie dominated by big bluestem and tall dropseed. Site 5 is a transect on never-plowed prairie upland dominated by big bluestem and little bluestem. Site 6 is six pairs of plots on the restored prairie, dominated by big bluestem. Site 7 is a transect on the restored prairie on a high hillside dominated by big bluestem, little bluestem, and bromegrass. Site 8 is a transect on the restored prairie on flat ground on top of a gentle rise dominated by big bluestem. Site 9 is a transect on the restored prairie on lower, flatter ground dominated by big bluestem with some little bluestem and Indian grass. These site descriptions are summarized in Table 1.

A cover class analysis was done in July of 1994. Percent cover was estimated by examining the species present in randomly placed 0.56 m^2 quadrants. Each species present was assigned to one of six cover class categories based on the estimated percent of the quadrant area it covered. These classes were 1-5%, 6-25%, 26-50%, 51-75%, 76-95%, 96-100%. The median value of the cover class of each species in each quadrant was used to calculate the mean percent cover for each species in each plot, transect, or site. Due to multiple layers of vegetation, percent cover can exceed 100%.

The species were grouped according to the categories annual, perennial, or biennial; warm season grass, cool season grass, legume, composite, or other forb; and desired or undesired. The undesirable category is made up of non-native invaders and native species that are considered overgrazing indicators. The main concern is that the undesireable native species do not increase in percent cover over time; they may not be undesirable at low levels of cover. The desireable category consists of species that are desired or of not much concern if they increase in cover.

Each site was described on the basis of the percent cover in each possible vegetative category. The most important categories are reported in Table 2.

Table 2
Percent cover of common species

	never-plowed prairie sites					restored prairie sites			
species	1	2	3	4	5	6	7	8	9
big bluestem *(Andropogon gerardii)*	40%	24%	42%	32%	42%	67%	13%	87%	45%
little bluestem *(Andropogon scoparius)*	32%	7%	27%	0	36%	0	31%	*	10%
western ragweed *(Ambrosia psilostachya)*	*	21%	*	7%	6%	*	0	0	0
ironweed *(Vernonia baldwinii)*	*	16%	10%	0	0	0	*	0	0
artemesia *(Artemisia ludoviciana)*	*	7%	*	0	0	0	*	0	0
Scribner's panicum *(Dicanthelium oligosanthes)*	*	*	8%	*	14%	0	0	0	0
sedge *(Carex sp.)*	*	*	7%	*	*	0	0	0	*
Indian grass *(Sorghastrum nutans)*	*	*	7%	*	*	5%	9%	*	12%
tall dropseed *(Sporobolus asper)*	*	0	*	12%	*	0	0	0	0
heath aster *(Aster ericoides)*	5%	*	8%	5%	6%	*	*	0	*
smooth bromegrass *(Bromus inermis)*	0	*	0	0	0	*	13%	0	0

* less than 5% cover

For each site grazing plots and exclosed plots were compared by analysis of variance. Since the ratio of variance to mean was not constant across plots and residuals were normally distributed, square root transformation of data was not necessary for the analysis of variance, as is often recommended for cover counts (Steel and Torrie 1980).

Richness, the number of species, was determined. Both mean plot richness at each site and total site richness was calculated. Total site richness for each plot was also split into desired and undesirable species.

Results and Discussion

Big bluestem was present at every site and was the species with the highest percent cover everywhere except at site 7, where it was second to little bluestem (see Table 2). Smooth brome was common only at site 7 where it was equal in cover to big bluestem. Little bluestem had the second highest cover at three other sites. Other commonly occurring species were western ragweed which was the second most common species at site 2, Indian grass which was the second most common species at sites 9 and 6, and tall dropseed which was the second most common species at site 4. The most common species, by percent cover, present at each of the nine sites is shown in Table 2.

If all grasses are considered, the restored prairie sites consistently have a higher proportion of their total cover of perennial plants as grass and less as forbs than do the unplowed sites (Table 3). While legumes showed no trend, composites and other forbs had a higher percent cover on the unplowed prairie than the restored prairie. Undesired composites were more common on the unplowed prairie than on the restored prairie except for site 6. Undesired species had a higher percent cover on most never-plowed prairie sites than on most restored prairie sites. The percent area covered by some of the vegetative categories is given in Table 3.

Species richness was higher on never-plowed prairie sites than on restored prairie sites. This holds true if sites are compared on the basis of number of samples, if mean richness is considered at sites with multiple plots (sites 1, 2, 3, and 6), and if total site richness is considered at transect sites (Table 4). Desirable species richness was higher on never-plowed sites than on restored prairie sites. Undesired species show no real trend in the transect site where fewer samples were taken. In the grazing plot sites the restored prairie did have more undesired species. The percentage of the richness which was undesireable species shows no trends. It is of note that at site 6, on the restored prairie, undesired species had more than

Table 3
Total percent cover (%) in selected vegetative categories at each site

	all desirable perennial	desirable warm-s perennial grass	undesirable cool-s grass	desirable legume	desirable composite	other desirable forbs	undesirable composite	undesirable species
never-plowed prairie sites								
1	94	85	0.3	0.7	4.9	3.4	4.4	6.9
2	58	46	3.9	0.1	8.1	4.0	49	61
3	107	91	1.0	0.1	8.1	4.0	15	19
4	48	36	2.0	1.6	8.5	0.8	7.8	21
5	110	96	0.3	3.5	8.3	1.6	6.0	7.4
restored prairie sites								
6	80	77	3.2	0.3	2.2	0.7	4.9	11
7	65	54	13	0	11	0.3	0.8	16
8	95	95	0	0	0	0.8	0	2.3
9	78	73	0	4.0	0.3	0	0	5.4

Table 4
Species richness at each site

	n	mean plot richness	total site richness	site richness undesirable	site richness desirable	percent richness undesirable
never-plowed prairie sites						
1	24	18	34	16	18	47%
2	24	22	37	20	17	54%
3	68	17	40	15	25	37%
4	10	NA	21	4	17	19%
5	10	NA	21	5	16	24%
restored prairie sites						
6	48	9	37	25	12	67%
7	10	NA	14	5	9	36%
8	10	NA	10	2	8	20%
9	10	NA	15	5	10	33%

n=number of 0.56 square meter samples

Ken Warren, right

Welcome to Ken Warren

Matthew Logan

Ken Warren, a long-time Friend of The Land, recently joined The Land Institute as Managing Director. This position, newly created by the Board, brings us experienced management as well as assistance in our expanded development effort. It also frees Wes Jackson to devote more time to writing and speaking. Ken reports his first priority is to ensure The Land Institute's financial and personnel stability, in order to continue to meet the goals of our program.

Ken brings a combination of scientific training and professional management experience to Salina. He has completed graduate studies in biology and geology, and holds Masters Degrees from both Kansas State and Yale. His business experience is in the financial services industry, with over twenty-five years in banking and brokerage. Ken's good humor and business acumen have already made an impression on the Land Institute staff. He and his wife Nina, and children Mary, 15, and Jay, 12, currently reside in Overland Park, Kansas.

Matthew Logan is Land Institute Director of Development.

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twice as much cover as desired species. At site 8, which was also on the restored prairie, desired species had eight times more cover than undesired species.

At each site that contained pairs of side-by-side plots (sites 1, 2, 3, and 6), no significant difference was found between exclosed plots and grazing plots at the 0.05 level. All the vegetative categories cited in Table 3, as well as mean plot richness, were analyzed.

The three side-by-side plot sites on the never-plowed prairie (sites 1, 2, and 3) have contrasts and similarities. Site 2 has a much higher cover of undesired composites, cool season grasses, and all undesired species than the others. In fact, the cover of desireable perennials is lower than the cover of all undesireable species.

Site 3 has much higher cover of desireable species and desireable warm-season grasses than the others, but a similar percent cover of desireable forbs as site 2.

Site 1 is midway between the other two sites in cover of desired species and warm-season grasses. It has a lower percent cover of desireable forbs than site 3 or site 2, except for slightly more cover of legumes. Even though its cover of undesireable species is lower than the other two sites, its richness of undesired species is about the same as site 3. The undesired species are there but not at a high percent cover.

The side-by-side plot site on the restored prairie, site 6, is predominately covered by warm-season grasses, mostly big bluestem. Desireable legumes, composites, and other forbs are all present. The cover of cool-season grass at this site was higher than any other site except site 2. The total site richness is comparable to the other plots on the never-plowed prairie, but the proportion of species that are undesireable is higher.

Species composition and vegetative class composition of the various sites will be used as baseline data for evaluating change over time. The nine sites surveyed provide a great variety in initial plant species composition from which to judge future change.

The lack of statistical difference between the grazing and exclosed plots at each of the side-by-side comparison sites (sites 1, 2, 3, and 6) will make it possible to continue to directly compare the two treatments at each site in future years. These sites will be important to watch since they allow an evaluation of change over time due to grazing.

All four of these sites have at least some occurrence of cool season grasses and undesireable composites; species that we do not want to increase. At sites with a high cover of undesireables, a decrease would be expected over many years as the prairie recovers from the past overgrazing. The percent cover of warm-season grasses is important for forage production and the cover of desireable forbs is important as an indicator of prairie health. The relative progress of these desireable species in taking over from undesireable species in grazed versus not-grazed plots will be an indication of the effect of our grazing program on prairie succession.

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Thank You and Welcome

Ken Warren

This past Prairie Festival marked the end of the current tenure of Land Institute board members Alice Waters and Mari Detrixhe.

Alice Waters has not only been a valued board member, but has reshaped our thinking about food. She showed us that food, locally grown in a responsible manner, is not only sensible and healthy, but downright tasty as well. The Prairie Festival this year owes a deep gratitude for Alice's donation of both foodstuffs and cooking staff which went to make the event even more special.

It is difficult to express to Mari Detrixhe what she means to the Land Institute. Put simply, she is a role model for us all. As an intern, staff person and board member, she has been a steadfast friend. Her critical thinking and cheerful nature have been valued by those with whom she has worked.

We hope Mari and Alice are simply taking a respite and will serve again, as both have indicated that we do have the right to call on them for help at any time. Thank you both for your tireless work on behalf of the Land Institute.

It is also with pleasure that we welcome two new board members. John McBride and Pete Ferrell were recently elected to three-year terms.

John McBride, a resident of Old Snowmass, Colorado, has been a civic leader in the Roaring Fork Valley for over twenty-five years. He was the driving force behind the Aspen Airport Business Center and has served on the boards of many philanthropies, including the Population Institute and the Wildlife Preservation Trust. He and his wife Lori live on a ranch and have three children working in the Aspen area.

Pete Ferrell is well known to friends of The Land Institute through his thoughtful presentations at Prairie Festival. His ranch in the Flint Hills of Kansas near Beaumont is a fine example of careful stewardship and the rotational grazing method. Pete serves on many boards in the state. He and his wife Debbie have two children, Jacob, 10 and Lauren, 7.

We feel fortunate to be able to add individuals with John and Pete's abilities to our board. Welcome.

Ken Warren is Land Institute Managing Director.

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