WHERE DO WE GO FROM HERE?

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Abstract—The structure and diversity of the upland oak ecosystem has changed significantly, primarily caused by fire suppression and historic forestry practices, leaving the ecosystem vulnerable to outbreaks of pathogens and insects. These conditions, coupled with periods of drought, have caused significant oak mortality throughout the Interior Highland region shifting the communities to different forest types. There is great concern among conservationists that a shift in forest type will cause declines in wildlife populations and rare species dependent upon these ecosystems. Upon witnessing this continued degradation of upland oak forests and woodlands, a momentum of purpose and resolve became established among a diverse group of conservation partners that lead to the idea of gathering various resource disciplines to this "state of our understanding" conference. Once assembled and with the quality of papers presented, it was easy to see that it would be beneficial to capture more of the expertise attending the event. Many of the research findings presented by the scientists can now be used by those in positions of management authority to make better decisions about the resources entrusted to their professional care. In keeping with the overall strategy of the symposium, the conference committee attempted to take advantage of the expertise gathered at the conference by polling the audience for ideas of "where we go from here." In concluding the symposium, the last session's focus was to provide closing comments by a panel of experts in each of four broad categories that encompass the various issues surrounding oak sustainability; restoration, research, policy and management. Audience responses to posed questions were then collected and tabulated. It was agreed by many present that information exists to restore the ecosystem, but political and economic barriers must be overcome for landscape level restoration to occur.

INTRODUCTION – MARTIN L. BLANEY

In the process of putting this symposium together with a diverse group of conservation partners, a momentum of purpose and resolve developed that seems to be unprecedented in our region. Upon witnessing our upland oak forests and woodlands slowly degrade in health and vigor through the last decades of our collective careers and then to watch their accelerated decline in the last three years has brought us to the same question. Can we continue in our own spheres of responsibilities and allow such a shift in forest communities to occur without our concerted efforts to find and affect solutions? With defiant conviction, the response was a collective "not on our watch." A strategy formed around the oak sustainability issue that had its beginnings in the Forestry Subcommittee of the Arkansas Wildlife Federation with the formation of a coalition of partners. At the same time, acting as a catalyst, an issue of the Arkansas Wildlife magazine focusing on oak decline was printed and widely circulated. The many and widely favorable responses received from the widespread distribution of this publication, further heightened the resolve of the coalition to the possibility of changing public opinion regarding the need for human intervention into the oak communities. With the onset of the red oak borer outbreak, questions from the public regarding hardwood forest management began to accelerate and the obvious gaps and conflicts in our professional understandings was apparent. These events lead to the eventual need of assembling the various resource professions to gain a cohesive awareness and understanding of oak ecology to both provide answers to the public and affect management solutions through better techniques. It was clear that we, as resource professionals, were quite divided in our understandings of how these systems worked and what were and were not appropriate recommendations when lending technical assistance to the inquiring public. Once assembled at the conference and with the quality of presentations and subject matter, it was easy to see that we also needed to capture more of the expertise attending this event.

We chose to conclude the symposium with a panel discussion focusing our attention upon what needs to happen for oak sustainability to occur. For the purposes of addressing this we divided the issues surrounding oak ecosystem restoration into four broad categories affecting oak restoration and provide a presentation on each by a qualified panelist. These categories are (1) an understanding of the history, ecology and restoration requirements, (2) what research needs and challenges await us, (3) the important public attitudes that will influence us and the policies that present hurdles, and (4) the importance of trying and finding appropriate management tools and affecting solutions on landscape scales. The session then concluded by polling the audience with two questions regarding barriers they perceive stand in the way of restoring our upland oak communities. The responses are summarized at the end of the paper. Following are the panel presentations as witnessed by the conference participants.

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RESTORATION – SCOTT SIMON

Historically, the interior highlands landscape consisted of a mosaic of prairies, savannas, woodlands, and forests. Based on Government Land Office survey (GLO) records interpreted by Tom Foti, only 33 percent of the Ozarks was described as closed forest (much of this in the steep slopes of Arkansas' Boston Mountains and Current River Hills in southeast Missouri), with the remaining 67 percent of the landscape described as open forest, savanna, and prairie. Densities calculated from the GLO records indicate average densities per subsection ranging from 38 trees per acre in the Central Plateau subsection to 76 trees per acre in the Upper Boston Mountains subsection per acre. Average density in the Upper and Lower Boston Mountain subsections combined is 54 trees per acre. Underneath these forest, woodland, and savanna communities was a diverse herbaceous understory that supported wildlife of elk, bear, bison, turkey, deer and over 150 species of plants and animals found no where else in the world.

The Ozarks was a landscape extensively maintained by fires and adapted to disturbance. Ignition sources from Native Americans and lightning strikes created fire frequencies that Richard Gyette and others estimated ranged from 1 to 6 years in prairie communities, 2 to 7 years in open woodlands and 5 to 50 years in the closed forest communities on steep slopes. These regular understory fires maintained a relatively open tree structure and a diverse herbaceous layer. What we've learned is that to this ecosystem, fire is as essential as rainfall.

Eventually with some of the changes in European settlement and extensive cutting that followed, the fires stopped and the forests, woodlands, savannas, prairie, and forests grew up (densified) before our generations' eyes. The new Ozark landscape was now much denser. Nearly all of the forested areas could be classified as closed forest. Historically there were 52 trees per acre in the Boston Mountains there are now 148 trees per acre based on Jim Guldin's data from the Ozark Ouachita Highlands Assessment. A threefold increase over what the historic landscape contained. An even greater increase has occurred in the sapling and shrub layer with 300 to 1,000 stems per acre currently—a staggering increase.

As David Van Lear, Michael Steele, James Fralish, and others described, this densification has had some effects. Very little light reaches the forest floor in the summer in the Ozarks. Because of the shade, oak regeneration is negligible, herbaceous layer diversity abundance is low (typically 20 to 40 plant species per acre compared to 150 to 200 species per acre in open, restored stands) and a new forest of shade intolerant woody species with maples, ashes and ostrya is the dominant understory. We really don't know what the future overstory would be. Moving us from an overstory of oaks to some other forest type, Tom Foti asked me to mention, isn't going to be a moist or a mesophytic forest that typically occurred on the moist lower north-facing slopes. It's going to be a subset of that historical forest type, it's going to be junk.

Because there are so many trees per acre that are competing for the same amount of nutrients and water, the ecosystem is under stress. Just like when humans are stressed, we're vulnerable to any individual pathogen and we get sick. Our oak ecosystem is susceptible to an epidemic of native insects like the red oak borer that as Rose-Marie Muzika described, had never been reported at epidemic levels in the history she was able to derive from tree ring data. Although there are many contributing factors to oak decline, it seems the root cause is too many trees per acre. There is nothing in the post-glacial record that suggests that the Ozark ecosystems have been previously impacted by changes of this magnitude or rapidity. These changes and their impacts to soils, water and other habitat conditions, may be occurring at a rate that is too fast for many of the species to adapt. Animal species are dependent on the plants. If plant communities change, we can assume that there are going to be changes in the animal population and wildlife populations. Of particular concern to us at The Nature Conservancy are those species adapted to the Ozark and Ouachita ecosystems found nowhere else in the World.

Over the millennia, this system has been maintained and stewarded by humans for about 12,000 years. In recent years with all good intentions, we have probably failed it and ultimately ourselves, our children, and grandchildren. We have the information to restore the structure, diversity, and sustainability of the oak ecosystem through the use of prescribed fire and silvicultural treatments utilized on numerous successful, small restoration projects conducted by many agencies and organizations. We need to utilize what we learned from these pilot projects and expand to selected larger areas on the landscape. It is up to our generation to restore the sustainability of the system. We don't want to restore the system to keep it in a box, with some preconceived idea of what it should look like. We need to restore its historical structure and diversity so that as the climate changes and the world changes, this system can change and adapt in a resilient way with the full complement of species for future generations to benefit from and enjoy. Future generations will have as many options in addressing their future as we have.

RESEARCH – JAMES M. GULDIN

Before reviewing the scientific high points that emerged from presentations during this symposium, a few comments are in order regarding the role of the scientist in matters of forest policy.

First, scientists are not decision makers. The work of the scientist is to develop the conceptual and quantitative understanding of natural resource issues—essentially, to add tools to the toolbox of the decision-maker. The many research findings presented by the scientists who spoke at this symposium can now be used by those in positions of management authority to make better decisions about the resources entrusted to their professional care.

Second, definitive research on natural resource issues does not and will never exist. This enhances, rather than diminishes, the responsibilities of the scientist and the decision maker. For example, some would argue that decisions should be deferred if the science about the issue is incomplete. But the ultimate costs of deferring decisions may frequently be greater than the costs of executing them,

especially in the long term. A case in point has been repeatedly discussed during this symposium—the decline in the health of Interior Highlands forest stands attributable to stand age in a forest landscape that has been under-managed for decades, especially on Federal lands.

Scientists will continue to study questions of forest health, sustainability, productivity, and diversity in the Interior Highlands from our comfortable ivory towers. Some of the products produced by this process may be informative, some will be useful, and a few will enable major scientific and conceptual understandings of the ecology and management of oak ecosystems. This process is maddeningly inefficient and seems conspiratorially independent of details such as decision deadlines and timely public discourse. As a result, the decisions that are made by those responsible for making them will continue to fall short of definitive scientific support. But a decision made without definitive science is not necessarily bad. There are a host of legal, political, economic, biological, and social considerations that bear upon a decision, many of which might be contrary to accepted scientific findings—and which nevertheless might result in an excellent decision in the public policy context or for a private landowner.

With respect to the scientific findings presented at this symposium, suffice it to say that the decision maker's toolbox has become heavier. A number of points deserve recapitulation for both the scientists and the decision-makers in attendance. These points were jotted down as speakers made their presentations, and in some instances the speaker's name appears in parenthesis after the salient point. The reader might refer to the appropriate paper in this proceedings for further detail.

The importance of fire in oak ecosystems is becoming increasingly appreciated, and speakers at this symposium suggested that its use could be expanded considerably. It was suggested that fire could be of great benefit in maintaining species and habitats (Ladd). Research opportunities to refine the influence of fire include the effects of fire on soil dynamics, the importance of growing season burns, and the manner by which fire influences landscape pattern (Foti, Heitzman, Benac). In addition, the role of fire in wood quality and utilization requires additional research (Patterson). Finally, the influence of fire, or lack thereof, was discussed in reference to stand recovery after exploitation; this was especially prominent in southeastern Missouri, where the acreage of land on which shortleaf pine was dominant has declined from 6 million acres at the turn of the century to less than 600,000 today (Benac). Certainly one part of the question regarding the fire-mediated restoration of the upland oak ecosystem is the degree to which shortleaf pine should be favored, either in mixture with hardwoods or as a dominant forest type on appropriate sites.

Conversely, several speakers observed that the limitations to broader application of fire in the oak ecosystem are real. Those constraints to burning more frequently over larger areas include the increasing human population in the region, both in absolute terms and in distribution through the wildland-urban interface, and the associated increased fragmentation of forests (Guyette, Fralish). These considerations suggest that less fire, not more, is likely in the future. This also speaks to the continued importance of research on fire surrogate treatments that emulate the ecological effects of fire in oak ecosystems.

A third topic of considerable interest to the research community at this symposium is wildlife, specifically deer. Several speakers pointed to the fact that numbers were fewer 200 years ago than today (Van Lear, Dickson), and there are implications regarding the adequacy of oak regeneration related to this point (Miller, Brose, Healy). It's too bad deer don't leave tree scars as fires do, so we can quantify their effects. But just because we can't quantify the effect doesn't mean the increase hasn't been ecologically significant. Among the reasons for the higher deer numbers may be loss of predators (Healy). An interesting question raised by these ideas is whether the detrimental influence of high deer populations exceeds that resulting from the lack of fire as a primary factor limiting oak sustainability. That would be easy to test—exclude deer from one area, increase cyclical burning in another, do both in a third, and see what happens.

There have been many advances in oak silviculture over the past several decades, and more are needed. Speakers identified a number of areas where advances might be in order, including study of stand dynamics in oaks under decline (Kabrick), oak seedling silvics, and regeneration potential under various fire prescriptions (Brose). The potential for the application of uneven-aged silviculture in oak stand, especially on the better sites, remains to be established (Loftis); group selection probably works better than single-tree selection, but more data are needed. However, the potential inherent in the single-tree selection method was convincingly shown by the 50-year, 150,000-acre case study at Pioneer Forest (Trammel).

A number of speakers mentioned the fact that the knowledge base for better management of oaks exists, but that knowledge may not be getting into the hands of users. Better approaches to technology transfer are being sought. Scientists will need to translate results from research studies into practical application for a wider variety of research data. Several good examples of this were presented, such as the ingenious planting guidelines for oaks based on survival probabilities (Spetich) and the development of oak regeneration models (Loftis, Schweitzer).

Finally, several speakers pointed to key challenges for oak management, especially regarding undesirable consequences in the absence of change. Speakers questioned whether management for oak sawtimber is consistent with oak ecosystem sustainability. Two emerging themes that captured this pessimism were that the next century will be a tough time to be an oak tree (Shifley), and that extraordinary efforts to modify the structure of Interior Highlands oak forests to resist gypsy moth appear to be justified (Gottschalk).

In summary, the research perspective points to many interesting directions and avenues of continued research. But one cannot help but be concerned that continuing the present course of affectionate, laissez-faire, hands-off

development of the upland oak forests of the Interior Highlands may essentially be little more than loving them to death.

POLICY – TOM RILEY

My challenge was to talk about the policy issues that we have to deal with related to management of the oak forest. First of all, I want to ask a question of the audience – maybe you can just give me a show of hands – how many of you have as your primary responsibility water quality protection? How many of you have air quality protection as one of your primary responsibilities? I think that is a challenge for all of us because I think everybody should raise your hands in both questions (three people in an audience of 200 raised their hands). We have a natural resource management responsibility and forestry is a part of that. We all have a responsibility to resource, to the implications of what we do relative to that resource and there are a lot of people out there who are looking at what we do, not from the standpoint of "what are you doing to my forest?" but "what are the actions that you are taking on that forest doing to my water quality, what's it doing to the quality of my air?" If you're living in Memphis, you are in an air of quality attainment zone, so anything that you do within that airshed is going to be influenced by what the city of Memphis says it wants to do. Those are the regulations, those are the rules that are going to apply. If you are in Little Rock or if you are in the vicinity of Little Rock, that same circumstance is going to apply. The numbers are getting so large now in terms of air quality that Fort Smith and Fayetteville may also be included. Think about it, in Arkansas, a million people, over 40 percent of the population of this state, resides in about five counties in northwest Arkansas. When you think about the future of that in terms of the population dynamics between the people and the resource, what we do out there on that resource is very much influenced by what it is those people think, what they understand. The question would be "how can you have an educated policy if you don't have an educated public?" If you don't have a public that understands exactly what you are doing, if you don't have a public that trusts you, trusts you and believes that what you are doing is actually right for the resource that's going to be a benefit to them. We've got a lot of opportunity, we have a lot of tools that are available to us. We've got one of the best conservation provisions in the Farm Bill that we've had in my memory, and I've done a lot of historical work associated with the history of farm conservation legislation. We can treat this in a lot of different ways: we can regulate, we've got all kinds of tools, we can do an incentive-based program, we can change our tax structure, we can also be influenced by the courts. If you've paid any attention to the way we have come to do some of the things we've done in the state of Arkansas, you've got a pretty sound logic if you think about a lot of the things that we do being influenced or directed by the courts. I'll guarantee if we don't do this right, if we don't do it with an educated public, that's where we will be. We'll be directed by one federal judge from some court somewhere. So we have to pay close attention to that as one of the policy options that's out there. We can use markets, economies, we can pay attention to landowners, and we have heard something about private landowners, a lot about moving private landowners to do things. What motivates the private landowners? What is the policy issue that they're going to be most concerned about? Most of them, it's a bottom line thing, it's a dollars and cents thing, or it's a social thing. It's something having to do with what I want to do on my property or what I believe my property rights to be. We talk a lot about the concepts of watershed management, of ecosystem management, and we use a lot of our scientific terms in that process and it scares individual private forest landowners and they become so distrusting that they won't listen to the logic. So we have to understand and deal with the language issue, the way we approach, and the way we communicate with individual landowners. We have this mix of resources that are available to us if you think about the Farm Bill and all the opportunities that are there: EQIP, the Environmental Quality Incentives Program, CRP, Wetlands Reserve, all of these include in them forest management opportunity, new forest potential within those different programs. We've got the FLEP (Forest Land Enhancement Program) that's specifically for private landowners. But where is the NRCS relationship that guarantees that fire is one of the management alternatives that's provided to the individual private forest landowner? If it's not in their tech guide, if it's not in their set of tools that they have available to them, working with that private landowner on an individual daily basis, it's not coming to ground, it's not going to be used. If those individual resource people who are out there working day to day with landowners don't know how to use fire, don't trust that concept in management, it's never going to be used in a private setting the way it ought to be used. Those are circumstances that we have an opportunity to overcome, but we can't overcome them in this audience – we have to broaden it. We have to broaden the audience, we have to broaden the understanding, that's how policy change gets made. It won't get made in this room. It gets made in taking this knowledge, this understanding, to another step and another step. There is a poet I think a lot of (Shel Silverstein) who says a lot of things – he wrote a poem that's very short and it kind of fits here:

> You, all of us, have a magic carpet that will whiz you through the air
>
> To Spain, to Maine, to Africa, you just tell it where
>
> So will you let it take you where you have never been before?
>
> Or will you just buy drapes to match and use it on your floor?

MANAGEMENT – DONNY HARRIS

I'm not sure I even understand that... but I'm sure it's all good. A few months ago, Martin Blaney approached me and asked me if I would be willing to serve on this panel and I said, "Man I'd be honored." I said, "Who's on the panel and what's my role gonna be?" and Martin said, "Well we've got Scott Simon, we got Jim Guldin and we got Tom Riley. Those people are extremely intelligent and very articulate. However, since you possess neither of those qualities, I'd like for you to serve on the panel to represent some balance." I said, "if you're tellin' me you need somebody to dumb it down, I'm your man." After all, as Bob McAnally so eloquently put it, "I was sixteen years old before I found out my name wasn't "get wood." And uh, for my Game and Fish brethren in the audience if I get to talkin' too fast, raise your hand and I'll slow it down just a little bit.

As we started this symposium, Paul Johnson enlightened us about oak forests and, how they're actually created by disturbance influences, and that we can actually perceive management activities as planned disturbances. Tom Foti went on to give us a historical perspective of how these oak forests, evolved and what the influence of fire was and what the influence of fire suppression was. Additionally Jim Dickson, Joe Clark and others spoke to, wildlife populations and how they've evolved in these habitat types and their dependence on the benefits derived from those habitat types. I said that to say this, I believe that we have the science. It's pretty obvious if you've set in the sessions and read the abstracts you have to come to that point that you believe we have adequate science, while it's not what we would desire, I believe it to be adequate. But science alone is not enough. Paul Sears in his book entitled *Deserts on the March*, which he actually wrote in 1947 said this and I quote, "Science has the power to illuminate, but not solve the deeper problems of mankind. For always after knowledge comes choice and action, both of which are intensely personal and individual." In keeping with that, in my closing remarks I'd like to extend this challenge. I believe we are at a fork in the road and must make a choice. We can leave here from this symposium and hope that through some factor of osmosis, a miraculous healing will take place in our ailing ecosystems. If that is our choice, future generations will sit in judgment and we'll be indicted and actually found guilty of negligence and outright malfeasance. Unfortunately those future generations will have to suffer the consequences of the choices that we make. On the other hand, if we link arms fortified with good science and bring the collective expertise, energy and resolve to bear on the issue at hand the outcome will not be the same. Those same future generations will sit in judgment, but I believe the conclusion will be much different. They may say in October 2002, in Fayetteville an assemblage of resource professionals decided that the upland oak ecosystems, we have come to love and appreciate, are worth everything we can do to save and perpetuate them, therefore we conclude that these professionals were responsible stewards of the resources that were placed in their care. And in summary I believe the acorn is truly in our court.

SUMMARY OF AUDIENCE COMMENTS – REBECCA MCPEAKE

After panelists responded to questions from the audience, the audience was asked their perceptions about sustaining the upland oak ecosystem. Notecards were distributed and audience members responded to two questions: (1) what are the barriers to sustaining upland oak ecosystems, and (2) what strategies or actions or solutions are needed to restore upland oak ecosystems?

Barriers

Barriers identified by many respondents were (1) a lack of recognition and support by the general public about managing oak ecosystems, particularly the importance of fire and tree harvest, (2) a lack of funding and resources to adequately implement prescribed fire treatments, given the large number of acres, limited timeframe within which controlled burns are optimally implemented, and smoke management regulations, and (3) an economic climate which favors landowners making short-term profits over long-term gains.

Respondents indicated a number of conflicting agendas between forestry professionals and public opinion, particularly those of landowners, radical environmentalists, politicians, urbanites, and the media. Examples of their comments are as follows:

> The Forest Service is perceived as timber beasts, not an interdisciplinary group of conservation professionals. The… national forests should dedicate a large amount of resources to changing public opinion or they will fight us every step of the way.
>
> The power of the decision makers is largely in the hands of non-informed or non-scientists – landowners - judges.
>
> We are allowing environmental advocacy groups to educate our educators. I am continually stricken with Muirist philosophy from third graders.
>
> Public opinion – not landowners' opinion necessarily – that prevents the use of good management and fire.
>
> Diversity of owners and in turn diversity of needs/objectives.
>
> Radical environmentalism… we need to collectively utilize the media to get a clear message to the public about the need to actively manage forest resources.
>
> Media, the corporate media (all owned by very few corporations) is reactionary and very focused on blame – natural resource professionals tend to get a bad rap.

Other respondents noted that not only conflicts exist between different stakeholder groups, but that forestry professionals themselves debate the various practices for oak sustainability:

> Poor research or lack of research or conflicting research has led to opposition among scientists.
>
> Like panelist said, NRCS has programs which do not include fire programs for private landowners. Agencies such as NRCS were not included/represented in this symposium.
>
> Knowledge: I think our information on past history is still a little thin in certain areas. Too much dependence on old records.
>
> Gap in total understanding of the upland oak landscape with regards to all its components and users, e.g., plants, animals, etc.

Many conference participants indicated a lack of public support for various fire management strategies. Some respondents linked this lack of support with policies, rules, and regulations counter to management strategies that enhance oak sustainability.

> [A barrier is a] Smokey Bear fear of fire by Baby Boomers.
>
> Public aversion to fire, smoke management programs, public aversion to fire surrogates (e.g., chemicals). [Another

barrier is] environmentalists' aversion to active management of forests. Doing nothing is not the solution.

Public perception about negative effects of fire.

Another category of responses dealt with a lack of funding and resources to adequately implement prescribed fire treatments, given the large number of acres, limited timeframe within which controlled burns are optimally implemented, and smoke management regulations. Examples of these comments were:

> Not enough resources, $, or manpower to address acres at risk even without considering policy or social barriers.
>
> Not all resource management agencies have adequate manpower, equipment and dollar resources to be as effective as they could be.
>
> Lastly, many noted that landowners are responding to an economic climate which favors making short-term profits over long-term gains, which are not conducive to sustainable oak ecosystems.

The majority of the land is in private ownership. Currently, all private landowners consider is selling timber. As a private consultant, timber sales are basically the only services I can sell because it puts dollars in the owner's pockets.

Human nature focusing on personal gain over decisions which could improve the big picture.

Management of forests that focus strictly on lumber/timber production and the political and social procedures that push only for production.

Strategies/Actions/Solutions

The second question asked audience members what strategies/actions/solutions they recommended for restoring upland oak ecosystems. Responses can be broadly categorized as (1) public education directed towards youth and private landowners, (2) political influence to facilitate the use of fire management, redesign the decision process for public forest management, leverage monetary support for landowner incentive programs, (3) a need for leadership and partnerships to direct and/or influence policy, education, and research, (4) improved technology transfer, and (5) increased awareness of the impact of deer and invasive plant species on the oak ecosystem.

Responses pertaining to public education identified increased educational efforts focusing on school-aged children. Justifications included presenting a counter-balance to some of the messages that are in opposition to management practices promoting oak sustainability. Examples of these comments were:

> Fund early educational programs to re-educate our young people. At best, they presently hear one radical point of view in the media, at school, and from parents who truly think they understand.
>
> Get a mascot for the oak ecosystem like Smokey Bear is for fire. Maybe an oak tree that talks!
>
> Programs for school kids that will let kids see that cutting trees is not bad and may even be needed.

Several audience members recommended that the next step after this symposium was to focus on NIPF (non-industrial private forest) landowner education as a large-scale effort. One proposed that the message should be to "convince landowners that we can deal with these problems through proper management." Other specific recommendations were:

> Disseminate information by special article: stateside papers, agency/NGO (Inc), publications.
>
> Involve private landowners in information gathering and implementation plans. Have similar symposia to this one (small scale, not so intense) for interested landowners (at reduced cost, of course) to educate them in their importance of achieving overall goal(s).

We want to educate the public. Would it have been a step in the right direction to have given a free pass to this symposium to the network press, local legislators, local mayors, local chamber of commerce, executives, etc., representative of governor's office? Every AR Legislator and the Governor and others listed above need to have a copy of the final report.

Respondents indicated that they expected the outcomes from educational efforts would result in support for oak ecosystem management. Specifically, two audience members stated:

> We know what to do in many cases but what we often do not have is public support (which mandates to political support). We need to reach the public and inform them on principles of forest ecology and what our options are.
>
> Build on renewed "pride" of our homeland. Engage the community of the public/private/landowners to take actions. The Ozarks aren't a tree museum - it's a dynamic community that requires action on a landscape scale.

Some linked educational efforts to improved political influence. Targeted policies were those that facilitate the use of fire management, redesign the decision-making process for public forest management, and leverage monetary support for landowner incentive programs. One respondent stated,

> This isn't a problem of science, it is a political problem. It can only be won in the political arena.

Respondents indicated that for policy changes to occur, partnerships are needed that directly address specific regulatory, legal, technical, and financial hurdles. Several recognized the need for legislation that facilitated implementation of prescribed fire, for example legislation that would reduce liability and risk. Examples of comments were:

> ID agencies and groups that can provide technical and financial assistance to private landowners to use recommended practices. Get $ for landowner education programs. Quantity economic value of environmental assets (plant and animal, soil, water, air, etc). Must have a credible link (organization) between the scientific community, conservation community, state and federal agencies and

private landowners. Must develop mechanism that facilitates payment for environmental assets to private landowners.

There is a national initiative to restore ecosystems to a healthy level. There will be competition to direct the funding associated with the initiative to the protection of communities at risk while this is important, it will take funding away from those programs designed to restore the landscape on a broad scale. We must correctly identify to our political leaders the importance of landscape management.

Many comments indicated a need for leadership to form partnerships and make progress in addressing oak ecosystem management. A couple of these statements were:

Some of the brain trust needs to come up with a well-conceived long-term (no flash in the pan) political and educational initiatives to take this body of issues to the public, to congress to NGO's to other agencies more marginal, etc. As Donnie Harris says, "future generations depend on us and will judge us."

It seems to me that there needs to be a board (committee?) of informed, landscape-scale decision makers that is comprised of representatives from each of the public land agencies. This needs to be a group of small number that can actually begin to (1) prioritize manageable areas (2) develop integrated restoration/maintenance methods. This group will interface with private landholders in those target areas; also interface with politicians and media to affect decision - making and public education/outreach (television!).

Use current tools available and move forward in area where we can make immediate changes. For those areas where barriers are too great, work to make changes in policies, [and] partnerships, partnerships, partnerships. I think we can under current policies get a good start on restoring oak ecosystems. Policy changes would certainly help us be more efficient in making changes. If past related matter is a barrier, if there is a policy change would we have the resources available to take advantage of those changes?

Develop the Oak alliance association to develop strategic plan to sustain Oak Ecosystems. This alliance would provide leadership - be the catalyst - form partnerships, statewide, regionally, nationally - move us forward NOW without delay. It would be representative of the natural resources agencies, landowners, conservation groups, industry etc. that own, manage and are stewards.

Many recognized the importance of "technology transfer" as a solution to restoring upland oak ecosystems. Some audience members focused specifically on prescribed fire for restoring and improving forest health in upland oak ecosystems. Other audience members emphasized the need to conduct research and educate private landowners about "ALL available tools, thin, fire, herbicide, etc." Specific recommendations were establishing demonstration and interpretive areas that applied a variety of management treatments.

Begin establishing testing sites to showcase various burn, burn trials to show landowners what it looks like, how to do it, and focus on fire surrogates which will be more popular.

Design a landowner kiosk that pinpoints the problems existing in the non-oak understory and tells how to identify when an establishment problem may be serious.

Designate a land (e.g., a watershed 10,000+ acres) and designate a management team to implement the best ideas (the current best science-based adaptive management) to create a healthy landscape (diverse, sustainable) and a productive one (in terms of timber, wildlife, and other commodities) Demonstrate what can be (free from administrative barriers). Natural Forest Planning is a good way to get public ideas but management on Natural Forests is too constrained by the appeals process. Do such a demonstration on state lands or on a private - public partnership. Get the best minds in the state together and implement, demonstrate, and educate.

Establish what regeneration techniques work within particular areas and prepare to implement them. This will require some specific, short-term research coordination… Enlist the public in our efforts. Show them the value of these methods on private and industry property.

One audience member challenged participants individually to put into practice the information presented at the symposium. The audience member stated,

Become an advocate for sustainability. Take some of that retirement money and buy forestland yourself. Invest in what you are trying to do.

A few indicated the need for continued research about fire surrogates, restoration of tree composition, and restoration of forest structure in the sustainability of an oak ecosystem. Even though specific information about management practices may be incomplete, audience members recommended that demonstrations and public education efforts should continue. As one respondent explained,

Research [will] focus on the problem which will be a function of $ available, hence must get political support, forest industries, NGO's etc public awareness.

Another commented,

Assuming that control of species composition in oak stands is an action that is needed to achieve desired conditions, we should begin to allocate/identify lands where fire can be used and where a fire surrogate like cutting or herbicides would be more appropriate. This is the first step in a strategy, and it can be started now by all agencies, organizations, and landowners while other details are being worked out by researchers and land managers. The public should be made aware that the resource professionals here are in agreement with this strategy.

Lastly, a couple respondents noted other influences should not be ignored when addressing strategies for restoring

upland oak ecosystems, particularly the control of expanding deer herds and invasive plant species.

In summary, it was agreed by many present that information exists to restore the ecosystem, but political and economic barriers must be overcome for landscape-level restoration to occur. Audience members were fairly consistent in their recognition of needs for education, policy, and research in addressing barriers and developing strategies for restoring upland oak ecosystems. This included developing a large-scale public education effort coupled with targeted landowner education efforts through demonstrations and workshops. Audience members recommended forming multi-stakeholder partnerships to affect policy that is more amenable to forest management practices and landowner incentive programs, and the need for leadership to develop strategies for addressing education, policy, and research.