MANAGEMENT STRATEGIES FOR EPHEMERAL PONDS

A one-day meeting sponsored by
Coastal Plains Institute

October 23, 2007
Tall Timbers Research Station
Tallahassee, FL

Other Sponsors:

EDITOR'S NOTE

Through a Florida Fish and Wildlife Conservation Commission sponsored State Wildlife Grant, Coastal Plains Institute began a project in 2005 to synthesize literature and review research projects involving ephemeral pond-breeding amphibians. The goal of this project is to provide management strategies for ephemeral ponds as they pertain to these amphibians. I conceived of this meeting as a way to obtain feedback and information regarding ephemeral pond management from various stakeholders and scientists. Sixty-one people registered for the meeting (maximum capacity) representing private landowners and consultants, water management districts, developers, non-profit organizations, land conservancies, research centers, timber industry, colleges and universities, and county, state, and federal governments.

The morning session consisted of 6 30-minute presentations. These presentations were designed to stimulate discussion and disseminate information regarding strategies that are currently being used to manage ephemeral wetlands. Presenters represented a non-profit organization, a research center, and three state agencies from Florida and Georgia.

Three panel discussions were conducted during the afternoon session. Each panelist introduced her/himself and provided comment on the discussion topic, after which questions were taken from the audience. Nancy Metzke of C & N Reporters transcribed and Kate Haley of the Florida Fish and Wildlife Conservation Commission facilitated the panel discussions. The discussions are presented here in order of occurrence. The original transcripts have been edited and rewritten for clarity and brevity. The edited version was sent to each panelist for approval.

I wish to thank Tall Timbers Research Station, and especially Jim Cox, for providing the meeting location and helping in meeting preparations; Kate Haley, Florida Fish and Wildlife Conservation Commission, for facilitating the panel discussions and providing feedback on the meeting design and implementation; and Chris Demers, University of Florida Forest Stewardship Coordinator, for sending the meeting flyer out to over 3300 landowners and professionals. I also wish to thank our sponsors: Florida Fish and Wildlife Conservation Commission, Tall Timbers Research Station, National Wild Turkey Federation, Society of Wetland Scientists, Florida Division of Forestry, Forest Stewardship, and University of Florida IFAS Extension.

Rebecca Meegan
Wildlife Ecologist
Coastal Plains Institute
January 17, 2008

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PRESENTATION ABSTRACTS

Management Strategies for Florida's Ephemeral Ponds: an Amphibian Perspective. Rebecca Meegan, Coastal Plains Institute

Management strategies for pond-breeding amphibians have been developed as part of a Florida Fish and Wildlife Conservation Commission, Wildlife Legacy Initiative State Wildlife Grant. These strategies are based on a synthesis of the literature and research projects and meetings with amphibian biologists and other scientists. Historically, management strategies have been suggested for individual species or for a particular land ownership; however, a summary of the entire group of pond-breeding amphibians in Florida has been missing. Based on limited radio telemetry data, drift fence studies, distance data for individual species, and recommendations by other scientists, a 500m core habitat area is suggested for the area surrounding an ephemeral wetland. An additional buffer to 800m from a wetland is also needed to incorporate pond dispersals, which have been documented up to 2 km. If a limited number of ponds can be incorporated into a management plan, it is important to prioritize pond clusters, ponds with varying hydroperiods, ponds within 1km of other ponds, ponds with known populations of target species such as flatwoods salamander (*Ambystoma cingulatum*), tiger salamanders (*Ambystoma tigrinum*), striped newts (*Notophthalmus perstriatus*), ornate chorus frogs (*Pseudacris ornata*), and gopher frogs (*Rana* capito) and ponds surrounded by intact or restorable upland habitat. Land managers must keep in mind that reducing the number of ponds not only reduces the number and density of sites where amphibians can reproduce and recruit juveniles into the population, but also increases the distance between ponds, which in turn diminishes the capacity to maintain local and regional species populations. Basic management strategies were discussed including: (1) identify and actively maintain or restore historic fire regime, including periodic growing-season burns, (2) avoid constructing firelines through or around wetlands, (3) avoid ditching or draining wetlands, (4) avoid use of vehicles and heavy machinery in or around wetlands, and (5) leave standing dead trees, stumps, logs, and other coarse woody debris.

Florida Silviculture Best Management Practices – 26 Years of Success. Roy Lima, Florida Division of Forestry

The Florida Department of Agriculture and Consumer Services, Division of Forestry recently completed its 2005 Silviculture Best Management Practices Compliance Survey on forestry operations statewide. These surveys are used to determine the extent to which the forestry community uses BMPs and have been conducted biennially since 1981; two years after the Division developed Florida's first Silviculture Best Management Practices. In addition, these surveys determine statewide compliance by evaluating a random sample of forestry operations for BMP implementation. Therefore, after twenty-four years of silviculture BMP monitoring resulting in a statewide average of 93%, that if BMPs are applied effectively, it's reasonable to

expect that Florida's BMPs are effective in protecting stream ecosystems from silviculture related nonpoint source pollution.

Habitat Management Guidelines: Maximizing Compatibility with Other Primary Objectives. Thomas Floyd, Georgia Department of Natural Resources

No abstract was available at time of posting.

Striped Newt Decline in the Munson Sandhills of North Florida: Results of a 38-year Study. Dr. Bruce Means, Coastal Plains Institute

Beginning in the winter of 1969-1970, a small 0.1 ha pond (Study Pond #1) in the Munson Sandhills of the Apalachicola National Forest, Leon County, Florida, was sampled periodically for the Striped Newt (*Notophthalmus perstriatus*) and other amphibians and reptiles. Sampling was erratic in the years 1969-1992 (n=20), but numerous adults in breeding condition, larvae, and neotenes were collected. In the period 04/1992 - 08/1994 a regime of frequent dipnetting (n=178) was instituted for the purpose of obtaining data on the phenology of larval life. From 11/1993 – 08/94 two small drift fences were also checked frequently (n=79) for incoming adults and efts or outgoing efts. Finally, during the ten-year period 09/1995 – 05/2005, a 340-m drift fence was placed entirely around the pond using fifty-four 20-liter plastic buckets as pitfall traps and checked every second day for amphibians and reptiles. No Striped Newts were seen at Study Pond #1 since 1994. Striped Newt abundances over time and potential causes of a severe decline are discussed.

Effects of Hardwood Removal on Depressional Wetlands within the Longleaf Pine Ecosystem. Dr. Lora Smith, Joseph W. Jones Ecological Research Center

No abstract was available at time of posting.

Landowner Assistance Programs. Kris Cathey-Thomas, Florida Fish and Wildlife Conservation Commission

Many landowners seek assistance with their land management. The types of assistance selected should be based on the landowners' goals and objectives and the identification of the existing or future limitations to reaching those goals. These goals often include timber production, wildlife, aesthetics, recreation, soil and water quality, and livestock production among others, or a combination of these goals. Limitations to achieving those goals may include knowledge, finances, experience, equipment, time, regulations, and others. There are currently many landowner assistance programs available to help overcome the limiting factors landowners

encounter in achieving their goals. Some of these programs include the Forest Stewardship Program, Landowner Assistance Program, Common Species Common Program, and many Natural Resource Conservation Service Programs such as the Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, and others. These programs provide technical advisement from a variety of resource professionals and may also help finance management practices such as prescribed burning, exotic species control, vegetation establishment, mechanical or chemical vegetation enhancement, installation of nesting structures, fencing or watering facilities, and much more. Regardless of the type of assistance needed, landowners have a great diversity of programs available and should consider taking advantage of the programs to help achieve their land management goals for the benefit of our natural resources.

PANEL DISCUSSIONS

Discussion: Ephemeral Ponds and Silviculture: Impacts and Strategies
This 45-minute panel was designed to discuss the impacts of silviculture on ephemeral wetlands and provide strategies for alleviating the impacts.

Panelists: Kevin Enge, Florida Fish and Wildlife Conservation Commission
Bruce Means, Coastal Plains Institute
Charlie Pedersen, Florida Division of Forestry
Dan Roach, Rayonier

CHARLIE PEDERSEN: I'm the Waccasassa District state lands biologist for the Florida Division of Forestry. I work on Goethe, Carl Duval Moore, Ross Prairie, Etoniah, and Welaka State Forests, and the recent Avatar purchase. My experience related to silviculture and ephemeral ponds comes from my work on two State Forests: Goethe and Jennings. I'm not the main biologist on Goethe but I've done some work there and some of the tracts have striped newts. I used to work on Jennings State Forest where we had striped newts, as did adjacent Camp Blanding, which is also owned by the state. If you're looking at a property to decide how important it is in terms of habitat for ephemeral pond-breeders, property that has been bedded immediately loses some pretty small scale depression ponds. These ponds are too small to be covered by regulations and too small to show up on an aerial photo, but it seems they're very important to breeding. So if you have property that hasn't been bedded and you're trying to prioritize, that would be something that would be a high priority.

I don't think you can overstate the importance of growing season fire for keeping ephemeral pond-breeders in good shape. Presumably it has something to do with the quality of the fringe of the habitat. In the case of striped newts, they tend not to be in the center of those ponds, as has been noted several times here this morning. They are found around the grassy fringe. Where there is a network of several ponds hooked together, there will often be swales and water channels within the upland connecting those ponds together. That's some of the smaller scale depressional ponds I was talking about. They'll be found in that shallow hydraulic between the ponds. That is an area that really gets shrubby quite fast and fire is very important. That is also an area that often has trouble with fire shadows because it will be in between a network of several wet sites.

DAN ROACH: I work for Rayonier, which is a privately held, publicly traded, forest products company. My title is Manager of Forest Environmental Systems and my area covers all of the southeastern states and upstate New York. Rayonier has about 2.6 million acres of land. We have land in Florida, Georgia, Alabama, Texas, Oklahoma, Louisiana, Arkansas, New York, and Washington where we started. We have an operation in New Zealand and Australia, a little bit of land in South America and Chili. We have some constraints associated with being publicly traded that a lot of people don't have. We're also a Real Estate Investment Trust (REIT). As an REIT, we are constrained to basically distribute 90% of our operating income to our shareholders every 90 days, so we're not exactly like a regular publicly traded company. We are very similar to some of the Timberland Investment Management Organizations (TIMO's) that are usually pension funds often out of large metropolitan areas with lots of big money that are buying up timberland as investments. We are third-party certified under the Sustainable

Forestry Initiative (SFI). You've probably heard about the Florida Stewardship Council (FSC), another forest certification mechanism is the Sustainable Forestry Initiative.

Our three core businesses are: timberland management, real estate, and performance fibers. We did not invite a thousand people a day to move to Florida, but they're coming; and when they come, they want to buy land. We don't do a lot of hands-on development (we do plan to do some in the future), but we do sell land to developers. We have two pulp mills, one in Fernandina Beach and one in Jesup, Georgia. We don't make paper; we make cellulose that goes into things like the front of your Blackberry or your cell phone, etc. We also have a few saw mills in Georgia.

Relative to ponds, we talked a little bit when Roy [Lima] was up here talking about Best Management Practices (BMPs). We treat ephemeral ponds like they're open water. A hundred percent of the pond is an exclusion zone, and we don't harvest timber in the 35-foot primary streamside management zone (SMZ) around the outside of the pond. Then there's a secondary zone outside of that, depending on the soil type and the slope around it. We do use herbicide, we do use fertilizer, and we do use pesticides. We have buffers around all of our wetlands. We know where the wetlands are, and we have exclusion zones to make sure that we keep those out of wetlands and out of buffers.

The main challenge I see is the disintegration of the forest products industry. A professor at the University of Georgia just gave a talk a couple of months ago, and he said within five years, and certainly within ten years, there won't be a vertically integrated traditional forest products company that owns a million acres of land in the United States of America. Other challenges: habitat loss, habitat fragmentation. I was at a meeting a couple of weeks ago and somebody told me that one man's habitat fragmentation is another man's biodiversity, and I thought that was a fairly astute statement. But it depends on if you fragment your habitat into subdivisions and golf courses or you fragment it into owners with different objectives. I guess the other challenge is the privatization of the publicly traded REITs, TIMOs, the pension funds. Traditional forest product companies will continue to sell land until they don't have any more. The only people that can own it are TIMOs, REITs, and high net worth individuals. They all have different objectives. The next thing you're probably going to see happen is the private equity funds trying to buy the publicly traded companies.

KEVIN ENGE: I work for the Florida Fish and Wildlife Conservation Commission (FWC). Currently, I am a herpetologist in our wildlife research lab in Gainesville, but for 17 years prior, I was a biologist and herpetology coordinator in a field office between Quincy and Tallahassee. I did my Master's research on the effects of clear cutting and different intensities of site preparation on flatwoods reptiles and amphibians on private forest land in Bradford County, Florida. During probably the best 15 years of my career, I did a lot of drift fence surveys in ephemeral wetlands and both managed and unmanaged timberlands.

From about 2000 to 2005, I was involved in surveys for flatwoods salamanders. I've seen most of the historic and extant flatwoods salamander ponds and probably a couple thousand ponds that don't have flatwoods salamanders, both on public lands and on private timberlands. I've looked for flatwoods salamanders in about 500 ponds on International Paper lands and never found them. So I have a real good idea of what's important for flatwoods salamanders. When we rank the potential of a wetland, we also look at the upland and whether there's still wiregrass,

the canopy closure, etc. But the most important thing is that transition zone that's been talked about, the ecotone. There has to be a basic ecotone with wiregrass and other herbaceous vegetation. If it starts getting encroached by shrubs because of lack of fire, you get the lyonia and the titi and largeleaf mulberry, the flatwoods salamanders do not persist in those sites. To me it's really important that you get fires burning from the uplands into the wetlands, even if it burns in that transition zone. Occasionally fires carry into the wetlands and you get peat fires, which everyone tries to avoid, but if you have a lot of organic accumulation, you no longer have that emergent vegetation. The last flatwoods salamander reproduction known in the Peninsula was ten years ago. The ponds just aren't filling up at the right time of the year. They're dry in that critical period from November to January.

The last couple of years, I've been coordinating a statewide survey for striped newts. I'm real concerned about the striped newt; it probably should be state and federally listed at some level of protection. It definitely has declined. Fortunately, we have found some new newt ponds, but there is some trouble. No newts have been found on Camp Blanding since 1994 I think, when Dan Hipes at FNAI was doing the survey. And there's nothing wrong with the uplands or the ponds. I think a lot of these problems that we're having are just long-term droughts. We're not getting the winter rainfall, especially in the Peninsula.

BRUCE MEANS: I was Director here at Tall Timbers Research Station from 1978 to 1984. We lived on the property, and I and my sons used to do a lot of work on the temporary ponds on Tall Timbers. There are about 15 or so of all different types, and I had drift fences up all around them. When the Wade tract became available, which was a beautiful tract of long longleaf, I had drift fences up looking at the native vertebrate fauna in what was very close to pristine longleaf ecosystems. Amphibian biology is my main focus, I like pond-breeding animals and I also like amphibians of all kinds. I'm known for working with venomous snakes; but, my real work has been with amphibians. I founded the Coastal Plains Institute in 1984. We have properties in Escambia County and Liberty County that we manage that have temporary ponds and silviculture plots on them. We're trying to convert the silviculture back to native ground cover. Some of the silviculture sites were bedded. But I do have to tell you – I guess you could call this a bias, I have written quite a few papers about the effects of silviculture on amphibians and reptiles. I was told not too long ago that at the forestry school in Clemson the graduate students are told that I am the Anti Christ of silviculture, just so you know where my bias lies.

AUDIENCE PARTICIPANT: How can a landowner grow timber in a flatwoods area? I want to grow timber successfully and be environmentally friendly. What can I do to grow timber when this rotation ends? Should I eliminate the beds?

BRUCE MEANS: A general working plan for anybody would be to try to grow what was originally on site. In many flatwoods environments, longleaf was the native timber. We didn't grow longleaf to start with because it has difficult properties of being established. It masts, but you can't get seed all the time when you want it. It has a long tap root which sometimes makes it difficult to get established. But now we know from studies that if you plant longleaf on a longleaf site, in about 20 years, it catches up with anything else you can plant there. Then you've got a good timber crop coming along on that site, even though it's longleaf pine. I think longleaf is a very good timber to have if you're going to grow it for lumber, it is quite valuable or if you're going to harvest it when it gets in the 40- to 50-year age, but you're growing a native plant. It will thin out naturally. You should have open groundcover. You should benefit the

whole ecosystem by being able to grow longleaf on a site. The reason we have slash pine on most sites and loblolly up in the loamier sites is because it was easier to get established, easier to get seed, easier to grow the seedlings. Early on, when experiments were conducted growing pines in the pine belt of the southeast United States, those are the plants that were first chosen. For a lot of reasons, but especially for ecological reasons, they're not as good because they grow much more densely stocked. That tends to shade out the groundcover, which is important in a longleaf ecosystem. You can start longleaf thickly stocked because it seems to reproduce in dense stands in nature, small clumps here and there. When it gets in the 20, 30, 40-year stage, it opens up enough to where light gets to the ground, and it does everything we want it to do as far as allowing the ecosystem to function with a rich, vital, primary productivity on the ground rather than up in the canopy.

DAN ROACH: I agree. I'd probably advise you to hire a consultant, somebody that knows something about forestry, and somebody that knows about wildlife too. The landowner's objectives are what are most important. We plant longleaf, slash, loblolly, and sand pine, but you don't have to bed. There are plenty of places you can plant. And you can make the argument that if you're bedding in an area, you're probably planting longleaf in places too wet anyway. If you plant longleaf, I'd recommend planting containerized longleaf, that's all we do, because you get a whole lot better survival. There are always natural regeneration systems. You can't control density like you can with a plantation, but I know folks that have taken a mechanized wheel planter and then plant serpentine plantations of containerized longleaf so you can't see rows and under planted it with wiregrass and do frequent burns, so it's doable.

KEVIN ENGE: As far as after you log and the site preparation for your next crop, ideally you want fire. Realistically, in flatwoods, go with a light roller drum chopper if you have to but definitely not bedding. We've done that in our management areas and it doesn't seem to impact, we seem to get plenty of reptiles and amphibians.

CHARLIE PEDERSEN: Just because you've got beds there and they weren't there before doesn't mean your first goal should be to try to remove them. That might cost more money and end up tearing the site up more than you would by working with what's there. Also, the beds might allow you easier establishment of your longleaf. What you might think about is if they bedded into areas that were too wet, are those the areas you want to take beds out, or even in those areas that were sort of too wet, did they go in there and dig some shallow canals or fire lines and hook pond to pond to pond? There might be some pretty small scale areas where you could do some modest tractor work and put some ditch plugs in those and do quite a bit of hydrological restoration. In the case of a site that you're going to actively manage for timber, you've got a different set of regulations to work with because you're operating under a silviculture exemption, and you need to have a consultant work with you on that. Instead of a big fancy permit, there's a jiffy permit for most water management districts you can operate under that allows you quite a bit more freedom in some of those restoration activities. It all depends on what your goals are on the site.

AUDIENCE PARTICIPANT: If the property has already been bedded and there is a pretty good understory of wiregrass, I assume it's not practical to get rid of the beds.

BRUCE MEANS: I would say that's right. You've got to remember, there basically are three kinds of soils in the Coastal Plain: flatwoods, sandhills, and loamy soils. In the flatwoods,

where bedding takes place, there is moisture near the soil surface, and the hardwoods that tend encroach are the titis and other associated hardwoods. That is quite different from the sandhills soils where you have deep sands and then your problems are with turkey oak and maybe blackjack oak, other scrub oaks that naturally occur with it. In the loamy soils like at Tall Timbers and the Tifton Uplands in Georgia, you have richer soils but you still have a turkey oak community on the hilltops where it's a little sandier because the rain beats the clay out. First you've got to know what kind of soil you're talking about. You really don't have to bed anywhere but flatwoods. In the flatwoods, it's hard to get rid of titi once it is in there. We have a site like that, and we had residual groundcover on the beds. After they rolled the beds up, there were some clumps of plants left. I have lots of good wiregrass going down the main clump but I don't have much wiregrass coming back in inner zone areas - in the furrows in between -, even though I've been burning that site for the last ten years in May and June, almost an annual burn. What we do have is *Pityopsis graminifolia* coming in like mad. *Pityopsis* is a little composite that seems to be taking over. Maybe this is just unique to this one property, I'm afraid to make this as a paradigm all over the flatwoods of coastal plain. My whole idea was to burn in the summer to get the wiregrass to naturally replace itself. It's not happening on some of that property as fast as I was hoping it would.

CHARLIE PEDERSEN: The main constraint with longleaf is getting it to reproduce, and the other constraint you have with longleaf is that it really doesn't reach stature maturity until -- I should let somebody that works on the Wade tract talk about this -- around 125 years. Up until that age, you get a mast producing year every 16 or 17 years, and so you really need to manage those cone crops when they come and be conscious of that. If you're trying to manage your longleaf for natural regeneration, you need to have enough light reaching the understory to allow those young longleaf piness to establish and you need to have some bare mineral soil for the seeds to establish in. You need to have a seed source, which for longleaf is going to be very patchy and intermittent. To get the bare mineral soil requirement in sandhill, it's a much lower intensity of fire, and you're more likely to be able to get to a point where you have bare mineral soil and a good healthy understory with an easier to achieve fire return interval. So in that case, you just need to somehow punch some holes in the canopy so there's enough light to get to the understory. There are thoughts about even age versus uneven age management and what is uneven age management? Are you managing patches or single tree selection? I don't know how much of that you want to get into. I'm no silviculturist, so I'm not super qualified to talk about it anyway. But if you have a sand hill site, basically, you thin it a little bit, try to take care of your hardwood midstory with fire. When you see that cone crop coming on, burn the snot out of it, and you have a pretty good chance of getting reproduction. In a flatwoods site, depending on how fire suppressed it is, you can have an intense root mat that could handle a lot more fire or potentially some chopping treatments that you'll have to put into that site to get to the point where there is bare mineral soil available. If you have that fedderbush, gallberry root mat, you can't expect the same amount of cone crop to produce the same amount of reproduction on that site, so the restoration trajectory is going to take longer.

BRUCE MEANS: A lot of it too depends on the size of the land, the piece of property that you're interested in growing timber on. I never did answer directly about the bedding. I didn't want to do anything to the beds because I wasn't getting the native cover to restore itself in the swales as fast as I was hoping I would. If I were to try to flatten those beds, then I would further eliminate or reduce the amount of the native vegetation I had there. If you walk around in nature, particularly hardwood forests where you see tree tip-up mounds, it takes 50 or more years for

them to slowly rot. Ultimately, over a long period of time, those beds will be flattened out by normal erosional processes. Something else we should all think about, because we're human beings, we think we live a long time but we want to do everything immediately. We either want to take the whole 550 acres and get it all planted right away, or we want to burn it all at once. Scale is important. If you own big private or public lands you have to do things on a bigger scale but on a smaller scale, you can customize things, even work on a patch basis.

AUDIENCE PARTICIPANT: I'd be interested in hearing everybody's opinion about site preparation given that we seem to agree that longleaf is a good way to go for sustainably managing forest products that will also produce biodiversity. Let's say you inherit an off-site slash plantation that has been bedded and the understory is titi. What do you do to get it back to longleaf?

BRUCE MEANS: The particular property I'm interested in restoring and maintaining is 80 acres of planted slash pine. The pines were about 15 years old when I started and I've been using only fire every year. If I'm not able to burn this year, I'll do it next year. I don't' feel I have to do it all once. If you keep working at it, I did eliminate titi by fire alone. I finally killed it. I pruned it and pruned it and pruned it. After about five of those summer burns, I do not have any titi left, and it's an eye opener for me, because it's hard to get rid of titi.

AUDIENCE PARTICIPANT: Are you going to be able to burn like that if there are enough pines to clear cut?

BRUCE MEANS: You have to be careful that you don't have that many pines. At about the 18-year stage, I took out every third row then thinned in between to leave the needle fall, and I kept burning. At the 23-year stage, I took out the next row and it was because I can't pulp any more.

AUDIENCE PARTICIPANT: What if you inherit the situation, it's already been clear-cut, and the clear-cut grew up in titi.

AUDIENCE PARTICIPANT: We've had situations like that and I think an important point that you just made is that you have to have the fuels. If you're going to rely on fire to do the job, you've got to have the fuels to have the fire. Fuel management is a big part of ecosystem restoration, if you're going to work with fire.

DAN ROACH: I may be at the opposite end of the spectrum. We've got to pay a dividend every 90 days, and internal rate of return in the stand is important to us, so we try to plant loblolly, slash, longleaf and sand pine. We try to match the species to the site, and we try to match the site-prep techniques to the site as well and we try to do as little site prep as we can mechanically. About half the site prep we do is chemical site prep. We use a lot of different chemicals and we really can't afford to take the time to use fire repeatedly year after year to get where we want to be. The other problem, our division headquarters are in Florida, and my saying is there's 18.5 million people in Florida and ten million of them are represented by competent legal counsel waiting for someone to strike a match so they can sue you. We use fire at the end of the rotation, during the site-prep process, and a little bit on some upland sites, mostly longleaf pine where it's growing naturally with wiregrass. Other than that, we don't have much fire on our plantations.

CHARLIE PEDERSEN: Getting longleaf back on to a site is going to depend a lot on the site. Assuming that you have to do some planting (artificial regeneration) some sites are going to be easier than others to reestablish longleaf. Towards the sandhill end, you don't have the level of competition and you don't have the amount of root mat so it will be easier. As you get into wetter sites and more fire-suppressed sites, you have more difficulty getting the longleaf to establish. If you want longleaf as your target species because you've got environmental goals you want to meet, presumably your most important environmental goal for planting longleaf is you can burn the site a lot sooner because you can burn it in the grass stage. That's why you're planting longleaf, so fire is a big part of your mix. If you've got the time to burn it three or four times and get in on a summer rotation before you plant it, time is on your side and that is a huge advantage. But you can't assume just because you burn a site a couple of times that you're going to necessarily get good reproduction on a very fire-suppressed site and on a wetter, flatwoods site. I'm firmly convinced that one of the most endangered ecosystems in Florida is wet flatwoods because of fire suppression. It doesn't take very long for it to get quite shrubby, and it's hard to get it back into a grassy state. It's really hard to restore that system because it's hard to get it very open. In that situation, you can't say I'm not going to KG blade my beds, I'm not going to broadcast and apply herbicide, I'm not going to ban spray chopper, I'm not going to do this, I'm not going to do that. You really have to look at the site and if you have the time to do fire and do a couple of fires. You always learn a lot more about a site after you've burned it a couple times. If you're interested in restoration and you don't burn a site a couple of times, you're kind of shooting your foot off because you really don't know the site. That's just my bias. But in terms of trying to get longleaf established, if you see some of those red flags coming up, I think you need to start small and plant a relatively small area with whatever techniques you want to start with. If you want to go real low key on the site prep and you want to do hand planting, start with a small area and see what kind of survival you get. Then you can add intensity until you get the results you want to meet your objectives. If you can do fire along and get your longleaf to establish, that's the way to go. But if a site has been beat up, you might need to beat it up some more to get it headed where you want to, unfortunately.

DAN ROACH: A lot of people use herbicides to knock the big fuel load down, and then they burn after they knock it down with herbicides because you're burning a lot of everything if you try to burn a high fuel load.

AUDIENCE PARTICIPANT: If I could throw in my two cents about maintaining your fuels and managing your fuels. It seems like a lot of times people make the mistake of using herbicides without thinking through how it's going to impact their fuels in the long run. You could easily get rid of your herbaceous fuels, your wiregrass, if you go too heavy handed with the herbicide. It seems like you need to take herbicides just as far as you need to in order to get to your goal and not a step further.

DAN ROACH: One of the principles of a sustainable forest, the SFI that we get audited on every year, is you're supposed to use the narrowest spectrum of herbicides and the least toxic and the least amount. We go through that on an annual basis. When we use herbicides for weed control on top of beds, it's banded, and it's usually three feet wide so the native vegetation is in the inner bed, and we band right on top of where the seedlings go.

AUDIENCE PARTICIPANT: A lot of people are really interested in herbicides and I think they deserve their role in silviculture, but do we know enough about the impacts that herbicides can

have on a sensitive species like amphibians to really promote their use in sensitive habitats such as ephemeral ponds?

BRUCE MEANS: There are some papers just recently out on a website called Center for North American Herpetology. We're starting to get some results and the papers show that herbicides and the breakdown products from them are bad for developing amphibian larvae in ponds.

AUDIENCE PARTICIPANT: In terms of research needs, that's probably an area that we really need to look at, in terms of impacts on the amphibians.

DAN ROACH: There's an organization called National Council for Air & Stream Improvement (NCAS), and they've done some research. Vicki Tatum at the University of Florida has done some work on toxicity for a lot of different aquatic species. One of the questions was: When you get this herbicide labeled, even if you keep it out of the water, is it still safe if something runs off or there's a spill, etc? And then the next question was: What if I add herbicide A plus herbicide B, or herbicide A with a surfactant?

CLOSING REMARKS FROM THE PANEL

CHARLIE PEDERSEN: Burn it. If you've got a site that's not screwed up and not bedded -- you've seen how hard it is to get beds established -- you've got a good site, so you need to do something special.

DAN ROACH: Land acquisition and conservation easements are two of our top fixes. We have the red hill salamander in our area and we have a Habitat Conservation Plan (HCP) for the red hill salamander. I guess because I've spent so much time in corporate America, I'm kind of a realist. If there's a species that you want protected and you go to the Legislature or whatever regulatory body and you try to sell a 900-meter or a 1,400-meter or a 500-meter buffer, politically that's going to be pretty tough to sell. So go to the place where you see the critter that you want to protect and try to protect it with a conservation easement, HCP, or go to the landowner and say, look, we've got an opportunity here. Lastly, I have people in my office that fly to Montana to do elk research for a vacation. Ecotourism. People think who wants to do research on striped newts? I guarantee, if you get on the web, you'll find people that want to put up a drift fence and count striped newts or dip net for larvae. I think that would be a great way. Find a landowner that wants to cooperate with you and go out there and get some research done, get free labor and hey pay the landowner to go out there and dip net a pond.

KEVIN ENGE: I'll defer to Bruce.

BRUCE MEANS: Silviculture is one of the reasons for the decline of a lot of things in the southeastern United States because so much land has been devoted to it. The forestry profession raised hell about grow trees, grow trees, grow trees. And now the Philippines and all the third world countries have taken that motto away. We can't sell pulp any more, and now we're stuck with zillions of acres of pines growing on lands that are essentially deserts in our Coastal Plain. If you don't believe me, Kevin just said - how many acres or how many places did you look on privately-owned industrial land? You can't find these animals. We have to have some advocates for nature out there. We've had plenty of advocates for corporate industrial human activities.

Discussion: Issues in Wildlife and Land Management
This 45-minute panel discussion was designed to discuss compatibilities of managing game species with the longleaf pine ecosystem and issues in managing for wildlife as a primary and secondary objective.

Panelists: Joe McGlincy, The Wildlife Company
Jim Moyers, St. Joe Company
Bill Palmer, Tall Timbers Research Station
Brian Zielinski, National Wild Turkey Federation

BRIAN ZIELINSKI: I'm a regional wildlife biologist with the National Wild Turkey Federation. After graduate school at Louisiana State University, I worked for the Louisiana Department of Natural Resources for about two and a half years. I gained a lot of experience conducting surveys of different flora and fauna. I also worked with water quality and barrier island restoration so my work was pretty diversified. I was an area manager with the Florida Fish and Wildlife Conservation Commission for about five years. In that job, I mainly was responsible for cooperating with the Division of Forestry in managing the property, running the hunts, etc. I didn't really get into a lot of pond management. This is probably the most extensive meeting I've been to as far as pond issues. In my current position with the Federation, I work in conjunction with FWC under their turkey section and with the US Forest Service in all three National Forests in Florida. In that position, I've gotten into more of what we're discussing today, especially with the Forest Service and specifically on the Ocala National Forest. Access on the National Forest has changed, and it's in the process of big change, not only on the Ocala but the Osceola and the Apalachicola as well because of some of the degradation we've heard about today, especially relating to ponds. The problems are much worse on the Ocala than what you've seen up here, but it's coming. The good thing is now that they're going through it on the Ocala you've hopefully kind of nipped it in the bud to some degree as far as the Osceola and the Apalachicola. I'm working with the Forest Service, preparing contracts for hydroseeding as well as active restoration of some of these ponds.

One thing you've got to remember is how much land out there is privately owned. We tend to focus on the public lands because that's where we have the opportunity to manage as agencies and NGOs, but we have a lot of private landowner programs and probably need more in order to push that side of it in terms of restoration of private lands and managing for striped newts and game species. Granted Florida is different. Florida is truly blessed because of the large amounts of public land thanks to programs like Preservation 2000 and Florida Forever. That's not something Georgia or other states are really privy to. Those dollars aren't going as far as they used to and that last purchase of Babcock Ranch pretty much bankrupted the system. Of course, there aren't many tracts left that are 90,000 acres. I think there are a variety of issues, and I'm glad to see that we're bringing some to light here today.

JIM MOYERS: I'm a wildlife biologist with the St. Joe Company. That's not St. Joe Timberland Company; that's St. Joe Company and there's a difference. St. Joe went through a major change in direction, from a forest products industry to a land development and real estate company in 1995. I came on board in 2000 so I can't defend nor retract any of the old history. My job could be described as a balancing act. I have development staff who need to navigate endangered

species issues, wetlands issues, land-use issues. We help them navigate in the best ecological way possible while balancing their needs. We help them navigate the permitting route that they have to travel in order to achieve their goals. Then, the third tier of that balancing act is to restore and enhance better ecological function, large mitigation and conservation areas that the company is putting aside so that they can do these developments. I sometimes feel like silly putty being stretched in many directions and being distorted all the time. It's a very interesting job; it's very challenging. It's interesting to come to conferences like this where I can learn new things.

The previous panel discussed a lot of silviculture operations and how to restore those, and the next panel will talk about restoration. I have to think about achieving the restoration goals that are laid out by the agencies, and reptiles and amphibians aren't always their first tier or second tier primary goals. The agencies want wetlands restoration in replacement for wetlands impacted somewhere else so they're looking primarily at function and plant diversity. If I achieve that on some of these heavily impacted lands, I'm hoping that nature, in its resiliency, will supply the rest and that's not always true.

JOE McGLINCY: I'm a wildlife biologist with The Wildlife Company. The Wildlife Company is a division of Southern Forestry Consultants and we're a consulting firm headquartered in Bainbridge, Georgia. The majority of our clients are nonindustrial private landowners, and we provide a variety of services from silviculture to wildlife to environmental issue management. I do a lot of red-cockaded woodpecker work and we also have flatwoods salamander projects. We work with the other species such as gopher tortoise and the suite of game species. I work closely with the foresters in our firm to integrate the management as best we can.

I think wildlife as one of the objectives of land management is very true. As Dan Roach touched on, we're seeing a tremendous upheaval of land ownership change, and we're getting a whole new generation of landowners into the game. These landowners are very different than the previous landowners, our parents or the generations that preceded them in that they oftentimes come into these properties knowing little or nothing about land management. They truly can't see where you're trying to take them because they have no concept of what it's going to look like after it's thinned or after it's burned. We need to educate these people and they are willing to listen and willing to try some things and do some things. Rather than timber driving the wagon, often what we're seeing now is wildlife, aesthetics, or just outdoor recreation as the key objectives and timber has dropped way down. Obviously, we still do forest management because that's often what's necessary to meet the first or second objective. So that has resulted in a major change in the way a lot of firms like ours do business, and it's resulted in the opportunity to manage for some of these nongame species, deal with ephemeral wetlands, and inject fire into these systems a whole lot more frequently than we used to.

The key thing we have lost the use of in the southeast is fire, both on public and private lands. We're very fortunate in south Georgia and north Florida where we see burning occurring here all the time. You get over into Alabama, Mississippi, and up into the Carolinas and you don't see that. You see areas that need to be burned but they're just not getting burned.

I think the change in land ownership patterns and the lack of prescribed fire are the things that are really challenges for us in the land management business, particularly on the private sector. The public owns more and more land, but that's a two-edged sword too. Owning it is one thing,

managing it is a whole other critter. There is a lot of good land in public ownership, but unfortunately, some of it is not being managed as it should be, and that's a challenge as well.

BILL PALMER: I've been here at Tall Timbers since 1996 and I run the game bird research program. I think anyone who's been around Tall Timbers since 1996 has seen a lot of restoration of our pine forests, which takes constant attention. The game bird research program works on dry prairie and mesic flatwoods in south Florida. We've worked on the coastal habitats up in North Carolina. We've restored lands, longleaf pine from slash pine, in South Carolina. We, of course, deal with the plantation community here in north Florida and south Georgia. A spectacular piece of land where I'm proud to say, because of bobwhite quail, it is still relatively pristine. I've always got to toss that in because there's often a perception of a lot of conflict, and I think we are splitting hairs on that. We have one of the largest game bird research programs in the world. We've banded over 20,000 quail, radioed countless number of birds, but we've also radioed snakes, cotton rats, and rodents. We track predator populations through substations and all kinds of studies because everything eats quail, and so we have an excuse to study pretty much everything.

The main point I want to make, and probably one of the more exciting things is a new project called The Upland Ecosystem Restoration Project that Greg Hagen here at Tall Timbers is overseeing. Herbert Stoddard said it, Leon Neil said it, and Bruce Means I know has said it: it takes constant attention to manage Florida uplands; you can't fall asleep at the wheel for three years. Unfortunately, because of the logistics and timing of bills, budgets and so forth, oftentimes things don't get done on our public lands. A three-year fire frequency isn't enough, and when it's five years, it's a disaster. One of the things we're trying to do is to take some of these lessons learned that the private landowners have used since the turn of the last century. Keeping fire on the ground is why you have tremendous wildlife population diversity on these rare but private lands. We're trying to take that message to some public lands. I know the managers of the public lands want to do this, and we've got about 80,000 acres in play now where we're trying to get fire frequency up and try to get some management done. Sometimes you have to use silviculture practices (chopping, mowing, timbering) to jump start it. You can't turn around 30 years of management with one year of management. It takes a lifetime. I'm very interested to see and learn what I've learned today at this meeting, and I'm more and more interested in the concept that if we do good quality fire and timber management, then we're going to have a lot of these species taken care, including bobwhite quail. We can use bobwhite quail as a species that excites some aspects of our communities, and then butterflies is another aspect, and wildflowers is another aspect, amphibians is another aspect; but, really, what we're talking about is good timber management, reasonable canopies, reasonable soil disturbance. Sometimes that means you have to use fire breaks, you can't get rid of it all sometimes, but really good fire frequency and smart use of fire.

AUDIENCE PARTICIPANT: A major portion of depressional and isolated wetlands is caused by subterranean collapse below the ground in geology formations as we move water around. My brother and I have over 80 years of experience in looking at wetlands collapse right in the area where we live and where we hunt. From one end of the state to the other, wetlands are disappearing through artificial drainage, manmade manipulations, or otherwise. The most important thing we need is a statewide, southeastern-wide, cooperative attitude and call it Capture the Rainfall. It starts with every private individual. It starts with large corporations. It starts with county governments in stormwater management, and certainly within our Water

Management Districts. We need professional biologists and engineers to petition the state and federal governments to look at the idea that we issue energy credits, carbon credits, and any kind of credits we can to subsidize our economy. Why don't we look at water credits on both private and public lands and certainly within large corporations? There are ways to conserve the water, but it starts with capturing rainfall.

BRIAN ZIELINSKI: The timing is probably pretty adamant based on the news we've been hearing lately because the water wars are coming, it's just a matter of time. I live in Volusia County and they're pumping water from the western side of the county to the coast. They just went through some issues around Ocala. They wanted to pump water out of the Ochlawaha to Orlando so they could keep building subdivisions. It's a matter of where the resource is going from that standpoint too. I've done a lot of walking in the woods and even in the eight years I've been here there are areas now that I've never seen as dry as they are now. And I mean they've been dry for the last three or four years. They've been dry ever since the hurricane. Water is being pumped out right underneath some of these ridges and it's going out to the coast. I think there are a lot of issues. Granted, we don't have time to get into them all here, but it's a valid point for sure.

AUDIENCE PARTICIPANT: I guess I better weigh in on the water withdrawal issue. I'm a biologist and I work for the Coastal Plains Institute. I'm working on a project right now in east Florida that is studying wetlands augmentation. I've been doing a before and after study for about seven years now where we're trying to determine whether wetland water withdrawal affected amphibians of these wetlands and what we can do about it. Our ephemeral wetlands are groundwater and rainwater driven at so they're dependent on the underlying water table but they're also dependent on how much rainfall are we getting to recharge that groundwater level. But if 18 million Floridians are getting 90% of their water from groundwater, it has a significant impact on our aquifer water level and therefore, our ephemeral ponds. Wetlands augmentation is an idea put forth by Water Management Districts to help them avoid impacts to surface wetlands in the face of groundwater withdrawal. As groundwater withdrawal occurs, try to pump some of it back into area wetlands of these in wellfields that you're pumping the water out of in the first place. I've been trying to determine whether or not, through time, that might be a feasible method for restoring wetlands. After seven years of study, the method itself has not worked in terms of increasing pond hydroperiod. Therefore, I could not determine whether or not it had effects on the amphibians living in the wetlands. I think it's a shot in the dark and I think it's a tiny little band-aid on the problem.

JIM MOYERS: Can you use gray water in that capacity? Can you use stormwater in that capacity? There are inherent risks with that in terms of what's suspended in them. But those natural wetlands can filter some of that, so do the skins of the amphibians, and that's a concern, obviously.

AUDIENCE PARTICIPANT: It's a possibility. I think not watering your lawn and not using any excess water is going to be a way to conserve water.

AUDIENCE PARTICIPANT: I'm with a support group for the Environmental Resource Permitting (ERP) DEP program. The ERP still does not protect isolated areas in this part of the state, but it will, hopefully, starting next October. What I need as a person in the support group, is information that the average person can see, feel, and do something about. What are the

critters that depend upon these habitats and other species that are very important and on the way out? How do we enable a property owner to feel good about keeping these areas intact? In the example of water, the approach is to teach people to plant what grows there naturally. That we can do, and that we have a handle on. What we really need is to help people to appreciate isolated wetlands. Talking about flatwoods salamanders, albeit it's a very important species, is not going to cut it. How do we bridge that gap to the people that are developing, the people who are buying home sites, and how do we teach people to live with fire?

JIM MOYERS: The average person doesn't know about the flatwoods salamander. However, when you educate them or provide in a development natural areas that accentuate or are provided as amenities then they can go and explore. Also to have somebody that teaches them about these things. Dan Roach from Rayonier talked about ecotourism, but there are also folks that want to buy a house on land that's not so impacted, that is green friendly. That's another way to achieve these goals and I think as a regulator, you can do that with the developers that are coming to you. Provide input that these things are valuable to the developer and set them aside as amenities.

AUDIENCE PARTICIPANT: I guess I'm looking for that gap. I can say nice things about the environment, but the species are what attract the people. What are the connections?

JOE McGLINCY: The way you get private landowners excited about it goes back to our gentleman's comment earlier, you make it financially beneficial for them. It's been done with endangered species credits, with carbon credits, with several incentive programs. You start putting economic value on isolated wetlands and all of a sudden you'll bring a lot of private landowners into it. But until you give them some financial reason... and trust me, there are people that will do it anyway, but on a scale of things, these things have got to have financial value to the landowner. How do you do that? It could be tax credits, it could be payments. It goes back to the gentleman's comment earlier: We've got to figure out a way to put dollars and cents value on these things to really get to a scale that's going to make a difference.

AUDIENCE PARTICIPANT: Is anyone doing economic feasibility studies in this area?

BILL PALMER: There are some examples in different states, where (unintelligible) and Kentucky (phonetics) they've got – The Nature Consesrvancy has got some watershed programs that are giving some incentives.

AUDIENCE PARTICIPANT: I know, but we need some here.

BILL PALMER: Yes, but it really helps to look at other states. If you look at the economics of the land, you're going to find some dollar values that it requires, and then you understand what the program is. Because, for instance, there are certain landowner programs that have been tried. Biologists decide how it's going to work and throw a $35 per acre figure on it, the landowner says, “I pulled about $175 an acre off that acre, so it's going to have to be $200 to get me to change my behavior.” There has been a lot of activity in a lot of states, so I would suggest you contact a lot of private land biologists and directors around the country and they will give you some real creative ideas of what it would take to get the job done. But Joe is exactly right, people will jump on it if they think they're going to make some money.

AUDIENCE PARTICIPANT: Some of that works with conservation easements. I couldn't agree with what Joe just said; however, I think we could take it to the next level with regards to getting incentives to specific habitats. Right now conservation easements run the gamut, pretty much get the same credit regardless of the quality of the habitat. What we need to do collectively as biologists is get on the backs of some of our representatives to instigate legislation that gives greater tax incentives to preserving natural habitats and species such that it becomes almost desirable for the landowner to have these sorts of easements with restrictions that protect these habitats. Otherwise we are dealing with low-hanging fruit. There are some folks that want that financial incentive too; however, right now the people that are strictly coming to this arena for financial incentives aren't too thrilled about putting habitat restrictions on their property, so that's just a general statement if anyone wants to respond.

AUDIENCE PARTICIPANT: I really agree with what Joe said completely. This is something that we've struggled with, the issue of isolated wetlands in particular. Just to give you an example, we know that there are really good incentives for best management practices in forestry and agriculture with respect to streams. You can translate that directly into a water quality benefit that has a benefit to society as a whole. The issue that we've been struggling with isolated wetlands is, first, I think everybody in this room would acknowledge that their importance to biodiversity is incalculable. But if we're to provide incentives that means society as a whole is going to have to come up with the money to fund. I personally don't see that as being much of a motivation. Now, certainly for people that are interested in conservation easements that may be an amenity that helps them justify it. One of the things we've struggled with and I'd love to hear your opinions as a panel, is what is it that's intrinsically valuable about these wetlands that can provide justification or cause your congressman or representative to propose an incentive program to protect them on private land or public land for that matter.

AUDIENCE PARTICIPANT: If they were essential for quail breeding, it would be a no-brainer.

AUDIENCE PARTICIPANT: One way to value wetlands is to look at what it costs to restore them. I know that there have been some studies that have looked at how to put a price tag on a wetland, and that's one possibility.

AUDIENCE PARTICIPANT: I don't know if this is really relevant, but to speak of how to make people and legislators value the wetlands, there is some really great research going on right now looking at the amount of biomass that comes out of these wetlands and goes into the uplands. It's amazing the amount of the amphibians and the insects. Dragonfly larvae are born in the ponds and in their adult stage are actually affecting pollination of crops and plants around the pond because they're eating bees. The linkages are there and there is research going on trying to quantify that to say, “If you get rid of an ephemeral pond, you're going to lose ...” This could have ramifications for quail. All these frogs and newts that go up into the uplands, not all of them make it; a lot of them die. They get eaten by birds, perhaps game birds. If you take them out, you're losing this whole production of energy into the system and that has to have some value.

JOE McGLINCY: In the realm of political reality, that's not very sexy, I mean it really isn't. To everybody in this room, we can understand that, but --

JIM MOYERS: And you're going to lose.

JOE McGLINCY: But to the audience member's point, we've got to find a hook that's, quite honestly, better than that.

AUDIENCE PARTICIPANT: You need a listed species. That's the only thing that matters.

AUDIENCE PARTICIPANT: That's what the Endangered Species Act has been doing for us and the game and fish commissions around the country who have listed species and ranked them according to their rarity or their special considerations as they get more and more likely to disappear. That's a heck of a way to try to save something because it's about extinct; but still that's what we've used. And we sure need to make sure that this administration doesn't eliminate or de-water the Endangered Species Act; otherwise, we wouldn't have a meeting like this at all.

AUDIENCE PARTICIPANT: A lot of people have mentioned the best way to manage these wetlands is through summer burns. I was wondering particularly Bill's response to summer burns and if he recommends those to landowners because I know that's when the quail nest on the ground.

BILL PALMER: That's a good question on the summer-burn issue. I hear a lot of people say quail management is winter dormant season fire. That hasn't really occurred in my existence in quail management. We really promote late March through May fire for quail management because of the hardwood issue. In native groundcover systems, we're seeing a lot of benefit to some level of June and July fire because of the good brood habitat it creates. You go back to the early records of game management which was the beginning of wildlife management and ecology studies, everybody was promoting January, February fire in the early days. Why? Because you didn't want to burn up the legumes, it was bad for the turkeys, it was bad for the quail, it was bad for all these species if you burned in the summertime. That was all of our history and what we're finding with research actually is that these birds have adapted very well, especially in the native system. Actually, if you're really focused on quail, late spring period is the best. The reason is because it promotes a lot of plant diversity and the structure to ground cover is right. All of these things add up. That doesn't mean that it's easy to change behavior of a hundred years of practices where people are burning in March. So I think seasonal burn is a red herring that gets everybody upset and angry at each other thinking one side thinks this and one side thinks that.

AUDIENCE PARTICIPANT: You've got professionals out there, people that are supposedly trained and knowledgeable, that still adamantly preach the January/February burn. If you don't burn the outside of that thing, you're destroying your habitat for your deer and turkey. How do you get rid of that?

BILL PALMER: That's the problem -- with a lot of these species we deal with, everybody is an expert. To do the individual research projects is very expensive but over time and through research, we're finding out that a lot of the old paradigms, as you would expect, are faulty. For instance, our research on the Wade tract, which is some of the most preferred brood habitat for bobwhite especially in drought, found it is important to burn ephemeral wetlands. The other thing is May/June fire. That's all -- your brood production in August, September, October in native longleaf wiregrass is in those patches that were burned. In fact, if you burn in April and

May, you'll have nests in that spot in August. Some of the same type of data is coming out on sparrows and other creatures. So I think that's something that we need to get behind us from a management group.

AUDIENCE PARTICIPANT: I work for a game agency, Georgia DNR, and my agency oftentimes tends to view poorly managed hardwood wetlands as a hard mass source on the landscape, and they are very resistant to the idea of getting rid of that. Turkeys, quail, I'm sure there's a lot of deer too, why should we as a sportsman-funded agency be logging live oaks and water oaks out of our wetlands, or should we be?

MR. PALMER: From our perspective primary productivity drives the seeds, the flowers, the insects, which is what drives the bob white population, all the diversity. One of our big foes in this is deer-hunting groups saying don't cut the oaks. But the bottom line is the grounds per acre. You get the acorn mass when they least need it, and the quality of the browse and the amount of browse per acre for deer goes up when you restore these areas. So, again, misinformation. We get it from wildlife commissions around every state we work in, where we get resistance from the agency because of the concern of what you mentioned, and I think it's another red herring.

BRIAN ZIELINSKI: As far as the turkey issue with the oaks, I always like to have a variety. Some years soft mass is good and your hard mass isn't and vice versa. I think each situation is going to be a little bit unique. That's where you're going to come in and harvest a certain percentage of the oak trees and leave some. As far as turkeys and fire, I'm a big proponent of spring burns. Yes, you may burn up a few nests; but you've got to think on a large scale here, you've got to think big scope. Don't worry about a couple of nests that you're burning up because you're having a greater benefit to the turkeys that are still out there in terms of habitat, feeding, broad rearing, etc, basically what Bill was getting into. The intrinsic or aesthetic value of a wetland and the species that are in it is a main issue because it's hard to assign a value to something like that, especially to individuals who may not deal with this on a daily basis like you do in this field. How do you assign a value to a salamander to somebody who lives in Orlando and doesn't even get to a management area, or doesn't really know how to enjoy the woods or that sort of thing? How do you get that across to folks that haven't been brought up that way to really enjoy the outdoors and really understand the stuff? I think that's a challenge that we're always going to face. The gentleman who brought up the conservation easements brought up a good thing and was really hinting at the fact that more and more within this wildlife field we are constantly dealing with policy and legislation. You've got things out there like sportsmen caucuses fighting for people's hunting rights. They have to pass legislation for the right to hunt. Do you think Aldo Leopold would have ever envisioned such a day where you would have to pass a piece of paper to say that you can go out and hunt deer or turkey or quail? I don't think I would have foreseen some of these changes in my career, and it's only been about eight or ten years so far. The last thing I'd mention is with the incentive programs. We talked about land value. If you can get $175 off this acre of land and the government cannot come up with incentive programs better than that, then it's going to be hard to alter that person's perspective or management as to what they want to do. Another battle that we're in now and probably going to be in for some years to come is that the government can't compete dollar-wise with private industry. When it comes to development, what is that acre worth? That's the reality of it. Joe had mentioned earlier that we've got a changing structure of the landowner. That's true in the sense that the landowner of old owned that land because he wanted to farm it, he wanted to

work it, and it had that intrinsic value. Now as that land gets passed down to their kids they see dollar signs and that's a big difference, especially now when developers are offering millions of dollars for small acreages of land in Florida. Even some of the old-timers see that and say, “Well hey, this is my retirement right here.” It's kind of hard to blame them when you look at it from that side.

Discussion: Restoration of Upland and Wetland Systems
This 90-minute panel discussion was designed to provide information about on-going restoration activities and to facilitate discussion regarding opportunities and methodology for restoring both wetland and upland systems.

Panelists: Margaret Gunzburger, Nokuse Plantation
Beth Mizell, The Nature Conservancy
Rick Owen, Florida Park Service
Kimberli Ponzio, St. John's River Water Management District
Lora Smith, Joseph W. Jones Ecological Research Center

RICK OWEN: I've been working as a district biologist in Gainesville for the Florida Park Service for about a year now. Before that, I worked at Wekiva Springs State Park, or Wekiva River Basin State Park as I like to call it, for four years. Prior to that, I had close to 18 years working with Florida amphibians, especially striped newts, reptiles and a lot of the other vertebrates. As an introduction to my comments on restoration, I'd want to bring us back to two of Rebecca's greatest threats [to amphibian conservation]: ditching and fire suppression. Fire suppression is a restoration technique that we've talked about throughout the day today and we use that as a very valid management tool in the Florida Park Service, just other agencies.

I'll start with the ditching aspect because I think that is one of the things in terms of restoration that we in the Florida Park Service have to deal with because of situations we've inherited in our State Parks. Guana River State Park was the first place I worked in the Florida Park Service and there were ditching issues, like a lot of other places where in the past man has tried to drain water off for development, etc. There's a long history on that peninsula of doing all kinds of alterations to the habitats but, coincidentally, the striped newt population is there. One of the projects at that park was a restoration of that inter-diurnal swale marsh system. Striped newts and mole salamanders were there, as well as a lot of ephemeral pond-breeding amphibians that we've talked about today. Where you have natural communities like Guana River State Park and Wekiva, the mission is either to maintain it in that natural community or restore it back to the natural community that we once thought it was. This inter-diurnal swale system is an example of that, where we've gone in and plugged up areas where water was being drained off to create a more ephemeral system, so to speak. Previously, water went freely back and forth. Dikes and levies and so forth are still in place in certain places of the park but this system is now a little bit better than it was when we first acquired that property.

BETH MIZELL: I'm a restoration specialist with The Nature Conservancy. We manage about 6,400 acres in Liberty County of intact sandhill, or getting to the point of intact. We've had a very aggressive restoration program there. Our program actually pioneered wiregrass reestablishment and working on groundcover restoration techniques, specifically for sandhill systems, but those techniques can be applied across the landscape. One of our important objectives in that program is to actually export that information to our partners to help them manage and conduct restoration activities on their land. A little bit about The Nature Conservancy, we're a global not-for-profit conservation organization. We're interested in protecting the plant and animal diversity and the lands and waters that they need in which to survive. I know our panel is talking about restoration, and I also have experience on the Apalachicola National Forest, but another one of my specialties is invasive species management.

And something that hasn't come up today is hogs and the impacts on our wetlands, ponds and amphibians. I was hoping to generate some discussion about that from some of the audience members, what their experience is, or if there's any kind of significant research out there and go from there.

LORA SMITH: I'm an assistant scientist at the Joseph W. Jones Ecological Research Center. I was fortunate to spend a lot of my career in Florida doing striped newt and gopher frog surveys around the Peninsula. I didn't find very many, but I did get to see many different types and conditions of wetlands, especially compared to historic sites. Where I work now, we have almost 30,000 acres and lots of isolated wetlands in reasonably good condition. But the larger picture in southwest Georgia is that the landscape is dominated by large-scale agriculture and we have no federal, state, or local protection for our isolated wetlands. Conservation of isolated wetlands in Georgia is not on anyone's radar screen. There are management issues, such as fire suppression, on the few protected state lands in Georgia. On private lands we are faced with attempting to restore agricultural wetlands. Hopefully, we can talk a little bit about that today. We are struggling with questions related to placing human values on these wetlands. As Margaret mentioned, there's potential value to human health in wetlands with intact food webs. Scientists at Jones Center and University of Georgia are beginning to compare the mosquito fauna of undisturbed and disturbed isolated wetlands because mosquitoes are potential vectors of human disease. So, as wildlife biologists, in order to justify protection of isolated wetlands, we need to think outside of the boxes that we're so comfortable with.

KIM PONZIO: I work at the St. Johns River Water Management District and before anybody gets the wrong idea, I'm not in regulatory, so I know nothing about the regulations of consumptive use permits or water supply. I am a botanist and I work in wetland restoration. I've worked from south Florida up to central Florida, in the Everglades, in the Kissimmee River, and in the upper St. Johns River basin. I've had an 18-year career in doing restoration in floodplain wetlands. Most of these areas are areas that were diked and drained for agriculture in the '50s and '60s. We then acquired those properties and restored them back to wetlands. As you might imagine, the most important thing is water, water, water. If we get the water right, then in most cases...the "build-it-and-they-will-come" type of mentality works. We manage the system with fire and we do manage exotic species. We have the wetland augmentation study mentioned previously. So there are a lot of studies ongoing about ways that we can better manage our properties. What we're trying to do with fire is to actually implement the role of fire in these ecosystems. Because they are so degraded and fragmented from what they were naturally, we can expect areas that are leveed off to have fires creeping into them when the water levels allow. We're looking at sort of the ends justifying the means of trying to have ecosystems that are more like native habitats. Those are not our goals since we do not expect that we could ever return to something that was from pre-Colombian times because we are dealing with such a degraded system with respect to chemistry and hydrology and fire, as well as other aspects. Most of the areas we restore were in cattle management. There is no timber that I know of in the upper-basin lands, which runs from Vero Beach up to around the Orlando area. We own and manage over 300,000 acres and with very little focus on isolated wetlands. Basically the theory is, if we get everything else right in this large area, we try to manage for the entire gamut of habitat across that area. We have little pieces of scrub here and open water, obviously, in our lakes.

I recently went to a Society for Ecological Restoration conference in California, it was hot-off-the-press research that a graduate student did in looking at the impact of Atrazine and some other chemicals, on tadpoles. They could not find any one particular chemical that would gather immune responses from tadpoles except when two or three chemicals were put together. Their in-laboratory studies showed that when tadpoles were subjected to something as benign as yeast, those that were not subjected to the herbicides were unaffected and those that were subjected to herbicides died in three days' time just from being subjected to yeast. Earlier, we were talking about pesticides and ways that we're managing our lands may be impacting amphibians. I think that almost everybody here knows that there has been a decline of amphibians worldwide. Maybe what we can do is take some of that in the incentive programs where you're talking to the natural layman and say, look at what is happening to amphibians; think about what's happening to you. You're not as thin skinned as an amphibian, but this is what is happening with the chemicals that are now in our environment. That is something that they can really say, “yeah, this is going to affect my children”. I need to be worried about the water that is not only going into those little ponds but the water that is going into my kid.

MARGARET GUNZBURGER: I got my Ph.D. from Florida State University and then did a postdoctoral at the U.S. Geological Survey in Gainesville. I have about ten years' research experience on amphibians in the southeastern U.S., in isolated wetlands as well as other types of wetlands. Right now I'm working at Nokuse Plantation, which is a 48,000 acre, privately owned, nature preserve in Walton County, Florida. Our goal is ecosystem restoration. We are not a public-access preserve so have a very unique capability in that we don't have to deal with a lot of the issues in our restoration that State and Federal land managers do. We still have challenges but we are in the process of ecosystem restoration to longleaf pine. More than half of our soils are xeric, but a little bit less than half are wetland flatwoods type soils. Challenges to restoring our wetlands and our habitat are the same as everywhere, hardwood encroachment, bedding. A lot of the land is slash pine plantation which we're converting back to longleaf through thinning of the trees, under-planting longleaf, and burning. We're trying to do some of unique things, similar to what Lora [Smith] talked about during her presentation. As we're thinning slash pine from some of our wetlands, we're actually having the timber crew chop down the titi while they're in there trying to get to the slash pine. We also have the timber crews pull trees back across beds and drive their skidders across the beds when it's dry because it breaks the beds down a little bit. We're trying to be creative about our wetland restoration. I've learned the importance of intact habitat in my brief time of working in ecosystem restoration. Where there is intact habitat left, it is so important to preserve it because it’s much harder to restore it. This is something we all need to keep in mind, that where there is still intact habitat, we've got to try to acquire it and protect it. Also, I've been amazed at how the degraded habitat responds to management. These slash pine plantations are bedded, they look awful. We thin it, we burn it and now there are pitcher plants growing in the beds, there is wiregrass. There is a lot of resilience to the ecosystem so the degraded habitat shouldn't be written off.

BRUCE MEANS: In relation to the seed bank and the fact that there are a lot of wetland plants still dormant in the seed bank, Tom Ostertag did a study on one of our properties near Pensacola. We had a 40+-year old stand of titi that had encroached on this beautiful wet flat savannah, and there was at least 24 inches of nothing but solid titi litter and twigs. There was no herbaceous vegetation. Tom got even wiregrass seeds to germinate out of that. Forty plus years of dormancy, wiregrass, not a lot, but some was still in the seed bank.

AUDIENCE PARTICIPANT: What application was made to release that?

BRUCE MEANS: I'm still trying to figure out how to get rid of it without burning up the local neighborhood. It's a master's thesis he did at the University of West Florida and Tom Ostertag now works for FWC.

AUDIENCE PARTICIPANT: I hope that one of the things that comes out of this whole meeting today is that what we're trying to emphasize is put the best minds and the best ideas together with a common sense attitude. First and foremost is to restore the geographical wetlands. We need our Water Management Districts and our legislatures to look at the idea of coming up with an Environmental Resource Permit (ERP) that is basically designed for restoration. As of today, hardwood removed from wetland areas, is $10-$12 a ton. It pays for itself to remove that stuff if you can find the people with the equipment and you've got enough of it to remove to make it worthwhile. Along this line, it seems that whenever you start talking about restoring a geographical wetland, the question that comes up is: How are you going to manage something like that? I'd like to see a consensus idea of the whole group today that we make a recommendation of the formation of a biological research panel to address the FWC, the Florida Stewardship program through silviculture, and the Water Management Districts, to look at how we're going to come across to combine private, public, and also commercial enterprise in the form of capturing rainfall. The idea of subterranean movement underground is getting greater. The way to try to offset that is to capture water that is overflowing and going downhill. There could be an incentive put in the form of subdivisions that already have storm water ponds, that if they capture the maximum amount of storm water rather than just the minor amount there is an incentive. They are capturing water coming from the streets, the yards, or otherwise and if its filtered and percolates back into the aquifer, you are adding value back to our system. I hope that we can come across with the consensus of forming up a panel that will involve all three of these major agencies so that they can make the recommendation to the legislatures to move this kind of action forward.

AUDIENCE PARTICIPANT: I just wanted to add that the North American Wetlands Conservation Act is fairly new. It offers monies to restore wetlands. The one caveat is that there has to be some link to migratory birds, particularly water fowl.

AUDIENCE PARTICIPANT: There are really two things that we can do here. In this area, depressional wetlands do offer habitat to two declining migratory birds, Henslow's sparrows and (inaudible). So you could tie in some restoration work with regards to those. The other thing is, as a group, we can collectively weigh our opinion in on these folks that are making decisions to possibly include amphibians as part of this act. It's really working out west with great success. It's also working in coastal areas with great success. It would be neat to see that get tied into some of the wetland systems that we're working on.

AUDIENCE PARTICIPANT: I would strongly support an ERP process that addressed habitat restoration as opposed to the process our and other have to go through when trying to do wetland restoration. You treat it as a developer as opposed to a restoration project.

AUDIENCE PARTICIPANT: About the water issue, it's not a wetland restoration issue; it's really more of a landscape scale issue. In southwest Georgia, not only are we using a lot of water to support our regional economy, but we're also losing a lot of water during the recharge season.

In agricultural areas, as in urbanizing areas, as you start to convert land from natural vegetation into a Wal-Mart parking lot or an agricultural field, as you start to diminish by preparing buffers, you have an accelerated hydrologic response. Water is essentially being lost to surplus runoff that would otherwise be going into the regional aquifer systems or the shallow water table that supports these isolated wetlands. I think that the wetland restoration issue can't be viewed hydrologically in isolation. We need to start viewing spring sheds, aquifer sheds, start looking at incentives for land management practices that discourage an accelerated hydrologic response on a regional basis regardless of land use. It's starting to happen in suburban and urban areas with rain gardens and things like that, but it really needs to be a comprehensive view.

AUDIENCE PARTICIPANT. I'm in ERP and usually people come to us because they want to destroy something; they don't want to restore something. Restoration might be part of the deal as mitigation but we don'

KIM PONZIO: As far as permits, even an agency like the Water Management District has to obtain permits to restore an area. We have to obtain these permits as if we're destroying the wetland, but we're trying to restore it. So it's even difficult for agencies sometimes to obtain those permits. We have to jump through the hoops. The funding also exists just for private landowners. We, on several of our restoration properties, have used monies from Natural Resource Conservation Service (NRSC), the wetland reserve program, to acquire restoration properties and to restore properties. It has run the gamut of buying properties, treating invasive aquatic weeds, removing cattle, back-filling ditches. We don't have a lot of money to do this on such a large area, so we rely on the seed bank. I think there has only been two places we've ever planted, which amounts to maybe about a hundred acres, tops. The rest of it is relying on the remnant seed banks that are in these floodplain wetlands, as well as those ephemeral wetlands that are up into the ecotonal areas. Our problem lies in the fact, in the ecotonal areas, there's Bahia grass all around those ponds. We are doing an experiment now to find out how to restore those ecotonal areas so that they're not exotic Bahia grass but they can then be like a native range.

AUDIENCE PARTICIPANT: One of the issues is invasive plant management and its effect on these ephemeral pond areas. I'd like to get comments from the panel. When we're doing hydrologic restoration on some of these Wildlife Management Areas, an issue we have is grass herbaceous species, which we want to manage for within these ephemeral ponds and that respond wonderfully to fire. If you burn them, they come back even thicker. In your experience, when you're trying to manage ephemeral marsh systems with exotic species that don't respond to these traditional methods, what experience do y'all have in dealing with those type of instances?

BETH MIZELL: We have a similar situation on the National Forest. Japanese climbing fern is beginning to come into documented flatwoods salamander ephemeral ponds, which is really awful. We do have certain mitigations that we're obliged to comply with just through our neighbor process, like 100 feet buffer, no herbicide use during the breeding season; so we can treat during the dry periods of the pond. Aquatic label herbicide is the tool in our tool kit that we're using every time, and it could be a similar situation with Chinese tallow or any of these wet-loving invasive species. They can alter the substrate, change the function of the system and alter the fire regime, everything that we need to keep these ponds in check and keep them healthy. I think your best friend is conscientious and appropriate herbicide use but timing is

critical. Use the least herbicide that you need. If you don't get a check on these invasive species, you're going to lose your pond, and you're going to lose function across the landscape.

AUDIENCE PARTICIPANT: We're on the same team, but I disagree with the use of chemicals. I can't imagine a use except if it were in a pinpoint area. Invasive species are here and the damage is done, and if we use something bad to eradicate something bad, all we have now are two bad things in the environment when all you had to begin with was one. I don't know how quickly some herbicides will biodegrade, but once they've percolated down into our drinking water and the Floridan aquifer, they might live in the basins of our wetlands, even though they may be dry for a while.

MARGARET GUNZBURGER: I think all land managers, or most of them, consciously try to limit their use of herbicides when they can. But we're not the only ones using the chemicals, and the land managers for ecological restorations are by far the minority of the amount of chemicals being dumped into our environment. I think it's dangerous to try to take that tool away from land managers when everyone else is doing a lot worse in terms of dumping, for example the Everglades agricultural area and that kind of stuff. I think it would be a mistake to try to limit the limited use of it for conservation purposes. Sometimes I think it is over used in restoration. But in the case of cogon grass, if you want to get rid of cogon grass you've got to herbicide it. There is no other way to get rid of it and you can't just let it go because then you lose your wiregrass.

AUDIENCE PARTICIPANT: I think you have to think about the longevity of the damage. Yes, herbicides are some sort of finite amount of damage. Is it going to be there ten years from now? Probably not. It's almost certainly not going to be there a hundred years from now. Cogon grass is going to be there until the next ice age. If you ever want to see a flatwoods salamander in that pond again, you've got to get rid of that cogon grass. I think most people are willing to tolerate an herbicide in the pond, which I think is an overstatement of the damage, in order to get rid of cogon grass.

MARGARET GUNZBURGER: It is an area that is worthy of more research and more monitoring. We don't know how much to put out so we need to be looking at how we can put the minimum out.

AUDIENCE PARTICIPANT: One of the issues that has come up over the last several years is that in aquatic systems, you're required to use aquatic herbicides. Being in aquatic enhancement, any time you spray you have some people that say it's a poison, it shouldn't be used. But in the instance brought up a little bit earlier about the Roundup killing amphibians, it was shown that the herbicide itself, Glycozine, isn't killing the amphibians. It's the surfactants being used in the herbicide. There is very little testing done on the surfactants used in the aquatic vegetations, but the herbicides that have been used for aquatic use have a very long history. The companies spend literally $20 or $30 million to get an herbicide approved. If they don't have a market for it, they're not going to spend the money to do it. I hate to hear we should limit herbicide use in systems where you don't have any other option.

LORA SMITH: I'm afraid to drink the water in some places too but you don't want to take away any of the much-needed tools for restoring disturbed habitats. I do agree however, that we need more research on the effects of these chemicals on amphibians. If you look at the literature on

things like Roundup, for example, it's been tested on fish and some invertebrates, but it would be nice to know the specific effects of this product on amphibians. The most recent outcome on some of the Atrazine work is that EPA has decided there is no negative impact on amphibians despite pretty credible studies to the contrary. However, the judicial use of herbicides for restoration of habitats may be worth some risk.

KIM PONZIO: I wanted to express what we do at the Water Management District. Since we have such a large amount of area that we have to manage, we have an invasive plant program, and we focus on areas where there are large infestations of certain species. I don't believe we've ever treated any of our isolated wetlands and nobody is paying any attention to them. We're not treating our isolated areas, but where we are finding, for example, Japanese climbing fern, we are doing large-scale treatment of those plants in the floodplain marsh. We saw what happened in south Florida when it got away from them and we try to keep everything at what they call "maintenance level". We're also doing some research studies with the University of Florida. There was some research done at Fort Drum Marsh Conservation Area down near Vero Beach, on torpedo grass, an exotic invasive. Some were questioning whether it provides the same form and function as *Panicum hemitomon*. So if we're going to budget the amount of herbicide we're going to use, we should use it on the really nasty stuff like the Japanese climbing fern. One I just heard about this past week was West Indian Marsh grass. They're doing herbicide research on that too. Before we start spraying these things willy-nilly, there is research being done to see whether or not we can be effective. Then we have to decide as a management and resource agency, whether or not we should. If we can kill it, could we and should we? I think that's a good point especially with what we're seeing happening with amphibians worldwide. We don't want to just throw herbicides in areas, but we also don't want to take it out of our tool box in areas where we think it's crucial that we're going to lose habitat.

AUDIENCE PARTICIPANT: I use herbicides in restoration work and have to keep really abreast of all of the labeling and requirements. One thing you need to look at with herbicides is Atrazine. I'm surprised the label even still exists on that and why the EPA even allows it. It's probably one of the most soil-active herbicides on the market. The EPA has been slowly removing those types from some of our more modern herbicides. You're comparing apples to oranges when you're looking at them as far as the soil activity and impacts on the site.

AUDIENCE PARTICIPANT: I want to change gears here. What if we restore it, if we burn it and we bring it back from a hydrologic function and a plant community function, but nature is not resilient enough to bring back the fauna? Is there a role for us to play in recognizing that we've interrupted metapopulation function and there's no chance for natural restoration of populations? Is there a role for us to play as ecological restoration specialists to assist in terms of species restoration?

LORA SMITH: I think there is a role. To my knowledge, this is not yet being addressed at a large scale. But, for example, we're providing larval gopher frogs to Georgia DNR for a reintroduction project on some TNC property in Georgia. However, I feel strongly that we should learn from past experiences with relocations, particularly in terms of potentially spreading diseases. When I look at the landscape at a place like Ichuaway, where we have some nice, well-managed wetlands that may no longer have flatwoods salamanders, perhaps these sites should be considered for reintroduction of this species. I'm not opposed to such invasive conservation actions, and anyone that knows me knows that five or ten years ago I wouldn't

have said that. But do I think we need to learn from the past.and consider risks associated with these actions. But people want to do reintroduction because it makes them feel good.

AUDIENCE PARTICIPANT: At Georgia DNR we are doing that in a limited manner. We started with frogs and we've been doing it outside of our Coastal Plains with bog turtles. I wish we could say that some of these fauna species would come back from the seed bank. I want to make a point about herbicides. In some cases, I deem the use appropriate when your natural disturbance regimes are interrupted to the extent that you would never reestablish the disturbance regime necessary to maintain the habitat over time. In order to get a system back to some semblance of a natural disturbance, sometimes herbicides are your best bet. We've tried to be judicious in our use of herbicides or surfactants and trying to select herbicides that bind with molecules of the soil and are not transported and degraded fairly quickly.

KEVIN ENGE: Regarding reintroduction, we have a state-wide management plan for flatwoods salamanders, and that is one of the things identified as a possible. If you have no source population, you're not going to spontaneously regenerate. Also I'll mention, they are introducing gopher frogs to phosphate land in Polk County, Florida. Basically, they're mining the areas where they're destroying gopher frog ponds, and they're creating ponds also where they introduce gopher tortoises and other species. They have eight wetlands that they're creating as gopher frog ponds, and they're taking tadpoles and adding egg masses, artificial reproduction. It's been going on for several years, and they've spent a lot of money. The nice thing about gopher frogs is they do use borrow pits, so they do use artificial wetlands.

KIM PONZIO: We recently had an introduction of a non-amphibian species in one of our wildlife management areas. Actually FWC manages it, and we own it, the Bull Creek Wildlife Management Area. They reintroduced some breeding pairs of red cockaded woodpeckers (RCWs). We've also had other places in the District where they've reintroduced RCWs and to my knowledge, there hasn't been any other species reintroduced to any of our lands. We certainly have enough land for it that was probably not in a condition that would support some species, but now has been restored and is being managed. So in the future there could be potential reintroductions into District lands.

AUDIENCE PARTICIPANT: I want a little bit more discussion on mechanical methods of hardwood removal around ephemeral ponds and fire shadows and your biological opinions or observations -- methods and techniques that could be used that don't impact the ponds and can be used while you're thinning.

LORA SMITH: We were working in wetlands that were less than 0.5 hectares. At this small scale we girdled the trees by hand, which of course is not disruptive to the wetland, it just takes a while for the trees to die. Then we used feller bunchers and to remove larger trees, which had pretty low impact. Elsewhere on the property we were trying to actually derive income to pay for hardwood removal across the site, so we had contractors that we handpicked and had a lot of oversight with them on the property. They worked in and around the wetlands and removed hardwoods. They were extracting some of the valuable hardwoods for income and then agreed to take away some of the trashier stuff for our restoration purposes, but they were very gentle on the landscape.

MARGARET GUNZBURGER: We're trying to follow in the same footsteps of how to get rid of these hardwoods because it is hard to get rid of them. We're lucky in that we're harvesting a lot of our slash pine. We're thinning the slash pine plantations so that we can start burning and start with the restoration. As we're doing that, we also have two timber crews that are very willing to do things for us like drive their skidders over the beds. Also, in a lot of our flatwoods with slash pine plantation, titi is 20 feet up in the slash pine. They've got to chop down the titi just get in there to cut the pine trees. It cuts into their ability to harvest a lot of trees, so they make less money, but they're still able to keep working for us. That's one of the things we do. We also are going to be experimenting with using our own tree-cutter-type machine to go into some of these wetlands and just chop down as much of the woody stuff as we can because we have titi, gum, and some oaks. We have a lot of ponds that have tons and tons of small cypress, just way too many small cypress, and we're hoping that natural restoration of burning is going to get these ponds back. But it's a work in progress, and we don't really know how successful it's going to be yet.

AUDIENCE PARTICIPANT: But are you using specialized equipment in the ponds or --

MARGARET GUNZBURGER: No. The timber crews are just using their skidders and things like that, their tree-cutting machines. The way we can do this is that it's dry. It's been so dry that we've been able to get into areas that we probably will never get into again if it ever starts raining. So right now they're not putting ruts in; they're not damaging the ground like they would if it was wet.

AUDIENCE PARTICIPANT: That's more recent, not long-term that you've been able to do that?

MARGARET GUNZBURGER: This property is relatively new, so this is in the last couple of years. If it's really wet in your wetlands, that adds a whole other problem to getting in with the mechanical equipment. Now that we've had a bunch of rain, we've actually pulled out of those wetlands, and we're doing sandhill thinning now.

RICK OWEN: I can comment on what we did at Rock Springs Run State Preserve over in the Wekiva River Basin. We have the southernmost population of the striped newt. In some of the properties on the park, there are some continuous populations that are still being found and even new populations just within the past couple of years. One of the historical sites where striped newts are known is a piece of 300-acre scrub known as Speer Scrub. They did work around the pond and removed what had encroached in there. Scrub in that area has a lot of sand pine, it's native to that area, but it was just thick and overgrown in many cases. We did want to get fire into that 300-acre zone, which was bisected by a road. The way they approached it was to log the entire area, leaving a buffer around the pond itself. Now dramatic, of course, in terms of mechanical treatment to the ground, but knowing the landscape is contiguous to some of those other ponds that we've now more recently found with striped newts, you might expect that you will have some dispersal to the pond through time. That's an example of a restoration that we did there.

AUDIENCE PARTICIPANT: Dr. Means mentioned in his talk the use of borrow pits by amphibians, ephemeral borrow pits I would assume. We work on a lot of lands that are old agricultural lands where people dug borrow pits, or they're mining lands in central Florida where you have deep-mined areas and we want to enhance the borrow pits to make them more

useful for amphibians. How would you create an ephemeral pond in these areas that have been heavily mined to get optimal use?

BRUCE MEANS: This is a crazy thing, U.S. 319, which goes south of Tallahassee, was in the process of being four-laned seven or eight years ago. I got support from the Florida Department of Transportation (FDOT) for about six years to study the effects on amphibians using an adjacent pond. They were no doubt thinking we will get data to help figure out what we're going to do about mitigating these ponds. I already knew a couple of old borrow pits along this road that the animals utilized because, decades ago, FDOT inadvertently made the ponds deep enough so that the hydroperiods were right and the animals came. I said to them, "When you widen US 319, I'll help you design your stormwater runoff ponds to be suitable for these amphibians." I went to a big meeting with FDOT officials and they were adamantly against it. The reason was that the road expansion was going to be federally funded one of these days, and then they would have a real big problem with the Fish and Wildlife Service. I called Linda LaClaire, who was the contact person, and she said, as you might expect, that the Fish and Wildlife Service would be happy to have you do that. You might kill a thousand more striped newts, but you're going to have ten thousand. The net gain to the species will be much better, so I'm all for it. Ryan [Means] recently has been trying to get the City of Tallahassee to consider doing the same kind of thing as they're widening a right of way, and they backed out of that. I mean what can you do?

AUDIENCE PARTICIPANT: You're talking about engineering the permeability of soils, the ground water tables, and even then you can't hardly predict what is going to happen.

BRUCE MEANS: You can construct them in certain ways though like putting liners in them. It's an engineering feat. It's something that engineers can work out, there is no question about that.

MARGARET GUNZBURGER: There are published guidelines. There is information, like Bruce says, on ways that you can make stormwater-type borrow pits function better as ephemeral wetlands. The Vertical Pond Guide is not perfect for our area, but it gets a lot of the ideas across about vegetation, hydro periods, that kind of thing.

LORA SMITH: The project Kevin mentioned with a mining area, they just scraped up the substrate in ephemeral wetlands, rolled it up and then put that down on the restored wetlands, and it worked for establishing the vegetation and some of the amphibians.

AUDIENCE PARTICIPANT: Yes, I think there was gopher frog reproduction.

KIM PONZIO: I want to change the topic a little bit. I want to ask the group if they have any experience with managing ephemeral ponds in the areas that are grazed by cattle. Nobody has been talking about that. I guess mostly you have silviculture up here, but down south we have a lot of cattle grazing, and we even have leases on our land. There is the MacArthur Agro-ecology Research Center down in the Okeechobee area looking at some of this information, such as impacts on amphibians. There was also some work done in Avon Park Bombing Range on brown-tail muskrats and the effects of cattle grazing. Does anyone in the audience have any recommendations or research that points to how cattle grazing is affecting ephemeral ponds?

AUDIENCE PARTICIPANT: Tall Timbers doesn't have any data on that but on conservation easements, we don't allow grazing in ephemeral ponds or actually anything that we designate as a special natural habitat.

KIM PONZIO: Do you have an official policy to that effect?

AUDIENCE PARTICIPANT: Yes.

KIM PONZIO: I'm also looking for an official policy that FWC may have because they have an unofficial mandate that they're going to do half the stocking density that NRCS recommends for their native ranch or improved pasture lands that are being grazed. I can't find that's actually a policy.

AUDIENCE PARTICIPANT: If the cows are eating the soft aquatic species, which they do, how are you keeping their excrement and their urine out of these things?

MARGARET GUNZBURGER: I think cattle grazing and ephemeral wetland management are not compatible uses in the same area. Based on what I've read and the work from the Archbold Biological Station, you can't have cows grazing in wetlands.

BRUCE MEANS: You guys have got to remember that we are living in a vacuum and there needs used to be a huge megafauna evolved with all this stuff. It's only been gone for about ten thousand years. Bison were here just a few hundred years ago so, if anything, we ought to allow bison. Just because a cow craps in water, it eats the vegetation and then it recycles it and it goes back in the water, that is not adding anything to the system.

AUDIENCE PARTICIPANT: There's a fundamental difference between the megafauna and the bison and the cattle as that megafauna. Bison graze and move on. Cattle are often fenced within areas and they pretty much stay there until they mow everything down and then they are moved on.

KIM PONZIO: You're right, cows just eat it and poop it back out again and nothing is added except, as said, they are confined to an area so there is more pressure on certain areas than there are on others. But also, their feed is supplemented, so they are adding the nutrients from their supplemented feed during certain times of the year. From reviewing the literature, I know their hoofs are compacting the soil like we talked about with heavy equipment and they're also killing egg masses and things when they're walking around. They're eating *Panicum hemitomon,* which is a major food plant and structural housing plant for the round-tail muskrat and a great plant for amphibian egg masses. So reduction in the cover of that particular plant is crucial, and cows prefer that plant. So whenever they can get into the wetlands, they will. They will prefer it over a Bahia grass pasture. Does anybody deal with any of these issues?

AUDIENCE PARTICIPANT: We had a student working in floodplain wetlands along the Chattahoochee River in the small headwater streams, looking at a range of things in cattle grazed areas versus areas that were buffered. We saw lower water quality, lower in-stream organic matter, soil bank erosion, riparian diversity, and very little riparian regeneration in cattle grazed areas. There was also a measurable impact on the amphibian diversity.

LORA SMITH: Right, it wasn't as dramatic as some of the other metrics, but she found higher numbers of salamander larvae in unimpacted streams than in impacted streams. It's pretty suggestive of an impact of stream degradation on salamanders.

AUDIENCE PARTICIPANT: I believe George Tanner may have a few publications on the carrying capacity of cattle grazing on uplands.

AUDIENCE PARTICIPANT: Regarding cattle and possible effects on pond-breeding amphibians. Overgrazing alters the uplands and we've been talking today about how important the uplands are around these ponds. The uplands are not just altered; they're completely changed into a very low-lying grassy environment. We're talking about overgrazing because the concentration of cattle in certain areas is so high that the structure of the upland community is turned into a monoculture, a grass. Then you've got the situation of cattle swimming and lounging around in high numbers in your wetland and defecating. My gut feeling would be that there is a detrimental impact on pond-breeding amphibians for overgrazed cattle crops. Now if it's not overgrazed, that's different.

LORA SMITH: I think the key phrase is probably overgrazed. I'm thinking which is worse, a pasture land and maybe fencing cattle out of wetlands versus a Wal-Mart? But we could definitely provide some recommendations on that.

AUDIENCE PARTICIPANT: I want to change the subject if I could. What about restoring cutover cypress, both with little regeneration and with extensive stump sprouting, in strand swamps?

AUDIENCE PARTICIPANT: There was a study a couple of years ago that the Division of Forestry combined with the University of Florida with Susan Vince and Mary Duryea where they clear-cut different kinds of cypresses and looked at the re-sprouting rates, the effect of different kinds of cypress planting, and the effect of the restoration strategy in those sites. That information is available from IFAS. Basically, they found that as pond cypress got larger, it didn't re-sprout as well because the buds got occluded inside the canopy layer as it grew out. The small cypress trees sprouted in fire better than large cypresses. The nursery in Chiefland grows some cypress if you need some.

AUDIENCE PARTICIPANT: When you have extensive stump sprouting and it can be so thick, with like five coming out of the same stump on a younger cutover cypress, should you chop some of that out?

BRUCE MEANS: They exhibit dominance over time though. One of them will assume dominance, and the rest will die.

AUDIENCE PARTICIPANT: We have a couple of cypress swamps on Jekyll Island. Is there a preferred basil area for a cypress swamp, ours is really dense. Does anybody have an opinion about what is too dense?

MARGARET GUNZBURGER: I don't know that I have an answer but we do have similar issues. Problems where there's almost no light reaching the pond because there are so many cypress

and that's obviously not a productive wetland. I would be very hesitant to go in and cut out and thin cypress.

AUDIENCE PARTICIPANT: I know that Catherine Ewell has done a lot of research on fire in cypress ponds, and her research has showed that those ponds were essentially thinned by having fire run through them. Fire kills the younger cypress trees, so those really high densities are probably not natural.

AUDIENCE PARTICIPANT: We need to look at forming all three agencies up that have anything to do with a wetland. We need to expand the Best Management Practices (BMPs) that are covered under silviculture which will basically address the restoration issues. I myself have been raised in cattle since I was a little kid and we have one of the best wetland systems around in Pasco County. They completely obliterated all the little oak sprouts underneath the cypress trees that you cannot get out any other way. Cattle have a positive value. They also have some adverse values. As far as water quality, the crawfish definitely will take care of all of the byproducts of what the cow produces, believe me. So again, we need to put our best ideas together in a comprehensive plan of some kind. Perhaps we need to take this best management program that we've got that already covers the silviculture issue and let restoration float into that along with the guidance of the Water Management District and also the management of the endangered species and our regular species and our invertebrates. We need to put it together in a complete thought.

MARGARET GUNZBURGER: We heard a presentation this morning about the PARC habitat management guidelines, and that document is intended to help. The problem with the BMPs is they are ways to minimize the effects of silviculture, it is not a restoration document. If your goal is ecosystem restoration, BMPs are not the framework that you necessarily want to use. For example BMPs include cutting cypress out of wetlands and if you're doing restoration, you're not into clearcutting wetlands. They serve a good purpose, but their goal is not ecosystem restoration. Somebody from DOF can correct me, but that's not the purpose of the BMPs.

AUDIENCE PARTICIPANT: I strongly disagree with you because I've been involved in the stewardship program since 1991. The original goal was to look at the multiple uses of wetlands for specifically that. The silviculture plan is a part of restoring and protecting and preserving those wetlands. That's why those guidelines were written in that manner.

AUDIENCE PARTICIPANT: Within the wetlands, those guidelines were set aside to protect and restore the wetlands and not destroy them or adversely alter them. So we already have a basic guideline there. I think it would work as good or better for FWC, along with the permitting process of the wetlands from the Water Management Districts, that we have a complete program put together. But one agency needs to lead the show.

AUDIENCE PARTICIPANT: The agency can't lead the show. The legislators and their friends have to lead the show. The agency has no power, authority.

AUDIENCE PARTICIPANT: She's right, the agencies don't tell the legislature what laws to do.

AUDIENCE PARTICIPANT: But it would be good to have someone take the lead on these animals that live in ephemeral wetlands. The only agency that can do that is the Fish and Wildlife Commission; DOF can't do that.

AUDIENCE PARTICIPANT: We have our stewardship program which helps landowners write plans to achieve the landowners' objectives. If the landowners' objectives are wildlife, then we get biologists and foresters together and we write the plan to help achieve those objectives. And if there is any way possible, leverage some money into getting that done. You've got to be clear on what those BMPs are; they are silviculture BMPs for water quality. They only apply to silviculture and they only apply to water quality with one exception, and that exception is Florida. BMPs came about because the timber companies and the EPA negotiated after the Clean Water Act, and the timber company asked to do this voluntarily and not by regulation. The timber companies got with their state Divisions of Forestry and developed BMPs that EPA approved. In Florida, there was a lot of controversy in the early '90's and the Commissioner of Agriculture put together an advisory group. That advisory group was very adamant that some wildlife considerations be mentioned in the BMPs and that's what they are. There are wildlife mentioned in the BMPs but you should not make any mistake that the purpose of the BMPs is to protect wildlife; it's not.

AUDIENCE PARTICIPANT: The BMPs were put in place to protect the stream structure within the bank, not the transitional zone, not the floodplain structure. They were put in place for turbidity, that's the only water quality factor they affect. They don't modify the impact from the changes in the upland, in chemistry that goes into the stream. You can have pH changes and you can have all kinds of things from the soils being disrupted that these BMPs don't address. It's just for turbidity and within channel-habitat structure, and that's it.

AUDIENCE PARTICIPANT: And agencies will not take the lead on some of this stuff; whether they can or can't is irrelevant.

AUDIENCE PARTICIPANT: It sounds like we should end this meeting with a list of urgent things that we think ought to be addressed at a governmental level and list them at least so that we, as a group, can put those out. Such as, 35 feet isn't enough of a buffer for a stream or around any wetland. Thirty-five feet is hardly as wide as this room.

AUDIENCE PARTICIPANT: Being from the government, I think there's a lot more power coming from private landowners and from nongovernmental organizations. For example, the power of Rebecca bringing her management strategies to the TAC committee for the silviculture BMPs is a lot greater than FWC biologists championing certain things, and probably a lot more effective.

AUDIENCE PARTICIPANT: You're absolutely right. My number one recommendation is to find out when this technical advisory group meets again. Don't consider it a public meeting, get in touch with them and say you'd like to make a presentation there and talk about this. You might get some traction somewhere. Even if you got traction on the public lands, that would be a step in the right direction because the public lands, they're not being managed well.

AUDIENCE PARTICIPANT: And you want to talk to your local governments.

KIM PONZIO: I agree that we need to have more than just one small group of stakeholders. It's not just the Water Management Districts, FWC, and whoever else was suggested. Private landowners and other NGOs and the Nature Conservancy and all these different people could agree to be on some type of advisory committee on management guidelines for ephemeral ponds. You talk a lot about silviculture BMPs, well I'm concerned about cattle grazing BMPs; and somebody else might be concerned about other things. Also, we're talking real heavy about amphibians; there are other animals that use ephemeral ponds. And the ecotonal areas of the uplands coming into the wetlands, those were the areas that were most quickly converted when parts of Florida were being converted, and they're the areas that are hardest to get back. As a Water Management District, we always buy the really wet stuff, and we get very little ecotonal land, so those areas would be higher priority.

I think it needs to be an advisory committee of all stakeholders and I think that's the way that they're approaching Everglades restoration. Sometimes it gets a little overwhelming because everybody isn't coming to a consensus, but you can come to a consensus of certain general guidelines based on the experts opinions for those particular areas: Cattle grazing, silviculture, amphibians, whatever other animals use ephemeral ponds. I think that was a good point, we might want to come out of this meeting with some just real quick bullet lists: Buffer zone, silviculture practices, restoration, how we get funding as a private landowner, a corporation or as a Water Management District.

AUDIENCE PARTICIPANT: I do think that as far as government agencies go, FWC is going to have to take the lead here because it's an animal focus that is going to get anything done with these ephemeral wetlands. When you go to that FWC site, you can go to bears, you can go to panthers, you can go to a couple of these flagship species. It seems like scrub is kind of a marquee habitat type but maybe we should have the ephemeral wetlands be kind of a marquee habitat type because it does include so much. We're just talking about amphibians here but deer, quail, and turkey use ephemeral wetlands as a source of water.

KIM PONZIO: And don't forget plants. As the president of the South Atlantic Chapter of the Society of Wetland Scientists, I'll tell you we're on board. The Florida Wildlife Society, all kinds of groups can be involved in this panel.

AUDIENCE PARTICIPANT: When we're looking at restoration and at preservation, I'm hearing a lot of talk about uplands around them too. When we're looking at this, we need to be thinking about how we preserve and restore the uplands around them and that we see these as an entire landscape and not as just a fragment. We can put a conservation easement on that single ephemeral wetland but if we don't get the land around it as well and keep that in a native habitat state, then we're still going to lose the species. We still may even lose some of the hydrology of that wetland if there are land-use changes in the uplands around it.

AUDIENCE PARTICIPANT: In Georgia, it seems like ditching is a real popular activity. I'm wondering if the panel has any suggestions on how to encourage landowners not to do that. I'm talking not necessarily ditching of ephemeral wetlands but ditching of hardwood drains that may lead into larger watersheds. I've heard reasons ranging from timber management (to drain water off quicker so they can get their lumber) to hardwood management to predator management.

LORA SMITH: It is a cultural issue. I've given talks on ephemeral wetlands, and at the end I talk about how important the lack of fish is to amphibians, and then the first question they ask me is how to get fish into these things. The ditching is actually a legal issue because the Corps of Engineers becomes involved when you start ditching, but laws are often not enforced. One of the things I'm going to suggest is that whatever initiatives, if any, that come out of this meeting be regional rather than state-focused. Georgia would benefit from a southeastern initiative, as well. We could sure use some help with some of these things because, yes, in Georgia, ditching around isolated wetlands is a problem.

CLOSING REMARKS FROM RESTORATION PANEL

RICK OWEN: One of the main things that Florida is going to have to deal with is water. I'm a District Water Coordinator for the Florida Park Service and am dealing with issues of minimum flows and levels of our springs. Withdrawal of water from our aquifer is a big deal that will be impacting ephemeral wetlands more and more. I think that is a major issue that has to be dealt with. Obviously, that goes a lot into regulatory and policy and bureaucracy, and we're definitely beyond today's scope but that is a major concern.

One of the important tools that we have is fire. Herbicides have got to be a tool that we have, but fire is one of the most important things that the Florida Park Service is trying to use. It is a very big, uphill struggle to do what we want to do with fire with as many things that we have to adhere to such as smoke management. It's an issue; keeping fire within the line so that it doesn't spread in the neighborhood. More and more things are being put on us in terms of policies within our agency even to burn, but I do think it's a major thing that we need to continue and I will strive to do so.

BETH MIZELL: I'll second your thoughts on fire. Fire is huge for these ephemeral wetlands and I would liked to have seen more fire in the discussion too, how we can use fire as a better tool in the struggles that we face. From a local perspective, one of the Nature Conservancy's targets is ephemeral wetlands. An improper fire regime and historic silviculture practices are some of the threats that we've identified with these wetlands. So in the future, the Nature Conservancy, and I can't speak for our program director, but we might be willing to participate in future discussions and step up to some of these things because it is one of our targets for the Apalachicola watershed. I'm also sorry we didn't get to talk about hogs.

LORA SMITH: I'll defer.

KIM PONZIO: I would like to actually see us get a sign-up sheet on this table and have anybody sign up that's interested in participating in one of these multi-agency, multi-stakeholder technical advisory groups. [Rebecca provides a sign-up sheet]. And, also, this is sort of a plea: We have a lot of land and we have only so many land managers in the Water Management District. If anybody wants to do any kind of amphibian or reptile monitoring in our ephemeral ponds or even in our floodplain wetlands, please contact me at the Water Management District.

MARGARET GUNZBURGER: I see the value of a group of interested people that want to continue this, but I only worked for the government briefly. Basically, if it has to do with a listed species, such as flatwoods salamanders, or if it's regulatory, it's something that people are going to care about. But endangered species are not in every ephemeral wetland and ephemeral

wetlands aren't regulated. We can get together and shout all we want about it, but we don't really have any power because people can destroy an ephemeral wetland right now, forget about restoration. I think one of the focuses of a group like this should be getting it on the regulatory radar. It should be a priority because not only are there no regulations for management, there is not even regulations to protect them from destruction. That seems like the basic starting point, which also is the hardest thing to accomplish.

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