Placing Wildlife At Risk By Ignoring Ecological Principles

By Dr. Michael Zagata

Wildlife of all sorts depends upon plants and other animals for their survival. That may not be a profound statement, but beneath the surface it is not well understood, and that lack of under-standing has, over several decades, put many species, both hunted and non-hunted, at risk.

Golden Winged Warblers
Photo by Isador Jeklin/CLO

The *"State of the Birds"* report issued in 2009 by the North American Bird Conservation Initiative, U.S. Committee and the U.S. Department of Interior indicates that many Eastern forest birds dependent on disturbed or early-successional forest or natural disturbance (including pine barrens) are suffering consistent and troubling declines. These include golden-winged warbler, whip-poor-will, prairie warbler, Eastern towhee, and field sparrow, and popular game species such as Northern bobwhite and American woodcock.

The Link Between Species and Habitat

The place that provides wildlife with the food, cover, breeding opportunity and shelter that it needs for survival is called habitat. Grouse hunters refer to it as a "covert" and bird watchers have their favorite birding spots. Two ecological principles hold true for both:

- Not all wildlife depends upon the same habitat for their survival. For example, a birder wanting to observe a meadowlark or bobolink doesn't go to a mature forest to find them. Neither does a grouse hunter go to a cornfield to find grouse. Thus, we have some new and exciting information to apply when we undertake the management of land for wildlife: if we want to be successful, we need to know what species we are managing for and what specific kind of habitat it needs, not just to survive, but to prosper. We also know that we often find more than one species of wildlife live in what appears to be the same or similar habitat. For example, we generally find the wood thrush and scarlet tanager associated with pole-stage or middle-age forests. Aldo Leopold, author of "A Sand County Almanac" and generally recognized as the "father of wildlife management", put it quite well when he said "As the community goes so goes the species" and the line from the 1989 movie "A Field of Dreams" put it another way: "Build it and they will come." Both versions embody the ecological principle that when a place has the space and other plants and animals that a specie or group of species needs for their survival they will, if

that place is within the geographical range they occupy, be present.

- That habitat is dynamic, i.e. it does not remain the same, or of the same "value" to the species that depend upon it, over time. That is a very important concept to further explore so that we will fully comprehend its significance to the species involved. Bird watchers know this and grouse and woodcock hunters know it, but they may not be consciously aware that they know it. For example, when I was a boy there was a small pond where I often went to observe waterfowl on the open water. Over time, the cattails began to grow and encroach on the open water. That encroachment continued until the pond became a good place to watch red-winged blackbirds clinging to the cattails, but with the open water fully engulfed by the cattails waterfowl no longer used it. The pond had slowly changed, due to an aggressive plant, toward becoming more land than water. The same is true of a grouse cover that I hunted as a boy. At the time I found grouse there in abundance, the plant life consisted of crab apples, viburnums, beaked hazel, young hemlock and a thick ground-cover of plants adjacent to a once-logged forest now moving toward "foresthood" once again. Today, that same area is occupied by pole-staged maples and adult hemlocks – both of which prevent light from reaching the forest floor during the growing season. Without sunlight, the green plants that produce the food and cover grouse and other wildlife rely upon are unable to flourish. As a result, the previously abundant food sources are gone along with the thick understory or cover that afforded protection from predators – and so are the grouse.

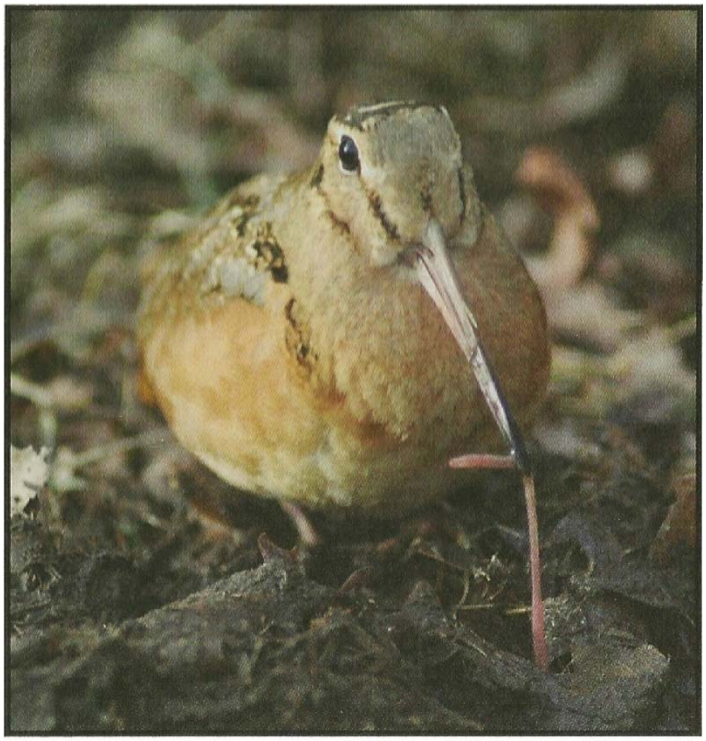
Boblink, Female
Photo by Christopher Taylor, www.kiwifoto.com

Habitat Waits for No One, i.e. the dynamics of plant succession

It's time now to talk about what drives the change that occurs with habitats over time. Ecologists have a term for that change. They call it plant succession – in other words one plant community is succeeded by another. That sounds good when you say it fast, but what does it mean, what are its consequences and what drives the process? The last question is, believe it or not, the easiest to answer. Sunlight, which is needed by green plants in order for them to make food (photosynthesis), or the lack of it, drives the process of plant succession and thus the changes that occur to habitats over time.

Let's start with a relatively simple scenario. You have just built your dream home adjacent to some wonderful birding areas. Part of that process involves some landscaping, including a new lawn. The site for the lawn is cleared and possibly fertilized. Now you have a choice – to wait for Mother Nature to "seed" your lawn with whatever blows in or to plant grass seed. If you plant grass, it will, as you well know, require considerable maintenance (mowing, fertilizers, weed and insect killers, etc.) to keep it healthy and "weed" free. If you choose for Mother Nature to provide the seed, she will indeed do that. In either case, plant succession will have started as the bare ground will become covered with green plants that can capture sunlight and use it to produce "food" for wildlife. Mother Nature's seeds will be quite hardy plants, called pioneer species, that can survive under harsh conditions, like the lack of moisture, normally lethal to lawn grasses. We often refer to these plants as "weeds" indicating they are unwanted by us – at least in our lawn. By the following summer, there will be quite a mix of what you want (grass) and don't want (weeds) and you likely will mow the new yard. Mowing does two things – it favors the grass that is invigorated by mowing and thwarts the annual weeds that didn't yet get to produce seeds. If you keep maintaining, in other words "managing" you lawn, it will stay as you want it. However, keeping it that way requires energy in the form of regular maintenance, i.e. your sweat and petroleum-based products like gasoline for the mower and weed eater, fertilizer, insecticides

and herbicides. Why is that the case – because of plant succession. It's easier to answer that questions if we ask ourselves what happens if we don't manage or maintain the lawn. Let's take a hypothetical case where, for whatever reason, you abandon that home in upstate New York or Michigan for five years and the lawn isn't mowed. You return one summer day and are greeted by a lawn overwhelmed with tall weeds, some blackberry stems and very little grass. What happened? Quite simply, the grass which is relatively short and shade intolerant (won't grow in the shade of taller plants) was replaced by taller plant species that shaded it out. If left alone for a long enough period, your lawn will become a beech-maple-yellow birch-hemlock forest. This happens because the grass, then annual weeds, then perennial weeds, then plants with woody stems, like blackberry, that allow them to grow tall, then with plants often referred to as brush (honeysuckle, beaked hazel, dogwood, crab-apple, etc.) then early forest trees like aspen, white birch and ironwood which get even taller, then intermediate forest trees like cherry and finally the lasting stage consisting of beech, birch, maple and hemlock whose branches and leaves produce, during summer growing season, a dense canopy of leaves that blocks all sunlight from reaching the forest floor. Again, it is important to fully understand that it is sunlight, or the absence of sunlight, that drives



American Woodcock
Photo by T.C. Flanigan
www.natureexposure.com

Prairie Warbler

this process of continuing habitat change. Even though the young forest trees like aspen are taller than the plants beneath them they cannot persist longer than the life span of the adult tree. This is the case because the aspen seedling cannot survive in the shade of the adult aspen. It is also important to understand that given birding spot or grouse covert doesn't happen at once, isn't always "just right" and doesn't immediately, at the turn of a switch (unless impacted by fire, wind or a timber harvest) disappear. A birding area or grouse covert develops over time as the plant community evolves as we have described. A good covert will persist at its peak for about ten years and then slowly begin to decline in quality. As the habitat deteriorates or becomes marginal the impact of predators may increase. However, that doesn't mean that total mortality will increase because other causes of mortality may decline at the same time.

One very important side note is that plant succession doesn't always require going back to bare ground to start the process over again. For example, if a mature aspen stand is harvested (clear-cut), that cut will allow sunlight once again to reach the forest floor and the aspen, which is uniquely adapted for this scenario, will immediately sprout suckers from its roots that may grow several feet in one growing season and thus begin to shade out other young plants responding to that same light.

Plant Succession:
It Isn't A Set Progression

Another important point to consider is that plant succession doesn't always move at the same pace. One site or location, blessed with fertile soil and adequate moisture, may rapidly progress

Wood Thrush

through the stages that eventually lead it to become a mature forest. Another site may, because one or more factors that limit plant growth are not present in the right amount, stay at an early forest stage like white birch for an unusually long time. This often happens when a "poor" site is burned or scarified (has the surface disturbed) and then invaded by white birches. Because the white birch is an "invader" or pioneer species it is able to survive under conditions where other trees cannot. Thus, it persists on the landscape, or a rock cut along a highway, until conditions on that site change over time to a point where the seeds of other, taller, tree species can germinate and grow. When that happens, the white birches will be replaced as shade from the taller species inhibits their ability to produce food via photosynthesis. Sunlight, water and fertile soils, or their absence, aren't the only factors that can alter the pace of succession. When a pasture is allowed to go fallow, or un-mowed or untilled, within a relatively short time that site may be invaded by goldenrod. If you live in the northern third of the country, you've seen its golden flowers atop a woody, greenish brown stem as you drive most anywhere during August. Indeed, across the fields in the Northeast, tens of thousands of acres are awash with it as more farms continue to be abandoned – and they may stay that way for 20 years or more.

How can that be? The goldenrod plants aren't that tall and they are crushed back to ground-level each year by the frost and weight of the snow. Goldenrod plants aren't designed to play fair. Their roots release a chemical that inhibits the growth of other, nearby plants. Over time, seeds of taller plants will find suitable sites on which do germinate and gain a foothold and thus shade will once again drive the on-going process of plant succession. Until then, those acres are occupied by a species indicative of a habitat-type that provides little in the way of benefits for any bird species facing a decline in their habitat(s).

Another relatively recent phenomenon is the lack of a transition or brushy phase of plant succession that once occupied the area where a pasture or mowed field butted up against the beginnings of a forest. Those areas, referred to as "edge", are rich in their mix of plant species and thus in wildlife. They are, however, on the wane as fields now abut directly with forests. This phenomenon is easily observed as one drives along most any of the Eastern interstate highways and pays close attention to what he or she is seeing. That same trip during the winter months when the leaves are off the deciduous trees will also provide a unique opportunity to observe the lack of an understory of shorter vegetation that would, if present, provide food and cover for wildlife beneath those trees. That condition is not limited to small patches of timber, but rather tends to persist for miles along those roadways. Yes, some of those mature trees are oaks and produce acorns or "mast", but not on a consistent, regular basis. What do deer, turkeys and grouse eat during the winters when the fall mast crop was poor?

The last stage of plant succession, often referred to as the climax stage because of its duration, will, if undisturbed by man or nature, persist for hundreds of years – well beyond the life of an adult tree. This happens because the seedlings from those tree species can germinate and prosper in the shade of the "parent" or adult trees overhead. Thus, this stage of plant succession is able to perpetuate itself. Later, we'll look at the ramifications of that fact on the wildlife that depend on it, as well as the other, earlier successional stages or habitats, for their survival.

Man's Impact on Nature's Process of Plant Succession

Now that we share a common background in the basic ecological principles that impact upon wildlife and its habitat, let's look at what's happened over time with regard to the ever-changing landscape where those habitats occur. In order to do this, we'll select just one hardwood producing state from the Mississippi River eastward because it will typify what

Fire or Timber Harvest = Reinvented Young Forest

has happened in each of those states. New York is somewhat typical in that it was heavily logged and farmed up until the 1950's. As a result, we have a historic, as opposed to a pre-historic or "Mother-Nature controlled" record. In the late 1940's, about 100,000 family owned dairy farms went out of business and, as a result, around 10,000,000 acres of farmed lands went fallow. Therefore, there were about 10,000,000 acres in the early successional (much in bare ground or grasses) stage of the plant succession process. Coupled with that phenomenon are the tens of thousands of acres of forested lands that had, at about the same time and often for the third time, been harvested and thus were occupied by plants typical of an early stage of plant succession. This scenario repeated itself from Indiana eastward to the New England states. Up until the mid-1980's clear-cutting was the main harvesting technique used on forest-company lands occupying the 10,000,000 acres comprising the un-organized townships of northern Maine. However, passage of the Maine Forest Practices Act in 1989 has severely curtailed clear-cutting as a management tool and thus the early successional habitats that gave rise to an increase in mourning warblers and moose in northern Maine may fall victim to well-intentioned but ecologically naïve policy makers. Many of those clear-cut acres are only now about 25 years along in their successional process, but will soon give way to the spruce-fir forest type of northern Maine and the mourning warblers will be evicted from their short lease on that site.

As those very early successional habitats, created by the scenarios described above, began to age and be occupied by taller, more shade tolerant species of "brush", alders and aspen, state wildlife agencies found themselves blessed with an abundance of game that responded positively to those ecological changes. Game and non-game populations alike blossomed and both birders and hunters took to the fields and woods in great numbers. Things were good. It was not uncommon to a New York or Pennsylvania deer hunter to see 40 deer a day or flush 25 grouse. That was in the 1960's. Let's fast forward to today. Things have dramatically changed. Hunters are complaining about that lack of game and impact of predators; and birders are focused on forest fragmentation and changing agricultural practices. However, although both groups are nibbling at the edge of the cause, the central issue driving the declines is forest aging and it's much more difficult to get people excited about because it's insidious (not immediately observable) and because the public has been misled to believe that we are, as a nation, running out of trees.

Changing Popular Perceptions: The Struggle to Introduce Ecological Principles into Forest Stewardship

How does all of this information relate to the title of this article: PLACING WILDLIFE AT RISK BY IGNORING ECOLOGICAL PRINCIPLES? It's

Ruffed Grouse Chicks - Photo by Paul Carson

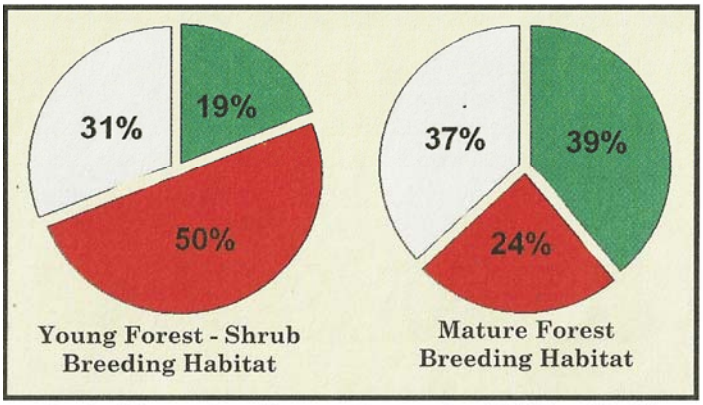
difficult to tell exactly when the "public", or self-proclaimed "public interest" groups, decided that the trained wildlife and forestry professionals needed to be supplanted by public sentiment and perception. After all, those professionals often worked for the "public" and thus need to be accountable. That is, of course, true. However, for the reason outlined below, those professionals have been replaced by the courts and thus good science and accountability have been replaced by attorneys who argue a case not on its ecological merits, but on a point of law or process. We have moved to a process that focuses on determining the impact of an action and then reducing or mitigating that impact (a good thing) but have placed far too little emphasis on identifying the impact of not taking the proposed action, i.e. a cut on a National Forest intended to create early successional habitat for neo-tropical songbirds that may be experiencing population declines. By not focusing on the adverse impact of not taking the proposed action, we have allowed ourselves to abdicate our responsibility under the "Public Trust Doctrine of Law" to assure the long-term viability of early, as well as late, successional species.

If only the science explained above was well understood and applied in both policy-making and political decision-making. One can only hope for that day, but it is not yet here. Again, New York lends itself well to helping elaborate on that point. While serving as Commissioner/CEO of New York's Department of Environmental Conservation for Governor Pataki, I was fortunate in being able to assist him in gaining passage of a State-wide "Environmental Bond Act" totaling $1.75 billion. The governor later went on to use a good portion

Ruffed Grouse - Photo by Paul Carson

of it to acquire close to one million acres of land in order to "protect" it for future generations – a laudable goal. The City of New York negotiated a historic "Watershed Agreement", which I signed on behalf of the state, in order to avoid the need to install an EPA mandated water filtration system for its up-state reservoirs. Part of that agreement involves the acquisition of tens of thousands of acres within the watershed that will be "protected" for future generations – again, a laudable goal. However, both of these programs are wanting from an ecological basis in terms of their ability to succeed due to their lack of active management. Neither program has a dime in it for the management or stewardship of those

Figure 1.
BREEDING BIRD POPLULATION TRENDS
Eastern United States 1980-2005 (USFWS BBS Data)



Red = Decreasing Green = Increasing White = Stable

Figure 2.
BREEDING BIRD TRENDS BY HABITAT TYPE
1966-1996

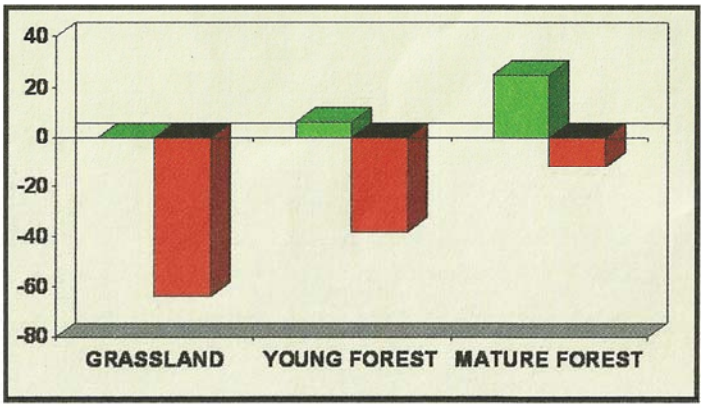
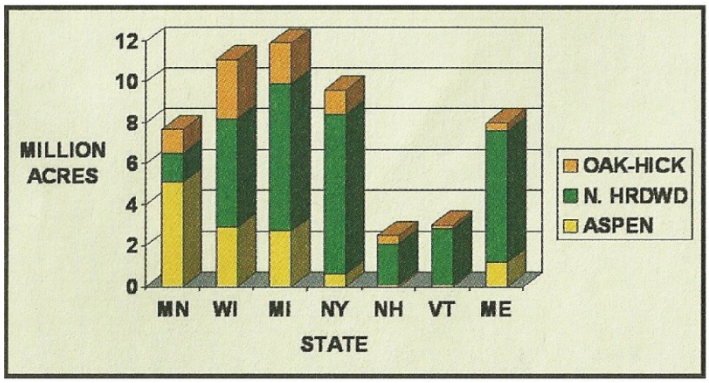


Figure 3.
FOREST COMOSITION - DECIDUOUS
NORTHERN STATES 1966-1996



acquired lands, many acres of which are in pastures, fields, woodlots, etc. – the things that give diversity and character to the landscape. What do we all now know will be the ultimate fate of those acres unless they are managed with a specific goal to the contrary in mind? They will, over time, become a beech-birch-maple-hemlock northern hardwood forest and the species now inhabiting them will have their leases vacated. They will either have to move elsewhere or perish from starvation, lack of nesting sites or drumming logs and predation. Is that really what we want? Is that what we intentionally set out to do?

We Have a Choice

We can preserve the land base upon which vegetation grows and wildlife depends, but we cannot "preserve" that vegetation unless it is in the later or climax stage of plant succession without actively managing it. Nature, when left alone, has two concurrent processes going on that provide the diversity of habitats wildlife need. One process is plant succession that slowly, yet methodically, moves from the early stage occupied by plant species that

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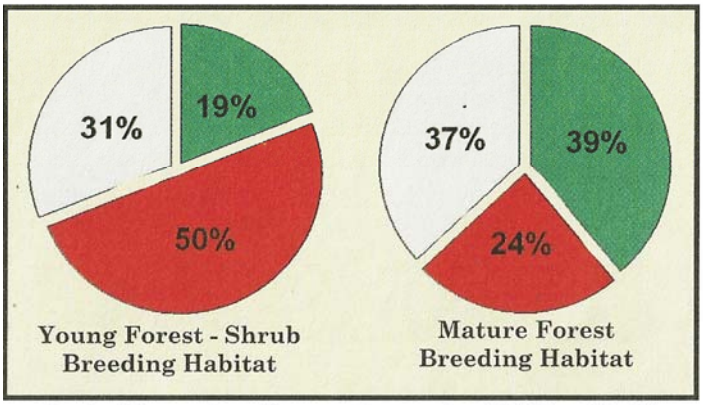
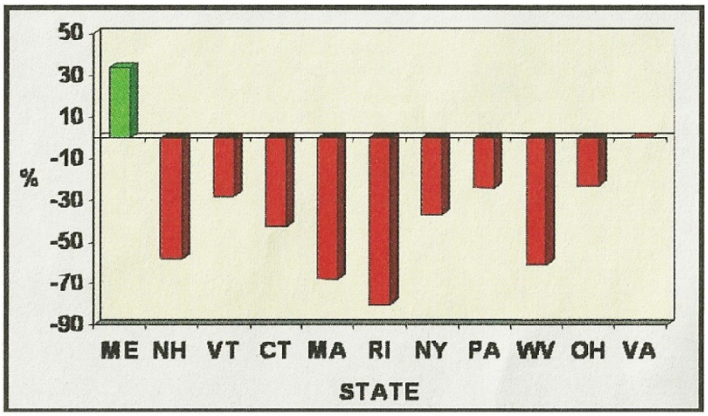


Red = Decreasing Green = Increasing White = Stable

Figure 4.
YOUNG FOREST HABITAT TRENDS
Percent change in seeding/sapling acreage in northeastern states since the 1970's



Data Source: Forest Inventory & Analysis

are shade tolerant towards plant communities that are shade tolerant. If left unmolested, the process would eventually lead to plant communities consisting only of shade tolerant plants, like the northern hardwood forests, and wildlife that need the early or younger stages would be eliminated. However, natural events like fire, blow-downs and climate change have historically disrupted that orderly progression and created diversity by allowing light to once again reach the forest floor and restart the cycle. For numerous reasons, man has done his best to eliminate fire and to favor the older successional stages. The result is that we now have choices. The first choice is to continue on our present course and watch as the present decline in early successional species accelerates – an alternative that will lead to countless "train-wrecks" as more and more species are listed as threatened or endangered. (See Figures 1, 2, 3, 4, 5 & 6.) The other choices are to recognize what is happening; to alert others to what is happening; and

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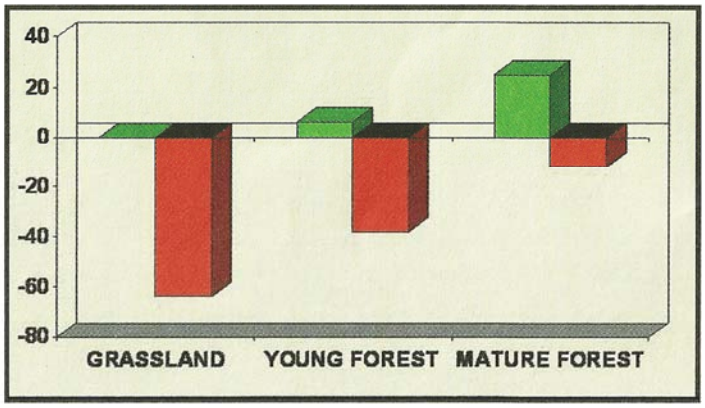

to use the tools we have at our disposal to reverse this trend. Those tools have really not changed much since listed in the 1930's by Aldo Leopold; fire, axe (chainsaw or tree shearing device), cow, plow and gun. The first four can be used to modify plant communities (habitats) and the gun is used to reduce the surplus game populations like deer that can literally eat themselves out of house and home.

Not Seeing the Forest For the Trees

Just recently, the U.S. Fish and Wildlife Service has, in some regions, begun requiring companies that cut trees as part of construction right-of-way to mitigate (doing something positive to offset the damage) what they consider to be an adverse impact or "taking" under the Migratory Bird Treaty Act. This is happening at a time when the decline of early successional habitats, like the ones created by cutting trees, is on the decline. One therefore can only question whether the companies should be given credit for creating a much-needed habitat type or punished by requiring them to mitigate for altering one that is in increasing abundance.

What set the stage for past and current mismanagement, often by well-intentioned people, on public lands? Certainly the litigation stemming from clear-cutting practices on the Monongahela and Bitterroot National Forests that led to passage of the 1975 National Forest Management Act can be pointed to as a vivid example of a shift in the pendulum – a shift that some might conjecture raised that pendulum too far in the other direction. It can be argued with some success that the mismanagement or over-cutting in the past set the stage for the mismanagement or non-management that is occurring today. The initial mismanagement was driven by greed. Today's mismanagement is driven more by misperception or basic ignorance of ecological principles. However, in the public policy arena perception often becomes reality and that has happened as the public, well-intentioned but often lacking knowledge of the sound, ecological principles outlined above, replaces the conservation, or wise-use, management strategy. That is not surprising as Smokey the Bear, The Nature Conservancy and the Audubon Society all led us to believe that locking up or "protecting" land was all that we needed to do in order to perpetuate its values – both to man and wildlife. That is now changing, but doing so in time to help avoid the impending train-wreck associated with the rapid decline in early forest wildlife populations will require an active, versus passive, approach. They must openly become an advocate for ecologically sound forest management, including clear-cutting, that leads to a mosaic of age classes or successional stage that create diverse habitats within our public and private forests. This can most easily be accomplished by working with the recently created Sustainable Forestry Initiative (SFI) and helping that organization create a standard that recognizes the environmental, economic, wildlife and recreational values of our forests and encouraging a management strategy that both protects and enhances those values.

Forest aging can be a good thing, but like many things, too much of a good thing can be bad. Managing our public forests with a strategy that leads to a mosaic of habitats or successional stages will lead to forests that are healthier, more resistant to disease and insects, provide healthy economic return to the landowner and a diversity of wildlife (both hunted and non-hunted), for this and future generations to enjoy. Not adopting that strategy will be a violation of the "Public Trust Doctrine of Law."