ISSN 0078-1355

# Transactions of the Seventy-third North American Wildlife and Natural Resources Conference

# Transactions of the Seventy-third North American Wildlife and Natural Resources Conference

***Conference Theme:***
***Effective Conservation through Partnerships***

March 23 to 28, 2008
Hyatt Regency Phoenix
Phoenix, Arizona

Edited by
Jennifer Rahm

Published by the
**Wildlife Management Institute**
Washington, DC
2009

The annual *Transactions of the North American Wildlife and Natural Resources Conference* (*Transactions*) are reviewed and proofread by the Wildlife Management Institute. Unless peer review for scientific accuracy is initiated by the author(s) or by the session chair, no such detailed editorial treatment is provided or implied. Conference presentations may not be included in the *Transactions* if the written papers do not follow the prescribed guidelines or if their content is deemed to be unsuitable by the editor.


Copies of these Transactions are available only in PDF format from the Wildlife Management Institute at its Website:
http://www.wildlifemanagmentinstitute.org

The *Transactions of the 73rd North American Wildlife and Natural Resources Conference*
ISSN 0078-1355

# 2008 Cosponsors of the 73rd North American Wildlife and Natural Resources Conference

***Platinum***

Boone and Crockett Club
National Shooting Sports Foundation
Rocky Mountain Elk Foundation
U.S. Department of Agriculture, Animal and Plant Health Inspection Service
U.S. Fish and Wildlife Service
U.S. Geological Survey

***Gold***

Bass Pro Shops
National Wild Turkey Federation
U.S. Bureau of Land Management
U.S. Department of Agriculture, Forest Service

***Silver***

American Sportfishing Association
Federal Cartridge Company
Natural Resources Conservation Service
National Wildlife Federation
Sierra Club
The Nature Conservancy

***Bronze***

Camp Fire Conservation Fund
Conservation Fund
Defenders of Wildlife
Ducks Unlimited, Inc.
Izaak Walton League of America
MyOutdoorTV
National Archery in the Schools Program
National Rifle Association
RECON Environmental, Inc.
Recreational Boating and Fishing Foundation
Ruffed Grouse Society
Safari Club International
Sustainable Forestry Initiative
The Wildlife Society
Theodore Roosevelt Conservation Partnership
U.S. Bureau of Reclamation
U.S. Sportsmen's Alliance
U.S. Department of Agriculture, Cooperative State Research, Education, and Extension Service

*The Wildlife Management Institute*
*appreciates and respectfully acknowledges the special partnership, assistance and cooperation of these cosponsors.*

# Contents

## Opening Session. Effective Conservation through Partnerships



## Session One. Covert Operations: Hatching the Game Bird Plans



## Session Two. Mitigation: Brokering, Bargaining and Bartering Natural Resources

## Session Three. Conservation Partnerships: Effective Military Natural Resources Conservation

## Session Four. Access: The Foundation of a Successful Natural Resources Model



## Workshop 1. The North American Model of Wildlife Conservation: Affirming the Role, Strength and Relevance of Hunting in the 21st Century

# Opening Session.
# *Effective Conservation through Partnerships*

## Welcome and Opening Remarks

**Steven A. Williams**
*Wildlife Management Institute*
*Washington, DC*

Welcome to the 73rd North American Wildlife and Natural Resources Conference. It is a pleasure to gather in Phoenix because of the weather and because, as Will Rogers observed, "The further you get from Washington, DC, the better you feel about the future of the country." I thank you all for your participation in this conference, with special thanks to the cosponsors, whose generous support makes this annual event possible. I would like to extend a special welcome to Secretary Ed Schafer and U.S. Fish and Wildlife Service Director, Dale Hall, who join me on the dais.

As you know, much of the work that gets done at this conference takes place at the workshops and in committees and workgroups. We have more than 160 meetings and events scheduled this week. This conference brings together federal, state and provincial resource agency administrators, researchers, educators, managers and conservation organization leaders. We hope you find the conference productive, and please feel free to call on WMI staff for any needed assistance.

In case you have not heard, this is an election year in the United States. Unlike the two previous presidential campaigns not much has been mentioned about fish and wildlife conservation or the anglers, hunters and wildlife watchers who enjoy these resources. I certainly hope that neither party assumes they have a lock on these voters. My deeper concern is the perceived relevancy of our profession and our passion. As the conference progresses, please think about and discuss how we can better elevate our issues to a national level. More than 87 million U.S. residents have a direct and selfish stake in what we do here this week.

The presidential candidates have and will continue to talk a lot about "change" and "experience." I am reminded of two quotes that might be

appropriate: “The more things change the more they remain—insane,” and “Experience is the name everyone gives to their mistakes.” Let us hope that is not the type of change and experience to which our candidates refer. In any event, next year at this conference, we will have a change in the administration and in members of Congress. However, based on our experience, our partnerships and collective commitment to the long-term, bipartisan work of conservation must not change.

Speaking of change, WMI has experienced a positive change in the year between last year’s conference in Portland, Oregon, and today. You may remember that we were uncertain about our future back then. I am pleased to say that WMI is alive and well. We have successfully negotiated the path to a truly separate and independent organization. Our mission remains to enhance professional wildlife management and to sustain our hunting heritage. We are involved in numerous national and regional projects, committees, and working groups involving federal and state agencies and our conservation partners. WMI staff sit on the board of directors or steering committees of a dozen national conservation organizations.

Recently, WMI received a 2008 Cooperative Conservation Award from the U.S. Department of Interior for our innovative project led by Scot Williamson to restore and enhance early successional stage habitat on private and public land to benefit more than 400 species that rely on that diminished habitat type. This is but one example of the conference’s theme “Effective Conservation through Partnerships.” We are working closely with our partners to expand this important work into the southeastern and Great Lake states. Our conservation mission has not changed and we are committed to rebuilding our staff to improve our service to the profession and to each of you who participate in this conference.

This past year has also been a busy year for conservation. Climate change has dominated much of the discussion on Capitol Hill and in conservation circles. It is hard to believe that 10 years ago, in 1998 at this conference, one of the plenary speakers discussed the threat posed by climate change. In the intervening years, the debate raged between reality and hoax. The work of the Intergovernmental Panel on Climate Change and others has all but put that debate to rest. During the past year, state and federal agencies and conservation groups focused increased time and energy to understand the potential impacts of climate change and to determine what they must do to adapt to this climate trend. On Monday, with the able leadership of John Cooper, we conducted a

full-day workshop on climate change. An impressive array of public and private presenters discussed impacts to fisheries, wildlife, outdoor recreation and future challenges.

In a separate effort, which was funded by the Bipartisan Policy Center, a group of nine leading conservation organizations developed and will soon release a book entitled, *Seasons' End: Global Warming's Threat to Hunting and Fishing*. This compilation and synthesis of white papers will be formally announced at a mid-April, Capitol Hill press conference with Congressman John Dingell. Our intent is to alert hunters, anglers and the public to the potential impacts of climate change on the fish, wildlife and habitats that they hold dear. It will inform Congress about the value that we attribute to these resources and about what is at stake. Finally and in layman's terms, it presents the case for increased funding so that resource agencies will be capable of managing these resources in trust for the North American public.

Perhaps the second most debated conservation topic is energy development. Energy development and its impact on fish, wildlife and habitats continue to trouble many of us who recognize the need for additional energy sources but who believe that that need can be met in a more environmentally sensitive manner. The pace of energy development across much of the West is frightening because it appears that we have not learned much from our mistakes, and it threatens the public-land, multiple-use doctrine. The adaptive-management process for energy development is a sound concept; however, it is often referenced and frequently ignored. Science has a meaningful role in this process if it is used to inform decisions. We should be able to incorporate adaptive management into energy-development plans to avoid, minimize or mitigate the inevitable impacts associated with exploration and production. Meanwhile, a recent court decision which ordered the U.S. Fish and Wildlife Service to reconsider the sage grouse listing decision will hurtle that species back into the cross hairs of energy companies and environmental groups alike. What will have measurably transpired on the ground with sage grouse and its habitat in the years between the earlier decision and the next? I do not pretend to know. But, what will be open for all to see is the comparison of conservation efforts that actually occurred to the conservation efforts promised three to four years ago.

It has been a remarkable year for charismatic megafauna. The Yellowstone population of grizzly bears was removed from the threatened list one year ago. Our national symbol, the bald eagle was delisted in July of 2007.

This Friday, the northern Rocky Mountain wolves will finally be delisted and returned to state management authority—an incredible and controversial conservation success story. As conservationists, we should applaud all those federal and state biologists and administrators, conservation organizations and landowners who shared in the decades-long effort to ensure the survival of these incredible, iconic wildlife species. While we await the decision on polar bears, we can only hypothesize what future challenges will confront Endangered Species Act decision makers. Imagine the difficulty of analyzing threats to species and its habitat given the speculative nature of future climate change impacts.

We anxiously await final resolution of the next Farm Bill but lament the missed opportunities to appropriately fund and establish certain conservation provisions in the bill. Those of you who have labored through the past five to six years to ensure that conservation remains an important component of our nation's agricultural policy deserve our utmost respect. The coalition of individuals and conservation groups working on the Farm Bill is impressive. Unfortunately, we do not always fare well against more pressing economic desires of major, well funded, lobbying efforts. The future of alternative energy sources, such as biofuels, cellulosic energy and wind power, promise to alter agricultural landscapes for years to come. Combine these factors with projected decreases in Conservation Reserve Program acres and climate change impacts on the Prairie Pothole Region and you can easily conclude that it will be increasingly difficult to be a pheasant or a duck. One can only hope that wise decisions were made this year and that our profession will continue to be involved in future decisions that affect hundreds of fish and wildlife species and the people who enjoy them.

The state of state and federal fish and wildlife agencies funding—is in a word—dismal. At a time when agency missions and expectations have expanded broader than ever, funding and license sales are flat, at best, human population and development pressures threaten habitat at alarming rates, and the uncertainties of climate change impacts loom. Resource agency budgets are simply inadequate to address the myriad of resource challenges. At the state and federal level, agencies have been forced to keep position vacancies open, close public facilities, reduce research budgets, reduce maintenance budgets, reduce land-acquisition budgets and forestall capital improvement projects. Each of these steps, although rational given the current budget atmosphere, result in digging a deeper and deeper hole for future conservation efforts.

But, let's focus on a brighter future. If enacted, current federal climate-change legislation would provide a significant amount of funding (think Conservation and Reinvestment Act on steroids) for both federal and state agencies to monitor, conduct research, address and adapt to climate-change impacts on wildlife and their habitat. These new dollars, derived from auctioning and trading carbon credits, would be available to supplement existing efforts to conserve species and protect and enhance habitats. Updated state wildlife action plans would play an integral role in assuring that dollars are well spent on species of greatest conservation need, as well as, others.

On another positive note, in recognition of the role that hunting and hunters have played in conservation, an Executive Order (EO), dated October 16, 2007, has directed federal agencies to review and enhance their programs to improve wildlife conservation and to sustain our hunting heritage. The EO also called for a White House conference on North American wildlife policy to be held 100 years after Theodore Roosevelt convened the Conference of Governors in 1908 to address conservation issues of his day. To secure this historic opportunity, members of organizations comprising the Sporting Conservation Council, American Wildlife conservation partners, and state and federal staff have selected five major focus areas for the conference. These areas include: the North American Model of Wildlife Conservation, federal/state/tribal wildlife management coordination, habitat conservation and management, funding, and perpetuating hunter traditions. Technical and policy working sessions will precede the actual White House conference where we expect bipartisan participation from the highest levels and branches of state and federal government. This effort should chart a course for federal agencies and raise the U.S. consciousness of the importance of wildlife conservation and sustaining our hunting heritage.

On the leadership front, the National Conservation Leadership Institute (NCLI) will enroll its third class of fellows this year. This innovative and effective program brings together some of the best and brightest conservation leaders from state, federal and tribal agencies, conservation organizations, and industry in a collegial and learning atmosphere in order to counter the leadership drain brought on by baby boomer retirements. There are 70 resource professionals who have benefited from the formal training and professional networking associated with NCLI.

The Conservation Leaders for Tomorrow (CLfT) program continues to grow in size and geographic reach. Through an intensive workshop experience,

CLfT exposes nonhunting, university-level wildlife students to the values, traditions and skills of hunting and hunters, so these future wildlife professionals will be better able to understand the role that hunting plays in conservation and in the quality of life for hunters and their families.

In a similar vein, hunter recruitment and retention programs at the state level have propagated across the country. Yesterday, a full-day workshop on the North American Model of Wildlife Conservation demonstrated the positive evolution of efforts to sustain our hunting heritage. Programs that aggressively recruit youth, women, minorities and anyone else interested in hunting have proliferated in the past 10 years. Since 2004, 22 states have changed their laws or regulations to promote youth hunting. Thirty-one states have no minimum age restrictions allowing parents to decide when their children are capable of responsible hunting behavior rather than state legislators. The Hunting Heritage Action Plan will hit full stride this year as our community attempts to develop comprehensive and coordinated strategic and implementation plans, akin to the North American Waterfowl Management Plan, to sustain and enhance hunter numbers in North America. We are making progress, but we must step up our efforts.

So, although the past year has brought some conservation successes and has deepened concerns about certain issues, we must be optimistic about our future. Noted philosopher and comedian Steven Wright once observed: "Half the people you know are below average." I do not believe that applies to the people in this room. I stand before an impressive group of intelligent and committed conservationists on par with our conservation heroes of the past. Their job was relatively easy compared to the complexities we face in the 21st century. The collective knowledge, dedication and effective partnerships that are represented in this room provide ample hope that we can accomplish conservation miracles. That's a good thing; we might just need them. Thank you and enjoy the rest of the conference.

# Remarks of the Secretary of the U.S. Department of Agriculture

**Edward T. Schafer**
*U.S. Department of Agriculture*
*Washington, DC*

Thank you very much for the great introduction, fused with the opening comments and for getting us charged up in the right direction today. I really appreciate it. And, thanks for the warm welcome. It is indeed an honor to be with you here today. I'm excited about your gathering, your conference, and I wish I could spend more time with you. But, they're not going to let me do that.

But, I do want to personally acknowledge your work, your efforts, and I wanted to stop in today to help in the process. I must say I'm not quite used to this Secretary Ed Schafer thing yet—that's how they introduced me. I haven't been on the job quite two months, and I'm working on that, and the titles are always pretty interesting to me. I'm reminded when I was governor people called me Governor, but I liked to be called that and I asked that would be done. But, when I left office people had no clue what to call me. You know, Former Governor, Ex Governor, Previous Governor or something like that. You should have heard what they said behind my back. I'd get introduced. In fact right before I left for Washington, DC I was introduced at a luncheon as the former Ed Schafer. I'm not certain what that was all about, but I decided that I actually liked that better than the way my mother had introduced me at the time, which was the Late Governor Ed Schafer.

I am pleased to be here with you alive and well today, and I'm excited about the opportunities that are unfolding in the United States today. I must say that one of the reasons that I'm excited to take on the role of Secretary of Agriculture was the U.S. Department of Agriculture's (USDA's) presence in the conservation arena. This is an issue that really has always been close to my heart.

As you can imagine, growing up in North Dakota in the wide open spaces and living on the land is really important, and when the opportunity to help the U.S. Forest Service acquire the Theodore Roosevelt Elkhorn Ranch in North Dakota came about, I was glad to jump in and help in that project. You know, that is really where Theodore Roosevelt learned to rope and ride and hunt in that part of North Dakota. When his wife and his mother died on the same

day, he took off to go touch the land that he arrived in that majestic spot in Western North Dakota that we call the Badlands.

But it was really there when he arrived, he was sickly, he was broken of soul and as he worked that land where he repaired himself. He became physically strong, repaired his soul; it was where he learned frontier justice and a hard day's work was important. Where lending a neighbor a helping hand was often the difference between life and death and where he learned those elements of servant leadership as he got involved in the conservation efforts and the issues of that land.

And, the Elkhorn Ranch now is a perfect example of what we can leave as a legacy that is adjacent to the Theodore Roosevelt National Park—where people always will be able to touch that very land where Theodore Roosevelt said, had it not been for my living there he never would have been president of the United States.

And, how important that is for us to keep that in front of us. It's also a grand example of how multiple needs came together with this project, where multiple use of the land that allowed hunting and fishing and grazing and farming, that allows the recovery of subsurface minerals, that allows us to protect the landscape there at the same time. And, it is really an opportunity for everybody to come together and recognize the value of the property and to keep it for perpetuity.

And it's appropriate that we made an effort to conserve Theodore Roosevelt's land there, as he really is the father of the conservation movement. Roosevelt was a hunter, and it helped him develop an appreciation of the land. And, hunters and sportsfolk were instrumental in getting conservation laws passed. Those laws regulated the length of hunting season and the types of weapons used so wildlife populations could be maintained. And, USDA values the knowledge and perspective that we gain from the partnerships with the sporting organizations such as those all of you represent here today.

And, we take that into account in our conservation activities. Our programs have broad range from clean air grants to wetland preservation. And, one of our biggest is the Conservation Reserve Enhancement Program known as CREP. It's run by the U.S. Farm Service Agency (FSA), and it helps agricultural producers to voluntarily retire land. In January, we are proud to announce that the program had enrolled its 1,000,000$^{th}$ acre in the country, helping to protect environmentally sensitive areas, to decrease erosion and to restore wildlife habitat.

Then there is our Conservation Reserve Program (CRP). CRP is run by our FSA as well. And, it gives farmers and ranchers technical and financial help to improve the environment practices on their land.

We recognize the pressures on CRP today, and we realize we need to continually look at that program and to examine and evaluate rental rates and their ability to be competitive with the cash rents out there so that we can continue to provide incentives for people to set aside property that should be there for the wildlife habitat and conservation efforts.

Our Natural Resources Conservation Service, NRCS, is also partners with several organizations to improve natural resources. For instance we worked with Utah Partners for Conservation Development and have implemented 240 restoration projects that restore wildlife habitat in riparian zones on 150,000 acres (60,702.8 ha) throughout Utah. We've worked with Pheasants Forever to bring their biologists to our regional service centers in areas with pheasant populations. And, these biologists use their knowledge in science and government regulations to help owners to guide, develop and fund habitat improvements on their land.

And, NRCS partnered with a number of state and federal authorities to protect the sage grouse in Colorado and to prevent it from becoming an endangered species. The U.S. Forest Service also signed on to the plan to protect the birds' sagebrush habitat. I had dinner with some folks last night, and I was pleased, as they went around the room, to hear the word sagebrush and grouse in people's conversations, and I made the observation that in my several months in Washington, DC, now, having gone through the nomination and confirmation process and now been in the office for a couple months, I haven't once heard in Washington, DC, anything about sagebrush or anything like that.

So, as things pick up with that conversation our U.S. Forest Service is central to USDA's conservation efforts. The 193 million acres (78,104,328.9 ha) it manages are among the United States' greatest treasures. This land is vital to conservation of many terrestrial and aquatic species and is home to some of the most important populations of rare species as well. In fact, land managed by the U.S. Forest Service includes 80 percent of the continental United States' elk and bighorn sheep habitat, 5 million acres (2,023,428.2 ha) of wetland, and 2 million acres (809,371.3 ha) of lakes. U.S. Forest Service is committed to protecting the land while enhancing the hunting and fishing opportunities.

In fiscal year 2007, the U.S. Forest Service worked with partners to improve nearly 2,400 miles (3,862.4 km) of stream habitat for fish and aquatic species, along with more than 270,000 acres (109,265.1 ha) of terrestrial habitat. We also dedicated $10 million for NatureWatch programs, which provide children and adults the chance to safely participate in activities and programs that raise

their awareness about wildlife, fish and habitat. These programs reach more than 2 million people each year and engage more than 1,200 partners.

USDA is also implementing President George W. Bush's executive order on hunting heritage and wildlife conservation. As you all know, President Bush is an avid hunter, fisherman and landowner himself, and he shares our commitment to conservation and hunting heritage, and he is united with us in our goal of preserving diverse animal species while promoting responsible sporting practices.

This order helps us do that. It directs the USDA and other agencies to expand hunting opportunities and to improve the management of game species and their habitat. Specifically, the order directs agencies to evaluate trends in hunting participation and take steps to expand and enhance hunting opportunities for the public. It calls for short-term actions to accomplish this goal as well as a long-term, 10-year plan.

To achieve the President's vision, the Departments of Agriculture and Interior will be working with a cross-section of federal, state, local and tribal governments, scientists, landowners, individual sportsmen, nonprofit organizations and other interested parties. We're already seeing results on the ground as agencies implement this executive order in our day-to-day operations. USDA is taking action by developing a one-stop shop where folks can find information on local hunting opportunities on local public land. In addition to immediate actions, we are taking several steps to ensure that the 10-year plan the President called for becomes the road map that will guide conservation and hunting for years to come.

As we develop this plan, we're seeking the advice of state and tribal Fish and Wildlife agencies as well as the Sporting Conservation Council. As leaders in the sporting community, you have a place at the table as we discuss what should be done to enhance hunting opportunities and how to sustain hunting traditions from one generation to the next. However, we also need to hear directly from hunters and anglers and conservationists on the ground who have the real insights into how the federal government can be a better operating partner.

I would like to take a moment here to thank the Sporting Conservation Council and the members of your community. Your recent letter, I think it was in November of last year, supporting the implementation of the executive order was important, and I hope, I encourage you to continue working together on this initiative. If there is one thing that I've learned about conservation it's that it's only going to be accomplished with strong partnerships. And your efforts in that are great, and we need to continue on. It's usually those of you who live on and use the land who are the most committed to preserving its beauty and its long-term proficiencies.

You know, each year more than 36 million visitors travel to national forests for hunting and fishing and for viewing wildlife. These visits result in nearly $8 billion in spending. They support about 190,000 jobs and contribute more than $870 million in federal income taxes. Since the 1930s, hunters have contributed more than $20 billion in voluntary support for land acquisition, management, and support for nonprofit conservation organizations.

So we frequently partner with sporting groups at the local level. But it's also important for the national groups to weigh in. For instance, the Forest Service's Get Wild! program is a collection of wildlife initiatives, and it's one of our best examples of fostering partnerships with national groups who are also strong advocates for hunting.

Get Wild! works to maintain biodiversity for wildlife that is not endangered nor threatened. Frequently this means providing for a mixed level of biodiversity or protecting especially important habitats in wetland and riparian areas.

While there is much we can do by promoting and enhancing these partnerships and directing our current program, I believe that one of the best ways to improve our conservation efforts is through our efforts with the current Farm Bill. And, I know that's a pressing question these days what's going on with the Farm Bill. I have no breaking news for you this morning, but the 2002 Farm Bill really was a major step forward in funding for conservation programs.

This Administration continues to believe that Congress should make a strong investment in protecting our nation's land and our nation's water resources. And, that's why part of our proposals to the 2007 Farm Bill calls for $7.8 billion in new spending on conservation programs. This is a bigger increase than we recommended for any other area in the Farm Bill.

The versions of the Farm Bill passed by the House of Representatives and Senate took approaches to conservation that differed from our recommendations, but both called for substantial increases in overall funding for conservation programs, and for that we commend their efforts. Both the House and Senate Farm Bills continued and reauthorized nearly all of the existing conservation programs. They called for maintaining CRP at the enrollment of nearly 40 million acres (16,187,425.7 ha) and reauthorized extending Wildlife Habitat Incentives Program at its current level.

The Senate bill would also create a new conservation stewardship program that would enroll 13 million acres (5,260,913.3 ha) nationwide every year. And, I'm pleased that both the House and the Senate versions of the Farm Bill include a Biomass Reserve Program that would encourage farmers to begin

cultivating the kinds of sustainable energy crops that can be converted later to a cellulosic fuel effort. Both versions of the Farm Bill in Congress contain new sod-saver provisions that will help protect native grassland from being converted into crop protection.

But, as good as those promises are, we cannot stand by as the House and the Senate continue to bicker over jurisdictional issues and funding issues and many areas that are providing a big gulf between the House and the Senate. We need to move forward with this bill.

Now, as I'm sure you have heard that, once again, Congress has passed an extension of the current Farm Bill that will take us through to April 18. There was going to be a 30-day extension, by the way. Somebody calculated that would come through on April 15, and, knowing that it's never a good idea to let public policy lapse on Tax Day, we decided to extend it for 33 days, and that's something we felt we could do.

But, I can tell you, the Administration is not going to make a habit of continual extensions of the current Farm Bill. We're going to use the time to do everything we can to reach agreement with Congress on a forward-looking Farm Bill that will improve the existing laws.

Over the past month, we have worked very hard to narrow the differences to get this legislation, important legislation in place. I think we're making a good deal of progress. We've put a lot of things on the table. Congress has put a lot of things on the table. The Administration started out with a $4.5 billion spending over baseline recommendation. The Senate and the House versions were anywhere from $15 billion to $27 billion over baseline in new spending and new taxes, which just isn't acceptable to this Administration.

We've indicated and have accepted a $6 billion level and have agreed with the funding source to do that, and we've outlined a framework to get us to a $10-billion level of increased spending over baseline, which is where the House and Senate seem to be kind of converging on getting to that effort. But, we've also said that new spending must be accompanied by real reforms in farm policy.

We've been very specific with Congress on identifying the offsets for that additional spending that would keep the bill within the pay-as-you-go budget rules that the majority in Congress has adopted. The Administration's goal today is the same as it was in the beginning of this process over two years ago: to deliver a farm bill to the President that achieves real reforms in farm policy, that strengthens the safety net for our producers out there and that keeps the door open to continued growth in trade. And, it does it all without imposing new taxes

on the people. A bill that meets those criteria is one that President Bush is going to be proud to sign into law this year.

The Farm Bill that is on the table right now has a lot to offer. It moves us forward in conservation, nutrition and research in specialty crops and in renewable energy. And, I am continually optimistic that in the next few weeks we're going to be able to come together and craft a bill that is going to be workable.

But, you know, producers need a firm idea of what farm policy is going to be in order to make planting decisions and financial decisions and commitments. And, the continued uncertainty isn't helping anyone. We'll be pushing to get a great piece of legislation signed, and we want to ensure that the final bill helps us move forward to our conservation goals. But, we need this new bill out there. We need a new bill on the table, and an extension for a year or two just is not good policy for this country. So, we're going to be working hard to craft that bill, and I want to thank you for your efforts both in generating the Administration's positions but also in supporting the process as we go along.

In closing I'd like to tell a couple of stories. We've milled around a little bit and visited with you and heard about some of your concerns and what's on your mind. I know a lot of you are concerned about the number of hunters and anglers out there, the people that are participating in the wildlife and workings of the land in this country. I have to tell you a story on how you might be involved in that. When I was Governor of North Dakota, I had this idea that it might be fun to encourage youth in hunting, and I thought that maybe a one-week-early hunting season for youth might be appropriate. It sounded like a good idea to me anyway. I can't tell you how many people came pounding on my door at the capitol who said, "You know, that kid out there is going to get my buck."

These people out there are, you know. This season, I've got my eye on that guy over there for years, waiting for the right time, and somebody's going to sneak in out there and take that away from me. And, I was shocked at the number of people that came in my office and insisted an early one-week hunting season for youth was not good. It reminds me that you and we together have to promote, in any way we can, getting youth involved in the habitat and the hunting and the angling and the preservation and the conservation of this country.

And there are many, many ways we can do it, mostly through you reaching out personally to get people involved. Reaching out personally in that involvement is (unclear). As Nancy, my spouse, and I have moved to Washington, DC, from North Dakota, we're finding our way around in the concrete jungles

that are out there. We're not used to that. You know, we're from the wide-open spaces and tree land and all the opportunities that we have in North Dakota and certainly many parts of the country.

But, one day we were out exploring, and we were on our bicycles and came upon a park in Arlington, Virginia. What was interesting there as we rode along this park is, we started seeing all kinds of cars parked in the parking lot. Then, we started to see kids walking all over with fishing poles and buckets and excitement on their voices. You see them all over the place. There's a stream that runs through this park, and, as we continued on our bicycles over bridges, on the bank side were things where kids were fishing. And, they were fishing because the stream had been stocked with trout, and it was just their opportunity for city kids to get out there with a pole and string and a worm and catch a fish.

And, it was exciting to see this as we were going along, opportunity of these kids that were out there and getting involved in fishing, the thrill and excitement of catching one for them, of seeing that happen. The understanding of life and death in nature instead of with a knife in the schoolyard was important. The sun shining on rocks under the crystal clear water, the vision of the beauty of nature at peace is what those kids experienced. Really that's what we're all about here. Bringing that generation of youth through this understanding and acceptance and the promotion of the wildlife efforts and the conservation of this land.

The future of this country does not lie in the halls of the Senate; it is not the Secretary of Agriculture's office. It isn't in the Oval Office. It is on the farms and the ranches and in this country in the towns and small communities across this land. As I spoke earlier of the land that Theodore Roosevelt touched that generated with him the ability to improve his life and to lead this country, it reminds me that it is the land out there that really builds our economy, it creates life that provides the sustenance and comfort in our nation, and it really generates the character that made this country great.

So, I want to thank you for all that you do. I really appreciate that. In an effort to generate that character that is the foundation of this country as we touch the land, I urge you to go home and to hug your spouse and let them know that you love them, not only with the words but with the actions, with putting your arms around the children and telling them you're proud of them and you support them in what they're doing, and reaching out to a neighbor and a helping hand and to finding someone to forgive. I know it makes you feel good out there and that's important, but you and your efforts provide hope for the future for this country. And I wish you Godspeed in your efforts. Thank you.

# Session One.
# *Covert Operations: Hatching the Game Bird Plans*

## Implementing the American Woodcock Conservation Plan

**James R. Kelley, Jr.**
*U.S. Fish and Wildlife Service*
*Fort Snelling, Minnesota*

**Scot J. Williamson**
*Wildlife Management Institute*
*St. Johnsbury, Vermont*

**Mark Banker**
*Ruffed Grouse Society*
*Lemont, Pennsylvania*

**Daniel R. Dessecker**
*Ruffed Grouse Society*
*Rice Lake, Wisconsin*

**David G. Krementz**
*Arkansas Cooperative Fish and Wildlife Research Unit*
*Fayetteville, Arkansas*

**Daniel G. McAuley**
*U.S. Geological Survey*
*Orono, Maine*

**William L. Palmer**
*Pennsylvania Game Commission*
*Spring Mills, Pennsylvania*

**Timothy J. Post**
*New York Department of Environmental Conservation*
*Albany, New York*

## Introduction

The American woodcock (*Scolopax minor*) is a popular game bird throughout eastern North America. Approximately 488,500 hunter days were expended to harvest nearly 311,000 woodcock in the United States during the 2006–2007 hunting season (Kelley et al. 2007). Woodcock are managed on the basis of two regions or populations, Eastern and Central, as recommended by Owen et al. (1977). Population trends are monitored by the singing-ground survey (SGS) within each state and province in the central and northern portions of the woodcock's breeding range (Figure 1). There have been long-term (1968–2007) woodcock declines of 2.0 percent per year in the Eastern Region and 1.8 percent per year in the Central Region (Kelley et al. 2007; Figure 2). Similarly, there have been long-term declines in woodcock recruitment in both regions, as determined from the Wing-collection Survey (Kelley et al. 2007; Figure 3). It is widely believed that loss of early succession forest habitat has been a major factor responsible for the observed declines in woodcock recruitment and overall population status.


Figure 1. Woodcock management regions, primary breeding range ar singing-ground survey coverage (Kelley et al. 2007).

Figure 2. Long-term trends (smooth line) and annual indices of the number of woodcock heard on the singing-ground survey, 1968–2007 (Kelley et al. 2007).

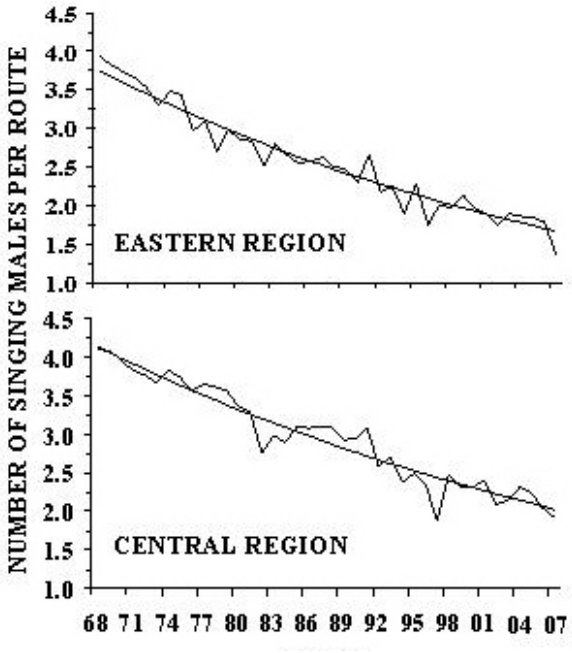
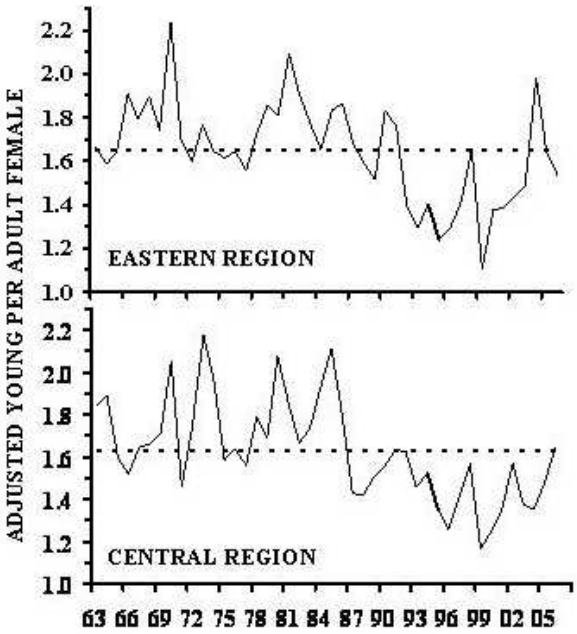



Figure 3. Weighted annual indices of recruitment (United States), 1963–2006. The dashed line is the 1963–2005 average (Kelley et al. 2007).



Previous national woodcock management plans were prepared by the U.S. Fish and Wildlife Service (1985, 1990). Objectives of the 1985 national plan were to (1) protect and manage habitat needed to maintain or increase woodcock numbers, (2) achieve optimum population levels consistent with the availability of habitat and (3) provide optimum opportunity for people to use and enjoy woodcock. Regional population objectives were to achieve average breeding population indices of 2.25 and 3.50 singing males per survey route in the Eastern and Central regions, respectively (U.S. Fish and Wildlife Service 1985).

Population goals in the 1990 plan were more general in nature and called for stabilization of declines and increases in population over (then) current levels to accommodate diverse public interests in woodcock (U.S. Fish and Wildlife Service 1990). Similarly, habitat goals in the 1990 plan were general in nature; however, some specific habitat action items, such as acquisition of habitat in Cape May, New Jersey, and Canaan Valley, in West Virginia were put forth. Both the 1985 and 1990 plans lacked quantifiable habitat goals and objectives to guide woodcock management. In 2002, the Association of Fish and Wildlife Agencies created a Woodcock Task Force with a charge to develop a national conservation plan but to avoid becoming involved in hunting-regulation issues.

## Goals and Objectives

The goal of the American Woodcock Conservation Plan is to halt the decline of woodcock populations and to return them to densities which provide adequate opportunity for utilization of the woodcock resource (Stewart 2006, Kelly and Williamson 2008). We determined that this would correspond to returning woodcock densities to those observed during 1970 to 1975. Specific objectives are to: (1) halt woodcock population declines by 2012 as measured by the SGS, (2) achieve positive population growth by 2022 as measured by the SGS, (3) halt the decline of early succession habitat by 2012 as measured by the U.S. Forest Service's Forest Inventory Analysis (FIA) system and (4) increase early succession habitat by 2022 as measured by the FIA.

The plan is intended primarily for planning purposes. Specifically, the intent was to determine the extent of population loss from the early 1970s, as well as the loss of early succession habitat since that time. Next, we determined the acreage of early succession habitat that must be created in each bird

conservation region (BCR) and state to return woodcock densities to those observed in the early 1970s. It should be pointed out that the population and habitat goals developed in this process constitute objective estimates of what it will take, without being constrained by consideration of factors that may prevent creation of new woodcock habitat. This will allow bird conservation planners to determine where the greatest needs for woodcock conservation overlap with those of other bird species. We recognize that practical limitations may prevent total achievement of habitat goals to fully restore woodcock densities in many portions of the woodcock's range. Therefore, we also determined the amount of early succession habitat that must be created annually in each BCR to achieve the objective of halting decline of such habitat (i.e., stabilize availability). Pursuing this objective in a given region should help stabilize woodcock numbers in that region by providing a steady state of early succession habitat availability.

## Analytical Approach

### *Woodcock Population Goals*

We used a deficit approach to deriving population and habitat goals. Average woodcock populations (singing males only) were estimated for the periods of 1970–1975 and 2000–2004 for each BCR, or portion of BCR, covered by the SGS. This was accomplished by determining the average number of singing males on each SGS route for each period. We then converted estimates from singing males per route to singing males per acre since we knew how many acres each survey route sampled. Based on these data, density contours were developed for the entire SGS area. In the United States, individual counties were assigned a density category based on which density contour the majority of its land area fell within. The total number of singing males in each county was determined by multiplying the density estimate by the total land base acreage (not simply acres of woodcock habitat) in the county. In Canada, population estimates were determined at the provincial level only. J. R. Sauer (U.S. Geological Survey) estimated woodcock densities from SGS data. J. Fallon (U.S. Geological Survey) conducted global-information-system analyses to determine areal extent of woodcock density categories and provided density contour maps.

The population estimate for an entire BCR was determined by summing population estimates from individual counties or provinces found within the BCR. The *effective density* of singing males in each period was determined by dividing

the number of singing males by the number of manageable acres found in the BCR during that period. We defined manageable acres as all timberland as determined by the FIA. We derived a woodcock *density deficit* by subtracting the current effective density from the historical effective density. The *population deficit* is the number of singing males that need to be added to a given BCR to achieve the effective density observed during 1970 to 1975. The population deficit was calculated by multiplying the density deficit by the current number of manageable acres.

***Woodcock Breeding Habitat Goals***

Population deficits were used to determine breeding habitat goals for each BCR. Habitat goals are the additional acres of woodcock habitat in a given breeding BCR that must be created to produce sufficient birds such that the effective density of singing males will equal those found during 1970 to 1975. We identified woodcock habitat as being small diameter (seedling or sapling) and nonstocked forest-inventory categories (Cushwa et al. 1977; Gutzwiller et al. 1982).

First, we needed to develop a habitat multiplier to determine how many acres of new habitat would be needed to add one singing male to the BCR. For each BCR, we calculated a habitat multiplier by dividing the acreage of early successional habitat (small diameter and nonstocked forest) for 1970 to 1975 by the number of singing males found in the BCR during the same period. Acreage goals were calculated for each BCR by multiplying the population deficit by the habitat multiplier specific to that BCR.

There has been a loss of over 829,000 singing male woodcock since the early 1970s (Table 1). This corresponds to a population density deficit of just under 828,000 males. Approximately 20.8 million acres (8.4 million ha) of new woodcock habitat needs to be created in order to eliminate this deficit and to return woodcock densities to those observed during the early 1970s (Table 1).

***Stabilization of Early Succession Habitat***

To estimate the amount of early succession habitat that must be created annually to stabilize its availability, we first determined the current extent of small-diameter (seedling or sapling) forestland. We assumed a time horizon of 20 years for the lifetime viability of early succession habitat as being suitable for woodcock habitat. The current acreage of small-diameter forestland for

Table 1. Changes in the population of singing male American woodcock (1970s versus present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s, summarized by bird conservation region. NC means not calculated.

| BCR | State/Province | Population of singing males | | Loss/Gain of singing males | Male population density deficit | Habitat goals | |
|---|---|---|---|---|---|---|---|
| | | Historical | Current | | | Acres | Hectares |
| 11 | MN | 41,773 | 33,337 | - 8,436 | 1,126 | 3,999 | 1,618 |
| 12 | MI | 407,260 | 304,934 | - 102,325 | 89,880 | 898,800 | 363,731 |
| | MN | 182,669 | 156,067 | - 26,602 | 96,864 | 968,648 | 391,998 |
| | WI | 108,141 | 79,712 | - 28,429 | 34,977 | 349,769 | 141,546 |
| | Subtotal U.S. | 698,070 | 540,714 | - 157,356 | 221,721 | 2,217,217 | 897,276 |
| | MB | 63,064 | 21,609 | - 41,455 | NC | NC | NC |
| | ON | 491,666 | 381,358 | - 110,308 | 126,537 | 1,265,370 | 512,077 |
| | PQ | 58,347 | 58,276 | - 71 | 139 | 1,390 | 563 |
| | Subtotal Canada | 613,077 | 461,243 | - 151,834 | 126,676 | 1,266,760 | 512,640 |
| | Total BCR | 1,311,147 | 1,001,957 | - 309,191 | 348,397 | 3,483.977 | 1,409,915 |
| 13 | NY | 97,888 | 62,239 | - 35,649 | 51,804 | 1,599,693 | 647,373 |
| | OH | 25,413 | 13,276 | - 12,137 | 18,186 | 323,716 | 131,003 |
| | PA | 12,831 | 7,882 | - 4,948 | 2,743 | 80,247 | 32,475 |
| | VT | 6,344 | 4,363 | - 1,981 | 1,711 | 26,758 | 10,829 |
| | Subtotal U.S. | 142,477 | 87,760 | - 54,716 | 74,444 | 2,030,415 | 821,680 |
| | ON | 193,746 | 149,638 | - 44,108 | 48,767 | 1,350647 | 546,587 |
| | PQ | 46,318 | 46,184 | - 134 | 7,265 | 201,231 | 81,435 |
| | Subtotal Canada | 240,064 | 195,822 | - 44,242 | 56,032 | 1,552,308 | 628,023 |
| | Total BCR | 382,541 | 283,583 | - 98,958 | 130,476 | 3,582,292 | 1,449,702 |
| 14 | CT | 2,349 | 896 | - 1,453 | 1,520 | 55,527 | 22,471 |
| | ME | 168,170 | 108,952 | - 59,219 | 62,358 | 1,912,514 | 773,967 |
| | MA | 4,445 | 2,393 | - 2,052 | 1,996 | 74,827 | 30,281 |
| | NH | 29,505 | 21,970 | - 7,535 | 7,493 | 268,986 | 108,855 |
| | NY | 43,741 | 28,230 | - 15,512 | 14,000 | 481,465 | 194,842 |
| | VT | 27,906 | 20,582 | - 7,324 | 8,702 | 394,122 | 159,496 |
| | Subtotal U.S. | 276,117 | 183,023 | - 93,094 | 96,069 | 3,187,441 | 1,289,912 |
| 14 | NB | 181,679 | 142,681 | - 38,997 | 44,191 | 525,426 | 212,632 |
| | NS | 67,372 | 52,373 | - 14,999 | 14,129 | 179,157 | 72,502 |
| | PEI | 10,973 | 6,799 | - 4,173 | 3,105 | 35,116 | 14,211 |
| | PQ | 101,344 | 99,329 | - 2,015 | 5,596 | 78,904 | 31,931 |
| | Subtotal Canada | 361,368 | 301,182 | - 60,186 | 67,021 | 818,603 | 331,277 |
| | Total BCR | 637,484 | 484,205 | - 153,280 | 163,090 | 4,006,044 | 1,621,188 |
| 22 | IL | 18,495 | 32,302 | +13,807 | 0 | 0 | 0 |
| | IN | 19,273 | 9,998 | - 9,275 | 14,206 | 267,633 | 108,307 |
| | MI | 4,037 | 2,978 | - 1,059 | 1,859 | 35,025 | 14,174 |
| | MN | 3,536 | 3,074 | - 462 | 754 | 14,210 | 5,751 |
| | OH | 26,166 | 14,409 | - 11,757 | 21,112 | 397,747 | 160,963 |
| | Total BCR | 71,506 | 62,761 | - 8,745 | 37,931 | 714,615 | 289,194 |

Table 1 (continued). Changes in the population of singing male American woodcock (1970s versus present), population density deficits and habitat goals for returning woodcock densities to those observed during the 1970s, summarized by bird conservation region. NC means not calculated.

| BCR | State/Province | Population of singing males | | Loss/Gain of singing males | Male population density deficit | Habitat goals | |
|---|---|---|---|---|---|---|---|
| | | Historical | Current | | | Acres | Hectares |
| 23 | IL | 599 | 481 | - 118 | 449 | 5,204 | 2,106 |
| | IN | 8,012 | 4,502 | - 3,510 | 6,499 | 75,324 | 30,483 |
| | MI | 134,278 | 99,832 | - 34,446 | 58,143 | 673,879 | 272,709 |
| | MN | 48,226 | 42,781 | - 5,445 | 12,172 | 141,078 | 57,092 |
| | WI | 114,890 | 84,519 | - 30,371 | 53,152 | 616,032 | 249,299 |
| | Total BCR | 306,005 | 232,114 | - 73,891 | 130,415 | 1,511,517 | 611,689 |
| 24 | IL | 3,697 | 6,971 | + 3,273 | 0 | 0 | 0 |
| | IN | 11,715 | 4,716 | - 6,999 | 8,043 | 509,126 | 206,036 |
| | OH | 443 | 211 | - 232 | 0 | 0 | 0 |
| | Total BCR | 15,856 | 11,977 | - 3,878 | 8,043 | 509,126 | 206,036 |
| 26 | IL | 121 | 292 | + 172 | 0 | 0 | 0 |
| 27 | VA | 8,189 | 2,186 | - 6,003 | 5,355 | 496,951 | 201,109 |
| 28 | MD | 2,518 | 1,099 | - 1,419 | 892 | 30,315 | 12,268 |
| | NJ | 5,048 | 1,176 | - 3,871 | 3,549 | 120,663 | 48,831 |
| | NY | 38,704 | 22,817 | - 15,888 | 17,744 | 603,293 | 244,144 |
| | OH | 17,540 | 8,741 | - 8,799 | 10,005 | 340,169 | 137,662 |
| | PA | 71,497 | 42,030 | - 29,466 | 30,414 | 1,034,059 | 418,469 |
| | VA | 13,068 | 4,284 | - 8,784 | 9,306 | 316,389 | 128,038 |
| | WV | 31,120 | 13,898 | - 17,222 | 16,276 | 553,368 | 223,940 |
| | Total BCR | 179,495 | 94,047 | - 85,448 | 88,186 | 2,998,256 | 1,213,351 |
| 29 | MD | 4,158 | 1,308 | - 2,850 | 1,612 | 75,764 | 30,661 |
| | NJ | 5,243 | 909 | - 4,334 | 5,576 | 262,072 | 106,057 |
| | PA | 8,111 | 2,439 | - 5,672 | 5,795 | 272,365 | 110,222 |
| | VA | 20,188 | 5,499 | - 14,689 | 13,221 | 667,917 | 270,296 |
| | Total BCR | 37,700 | 10,156 | - 27,544 | 27,194 | 1,278,118 | 517,236 |
| 30 | CT | 10,261 | 3,388 | - 6,873 | 5,874 | 283,096 | 114,565 |
| | DE | 5,199 | 1,377 | - 3,822 | 3,700 | 178,350 | 72,176 |
| | ME | 6,006 | 3,906 | - 2,100 | 1,957 | 94,312 | 38,167 |
| | MD | 13,427 | 3,738 | - 9,689 | 7,498 | 361,393 | 146,251 |
| | MA | 6,006 | 3,906 | - 2,100 | 1,461 | 70,409 | 28,494 |
| | NH | 4,321 | 3,090 | - 1,230 | 760 | 36,634 | 14,825 |
| | NJ | 20,651 | 2,983 | - 17,668 | 17,204 | 829,199 | 335,565 |
| | NY | 7,908 | 2,707 | - 5,201 | 3,373 | 162,580 | 65,794 |
| | RI | 3,765 | 1,302 | - 2,464 | 1,933 | 93,189 | 37,712 |
| | VA | 3,979 | 1,079 | - 2,899 | 2,509 | 120,917 | 48,933 |
| | Total BCR | 81,523 | 27,476 | - 54,047 | 46,269 | 2,230,079 | 902,481 |
| All | All | 3,073,340 | 2,244,012 | -829,328 | 986,482 | 20,814,974 | 8,423,521 |

each BCR was divided by 20 to determine the amount of new early succession habitat that needs to be created to halt the decline of such habitat.

To halt the decline of early succession habitat, approximately 4.8 million acres (1.9 million ha) must be created annually (Table 2). Habitat management should focus primarily on forest types that are potentially valuable woodcock habitat but that currently are too mature for woodcock use due to forest succession. This constitutes creation of new habitat because it concentrates on areas that once contained woodcock. New habitat can also be created by converting nonforested habitat to that which would support woodcock. Examples of such conversions would be withdrawing row-crop fields from production and areas being actively reforested. Management of habitat that currently contains woodcock will obviously be part of the conservation effort. However, this is better described as habitat enhancement rather than habitat creation. We have no information to guide us on how to quantitatively predict woodcock response to enhancement and, therefore, we did not include it in goal calculations. Recommended techniques for managing woodcock breeding habitat are provided by Sepik et al. (1981).

### *Woodcock Wintering Habitat Goals*

A significant portion of the woodcock's migration and wintering range is not covered by the SGS. Although woodcock nesting occurs in the southern United States, the primary importance of this region is providing wintering habitat. Without density estimates for southern areas, development of population and habitat goals was not possible using the same deficit approach that was used for breeding areas. Instead, action plans for southern BCRs will focus on documentation of habitat loss, description of current habitat composition and identification of areas where current and potential woodcock habitat (manageable acres) exists. Recommended habitat-management techniques in wintering areas are provided by Krementz and Jackson (1999). Detailed accounts of habitat and woodcock population changes and management recommendations for BCRs throughout the species range are provided in individual chapters of the conservation plan.

### *Data Limitations*

There were several limitations to data utilized in development of population and habitat goals. As currently designed, the SGS does not account for detectability

Table 2. Acreage of early succession habitat (ESH, small-diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat, by BCR.

| | | Small-diameter forest | | Acreage needed to stabilize | |
|---|---|---|---|---|---|
| BCR | State/Province | Acres | Hectares | Acres | Hectares |
| 11 | MN | 126,953 | 51,376 | 6,348 | 2,569 |
| | IA | 2,904 | 1,175 | 145 | 59 |
| | Total BCR | 129,857 | 52,551 | 6,493 | 2,628 |
| 12 | MN | 4,319,526 | 1,748,050 | 215,976 | 87,402 |
| | WI | 2,020,144 | 817,523 | 101,007 | 40,876 |
| | MI | 2,928,151 | 1,184,981 | 146,408 | 59,249 |
| | Subtotal U.S. | 9,267,821 | 3,750,554 | 463,391 | 187,528 |
| | MB | no data | no data | no data | no data |
| | ON | 1,382,200 | 559,356 | 69,110 | 27,968 |
| | PQ | 3,649,000 | 1,476,698 | 182,450 | 73,835 |
| | Subtotal Canada | 5,031,200 | 2,036,054 | 251,560 | 101,803 |
| | Total BCR | 14,299,021 | 5,786,609 | 714,951 | 289,330 |
| 13 | VT | 45,400 | 18,373 | 2,270 | 919 |
| | NY | 1,301,100 | 526,536 | 65,055 | 26,327 |
| | PA | 128,500 | 52,002 | 6,425 | 2,600 |
| | OH | 358,900 | 145,242 | 17,945 | 7,262 |
| | Subtotal U.S. | 1,833,900 | 742,153 | 91,695 | 37,108 |
| | ON | 1,882,700 | 761,902 | 94,135 | 38,095 |
| | PQ | 219,100 | 88,667 | 10,955 | 4,433 |
| | Subtotal Canada | 2,101,800 | 850,568 | 105,090 | 42,528 |
| | Total BCR | 3,935,700 | 1,592,721 | 196,785 | 79,636 |
| 14 | CT | 14,316 | 5,793 | 716 | 290 |
| | ME | 4,973,720 | 2,012,793 | 248,686 | 100,640 |
| | MA | 19,230 | 7,782 | 962 | 389 |
| | NH | 408,156 | 165,175 | 20,408 | 8,259 |
| | NY | 462,086 | 187,000 | 23,104 | 9,350 |
| | VT | 387,082 | 156,647 | 19,354 | 7,832 |
| | Subtotal U.S. | 6,264,590 | 2,535,190 | 313,230 | 126,760 |
| 14 | NB | 2,810,200 | 1,137,248 | 140,510 | 56,862 |
| | NS | 816,300 | 330,345 | 40,815 | 16,517 |
| | PEI | 122,500 | 49,574 | 6,125 | 2,479 |
| | PQ | 1,465,000 | 592,864 | 73,250 | 29,643 |
| | Subtotal Canada | 5,214,000 | 2,110,031 | 260,700 | 105,502 |
| | Total BCR | 11,478,590 | 4,645,221 | 573,930 | 232,261 |
| 21 | OK | 575,964 | 233,084 | 28,798 | 11,654 |
| | TX | 95,214 | 38,532 | 4,761 | 1,927 |
| | Total BCR | 671,178 | 271,616 | 33,559 | 13,581 |
| 22 | MN | 13,311 | 5,387 | 666 | 270 |
| | IA | 234,144 | 94,755 | 11,707 | 4,738 |
| | MO | 393,749 | 159,345 | 19,687 | 7,967 |
| | IL | 242,801 | 98,258 | 12,140 | 4,913 |
| | IN | 72,221 | 29,227 | 3,611 | 1,461 |

Table 2 (continued). Acreage of early succession habitat (ESH, small-diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat, by BCR.

| | | Small-diameter forest | | Acreage needed to stabilize | |
|---|---|---|---|---|---|
| BCR | State/Province | Acres | Hectares | Acres | Hectares |
| 22 (cont.) | OH | 209,676 | 84,853 | 10,484 | 4,243 |
| | MI | 10,781 | 4,363 | 539 | 218 |
| | Total BCR | 1,176,683 | 476,187 | 58,834 | 23,809 |
| 23 | MN | 396,939 | 160,636 | 19,847 | 8,032 |
| | WI | 1,243,911 | 503,393 | 62,196 | 25,170 |
| | MI | 615,231 | 248,975 | 30,762 | 12,449 |
| | IA | 41,670 | 16,863 | 2,084 | 843 |
| | IN | 30,577 | 12,374 | 1,529 | 619 |
| | IL | 0 | 0 | 0 | 0 |
| | Total BCR | 2,328,328 | 942,241 | 116,416 | 47,112 |
| 24 | AL | 261,568 | 105,853 | 13,078 | 5,292 |
| | AR | 417,046 | 168,773 | 20,852 | 8,439 |
| | IL | 50,871 | 20,587 | 2,544 | 1,030 |
| | IN | 239,874 | 97,074 | 11,994 | 4,854 |
| | KY | 583,543 | 236,151 | 29,177 | 11,808 |
| | MO | 1,059,121 | 428,611 | 52,956 | 21,431 |
| | OH | 2,564 | 1,038 | 128 | 52 |
| | TN | 597,180 | 241,670 | 29,859 | 12,084 |
| | Total BCR | 3,211,767 | 1,299,756 | 160,588 | 64,988 |
| 25 | AR | 1,959,770 | 793,091 | 97,989 | 39,655 |
| | LA | 229,015 | 92,679 | 11,451 | 4,634 |
| | OK | 969,927 | 392,516 | 48,496 | 19,626 |
| | TX | 2,647,552 | 1,071,426 | 132,378 | 53,571 |
| | Total BCR | 5,806,264 | 2,349,712 | 290,313 | 117,486 |
| 26 | AR | 211,528 | 85,602 | 10,576 | 4,280 |
| | IL | 3,660 | 1,481 | 183 | 74 |
| | KY | 0 | 0 | 0 | 0 |
| | LA | 390,163 | 157,893 | 19,508 | 7,895 |
| | MO | 26,989 | 10,922 | 1,349 | 546 |
| | TN | 3,407 | 1,379 | 170 | 69 |
| | Total BCR | 635,747 | 257,278 | 31,787 | 12,864 |
| 27 | KY | 28,985 | 11,730 | 1,449 | 586 |
| | TN | 799,984 | 323,742 | 39,999 | 16,187 |
| | MS | 6,915,223 | 2,798,491 | 345,761 | 139,925 |
| | LA | 467,345 | 189,128 | 23,367 | 9,456 |
| | AL | 7,682,620 | 3,109,046 | 384,131 | 155,452 |
| | FL | 3,894,577 | 1,576,079 | 194,729 | 78,804 |
| | GA | 5,572,533 | 2,255,124 | 278,627 | 112,756 |
| | SC | 2,431,075 | 983,821 | 121,554 | 49,191 |
| | NC | 4,171,620 | 1,688,195 | 208,581 | 84,410 |
| | VA | 613,161 | 248,137 | 30,658 | 12,407 |
| | Total BCR | 32,577,123 | 13,183,494 | 1,628,856 | 659,175 |

Table 2 (continued). Acreage of early succession habitat (ESH, small-diameter forestland) and the number of ESH acres that must be created annually to stabilize availability of such habitat, by BCR.

| | | Small-diameter forest | | Acreage needed to stabilize | |
|---|---|---|---|---|---|
| BCR | State/Province | Acres | Hectares | Acres | Hectares |
| 28 | AL | 2,458,767 | 995,028 | 122,938 | 49,751 |
| | GA | 468,479 | 189,587 | 23,424 | 9,479 |
| | KY | 474,202 | 191,903 | 23,710 | 9,595 |
| | MD | 65,095 | 26,343 | 3,255 | 1,317 |
| | NJ | 18,424 | 7,456 | 921 | 373 |
| | NC | 481,702 | 194,938 | 24,085 | 9,747 |
| | NY | 654,520 | 264,875 | 32,726 | 13,244 |
| | OH | 555,423 | 224,772 | 27,771 | 11,239 |
| | PA | 1,645,394 | 665,867 | 82,270 | 33,293 |
| | TN | 560,411 | 226,790 | 28,021 | 11,340 |
| | VA | 581,794 | 235,444 | 29,090 | 11,772 |
| | WV | 879,639 | 355,977 | 43,982 | 17,799 |
| | Total BCR | 8,843,850 | 3,578,979 | 442,193 | 178,949 |
| 29 | AL | 245,001 | 99,148 | 12,250 | 4,957 |
| | GA | 1,876,542 | 759,410 | 93,827 | 37,970 |
| | SC | 1,210,237 | 489,766 | 60,512 | 24,488 |
| | NC | 1,840,065 | 744,648 | 92,003 | 37,232 |
| | VA | 1,615,976 | 653,962 | 80,799 | 32,698 |
| | MD | 49,337 | 19,966 | 2,467 | 998 |
| | PA | 22,765 | 9,213 | 1,138 | 461 |
| | NJ | 39,309 | 15,908 | 1,965 | 795 |
| | Total BCR | 6,899,232 | 2,792,020 | 344,962 | 139,601 |
| 30 | ME | 51,900 | 21,003 | 2,595 | 1,050 |
| | NH | 41,900 | 16,956 | 2,095 | 848 |
| | MA | 105,800 | 42,816 | 5,290 | 2,141 |
| | RI | 21,300 | 8,620 | 1,065 | 431 |
| | CT | 88,000 | 35,612 | 4,400 | 1,781 |
| | NY | 25,900 | 10,481 | 1,295 | 524 |
| | NJ | 139,100 | 56,292 | 6,955 | 2,815 |
| | DE | 47,000 | 19,020 | 2,350 | 951 |
| | MD | 168,700 | 68,270 | 8,435 | 3,414 |
| | VA | 62,800 | 25,414 | 3,140 | 1,271 |
| | Total BCR | 752,400 | 304,485 | 37,620 | 15,224 |
| 31 | FL | 1,517,705 | 614,193 | 75,885 | 30,710 |
| 37 | LA | 186,894 | 75,633 | 9,345 | 3,782 |
| | TX | 131,169 | 53,082 | 6,558 | 2,654 |
| | Total BCR | 1,835,768 | 742,909 | 91,788 | 37,145 |
| All | All | 95,130,638 | 38,498,004 | 4,756,532 | 1,924,900 |

of singing males. Therefore, no correction is made to roadside survey counts to account for birds potentially missed by observers. As a consequence, the population estimates utilized in the plan represent minimum estimates. Collection of forest-inventory data for the two different periods was complicated by spatial and temporal factors. Because goals were developed by BCR, forest-inventory data from several states or portions of states, were required to cover the entire BCR. The year of inventory-data collection usually varied widely among states in a given BCR. Therefore, we were forced to make subjective decisions on which inventory year should be used for various states for the early (1970–1975) and current periods for comparisons.

***Recommendations for Managers***

Early succession wildlife habitat has declined throughout much of the eastern United States, mostly from forest maturation, declines in farm abandonment, drainage and conversion of bottomland hardwoods to agriculture and pine plantations, fire suppression and urbanization. Forestland is maturing because disturbance factors, such as fire, have been suppressed and negative societal attitudes towards active forest management have received much attention. In addition, there has been an increase in the number of small (fewer than 100 acres [40 ha]) forest tracts that have nonindustrial private owners who are less likely to harvest timber. In the absence of natural forest-disturbance factors, habitat managers must replicate those factors in order to conserve species that depend on early successional habitat. Without management programs to create patches of young forest, species that are associated with them will continue to decline and eventually will disappear. Therefore, the challenge is to protect, create or restore an appropriate mix of young and old forest.

Proper habitat management for woodcock involves careful consideration of the juxtaposition of various covers that serve different purposes. For example, clearings (fewer than or equal to 0.5 acre [0.2 ha]) provide singing grounds for males. But, it is critical that such clearings be placed near suitable nesting and brood-rearing cover consisting of young, second-growth hardwoods (Figure 4). Creating feeding covers of dense shrubs and stands of young hardwoods on moist, rich soils is also important. Finally, nocturnal roosting areas consisting of old fields or recently harvested woodland of at least 3 to 5 acres (1.2–2 ha) should be located within 0.5 mile (0.3 km) of suitable feeding cover. Active

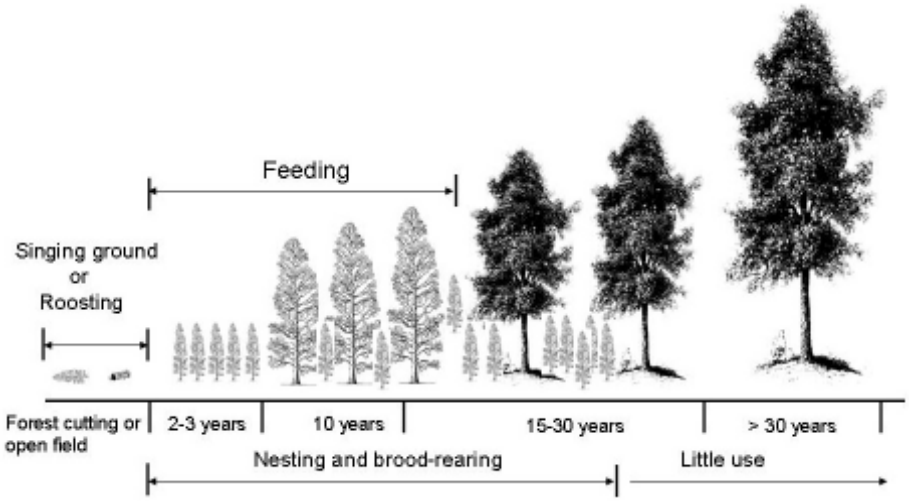



Figure 4. Key habitat components required by woodcock in relation to forest succession (Kelley et al. 2006).

forest-management programs in hardwood and mixed hardwood forests can provide all of these necessary components.

A landscape-level approach to woodcock management involves using management units of 500 to 1,000 acres (202–405 ha), which should support approximately 500 woodcock. Ideally, several units should be located within 2 miles (3.2 km) of each other to allow interchange of birds. Within management units, habitat treatments should be centered on broad-leaved deciduous, or deciduous shrub-scrub wetland where moist soils are found. By locating (where allowable) treatments across wet areas or streams, suitable woodcock habitat will be created along a moisture gradient that will provide a consistent supply of earthworms throughout summer. Even-age forest management treatments of fewer than or equal to 5 acres (2 ha) will stimulate sprouting of shade-intolerant species, such as aspen, to create ideal woodcock habitat. Short rotation cutting cycles of no more than 20 years ensures that forested habitat will not become too mature and will not experience a decline in woodcock use.

### *Plan Implementation*

The woodcock plan was organized by BCR to facilitate cross pollination with other bird plans generated under the auspices of the North American Bird Conservation Initiative. Plan success will be enhanced if objectives of other

early succession bird group plans can be accomplished while managing for woodcock. Within each BCR plan, population and habitat goals were subdivided by state to facilitate state agencies' ability to translate national-level goals to the state level. The logical next step is to create state step-down plans so that agency resources and programs can be assessed in relation to woodcock habitat goals.

Recently, the Northern Forest Woodcock Initiative (NFWI) was established by the Wildlife Management Institute in BCR 14—Atlantic Northern Forest—to achieve woodcock population and habitat goals outlined in the conservation plan. The NFWI has assembled a coalition among 32 public and private conservation entities to implement the most effective habitat management practices on public and private land, to monitor woodcock populations and to provide extensive outreach to landowners on managing for woodcock. A primary focus of the NFWI is to develop best management practices for creating diverse woodcock habitat and then to implement those practices on selected public and private land. By monitoring woodcock response to such practices on demonstration areas, results can then be transferred via technical assistance to landowners interested in managing their land for woodcock. To date, approximately 49 demonstration areas have been established in BCR 14 (S. J. Williamson, personal communication 2008). In 2008, the NFWI was given a Cooperative Conservation Award by the U.S. Department of Interior. The award recognizes cooperative conservation achievements that have involved collaborative activity among a diverse range of entities that may include federal, state, local and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities, and individuals. The Wildlife Management Institute is in the process of establishing additional woodcock initiatives in BCR 28 (Appalachian Mountains) and in the Great Lakes Region (BCRs 13 and 23; S. J. Williamson and P. Ruble, personal communication 2008). We recommend that additional initiatives be started in migration and wintering areas throughout the woodcock's range. Partial funding for development of the conservation plan was provided by the National Fish and Wildlife Foundation.

## Reference List

Cushwa, C. T., J. E. Barnard, and R. B. Barnes. 1977. Trends in woodcock habitat in the United States. *Proceedings 6th Woodcock Symposium*. 6:31–8.

Gutzwiller, K. J., C. H. Strauss, K. R. Kinsley, J. S. Wakeley, and G. L. Storm. 1982. Relationships between land use and woodcock habitat in Pennsylvania, with guidelines for rangewide research. In *Woodcock ecology and management*, 86–96, eds. T. J. Dwyer, and G. L. Storm. Washington, DC: U.S. Fish and Wildlife Service.

Kelley, J. R., Jr., R. D. Rau, and K. Parker. 2007. *American woodcock population status, 2007*. Laurel, MD: U.S. Fish and Wildlife Service.

Kelley, J. R., and S. J. Williamson, editors. 2008. *American woodcock conservation plan*. Washington, DC: Association of Fish and Wildlife Agencies.

Krementz, D. G., and J. J. Jackson. 1999. *Woodcock in the Southeast: Natural history and management for landowners, bulletin 1183*. Athens, Georgia: University of Georgia, Georgia Cooperative Extension Service.

Owen, R. B., Jr., J. M. Anderson, J. W. Artmann, E. R. Clark, T. G. Dilworth, L. E. Gregg, F. W. Martin, J. D. Newsom, and S. R. Pursglove, Jr. 1977. American woodcock (*Philohela minor = Scolopax minor*) In *Management of migratory shore and upland game birds in North America*, 149–86, ed. G. C. Sanderson. Washington, DC: International Association of Fish and Wildlife Agencies.

Sepik, G. F., R. B. Owen, Jr., and M. W. Coulter. 1981. *A landowner's guide to woodcock management in the northeast*. Orono, Maine: Maine Agriculture Experimental Station.

Stewart. A., editor. 2006. *Implementation of the American woodcock conservation plan: Tenth American woodcock symposium*. East Lansing, Michigan: Michigan Department of Natural Resources.

U. S. Fish and Wildlife Service. 1985. *Migratory bird national resource plan for the American woodcock*. Washington, DC: U.S. Department of the Interior, and U. S. Fish and Wildlife Service.

U. S. Fish and Wildlife Service. 1990. *American woodcock management plan*. Washington, DC: U.S. Department of the Interior, and U. S. Fish and Wildlife Service.

# A Grassland Conservation Plan for Prairie Grouse in North America

**William L. Vodehnal**
*Nebraska Game and Parks Commission*
*Bassett, Nebraska*

**Jonathan B. Haufler**
*Ecosystem Management Research Institute*
*Seeley Lake, Montana*

**Richard K. Baydack**
*North American Grouse Partnership and University of Manitoba*
*Winnipeg, Manitoba*

## Introduction

Prairie grouse populations, including sharp-tailed grouse (*Tympanuchus phasianellus*), greater prairie-chicken (*T. cupido*) and lesser prairie-chicken (*T. pallidicinctus*), have declined significantly from historical levels throughout the Great Plains of North America. While many factors have contributed to these declines, the loss and fragmentation of expansive prairies to farming and the reduction of habitat quality within remaining prairie fragments are known to be the primary causes. The social, political and economic drivers that facilitate this loss of native grassland throughout the United States and Canada generally fall beyond the jurisdiction of the individual local, regional, state and provincial wildlife management authorities. As a result, many grassland-dependent species requiring high-quality native grassland are now threatened, endangered or species of concern. Fifteen species of landbirds that breed primarily in grassland—including the three species of prairie grouse covered in this grassland conservation plan (Plan)—have been identified as species of continental importance in the United States and Canada by Partners In Flight (Rich et al. 2004). The greater prairie-chicken has been identified as a species of concern and the lesser prairie-chicken has been rendered a warranted but precluded status by the U.S. Fish and Wildlife Service (USFWS).

The North American Grouse Partnership (NAGP) was formed in 1999 as a national and international advocacy group in response to the clear conservation needs of 11 grouse species. The NAGP works to bring the plight of declining grouse species and their habitats to the attention of the public, provides oversight for the health of grouse populations, implements solutions to problems causing grouse declines and encourages public policies and management decisions that will enhance important habitats and grouse populations. The NAGP began the grouse planning process by developing the North American Grouse Management Strategy which addressed the threats and concerns of the 11 grouse species in 2003 and culminated in the plan for three species of prairie grouse produced in 2007.

The Plan for prairie grouse is a strategic plan that emphasizes managing, enhancing and restoring grassland ecosystems for the benefit of prairie grouse and benefitting all other grassland-associated species. Prairie grouse are resident species that require relatively large home ranges to sustain their populations. To sustain a secure, genetically healthy, minimum population of 10,000 prairie grouse that could survive 2 years of catastrophic reproductive failures would require 500 spring display grounds which equates to approximately 225,000 acres (91,057.5 ha) of grassland within a confined area. Prairie grouse are popular and charismatic species with a history of supporting sport hunting, garnering conservation backing from a large segment of the public. For these reasons, prairie grouse are excellent flagship species for grassland conservation.

## Grassland Diversity Approach

Prairie grouse adapted to the diversity of the native prairie ecosystems of the Great Plains of the United States and Canada. The approach used in developing a grassland plan for prairie grouse was designed to maintain and restore representation of the diversity of the native grassland ecosystems across the Great Plains of the United States and Canada. This representation was based on a reference to what occurred historically, with this condition characterized within definable landscapes occurring across the Great Plains (Figure 1). The use of this approach has been described in various publications (Haufler 2000; Haufler et al. 1996, 2002). Within each specific delineated landscape, the plan determined the types of grassland diversity that occurred historically, and then set desired amounts of each specific grassland ecosystem

Figure 1. Map of major land resource areas (MLRA) of the Great Plains of the United States and soil correlation areas (SCA) of the Great Plains in Canada included in the Grassland Plan for Prairie Grouse. Each MLRA and SCA was used as a planning landscape for development of an ecosystem diversity characterization for grassland conservation for prairie grouse.

based on the needs of prairie grouse. There is a strong scientific foundation for using a historical reference for defining ecosystem diversity. Prairie grouse, along with all of the other prairie flora and fauna, evolved with and adapted to the historical ecosystem diversity of the Great Plains and other areas. Providing representation of this ecosystem diversity is perhaps one of the only effective ways of providing for the habitat needs of not only prairie grouse, but also for other prairie-dependent species, many of which we know little about.

Historical ecosystem diversity of the Great Plains was created by two primary factors: different ecological sites (abiotic factors that influence species occurrence) that allowed different plant and animal species to occur at that site, and disturbances that further influenced the composition and structure of the plant community. Understanding the types, distribution and dynamics of these ecosystems is fundamental to managing or restoring ecosystem diversity for prairie grouse habitat across the Great Plains. Ecosystems and prairie grouse habitat have and continue to be directly altered by human actions. Although American Indians interacted and influenced ecosystems for thousands of years, these influences are incorporated in an historical reference. It is the extent of human influence over the last 150 years that is of greatest conservation concern. Ecosystem conversion to agriculture, urban and suburban uses are the most obvious impacts. However, there are also less obvious, yet in some instances

more pervasive, human-induced changes at the ecosystem level. We have only recently begun to understand the implications of a century of European alterations to and interruptions of historical disturbance regimes in the Great Plains. Recent studies have shown that the suppression or cessation of historical disturbance has gradually changed ecosystem processes and ultimately the composition, structure and function of many ecosystems. These changes have also impacted the distribution and quality of habitat for many prairie grouse species. Therefore, important reference information for the identification of ecosystems or habitats in need of conservation includes a description and assessment of historical conditions as influenced by historical disturbance regimes. This information can then be used to compare historical conditions to current land-use patterns to identify critical remaining areas of intact or native ecosystems and to highlight additional areas with the greatest restoration potential. This approach also provides important information on the specific plant communities that should be maintained or restored at a specific site for implementing restoration or enhancement efforts.

The ecosystem diversity approach used in the plan is directed at maintaining or restoring functional prairie ecosystems that represent the full array of grass and shrub ecosystems that occurred within the Great Plains in the United States and Canada. The goal is not an effort to return to some point in time, but to use an historical reference to guide restoration and maintenance of areas of high conservation value for prairie grouse and other grassland species.

Three primary historical disturbance regimes were identified for grassland ecosystem diversity across the Great Plains: climate, fire and grazing. The normal Great Plains climatic pattern is cyclical between wet and dry periods that can cause changes in plant species compositions and structures. Fire was a relatively common disturbance event prior to European settlement, and, as a result, most ecosystems exhibit a number of characteristics and strategies that are well suited to a fire-prone landscape. Grazing, particularly by bison (*Bos bison*), also contributed to shaping the grassland ecosystem diversity of the Great Plains.

The Plan identified specific ecosystems (plant communities as temporal states or stages occurring on specific ecological sites defined by soils and other abiotic factors) that in total included a classification of all ecosystems that occurred historically within each major land resource area (MLRA) in the United States (Natural Resources Conservation Service 2003) or soil correlation areas (SCA) in Canada (Figure 1). A brief description of the major historical disturbance

regimes within each MLRA was developed. Ecosystem diversity within each MLRA or SCA was displayed using a tool phrased an ecosystem diversity matrix that identified the effects of both the different ecological sites and the historical disturbance regimes, and the resulting plant communities or ecosystems for each combination of factors. Analysis of soils maps quantified the amounts of each ecological site within each MLRA or SCA. Additional mapping analysis determined amounts of each ecological site that have been converted to row crops, urban development, exurbia, or other human uses.

Information on the existing conditions of plant communities does not exist on a consistent basis for the untilled grassland across the Great Plains, information that we think is critical for grassland conservation. Without this information, we cannot quantify the existing levels of representation of historically occurring ecosystems, although numerous studies in various locations suggest that current conditions are significantly different than the full ecosystem diversity that occurred historically. For example, in the Missouri Coteau region of South Dakota, Ganguli et al. (2008) reported very low rates (most less than 1 percent) of representation for native ecosystem diversity in a region targeted for its high conservation values. This is a primary reason why prairie grouse, as well as other grassland species, are of significant concern today. Correcting the cumulative effects of habitat change in grassland ecosystems may best be approached by providing representation of all ecosystems within a planning area (e.g., MLRA) that occurred historically.

Using the described classification system and accompanying analyses, the ecosystem diversity approach functions to identify conservation objectives for ecosystem diversity. The goal is not to return landscapes to historical conditions, but to use the historical reference to set specific objectives for different plant communities at the landscape level and the desired compositions and processes for plant communities at the ecosystem level. The appropriate levels of ecosystem representation can be formed by the historical reference, but, because the goal is not a return to historical conditions across the landscape, the desired amounts and distributions of desired ecosystem conditions must be evaluated with additional criteria. This is where prairie grouse, as flagship species, can help to set these desired amounts and distributions.

The grassland plan focuses on providing sufficient amounts of functionally similar ecosystems to those that were present historically to provide for the habitat needs to maintain sustainable and viable populations and desired population

sizes of native species. Prairie grouse were therefore used to set these desired amounts and distributions since their needs encompass those of many other grassland species. Ecosystem representation based on the historical reference identifies an estimate of the threshold level to represent each ecological community that occurred under historical disturbance regimes at the landscape level. Requirements for representation at the ecosystem level, such as a maximum level of exotic species for representation areas, have not been addressed in the plan, but would be an additional component of local restoration projects.

In this prairie grouse plan, an initial goal for ecosystem representation is maintaining or restoring more than 10, 15 or 20 percent of the historical conditions for all ecosystems in each of the 46 MLRAs in the United States and 9 SCAs in Canada. The value of 10, 15 or 20 percent was determined based on the status of the existing prairie grouse populations, with higher levels of ecosystem representation occurring in areas with higher existing grouse populations and lower representation in areas with lower grouse populations (Figure 2). The minimum 10-percent level of representation has often been used as a conservation goal under various national and international programs. The assumption here is to put the greatest focus on those areas that still have grouse populations as indicators of where functional grassland ecosystems may still occur and to maintain the quality of these areas. The assumption used in developing these varying levels of representation across MLRAs and SCAs was that with limited resources available it would be more cost effective for prairie grouse conservation to target higher levels of representation where prairie grouse populations are still viable and to target lower levels of representation in areas where grouse populations are lower, needs exist to connect populations, and where fewer cost-effective options may exist for ecosystem restoration. These goals can be revised through finer scale analyses or when more resources become available and are not suggested to override any local efforts at grouse conservation that may set higher levels in specific locations where good restoration potential exists. Table 1 lists the total acres of representation goals for each bird conservation region (BCR) mapped by Partners In Flight, within the overall plan area. BCRs have been a primary focus for the North American Waterfowl Management Plan and joint-venture initiatives, so the representation goals developed for each MLRA or SCA were compiled into an aggregate goal for each of these larger areas.

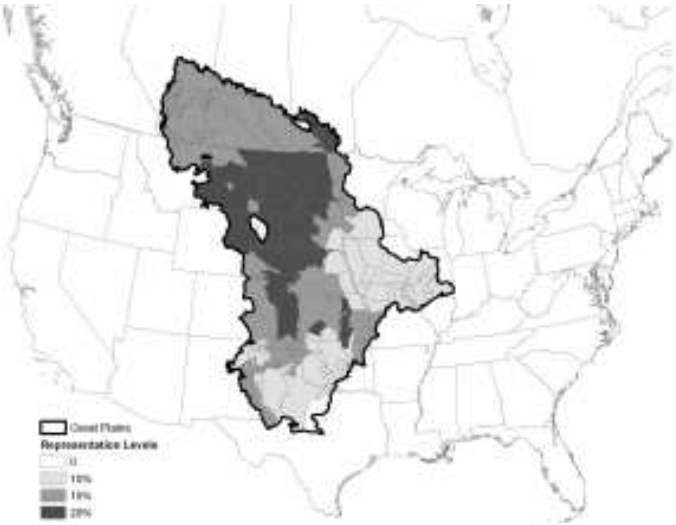


Figure 2. Recommended levels of representation of historical ecosystem diversity for major land resource areas in the United States and soil correlation areas in Canada based on current population status of prairie grouse.

Table 1. Bird conservation region (BCR) acreage goals for grassland conservation for prairie grouse based on ecosystem diversity representation in the Great Plains.

| BCR | BCR Number | Acreage goals |
|---|---|---|
| Prairie pothole | 11 | 23,680,328 |
| Badlands and prairies | 17 | 13,436,515 |
| Shortgrass prairie | 18 | 11,976,269 |
| Central mixed-grass prairie | 19 | 11,217,531 |
| Eastern tallgrass prairie | 22 | 2,881,277 |
| Northern Rockies | 10 | 473,407 |
| Southern Rockies/Colorado plateau | 16 | 905,200 |
| Oaks and prairies | 21 | 680,428 |
| Total | | 65,250,955 |

To achieve the representation goal of 65,250,955 acres (26,407,061 ha) across the Great Plains of the United States and Canada identified in Table 1, significant conservation actions and funding are needed. This plan identifies a number of these specific needs within each BCR, as well as general strategies and actions that will be needed to achieve this goal. The plan proposes to accomplish this task over time. The Great Plains of the United States and Canada were not degraded to their current status quickly, and their restoration will likewise not occur quickly. However, with the significant risks that exist to the integrity

of these ecosystems and to prairie grouse that depend on these ecosystems, conservation actions should begin immediately to reverse the downward trends and losses that have and continue to occur.

## Additional Threats to Prairie Grouse

The approach described previously presents a strategy for maintaining and restoring functional grassland ecosystems distributed across the Great Plains of the United States and Canada. When implemented, this should provide sufficient habitat to support populations of the three prairie grouse species as well as populations of most other grassland-associated species. However, as mentioned, implementing this strategy will take substantial resources and will require time. Short-term habitat gains have been achieved over the past two decades through the Conservation Reserve Program administered by the Farm Services Agency (FSA) and Farm Bill programs administered by the Natural Resources Conservation Service (NRCS). However, the future of these gains is currently at risk due to the increasing demand for corn for a developing ethanol market. These short-term threats to prairie grouse habitat are a high priority to address while working on implementing the longer term grassland-conservation plan.

Additional threats beyond habitat loss and fragmentation have been identified for prairie grouse by state and provincial biologists, and should also be considered in conservation plans. Specific threats include:

- effects of energy development—the demand for energy and fuel sources is at an all-time high in the United States and many of the potential sources of energy are located within the Great Plains. Exploration and development of energy from oil, gas (e.g., coal bed methane), and wind continues with increasing momentum, elevating the need for the conservation community to be proactive in minimizing adverse effects. Besides the direct loss of habitat from these developments, the presence of structures (oil wells, wind turbines, etc.) can influence the suitability for surrounding grassland areas for prairie grouse and other grassland-dependent species.
- power lines and other physical structures—the presence of power lines and other tall structures can cause avoidance of areas otherwise suitable for prairie grouse and other species. In addition, collisions with power

lines and other structures can cause significant direct mortality as noted with lesser prairie chickens.

- effects of fencing—grazing is an important tool in managing our grassland landscapes and promoting healthy ecosystems. With the advent of specialized grazing systems which employ greater fencing, adverse effects from increasing number of collisions of grouse with fences may result.
- competition from exotic species and feral animals—increasing numbers of situations are occurring across the Great Plains of North America where invasive plant species and feral animals are negatively affecting conditions for prairie grouse. In addition, nest parasitism by ring-necked pheasants (*Phasianus colchicus*) can be a problem for prairie grouse.
- tree breaks and spread of trees and shrubs—woody invasion into grassland landscapes and planting of trees in windbreaks and fencerows can reduce the quality of grassland to many grassland species, can increase grassland fragmentation and caqn increase habitat for predators of prairie grouse.
- maintaining genetic compositions of subpopulations potentially isolated by continuing habitat fragmentation—as prairie grouse subpopulations becoming increasingly isolated due to many of the above effects singly or in combination, questions are arising about the sufficiency of population levels to maintain the heterozygosity requirements for genetic diversity.

## Implementation Strategies of the Grassland Conservation Plan for Prairie Grouse

The purpose of the Plan for prairie grouse is to focus resources and actions from multiple entities on areas that are key to the recovery and conservation of habitats essential to prairie grouse and allied grassland species. The Plan affords a landscape-level perspective for implementation strategies. Achieving success will require a concerted effort by federal, state and provincial agencies as well as private organizations to fully evaluate current habitat conditions, to prioritize specific conservation actions, to develop financial and information partnerships, to secure implementation funding (in concert with NAGP and other partners) and to monitor and evaluate the changing status of prairie

grouse and other grassland species. The broad strategies identified following provide a framework for more specific actions that reflect priorities of the various geographies and species represented in the plan.

***Strategy A: Develop Necessary Partnerships and Coalitions for Step-down Planning and Implementation***

***Action step 1***. Identify and coalesce partners within each state or province who are positioned to provide resources and expertise for implementing the grassland conservation plan; include federal land management and conservation agencies (USFWS, Canadian Wildlife Service, U.S. Forest Service, NRCS, U.S. National Park Service, U.S. Bureau of Land Management, Agriculture and Agri-Food Canada); state and provincial wildlife, natural resources, and agriculture agencies; county and local conservation and land-management agencies; and nongovernment organizations, especially those that directly influence large landscapes.

***Action step 2***. Develop or maintain interagency-organization subteams for each of the three prairie grouse species for preparing area-specific step-down implementation and action plans.

***Action step 3***. Develop or maintain links to and involvement with all bird initiatives (ABI), Joint Ventures, Partners in Flight, and others; seek common goals, compatible funding strategies, and shared expertise and databases.

***Action step 4***. Develop partnerships with agricultural producer organizations and other landowner stakeholders in order to identify common goals and interests, and address any potential conflicts.

***Action step 5***. Develop mechanisms that will facilitate generation of comprehensive data layers that illustrate where grouse habitat projects are being planned or conducted in order to increase leveraging of resources and improve targeting of conservation initiatives (state and provincial natural heritage organizations, universities, etc.).

***Strategy B: Secure Funding for Full Implementation of the Grassland Components of the North American Grouse Management Plan***

***Action step 1***. Develop and implement specific action plans for generating state, federal and provincial support necessary to complete rangewide restoration and conservation of identified ecosystem diversity for prairie grouse and allied grassland species (separate from agriculture support program funds) on public

and private land; utilize state and provincial coalitions and an international steering group; ensure coordination of federal, state and provincial legislative communication; consult with other nongovernment organizations' staff in developing a funding platform and strategies; consult federal land-management agencies regarding budget needs and associated support.

***Action step 2***. Cooperate with AFWA and the broader U.S. Farm Bill conservation coalition to develop strategies to focus funds, programs and practices on habitat goals for prairie grouse and allied species; prioritize funding in programs, and implement practices to achieve stated objectives.

***Action step 3***. Develop strategies to focus other private land programs on key habitat needs, including state, federal and provincial wildlife agency private land programs and nongovernment organization programs.

***Strategy C: Develop and Implement Monitoring Programs and Protocols to Ensure That Greater Prairie-chicken, Lesser Prairie-chicken, and Sharp-tailed Grouse Numbers and Distribution, and Associated Trends, Are Fully Described and Understood across Their North American Ranges***

***Action step 1***. Synthesize current survey methodologies and evaluate effectiveness, compatibility with other data sets, and scientific rigor.

***Action step 2***. Monitor population and distribution trends across state and provincial boundaries, using standardized protocols.

***Action step 3***. Evaluate the feasibility of the creation of a centralized database to display ground location coordinates and use history; ensure that data management protocols respect confidentiality and data-ownership concerns.

***Action step 4***. Conduct continuous monitoring and evaluation of priority areas to accurately assess habitat conditions and population responses of prairie grouse and identified allied species.

***Strategy D: Inventory and Monitor Current Habitat Conditions at Finer Scales to Develop More Accurate Assessments of Ecosystem Diversity and Prairie Grouse Habitat Conditions***

***Action step 1***. Coordinate with current experts to determine best practices, needs for standardization and methods to acquire better information on current ecosystem conditions, especially those that involve remote sensing and other uses of available technologies.

***Action step 2***. Measure and document quantities and distribution of current ecosystem conditions that meet desired ecosystem criteria.

***Action step 3***. Document and prioritize for action those areas where habitat is degraded but still in a condition that facilitates recovery.
***Action step 4***. Document and prioritize areas that are in need of restoration and recovery for the purpose of abating habitat fragmentation and restoring genetic connectivity of populations.

***Strategy E: Provide Outreach, Education, Information Transfer and Technical Assistance to Landowners and Associated Stakeholders***
***Action step 1***. Develop a formal network to provide information on best practices, research and other issues to all partners and stakeholders in conservation of prairie grouse and allied grassland species.
***Action step 2***. Provide information, education and technical assistance on ecosystem conservation and restoration and on prairie grouse conservation through various outreach mechanisms (popular and technical articles, brochures, videos, workshops, etc.).
***Action step 3***. Cooperate with partners who offer appropriate technical expertise in order to identify and prioritize research and monitoring needs; seek funding for implementation.
***Action step 4***. Develop specific actions to utilize existing communications and educational programs of nongovernmental organizationss and government agencies to promote conservation of large landscapes for prairie grouse and allied species; address funding needs in communications.

***Strategy F: Foster Research to Address Information Gaps That Impede Landscape-level Habitat Management for Prairie Grouse and Other Grassland Birds***
***Action step 1***. Create consensus among conservation partners that research projects for prairie ecosystems and prairie grouse and associated species that are critically needed; identify and prioritize immediate needs and direct to appropriate universities and other sources of expertise; identify and pursue necessary funding.
***Action step 2***. Identify top-priority gaps in expertise and information that presently impede landscape-level management of prairie ecosystems, prairie grouse and other grassland species.
***Action step 3***. Develop and implement adaptive management frameworks for ecosystem restoration and prairie grouse management; consider trends in grouse

populations, land-use, habitat conditions, climatological changes, weather patterns and large-scale, land-conservation programs

***Action step 4***. Foster and participate in regular and formal interagency-organization synthesis of research and monitoring results.

## Reference List


Ganguli, A. C., J. B. Haufler, C. A. Mehl, and S. D. Yeats. 2008. *Assessing native prairie conditions in the Missouri Coteau of South Dakota*. Louisville, KY: Society of Range Management Annual Meeting.

Haufler, J. B. 2000. Ecosystem management: From rhetoric to reality. *Transactions of the North American Wildlife and Natural Resources Conference*. 65:11–33

Haufler, J. B., R. K. Baydack, H. Campa, III, B. J. Kernohan, L. J. O'Neil, L. Waits, and C. Miller. 2002. *Performance measures for ecosystem management and ecological sustainability. The Wildlife Society Technical Review 02-01*. Bethesda, MD: The Wildlife Society.

Haufler, J. B., C. A. Mehl, and G. J. Roloff. 1996. Using a coarse filter approach with a species assessment for ecosystem management. *Wildlife Society Bulletin*. 24:200–8.

Natural Resources Conservation Service. 2003. *National range and pasture handbook*. Washington, DC: U.S. Department of Agriculture.

Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Inigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, and T. C. Will. 2004. *Partners in Flight North American landbird conservation plan*. Ithaca, NY: Cornell Lab of Ornithology.

# Status and Structure of the North American Wild Turkey Management Plan: An Integrated Approach to Wildlife Management

**Mark A. Hatfield**
*National Wild Turkey Federation*
*Edgefield, South Carolina*

**Scott Vance**
*National Wild Turkey Federation*
*Edgefield, South Carolina*

## Introduction

In the early 1900s, wild turkey (*Meleagris gallopavo*) populations declined significantly throughout the United States (Mosby and Handley 1943), but the commitment to restore and manage wild turkey populations did not intensify until the 1930s. In 1935, the Virginia Cooperative Wildlife Research Unit initiated a research effort on turkey propagation. Other state agencies followed Virginia's lead and started development of wild turkey research projects in the late 1930s. Early restoration efforts focused on raising and releasing pen-raised birds, but efforts were met with extreme disappointment. Survival was poor, and this approach hampered the wild turkey comeback for nearly two decades.

The regional extirpation and severe population declines through habitat destruction and subsistence hunting caused some to wonder if the species could survive (Davis 1949). It was not until the advent of the cannon net that wildlife agencies could successfully trap large flocks to relocate them into new habitats and thus to begin to restore the species population. While the cannon net was a major factor in the wild turkey restoration, research and management identified and created suitable habitat for the relocation efforts that the cannon net made possible (Kennamer 1992).

Wild turkey trap and transfer programs initiated by wildlife agencies in the 1950s have increased populations and have helped reestablish huntable wild turkey populations across the United States and Canada (Mosby 1959, 1973, 1975; Bailey 1980; Kennamer 1986). During the past 50 years, state and provincial restoration programs have been largely responsible for the reestablishment and

the expansion of the North American species. Wild turkeys now occur in 49 states, 7 Canadian provinces and efforts in Mexico are just beginning (Figure 1).

Figure 1. Wild turkey species and subspecies North American range.

The comeback of wild turkeys in North America is arguably the greatest conservation success story in history. Estimated at over 7 million wild turkeys in the United States, Canada and Mexico (Tapley et al. 2005), this increase is primarily due to the success of state and provincial restoration programs, to improved habitat management and to increased conservation efforts that have focused primarily on population status assessment and harvest regulation promulgation. Due to these historic and ongoing efforts, and to the adaptability of the wild turkey, the bulk of suitable habitat currently supports wild turkey populations. In 2004, an estimated 750 million acres (303.5 million ha) of habitat had viable populations of wild turkeys while only 5 million acres (2 million ha; less than 1 percent) of suitable habitat remained uninhabited (Tapley et al. 2005).

## The Need for a Plan

As the restoration of the wild turkey comes to an end, it is important to look towards the future. Today, almost half of the jurisdictions containing wild turkeys lacks a turkey-management plan. Less than half of existing turkey plans

incorporate habitat management or land protection considerations (Vance et al. 2005). These documented deficiencies clearly highlight the need for a coordinated plan that will choreograph interested groups to partner in conservation to ensure the health and viability of wild turkeys for generations yet to come. By coordinating efforts across jurisdictional and organizational boundaries, habitat management prescriptions can be developed to account for both financial resources and the vital human capital which conservation organizations possess (Vance et al. 2005). The plan will also provide a North American perspective on wild turkey habitat management across political boundaries, will depict baseline wild turkey data and will provide an intuitive tool to plan and compare habitat management and restoration efforts with important regional conservation needs.

## Structure

The plan**,** ambitious in design and structure**,** will adjust to the changing demands of wildlife conservation. Its foundation, the North American Bird Conservation Initiative (NABCI), habitat joint ventures (JV) and bird conservation regions (BCR), is built on historical wildlife managers' successes and demonstrates the importance of evaluation (past, present and future). NABCI, a forum of government agencies, private organizations and bird initiatives, helps partners meet common bird conservation objectives. JVs are self-directed partnerships of agencies, organizations, corporations, tribes or individuals that have formally accepted the responsibility of implementing national or international bird conservation plans within a specific geographic area or for a specific taxonomic group. BCRs are ecologically distinct regions in North America with similar bird communities, habitats and resource management issues.

Both JVs and BCRs support project development, implementation and fundraising. Each has systematically and scientifically apportioned the United States into conservation units, as well as promotednew and existing partnerships and identified overlapping or conflicting conservation priorities. Utilizing this international, national and regional framework will only strengthen other developed, successful conservation plans, such as The North American Waterfowl Management Plan, State Comprehensive Wildlife Conservation Strategy, and U.S. Shorebird Conservation Plan.

The plan will address all species and subspecies of wild turkeys (Figure 1.). A BCR-level plan will be developed for each BCR that has a viable population

of at least one wild turkey species or subspecies. BCR plans will include management prescriptions for landscape-scale habitat improvements, localized population restoration, habitat protection and enhancement focus areas. They will also monitor objectives and will identify and recognize potential conservation partnerships. The NWTF will also develop NWTF state strategic plans (SSP) that will support the BCR plans. SSP will outline strategies and needed contributions from NWTF state chapters to reach goals set forth by their respective BCR. All plans will be working documents that will be updated, as new information becomes available.

## Status

The North American Wild Turkey Management Plan is an enormous undertaking and is further compounded and delayed by the huge variation in habitat requirements of wild turkeys. In January 2007, the inaugural North American Wild Turkey Management Plan Summit was held at the Wild Turkey Center, Edgefield, South Carolina. The 15 partners (Table 1) in attendance discussed content along with structure and developed the mission and the guiding principles of the plan.

Table 1. List of agencies and organizations that are supporting or contributing to the development of the North American Wild Turkey Management Plan.

| | |
|---|---|
| Arizona Game and Fish Department | South Carolina Department of Natural Resouces |
| Arkansas Game and Fish Commission | U.S. Bureau of Land Management |
| Association of Fish and Wildlife Agencies | U.S. Fish and Wildlife Service |
| ESRI | U.S. Forest Service |
| Georgia Pacific | U.S. Geological Survey |
| Hulsey, McCormick and Wallace, Inc. | USDA Natural Resources Conservation Service |
| National Wild Turkey Federation | Wildlife Management Institute |
| Partners In Flight | |
| Resident Game Bird Working Group, AFWA | |
| Resource Management Services | |

National land-cover data for 2001 is currently being analyzed to calculate wild turkey subspecies range for all BCRs and states. Wild turkey population estimates are being created for all BCRs based on corresponding state harvest reports and population estimation models. Draft plans have been written for the Appalachian Mountain BCR, Central Hardwoods BCR, Southeastern Coastal

Plain BCR, and Mid-Atlantic BCR. Forty-six NWTF SSsP have been drafted, and 20 NWTF state chapters have formally endorsed their SSP and the North American Wild Turkey Management Plan (Table 2). All SSPs will be completed by June 1, 2008 and all additional BCR plans will be drafted and sent out for external review by January 1, 2009.

Table 2. List of National Wild Turkey Federation state chapters that have endorsed the development of the North American Wild Turkey Management Plan.

| | |
|---|---|
| Alabama State Chapter | North Carolina State Chapter |
| California State Chapter | North Dakota State Chapter |
| Idaho State Chapter | Oklahoma State Chapter |
| Indiana State Chapter | Oregon State Chapter |
| Kansas State Chapter | Pennsylvania State Chapter |
| Maine State Chapter | South Dakota State Chapter |
| Mississippi State Chapter | Tennessee State Chapter |
| Nebraska State Chapter | Virginia State Chapter |
| New Jersey State Chapter | Wisconsin State Chapter |
| New York State Chapter | |

## Conclusion

Tremendous challenges face the continent's wildlife and wildlife managers including habitat degradation and conversion privatization of wildlife and hunting, locally overabundant wildlife populations, expanding lists of species at risk and the unending need for additional species monitoring data to the loss of rural traditions that foster appreciation of wildlife. Our history of turkey management and restoration demonstrates that we are capable of rising to the challenges before us.

Through coordinated efforts across jurisdictional boundaries, we can fully utilize our common resources to ensure wild turkey conservation success. This plan can guide us in selecting population goals; it can assist us in prioritizing land acquisition and habitat management; it can enhance our ability to seek and acquire funding while leveraging existing funding across jurisdictional boundaries. In addition, the plan can provide a framework to establish and maintain successful partnerships. It is for these reasons that a North American Wild Turkey Management Plan is of utmost importance.

We recognize and appreciate the tremendous efforts made by thousands of individuals from state, provincial and federal agencies and private conservation

organizations. This dedication and commitment saved the wild turkey from the brink of extinction. An unrivaled effort of trap and transfer, regulatory enforcement, and land-use changes has helped make the wild turkey an overwhelming conservation victory for North America.

## Reference List


Bailey, R. W. 1980. The wild turkey status and outlook in 1979. *Proceedings of the National Wild Turkey Symposium*. 4:1–9.

Davis, H. E. 1949. *The American wild turkey*. Georgetown, South Carolina: Small-Arms Technical.

Kennamer, J. E., editor. 1986. *Guide to the American wild turkey*. Edgefield, South Carolina: National Wild Turkey Federation.

Kennamer, J. E Mary Kennamer, and Ron Brenneman. 1992. History In *The wild turkey: Biology and management*, 13–5, ed. James G. Dickson. Mechanicsburg, Pennsylvania: Stackpole Books.

Lewis, J. B. 2001. A success story revisited. *Proceedings of the National Wild Turkey Symposium*. 8:7–13.

Mosby, H. S., and C. O. Handley. 1943. *The wild turkey in Virginia: Its status, life history and management*. Richmond, Virginia: Virginia Division of Game, Commission of Game and Inland Fisheries.

_____. 1959. General status of the wild turkey and its management in the United States. *Proceedings of the National Wild Turkey Symposium*. 1:1–11.

_____. 1973. The changed status of the wild turkey over the past three decades In *Wild turkey management: Current problems and programs*, 71–6, eds. G. C. Sanderson, and H. C. Schultz. Columbia, Missouri: The Missouri Chapter of the Wildlife Society and University of Missouri Press.

_____. 1975. The status of the wild turkey in 1974. *Proceedings of the National Wild Turkey Symposium*. 3:22–6.

Tapley, J. L., R. K. Abernethy, and J. E. Kennamer. 2005. Status and distribution of the wild turkey in 2004. *Proceedings of the National Wild Turkey Symposium*. 9:21–32.

Vance, A. S., M. A. Hatfield, A. Stewart, and K. T. Cleveland. 2005. We've come along way. Where do we go from here?: The North American wild turkey management plan. *Proceedings of the National Wild Turkey Symposium*. 9:15–20.

# Session Two.
# *Mitigation: Brokering, Bargaining and Bartering Natural Resources*

## Opening Remarks

**Steve Thompson**
*U.S. Fish and Wildlife Service, California and Nevada Region*
*Sacramento, California*

Mitigation is defined by *Webster's Dictionary* as to make less severe or painful. While the word mitigation is meant to convey the idea of bringing relief to a severe circumstance, some might say that the mitigation process in the natural resources realm defines the circumstance from which they need to be delivered rather than the instrument that brings welcome relief. Others might say that mitigation has been, and will continue to be, the single most important factor in conserving our natural environment. There is no universal agreement on mitigation when it comes to natural resources, except perhaps that it is an integral part of the way we conduct business when dealing with the environmental impact of a given project. During the past few decades, mitigation has become increasingly recognized as a conservation tool, and there are numerous examples of how it has become more prevalent in environmental statutes and regulations since its inception with the Fish and Wildlife Coordination Act of 1934 (Coordination Act).

The Coordination Act started the ball rolling with the concept that water-resource-development projects must consider fish and wildlife resources objectives equal to water-development objectives. Thus, conservation features could be required as part of water resource development projects. Following the Coordination Act, section 404 of the Clean Water Act created wetland-conservation provisions administered by the Army Corps of Engineers, who can require mitigation measures following a three-tiered process of avoiding, minimizing and finally off-setting wetland impacts. Mitigation under the Clean Water Act has spurred much discussion on how the process should be conducted. There is in-kind mitigation, which attempts to replace impacted wetlands with areas of similar ecological value, and out-of-kind mitigation, which is usually

less desirable, as the ecological value of the mitigation doesn't match that of the impacted wetlands. There have been countless debates about the value of on-site mitigation, which takes place in the same ecological vicinity as the impacted area, as opposed to off-site mitigation, which is located elsewhere but could be worth greater ecological value than possibilities available on-site.

To further the mitigation momentum, section 10 of the Endangered Species Act (ESA) requires that take of a federally listed species be accompanied by appropriate mitigation measures. Moreover, while not required under section 7 of the ESA, some federal agencies have found that when they voluntarily address impacts upfront through mitigation, their projects are completed more efficiently and with less time spent in the negotiation process. Perhaps the most challenging aspect of applying mitigation in these regulatory contexts is that there is frequently no standard by which an impact can be measured and translated into equitable mitigation. This may be the single, strongest reason why the value of mitigation is so often contested. Ultimately, unless there is a policy or guideline detailing appropriate standards, mitigation is often governed by negotiation rather than hard science. This is a flaw inherent in the permitting process, as there is seldom sufficient data to accurately assess appropriate mitigation needs. After the negotiation is complete, there are still other challenges that must be overcome to ensure that the mitigation is effective.

If mitigation involves restoration, chances are good that the impact in question (e.g., a housing development) will be completed well before the restoration can take effect. Thus, the success of that mitigation cannot be determined until it is likely too late to seek additional necessary mitigation. Ongoing maintenance and monitoring of a restoration project are crucial for the mitigation to be successful later, but as time passes, fewer individuals keep track of the mitigation project. Furthermore, many mitigation projects are implemented in proximity to the development. While such on-site mitigation may be considered by many as optimal, it would almost certainly be surrounded by concrete and asphalt, subjected to pollution and misuse, and may lose whatever ecological value it might have otherwise had. Despite these shortcomings, mitigation has not lost its luster. In fact, the practice of mitigating projects continues to evolve, and this evolution is not driven by chance, but by the creative thinking of scientists and practitioners on the cutting edge of this issue.

In light of the challenges discussed above, we chose five individuals who demonstrated innovation in applied mitigation, to present their case studies

in making mitigation less of a bargaining process and more of a measurable, collaborative, and solution-oriented endeavor. Each of the presenters has a unique background and perspective. John Rogers from The Conservation Fund describes a ground-breaking effort to establish a voluntary market for emissions offsets. His work details a process of carbon sequestration that puts land into public ownership, allows corporate partners to receive offsets, and fights climate change through tangible conservation efforts. R. Neal Wilkins with Texas A&M University explains a process called recovery crediting, which is a step beyond typical mitigation. His model for mitigation establishes a baseline of actions for recovery purposes, followed by additional mitigation to offset project impacts. His method includes measurable mitigation units, standardized mitigation requirements, and monitoring for success. Patricia Mulroy with the Southern Nevada Water Authority (SNWA) describes how her agency is ushering in what she calls a new ethos of resource management. The SNWA is faced with one of the most daunting challenges in the West: providing water for municipalities, agriculture and the environment when there is arguably not enough water to go around. Sara Vickerman with Defenders of Wildlife discusses the beginnings of a multicredit ecosystem market, where credits on a given piece of land can be purchased separately for water temperature, wetlands, carbon and listed species' needs. Her paper identifies an incentive-based market, which coupled with accountability and monitoring, can likely accommodate the needs of all stakeholders. Finally, Andrew Bremner with the Independent Petroleum Association of Mountain States highlights the growing attention on the West for our nation's energy and provides examples from throughout the region of how companies, both big and small, are working to help ensure wildlife and wildlife habitat are there for future generations.

In each of these unique presentations, you will hear a common theme: mitigation will only work if there is a defined benefit to both natural resources and stakeholders, a strong commitment to collaborate with partners, a willingness to innovate and sound science. With ideas generated from the individuals in this session, it is only a matter of time before mitigation more resembles science than negotiation.

# Mitigating Climate Change and Enhancing Wildlife Habitat: A Partnership Approach

**John G. Rogers**
*The Conservation Fund*
*Chapel Hill, North Carolina*

Global climate change is widely acknowledged and at the front in every environmental conversation; the need to take action is clear. The science is strong, but policies supporting action are lacking. Thus, mitigation is sporadic and required only in a few places in the United States. According to the Intergovernmental Panel on Climate Change (International Panel on Climate Change 2001), more than 17 percent of global anthropogenic carbon dioxide emissions are due to deforestation and decay of biomass. Furthermore, it is estimated that as much as one-half of the increase in diurnal temperature over the last 50 years may be due to the effects of land use change (Kalnay and Cai 2003).

On the bright side, some farsighted and concerned corporations are voluntarily working with conservation organizations by undertaking projects to mitigate the impacts of their activities on climate. As these companies consider a portfolio of possible actions associated with reducing or offsetting their carbon dioxide emissions, they have begun to integrate strategies that help to reverse deleterious land use change activities. To this end The Conservation Fund has been working with Fortune 500 corporations as well as with organizations like the U.S. Fish and Wildlife Service's National Wildlife Refuge System and state wildlife management agencies to carry out projects that conserve land, restore historic forests, improve fish and wildlife habitat, and sequester carbon dioxide from the atmosphere. These projects represent a true partnership from which each participant benefits. The governmental agency receives land (donated or at a discounted price), restored habitat and some funds to assist in future management; the corporate partner acquires the right to claim the carbon sequestered as an offset against its emissions or as a commodity to trade; The Conservation Fund gets the opportunity to further its land conservation mission; and all receive public recognition of their joint effort.

Carbon sequestration, as we practice it, takes advantage of a process we all learned in eighth grade—photosynthesis. Solar energy, in the presence of chlorophyll, converts sugars and carbon dioxide into plant tissue, incorporating

atmospheric carbon dioxide into the structure of the plant. As a carbon-mitigating policy and practice, carbon sequestration usually takes the form of encouraging plant growth where plants (usually trees) are not currently growing or where they can be made to grow more efficiently (Noonan and Rogers 2002). However, as an activity designed to mitigate carbon dioxide emissions to meet registration and crediting requirements, carbon sequestration is more complex and goes beyond planting trees.

Much is still unknown about what form carbon crediting will take in the United States, but there are established requirements in the field to assure that benefits are real, permanent and measurable. These were established in the Kyoto Accord but have carried forward to requirements of virtually all of the various registries developing in this country. The overriding requirements that must be demonstrated for each project are:

- leakage: the tendency of a project to merely displace the avoided activity to a different location
- permanence: assurance that the project will remain an enduring part of the landscape
- additionality: a demonstration that the project results in conditions that would not have occurred in the absence of the project.

In addition, to ensure that these requirements are met and that the broader environmental benefits are realized, The Conservation Fund carries out its projects to meet a number of overarching goals.

- Projects must represent sound conservation.
- Projects must be based upon state-of-the-art science.
- Projects must conform to the current state of policy.
- Projects must reflect and respect the needs of all of the partners.

To assure that projects meet the broad requirements and accomplish the overarching goals The Conservation Fund and its partners—including representatives of the U.S. Fish and Wildlife Service, Environmental Protection Agency, Illinova (a utility), the Edison Electric Institute, Chevron-Texaco and Environmental Synergy, Inc. (an organization that specializes in planting trees for carbon sequestration)—together developed a set of principles that would constitute a positive mitigation action and guide development of projects. These have been refined and today are:

- design: restoration of fully functioning natural ecosystems using native species
- additional: results in carbon accumulation beyond that which would have occurred without the project
- leakage: does not displace a productive land use and is not part of required mitigation
- permanent: The Conservation Fund works with the nation's leading public natural resource agencies to ensure that trees are planted in permanently protected areas that have long-term management plans to ensure accuracy and certainty of carbon sequestration; project areas with high risk of natural disaster (fire, storm) are carefully evaluated and may not qualify
- baseline: the project establishes a carbon baseline and a defined monitoring system so that greenhouse gas (GHG) removal can be independently verified
- registration: the project meets the standards and protocol consistent with an established registry; for example, the 1605(b) program of the 1992 Energy Policy Act, administered by the Energy Information Administration of the U.S. Department of Energy, the Climate Registry, and GHG Registry® Program.
- environmental benefits: projects provide additional environmental benefits including restored wildlife habitat, improved air and water quality, and enhanced recreation areas.

Each project has six components that must be addressed in the planning and execution phases. First, the site must be identified. It sounds simple, but the partners must agree on where the project is to be carried out in order to achieve the anticipated benefits. Second, appropriate rights to carry out the project must be acquired. With The Conservation Fund's projects, this has typically resulted in a fee title purchase of the land on behalf of the state or federal agency. Other organizations have developed and executed easements. The third project component requires site preparation and tree planting under the direction of the wildlife agency. Agency biologists are responsible for determining the species mix to be planted. Fourth, and vitally important, provisions must be made for long-term management of the site. In most cases, a management plan is developed under which all parties understand how the land will be managed. This generally specifies that the site will be managed as wildlife habitat and that commercial silvicultural treatments will not be allowed. Fifth, the methods and timing of carbon monitoring and verification are specified, and the responsibility for carrying

out those responsibilities is determined. The sixth and final step is to assure that all partners receive appropriate recognition for their contributions to the long-term success of the project.

As a true partnership, each stakeholder brings its individual expertise to the table to assure that these components are fulfilled in the best possible manner. Thus, The Conservation Fund generally initiates early discussions with interested corporate sponsors, acquires the land or the rights to the land, and generally fosters the partnership; Environmental Synergy, Inc. performs the restoration and assists in the carbon monitoring; Winrock International designs the monitoring protocol and carries out some of the field monitoring; the land-management agency manages the land as a natural ecosystem for wildlife habitat, and the sponsoring company provides funding.

At the field level, each project is different, reflecting the varying nature of company needs, land availability, agency requirements and reforestation costs. In general, projects have moved forward as follows:

- An agency identifies land that it would like to own as part of a conservation unit and then determines if it should be best restored as a forest.
- The Conservation Fund purchases the land or appropriate rights from willing sellers.
- In order to meet a predetermined cost per ton of carbon dioxide sequestered, it is often necessary to identify land already in the possession of the agency that needs to be restored. This land is reforested, and the sequestered carbon is reserved to the corporate sponsor.
- A baseline calculation is determined to calculate the amount of carbon that would be present in the without-project case—baseline calculation. (Carbon credits are awarded for all carbon accrued above the baseline).
- The land identified for the project is reforested.
- When all these have been successfully carried out, the purchased land is donated to the agency, on behalf of the sponsoring corporation, along with some funds to help defray initial management costs. Simultaneously, rights to all carbon sequestered by the project are reserved to the company for 99 years.

To date, The Conservation Fund has pursued this model with 8 companies in 14 separate projects preserving or restoring more than 20,000 acres (8,093.71 ha) that will sequester 8 million tons (8 billion kg) of carbon dioxide over the life

of the projects. Several additional projects are being developed and negotiated. We have successfully demonstrated that voluntary mitigation is compatible with goals for protecting and restoring land and managing it for wildlife habitat in this era of limited funding for wildlife management agencies and their land acquisition programs.

Land conservation and restoration through carbon sequestration is a model that has served The Conservation Fund, its conservation agency partners and other nongovernmental colleagues well for the past several years. It has resulted in major habitat gains for fish and wildlife as well as outdoor recreation. The future is less certain. We do not know if projects like these will fare well in a compliance market where companies will be required to reduce or offset carbon emissions. Also, for these projects to be competitive, agencies must continue a positive approach; they will need to make their lands available and to continue policies that enable projects to compete financially with other approaches. Requiring optional activities that drive costs up will ultimately reduce the financial viability of terrestrial carbon sequestration. Land prices are on the increase; the pressure of the corn ethanol market, among other pressures, is driving land prices up and is competing directly with carbon sequestration interests.

Finally, climate mitigation through carbon sequestration has represented a true partnership in which all partners have gained. It has evolved into an important source of conservation capital in these times of shrinking agency budgets. With continued recognition that this is a real and productive partnership, continued cooperation and ingenuity, we can continue to mitigate climate and conserve and restore land for future generations.

## Reference List


International Panel on Climate Change. 2001.*Climate change 2001: Synthesis report. A compilation of working groups I, II, and III to the third assessment report of the Intergovernmental Panel on Climate Change,* ed. R. T. Watson. New York, NY: Cambridge University Press.

Kalnay, E., and M. Cai. 2003. Impact of urbanization and land-use change on climate. *Nature*. 423:528–31.

Noonan, P. F., and J. G. Rogers. 2002. The role of carbon sinks in ameliorating climate change. In *U.S. policy on climate change: What next?*, ed., John A. Riggs, 87–95. Washington, DC: The Aspen Institute.

# Beyond Compliance: The Challenges and Opportunities of Responsible Water Resource Monitoring, Management and Mitigation

**Patricia Mulroy**
*Southern Nevada Water Authority*
*Las Vegas, Nevada*

## Background

For much of the 19th and 20th centuries, until the advent of federal environmental regulation in the 1970s, water development in the western United States was dependent on local custom, historical precedent, state water law, and the personal or corporate ethos of the individual or entity pursuing development of a particular water supply, whether that supply was a lake, river, stream, spring or underground aquifer. In the arid southwestern United States, where potable water supplies were particularly scarce, the doctrine of prior appropriation and the concept of beneficial use became the basis for most water development activities from the mid-19th century on, with trained engineers and other formal oversight mechanisms coming into play more fully at the state level by the first few decades of the 20th century. These formal mechanisms effectively managed the extent of a water resource's development, but they typically did not concern themselves with identifying and minimizing potential impacts to flora, fauna and the resource itself over time. A focus on protecting the environment was essentially nonexistent—or in evidence only to the extent that protecting the environment (whatever that might entail) coincided directly with protecting an already granted right in water. This less reflected some fundamental disdain by westerners for protecting the environment but more the prevailing national attitude at the time, which emphasized expansionism and, to that end, sought to transform what was then viewed as the West's desert wasteland into an Edenic garden emblematic of U.S. progress and ingenuity. The history and consequences of this sociocultural bias have been described elsewhere (for example, in such classics as Samuel Wiel's *Water Rights in the Western States*, Marc Reisner's *Cadillac Desert* and Donald Pisani's *Water and American Government*). Suffice it to say, the bias laid the groundwork for long-term development trends that would vary widely in their impact on western water supplies and local

environments for the next 80 or 90 years and would eventually provide just one of many rationales for the advent of federal environmental regulations in the 1970s.

From the first trickle of Euro-American settlers in the early 19th century, the western United States and its water supplies changed dramatically in only 150 years. Beginning with intense mineral exploration, expansionism and subsequent reclamation of the native landscape in an effort to transform the region into another breadbasket for the nation, the West moved into a period of prolonged in-migration and growing urbanization. Today, contrary to its relatively desolate nature a mere century ago, the West is home to some of the United States' largest populations and most vibrant municipal economies, such as Los Angeles, Phoenix and Las Vegas. To support these populations and economies, native water supplies have been diligently sequestered, expropriated and allocated using a variety of juridical tools. The result has been a humanmade reconfiguration of the natural environmental regime throughout much of the West, resulting in greater interdependencies between humans and other species, their surrounding habitats and the water supplies available in those areas. How these interdependencies are managed is critical for all elements of the equation and represents one of the foremost rationales for why federal environmental laws exist in this area. A failure to manage the interdependencies can have devastating consequences, such as those that occurred in Owens Valley more than 80 years ago or, more recently, in Klamath Falls.

With the passage of legislation, such as the Safe Drinking Water Act and National Environmental Policy Act, and with the creation of federal departments, such as the Environmental Protection Agency, access to water resources became subject to a number of environmental laws, regulations and issues. The resulting compliance requirements changed the process by which many resources are developed, strongly influencing how they are developed or whether they are made available for use at all. To facilitate development of future water resource options, while taking steps to accommodate these requirements, the Southern Nevada Water Authority (SNWA) participates in a broad range of environmental processes to preserve and protect species and habitat. The processes are a critical component of SNWA planning and maintain and develop its portfolio of water-resource options described in its Water Resource Plan.

Today, water managers face unique challenges in developing and implementing effective environmental processes that achieve intended results while avoiding severe limitations to long-term, water-resource development. The challenges stem from balancing a multitude of stakeholders, including environmental, state and federal partners, with more basic concerns, such as funding and time constraints. Environmental planning and compliance efforts often require a substantial financial commitment, which may lead to solicitation of state and federal grants or other funding to pay for additional staff, resources and services. Despite these challenges, the SNWA has successfully established or promoted regional planning and environmental programs for a variety of its water resources, as the following sections describe.

## Las Vegas Groundwater Management Program

Groundwater is a contentious issue in southern Nevada. Before Colorado River water was available to southern Nevada users by way of Hoover Dam, groundwater was considered the basic source of water for southern Nevada. By 1940, groundwater use had reached almost 20,000 acre-feet per year (AFY) and local resource managers began expressing concerns about limited water supplies, water waste and declining water levels. Initial attempts to manage local water demands more effectively (for example, efforts to repeal a statutory ban on water meters) were unsuccessful. Southern Nevada began to grow exponentially as did the amount of water being withdrawn from the groundwater basin. To meet demands, the Nevada State Engineer began issuing temporary water rights in excess of the perennial yield of the groundwater basin, which provided for water pumping over the perennial yield of the basin. Rights were issued on the basis that Colorado River water would be available in the future, which would replace the need for southern Nevada's groundwater supply and woild allow the basin to recharge over time.

In 1971, the community began drawing water from the Colorado River, and the strain on the groundwater basin was substantially reduced. However, the basin remained an area of attention for environmentalists and policymakers. In response to mounting concerns about southern Nevada's fragile groundwater basin, the Nevada state legislature passed bills in the late 1990s that directed the SNWA to work with public stakeholders and to develop the Las Vegas Groundwater Management Program (GMP) to protect and manage the Las

Vegas Valley's primary groundwater supply. An advisory committee— comprised of seven appointed members who represent groundwater interests (domestic well users, municipal rate payers, etc.) and two nonvoting members who represent the Nevada State Engineer and the Nevada Division of Environmental Protection—was formed to protect the local groundwater basin from overdrafting and contamination. The committee worked with staff to develop the program's goals, which include the protection of the aquifer, management of the groundwater system, distribution of information and groundwater user-agency cooperation.

Management of southern Nevada's groundwater supply requires cooperation and compromise of both the advisory committee and the SNWA. The committee meets quarterly to discuss issues related to the Las Vegas Valley groundwater basin. Ultimately, the committee is tasked to make recommendations to the SNWA Board of Directors regarding best practices for the groundwater basin and management program. In addition, the committee works to educate others about ongoing groundwater issues as they conduct public workshops at least once a year. Their informed opinions and proximity to the issues provide an invaluable resource to the SNWA.

The groundwater basin in Southern Nevada is a fragile resource with a number of environmental, hydrological and safety concerns. The GMP works to address these concerns and to implement effective programs aimed at improving the basin. These programs address important groundwater issues, including protection of the groundwater basin, funding opportunities for well users who are required to connect to a municipal system and public education.

Through recommendations from the committee members, the GMP works on a number of initiatives to protect the basin from overdraft and contamination. For example, the GMP has purchased water for permanent recharge and is using two dedicated recharge wells on behalf of the program. Injecting treated Colorado River water directly into the groundwater basin provides more stable groundwater levels and more efficient groundwater wells that stay in operation longer, run more efficiently and use less energy. Additionally, the GMP has established the Las Vegas Valley Groundwater Management Program Hydrologic Telemetry System to educate well owners about water levels in the valley and to allow well owners to see fluctuations in water levels near their wells in real time. This information keeps well users informed of water pumping impacts to the groundwater basin.

The SNWA Well Conversion Grant Program was established through state law in 1999. The program offers assistance to well users who are required by the Nevada State Engineer to connect to a municipal water system. The program funds a majority of the costs associated with hooking up to a municipal supply, which can be a concern for those residents who are required to connect.

## Lower Colorado River Multispecies Conservation Program

Because the majority of water used in southern Nevada comes from the Colorado River, managing environmental issues along the river are of utmost importance to the SNWA. Many of the fish, birds and other wildlife that call the Colorado River home are threatened or endangered under the federal Endangered Species Act. In addition, reduced aquatic habitats directly affect the river's ecosystem. To begin stabilizing and rebuilding the population of endangered species, the SNWA has worked with state and federal partners including Arizona, California and the U.S. Department of the Interior, to develop the Lower Colorado River Multispecies Conservation Program (MSCP). The MSCP coordinates strategies to permit federal and nonfederal operations in the lower Colorado River, while working towards the recovery of listed species.

The MSCP is overseen by a steering committee comprised of 53 members, including state and federal agencies, Native American tribes, entities such as the SNWA, and interested conservation organizations. Together, these stakeholders make decisions that have led to razorback sucker (*Xyrauchen texanus*) studies on Lake Mead and southwestern willow flycatcher (*Empidonax traillii*) surveys along the Virgin and Muddy Rivers, both species listed under the Endangered Species Act. The large number of stakeholders with competing interests demands cooperation among participating organizations for brainstorming strategies and successful implementation efforts. The steering committee provides opportunities for the parties to work together to develop unique solutions to challenging environmental problems. Without the program commitments of the participating organizations, the future of threatened and endangered species along the Colorado River would be highly uncertain. The MSCP's process of cooperation and compromise ensures the survival of critical habitats and the program's long-term commitments protect declining populations at levels that can be sustained and improved over time.

## Las Vegas Wash

The SNWA has also taken steps to protect the quality of water entering the Colorado River. Where the MSCP aims to protect threatened species along the lower Colorado River, recent efforts in the Las Vegas Wash (the Wash) are focused on managing a variety of issues, including water quality, erosion control and wetlands restoration. The Wash—the primary drainage channel for Southern Nevada's urban runoff, shallow groundwater, reclaimed water and stormwater—is approximately 12 miles (19.3 km) long and carries, on average, more than 150 million gallons (567,811,768 l) per day of highly treated wastewater to the Las Vegas Bay and Lake Mead. Although these flows represent less than 2 percent of water flows into Lake Mead, they are an important component of southern Nevada's water-resource portfolio because they provide return-flow credits to supplement Nevada's Colorado River allocation. The water of the Wash also supports wetland that provides critical habitat for many species of both animals and plants of the Mojave Desert. In addition to the habitat it provides, the wetland also acts as a natural cleansing point for runoff from the Las Vegas Valley, reducing pollutants as the water travels through the Wash and eventually enters Lake Mead.

Historically, wetland in the Wash has served to remove pollutants and suspended solids as urban flows pass into the Colorado River system. Erosion, however, dramatically reduced the amount of wetland in the Wash, leading to increased sedimentation in Lake Mead, habitat loss and water quality concerns. To address these issues, a multiagency coordination committee was formed in October 1998 pursuant to the recommendation of a regional water-quality citizens committee sponsored by the SNWA. The Las Vegas Wash Coordination Committee (LVWCC) consists of 29 members including local, state and federal agencies, that are interested in protecting the ecosystem of the Wash. Administered by the SNWA, the LVWCC developed a Las Vegas Wash Comprehensive Adaptive Management Plan that set forth recommendations for restoration and management of the Wash, using study teams comprised of committee members to implement specific recommendations set forth in the plan. The three guiding goals of the plan are to manage erosion control, environmental monitoring, and wetlands restoration and enhancement for the betterment of the Wash and Lake Mead. In 2000, the SNWA was designated the lead agency for implementation of the plan and established the Las Vegas

Wash Project Coordination Team to provide administrative and technical support to the LVWCC.

To address water-quality concerns in the Wash, the LVWCC has taken a proactive approach with the construction of erosion-control structures and extensive monitoring efforts. Since its inception, the LVWCC has built ten grade-control structures, has installed roughly 40,000 linear feet (12,192 m) of stream-bank protection, has conducted water-quality and tributary monitoring, and has performed extensive revegetation in the area. These efforts have resulted in a 75 to 80 percent total sediment reduction, improving water quality in both the Wash and Lake Mead.

The issues surrounding the Wash are complex and require significant coordination and cooperation among stakeholders. Because research is the starting point for any successful environmental mitigation and management plan, the Wash is a focal point for research involving water quality, water levels and biological studies. Water-quality data is collected at 20-minute intervals daily and distributed among LVWCC members for analysis and review. Stream-gauging provides an accurate measure of flows in the Wash tributaries, which helps to determine contaminant contributions from urban runoff and allows committee members to study the effects of runoff on water quality.

The LVWCC also participates in a variety of biological studies that explore the relationship between the water in the Wash and the ecosystem it maintains. The presence or absence of wildlife can provide scientists with valuable information about what is happening in an ecosystem. The Wash is home to over 300 species of plants, fish and wildlife, and the member agencies of the LVWCC are committed to working collectively to ensure that the habitats of those species remain protected. The LVWCC has an extensive bird-monitoring program, which includes avian point-count studies; this program has identified more than 160 bird species at the Wash, many of which breed in the area or periodically stop as part of their migration route. Protecting this habitat is crucial for wetland areas, as it has been found that 80 percent of the breeding bird population in the United States—and more than 50 percent of the protected migratory bird species in the country—rely on wetland and riparian habitats.

Given the Wash's history of erosion and decreasing wetlands, revegetation efforts have been a critical component to the long-term success of the LVWCC. Over the past 30 years, wetland vegetation had decreased from approximately 2,000 acres (809.4 ha) to about 200 acres (80.9 ha), mostly due

to increasing highly treated wastewater flows. Increasing daily flows alter surface and subsurface hydrology and accelerate the process of erosion. However, channel-stabilization activities create the opportunity to revegetate land adjacent to erosion control structures. The adjacent land is often cleared of nonnative invasive species, which provides further opportunities for the implementation of coordinated, long-term, invasive-management strategies. Once cleared, areas are then planted with native wetland, riparian and upland plants. These actions, individually and in concert with one another, protect the Wash against erosion, promote wildlife habitat and improve overall water quality.

Given the importance of plant vegetation to the Wash ecosystem, extensive records and logs are kept on current plant species in the Wash, which currently number over 180. In 2000, it was estimated that up to 80 percent of the vegetation in the Wash was tamarisk (*Tamarix*), a highly invasive plant listed on Nevada's noxious weed list. To address this problem, the Las Vegas Wash Weed Partnership was formed and began work to control the 1,500 acres (607 ha) of invasive weeds that was documented in the Wash area. Since 2002, the National Park Service's (NPS's) Exotic Plant Management Team, with assistance from local agencies, has conducted biannual weed surveys along the Wash. Through the efforts of the weed partnership and LVWCC, over 680 infested acres (275 ha) of tall whitetop (*Lepidium latifolium*) have been treated in the Wash, 115 acres (275 ha) of tamarisk have been cleared, 38 stands of giant reed (*Arundo domax*) have been removed and four controlled burns have been conducted, saving hundreds of thousands of dollars in disposal costs.

Because issues in the Wash have regional effects, community awareness contributes significantly to the success of efforts, such as the LVWCC and Las Vegas Wash Weed Partnership. For example, the weed partnership has developed a number of outreach materials for the public that educates about the harmful effects of invasive weeds. In addition, several volunteer weed pulls have been hosted at the Wash, encouraging community volunteerism and education. The LVWCC sponsors an annual clean-up event at the Wash, as well as periodic community plantings and other events to raise awareness.

## Colorado River Delta

Similar to issues in the Wash, the Colorado River Delta (the Delta) in Mexico is a regionally significant wetland and estuarine ecosystem that supports

a diverse array of plant and animal species, including several listed as endangered in both the United States and Mexico. The construction of dams and subsequent diversion of water from the Colorado River and Mexico have reduced water and sediment flows to the Delta, substantially reducing the amount of riparian and wetland areas in the Delta from predam levels. Many environmental organizations have advocated increased water flows and changed management of the river flows to improve and restore more of the Delta ecosystem. The U.S. and Mexican governments have developed a conceptual framework for cooperation on studies and recommendations regarding environmental issues in this critical region of the Colorado River system.

With the regional drought and increased pressures on Colorado River water resources, the issue of the Delta will likely become more complex. The SNWA continues to gather information and ensure that other stakeholders are well informed of the many issues concerning this fragile ecosystem. By continuing to engage this issue, the SNWA will be prepared to address binational issues as a shared regional water resource and environmental solution.

## Seven States Process

In addition to the environmental challenges facing the Colorado River, the sustained drought in the Colorado River Basin has affected management and operation of the river system as a whole. The drought has left Lake Powell and Lake Mead at half their combined capacity, with future concerns related to climate change not boding well for the river's future flows. To meet the challenges of ongoing drought and climate change in the Colorado River Basin, the Secretary of the Interior requested input on the potential operation and management of the river system during times of shortage. This request motivated the seven basin states of the Colorado River (California, Arizona, New Mexico, Utah, Colorado, Wyoming and Nevada) to begin meeting in 2005 to discuss shortage criteria and related issues.

The negotiations led to a conceptual plan for innovative approaches to managing the river in a time of severe drought or other shortfalls in supplies, including a shared-shortage agreement and additional water banking between Nevada and Arizona, and mechanisms to encourage and account for augmentation and conservation of water supplies in the Lower Colorado River Basin. On December 13, 2007, the Secretary approved a set of interim guidelines

for Lower Basin shortages and coordinated operation of Lake Powell and Lake Mead that reflect, in large, part the recommendations of the seven basin states. Although the guidelines do not specifically address environmental issues facing the Colorado River, it represents a historic agreement among those who share the resource and are working diligently to monitor and manage those environmental issues. The agreement represents years of cooperation and negotiation among the seven basin states and could serve as a model for agreements that address environmental initiatives along the river.

## Muddy and Virgin Rivers

Apart from the Colorado River, there are other environmental initiatives undertaken by the SNWA to address concerns on other water resources. The mainstream river, tributaries and springs of the upper Muddy River provide habitat for several species that are considered rare and sensitive. The upper Muddy River and the Warm Springs area are home to the endangered Moapa dace (*Moapa coriacea*). The U.S. Fish and Wildlife Service (USFWS) manages the Moapa Valley Wildlife Refuge in this area for conservation of the Moapa dace, as well as additional sensitive species on the river. Conservation of the species found along the Muddy River is a high priority for many local, state and federal agencies. To address these concerns, in 2006 the SNWA approved a memorandum of agreement among the USFWS, Coyote Springs Investment LLC, Moapa Band of Paiutes, Moapa Valley Water District and the SNWA that establishes a plan for the monitoring, management and mitigation of groundwater development in Coyote Spring Valley and California Wash groundwater basins, while simultaneously working to protect and recover the Moapa dace. This unique agreement among the diverse stakeholder groups provides for a range of conservation measures that will help to protect and recover the threatened species.

In 2007, the SNWA approved an agreement with the USFWS to implement species conservation measures, including the construction of fish barriers in the Muddy River, eradication of nonnative fish and improvement and restoration of Moapa dace habitat on an area of the Moapa Valley National Wildlife Refuge. In addition, the two agencies will work cooperatively to develop a recovery implementation program an ecological model and to establish a hydrological review team. The Muddy River Recovery Implementation Program

will provide a comprehensive umbrella Endangered Species Act program for water-resource management in Coyote Spring Valley, the Muddy Springs and the Muddy River areas and will serve to support the recovery of listed species and identify opportunities for sensitive species and their habitat. The program area extends from the upper Muddy River to Lake Mead. The development phase of the program is expected to be completed in 2008 and program implementation will begin shortly thereafter.

The Virgin River is one of the largest riparian corridors in the desert Southwest and is home to a number of endangered species. There are more than 200 other species of wildlife that also utilize this riparian corridor as a residence or seasonal migration route. The Virgin River is regarded by federal and state agencies, as well as environmental organizations, as an integral component of the desert southwest's ecosystem because of its high level of biodiversity. Because of its value as an area of environmental interest, the SNWA has been conducting environmental research along the Virgin River since 1993. Much of the available biological information concerning the lower Virgin River has been collected by the SNWA. This includes population and habitat surveys for fish, birds, mammals, amphibians and sensitive plants.

In the upper Virgin River (within Utah), federal, state and local agencies with various other stakeholders are implementing the Virgin River Resource Management and Recovery Program. This program provides environmental compliance for water-development and flood-control projects by implementing resource-management agreements aimed at recovering listed species, at conserving native species and at protecting the river corridor.

In 2004, Mesquite began development of the Virgin River Habitat Conservation and Recovery Program for the lower Virgin River as part of the Mesquite Lands Act. The SNWA, Clark County, Virgin Valley Water District, NPS, Nevada Department of Wildlife and the U.S. Bureau of Land Management (BLM) joined the planning process in 2005 and established an executive committee with representatives from the participating agencies to guide the process. Five specialized technical committees have been established to provide additional guidance and recommendations to the executive committee.

In addition to the Virgin River Habitat Conservation and Recovery Program, the Lower Virgin River Recovery Implementation Team is developing a conservation plan, conducting research and implementing interim conservation measures for selected endangered fish found in the area. The Virgin River

Conservation Partnership is a stakeholder group comprised of federal, state and local agencies working to share information and recommend to planning efforts, like the Virgin River Habitat Conservation and Recovery Program. The SNWA is a key participant in these efforts to ensure they are developed in coordination with the development of the SNWA's water rights in the Virgin River.

## Warm Springs Natural Area

In July 2006, the SNWA Board approved a purchase agreement for 1,179 acres (477 ha) of land historically known as the Warm Spring Ranch, located in Moapa Valley. The property was acquired in September 2007 with funds from the Southern Nevada Public Lands Management Act (SNPLMA), secured under the Parks, Trails and Natural Areas category. The property is currently home to the majority of Nevada's Moapa dace population and habitat, which was at risk of being developed for residential purposes. The property has since been renamed the Warm Springs Natural Area to reflect its intended purpose as a conservation and natural area. The area, along with the neighboring Moapa Valley National Wildlife Refuge, encompasses approximately 20 springs which form the headwaters of the Muddy River. Other endangered and sensitive species found on the property include the largest breeding population of vermillion flycatchers (*Pyrocephalus rubinus*) in the state.

Although the primary purpose for acquiring the property is for the protection of the Moapa dace, the SNWA manages the entire property as a natural area to develop a long-term management plan. It is anticipated the property will be managed alongside the adjacent Moapa Valley National Wildlife Refuge and The Nature Conservancy's Muddy River property. Coordinated management of the properties will provide seamless operation and will maintain cooperative relationships among the agencies.

## In-state Water Resource Development

The SNWA is currently pursuing the development of unused groundwater in five hydrologic basins in eastern Nevada (Delamar, Dry Lake, Cave, Spring and Snake valleys). This region lies within the Great Basin, a high desert area that supports a suite of unique and sensitive plant and animal species. Many of these species are dependent upon springs and small streams that are scattered

throughout the area. In an effort to develop a responsible water management plan for the area, the SNWA has conducted hydrologic and environmental research in the region since the early 1990s. This data has been provided to the BLM for evaluation during the environmental-impact-statement process conducted as part of the SNWA's request for rights-of-way on federal land for water transmission and other related facilities. As part of the decision-making process, the BLM will also evaluate studies and information provided by the Desert Research Institute, Great Basin Bird Observatory, Nevada Department of Wildlife, Nevada Natural Heritage Program, USFWS, and the U.S. Geological Survey. Utilizing this broad information base will provide for a thorough assessment of the region and will allow the BLM to make the most informed decision. Biological data provided includes surveys for bats, small mammals, raptors, hawks, breeding birds, sensitive plants, general wildlife, weeds, terrestrial invertebrates and aquatic ecosystems. In addition, the SNWA has collected extensive geologic and hydrologic data from published sources, field surveys and studies, and new monitoring and testing wells. This information will allow the SNWA to better predict potential impacts from groundwater development and to design successful monitoring and management plans for the area.

In April 2007, the Nevada State Engineer granted the SNWA water rights in Spring Valley, Nevada. In conjunction with the water-rights process, the SNWA entered into an agreement (Stipulation) with the U.S. Department of Interior on behalf of the USFWS, NPS, BLM and the U.S. Bureau of Indian Affairs to work together to monitor and protect Spring Valley resources. The federal agencies withdrew their protest to SNWA's groundwater applications as part of the stipulation and the SNWA's commitment to work cooperatively. These efforts will ensure that groundwater development in Spring Valley is managed in such a way as to avoid adverse effects to federal water rights, resources and water-dependent ecosystems over a long-term period.

The Stipulation calls for the development of two key documents, including plans for hydrologic and biological monitoring as well as management and mitigation plans. To oversee these commitments, the agreement establishes a technical review panel for the hydrologic program and a work group for the biological program. The hydrologic management plan will establish a monitoring network to assess the effects, if any, of the SNWA's groundwater withdrawal in Spring Valley. Similar to the hydrologic management plan, the biologic management plan establishes a monitoring program to assess the response of

aquatic and terrestrial organisms to any changes in local water-dependent ecosystems from development of groundwater in the area.

The hydrologic and biologic management plans also outline specific commitments for the management and mitigation of potential adverse effects of groundwater pumping by the SNWA, including the modification of the location of the pumping, restoration of habitat or cessation of pumping should there be unreasonable effects. The processes set forth in the stipulation will provide an early warning system so preventative measures can be taken if necessary to keep adverse impacts from reaching sensitive biological areas. The agreement establishes a cooperative process between the federal government and the SNWA that allows for the development of necessary municipal water supplies in a manner that protects the environment in the region.

Recently, the SNWA has reached a similar agreement with federal agencies for the management of groundwater development in the Dry Lake, Cave and Delamar valleys. The Moapa Band of Paiutes also signed a separate stipulation concerning the management of these three basins. These agreements represent a management and monitoring commitment to ensure all interests are represented and protected.

## Conclusion

As water managers' responsibilities in water resource procurement and development evolves, water agencies are challenged to take on a variety of roles including those of environmentalists and conservationists. Instead of initiating environmental processes to simply meet regulations, the SNWA is ushering in a new ethos of resource management. The SNWA recognizes that water resources need to be managed conjunctively with other resources in the watershed, including the land, vegetation and wildlife. This approach encourages a more responsible culture for environmental management and gives stakeholders an opportunity to develop comprehensive management plans for the watershed and its surrounding areas.

Water management is no longer simply a supply and demand issue, but instead a complex weave of competing issues that must be carefully balanced. The new age of resource planning involves difficult challenges, including careful consideration of stakeholder, environmental and public expectations, and it requires cooperation amongst local, state and federal agencies and interests for efficient

and sustainable long-term resource development. Engaging a larger audience is vital to ensuring these stakeholders' interests are represented in long-term planning activities. Higher costs and longer project timelines are often the result of increased participation, but responsible resource management demands a renewed commitment to these processes to ensure protection of the environment and other cultural values. Toward this end, such expenses are seen as investments in the environment, which yield valuable returns.

In conclusion, the future of water-resource development expects sustainable practices and proactive measures to watershed protection, rather than actions that are part of a regulatory process or are required by state or federal law. The SNWA, along with other water-resource managers, embodies this ethos and works with stakeholder groups to effectively manage water resources conjunctively. Moving forward, this reality will become increasingly apparent to other managers in the development of other resources including power, oil, natural minerals and energy. Water resource development is beyond compliance. We can no longer simply adhere to regulated processes but must also work to secure the future for sustainable, long-term development of resources.

# Building an Ecosystem Marketplace in Oregon's Willamette Basin

**Sara Vickerman**
*Defenders of Wildlife*
*West Linn, Oregon*

## Introduction

The idea of mitigating for development's impacts on ecological functions is not new. For more than 30 years in the United States, mitigation has been required of developers who impact wetland. Historically, however, wetland mitigation has been done on or near the site of impact and was intended to compensate for the loss of wetland function as closely as possible. This approach is generally referred to as on-site, in-kind mitigation. Numerous studies have determined that this approach is not ecologically effective for many reasons. The on-site, in-kind projects are often poorly designed and maintained, are too small and often are located in fragmented landscapes. One frequent criticism is that the required sequence—avoid, minimize then mitigate—is not followed, and important wetland that should have been avoided is developed. As a result, mitigation strategies have not been popular among many in the conservation community. Partially in response to these problems, mitigation banking is gaining wider acceptance. High-quality, well functioning, wetland-mitigation banks can be established, generally on private land, which produce significant ecological benefits. The ecosystem services provided by the banks, such as water filtration and flood control, can be converted into credits to be sold to developers with mitigation responsibilities.

There is a growing interest in the potential to use similar market-based strategies to conserve land and water, along with the ecosystem services that they generate. Given the political resistance to more stringent regulations, rising influence of property-rights interests and shrinking natural-resource budgets, it is unlikely that current government and private-sector programs will be adequate to conserve enough fish and wildlife habitat, in the right places and in ecologically viable configurations, to prevent continued endangered species listings and maintain long-term viability of ecosystems.

This paper describes an effort, initiated in Oregon's Willamette Basin, to develop a new approach to conserving functioning and attractive landscapes.

The idea of an ecosystem marketplace has emerged as a viable tool to supplement, not replace, existing conservation strategies. An ecosystem marketplace will establish a mechanism for landowners to sell ecosystem services to developers and others who cause adverse environmental impacts. With the potential to make more effective use of existing mitigation funds and to tap new private and public sources, the proposal has captured the imagination of a variety of stakeholders, and the marketplace has gained traction with conservationists, resource agencies and the business community. However, considerable work lies ahead to develop the rules of the game and to ensure that the new system does not repeat the mistakes of the past or create a new set of problems that will compromise the achievement of conservation goals.

## Willamette Partnership

The Willamette Basin, located in the northwestern corner of Oregon, is under considerable growth and development pressure, like much of the western United States. The result has been degraded ecosystems, lost and fragmented fish and wildlife habitat, water shortages, impaired water quality and a host of other challenges that will likely be exacerbated by global warming.

The Willamette Partnership was incorporated as a nonprofit organization in 2004. Founded by a diverse group of stakeholders, including local officials, farmers, developers, attorneys and conservationists, its mission is to increase the pace, expand the scope and improve the effectiveness of conservation in the Willamette Basin. Most of the stakeholders have been involved in previous efforts and, as veterans of the conservation wars, are determined to find a more effective and efficient way to do business. This new approach, described as an ecosystem marketplace, is based on the theory that accommodating a projected doubling of the population by 2020 while conserving, and even improving, ecosystem functions is possible if smart decisions are made and resources are effectively invested.

The partnership secured a targeted watershed grant from the U.S. Environmental Protection Agency to expand water quality trading to reduce stream temperatures and to propose a mechanism for a multicredit ecosystem market. The U.S. Department of Agriculture's Natural Resources Conservation Service subsequently awarded a conservation innovations grant to the partnership to assist in the development of market mechanisms and on-the-ground

implementation of the marketplace concept. Additional support was provided by the National Fish and Wildlife Foundation for stakeholder outreach and communication. Matching funds and substantial in-kind support from dozens of partners also support the effort.

Although similar efforts are underway across the United States and around the world, the Willamette Partnership's approach differs in several substantial ways. First, the starting point is not simply saving time and money for developers, although this is an expected outcome. The primary focus is on restoring ecosystem function in the basin. Second, the holistic approach places a priority on integrating multiple types of ecosystem services at a landscape scale. For example, a single large landowner or group of landowners could sell wetland, endangered species, water quality and carbon credits from the same piece of land. And, finally, with the benefit of multiple ecological studies over the past decade, The Nature Conservancy and other partners have integrated relevant data and conservation priority schemes in a single synthesis map that can be used to direct conservation investments to the best places on the landscape in the Willamette Basin.

## What Is an Ecosystem Marketplace?

An ecosystem marketplace is a system in which multiple types of ecological services are bought and sold. A multicredit marketplace includes transactions driven by regulations, such as wetland mitigation and conservation banks. It includes transactions stimulated by cap-and-trade programs like the sale of carbon credits to limit carbon dioxide emissions. A marketplace also includes voluntary transactions, in which companies or individuals invest in conservation projects to compensate for adverse environmental impacts.

A multicredit ecosystem marketplace is distinguished from individual markets that focus on specific environmental values. In addition to wetland mitigation banking, examples of these markets include carbon, conservation banking and water quality. Carbon markets involve power companies and others who are either required or choose to offset their carbon dioxide emissions. Most carbon trades support technical approaches to emissions reductions, but, increasingly, carbon credits are sold by forest landowners whose activities sequester carbon or by farmers who adopt agricultural practices that retain carbon in the soil instead of releasing it to the atmosphere. Under the Endangered

Species Act, conservation banking allows impacts to endangered species habitat to be offset by investments in suitable habitat elsewhere, provided that the habitat is conserved in perpetuity with a conservation easement that protects a single species or group of species. As for water quality, separate markets exist for temperature, phosphorus and nitrogen. The temperature market allows industries to purchase credits from landowners who restore riparian habitat that cools the water.

### *Selling Ecosystem Services*

Ecosystem services include the full spectrum of environmental benefits including fish and wildlife habitat, clean water and air, pollination, mitigation of environmental hazards, control of pests and diseases, carbon sequestration and emissions control, and soil productivity. Some definitions of ecosystem services include commodities like food and wood products, but for the purposes of this paper, products with well developed commercial outlets will not be addressed as part of a market.

The important point here is that most ecosystem services are undervalued in our economic system. Once destroyed, they are costly to replace. Services like clean, abundant water, clean air, flood control, fish and wildlife habitat, pollination and temperature moderation are often provided by nature for free. Technical, engineering solutions are expensive have limited ecological value, and require continued investment for maintenance.

There is a variety of programs by which landowners are paid to provide ecosystem services, but most have nothing to do with markets. For example, most conservation incentive programs under the U.S. Farm Bill provide financial assistance to farmers who take land out of production, restore wetland, restore fish and wildlife habitat, control pollution or implement other conservation measures.

## Why Build an Ecosystem Marketplace?

There are many reasons to create an ecosystem marketplace. The most significant reason is that existing programs are not working. Many environmental regulations are narrowly focused, unevenly constructed and applied, complicated and expensive to implement, and often inadequately

enforced. Even with perfect compliance, ecosystems will continue to degrade, since regulations are typically designed to limit destructive activities rather than compel restorative and positive acts. In addition, although significant investments in conservation are made by public and private entities, they tend to be scattered and piecemeal. Similarly, conservation resources will always be limited given competing social and political demands for funds. Overall, ecosystem services are expensive to replace, especially if they are addressed individually and with technical engineering solutions like water treatment facilities, impoundments and flood-control structures. Yet, a properly designed ecosystem marketplace can tap private funds to offset impacts, thereby expediting development in the desired locations while steering conservation investments to high-priority habitats.

## Essential Elements of an Ecosystem Marketplace

### *Ecological Effectiveness*

The market must be ecologically effective. Although it may seem obvious, effectiveness cannot be determined unless broad and site-specific ecological goals are in place to guide monitoring. The monitoring system must be tied to the goals. An accounting system is needed to determine whether the condition of ecosystems is getting better or worse relative to the desired condition. Even under optimal conditions, market-based conservation projects will only constitute a fraction of the total effort. Therefore, landscape-scale monitoring will need to be coordinated by resource agencies in cooperation with a variety of private sector participants, while on-site monitoring can be conducted by landowners or managers as part of their obligation under market agreements.

Land protection strategies need to reflect basic principles of conservation biology, such as connectivity, and to accommodate of natural disturbances, such as flooding and fire, and the needs of species and habitats at risk. Although the prospect of developing a consensus on ecological goals and of implementing a coordinated monitoring system to track progress is daunting, it is possible to take small steps in that direction to demonstrate how it might work at a larger scale. Without clear goals and coordinated monitoring, it will be difficult to apply the principles of adaptive management that lead to continuous improvement. A reasonable starting point is to determine a baseline condition for habitat, water quality and other values.

***Addressing Multiple Values***

An ecosystem marketplace must address multiple values. Single-purpose, environmental services markets are, in most cases, too thin to be economically viable and are likely to be ecologically ineffective if they simply facilitate many small, disconnected conservation projects. Regulatory markets currently exist for wetland, water quality and quantity, carbon and endangered species. Voluntary markets are expanding and may be used to address currently unregulated resources. In the short run, market participants will need to find efficient ways to stack or bundle payments for ecosystem services. For example, forest landowners may seek certification for their wood products, sell carbon credits and sell a conservation easement on the property. In combination, these revenue streams may improve the long-term viability of the operation and may prevent the sale and conversion of land to development.

At some point, it may be possible to develop generalized ecosystem credits, especially for voluntary markets. While potentially fraught with the hazard of homogenizing treasured ecological values (like individual species), developing a generalized credit, perhaps in addition to specific ones, can protect larger parcels of land that do not contain regulated resources like wetland or listed species. A generalized ecosystem credit may also be useful in a context where a community seeks to implement a no-net-loss of ecosystem services policy.

***Facilitating Strategic Investments at Landscape Scale***

The system needs to facilitate strategic investments at a landscape scale. Currently, many projects are too small and disconnected to be ecologically viable. A landscape approach is needed that addresses long term viability issues, especially in the face of uncertainty associated with climate change. Achieving this goal will require ecological assessments that span jurisdictional and ownership boundaries, as well as coordinated planning, conservation and management activities. Market rules will either need to provide incentives for investing in priority locations or penalties for investing in the less desirable locations. Existing barriers to the conservation of large landscapes will also need to be addressed.

***Transparency and Credibility***

Ecosystem markets must be transparent, credible and periodically evaluated. In order to pass political muster, especially with the conservation community, market transactions need to be guided by rules and open to anyone

to examine or participate in. To satisfy this requirement, it will be necessary to develop mechanisms to display detailed information about ecosystem services that have been sold or offered for sale. This mechanism will likely be a Web-based instrument that is open to buyers, sellers, regulators and the general public. Since different ecosystem services are traded at different scales, the system needs to accommodate transactions on scales as limited as a small watershed or, in the case of carbon, as broad as the global market.

### *Accessibility and Efficiency*

Markets should be accessible with low transaction costs. In order to attract both buyers and sellers of ecosystem services, markets need to be open to anyone and not overly burdened by administrative complexity. There is always a need to balance precision and quantification of values with simplicity to ensure a viable market. Reducing risk to early market participants may be necessary.

## Status of the Ecosystem Marketplace

### *Wetland Mitigation Banking*

Wetland mitigation banking has expanded and improved significantly in the last 10 years. North Carolina established a statewide program that takes a watershed approach and allows the creation of credits prior to impacts. Oregon has several large and effective wetland mitigation banks and a new program designed to protect wetland in the Willamette Valley, while expediting the development of suitable industrial land. New federal regulations encourage a watershed approach to wetland conservation and promote mitigation banking.

### *Water Quality Trading: Clean Water Services Example*

The Environmental Protection Agency has authorized more than 40 water quality trading programs across the country. In the Midwest, the programs focus on trading nutrients and phosphorus. One of the earliest and most effective of the programs is in Oregon's Willamette Basin, operated by a special district called Clean Water Services. The district covers a broad geographic area (122 square miles [315.97 $km^2$]) west of Portland and includes urban, suburban and rural land. Facing a requirement under the federal Clean Water Act to reduce the temperature of effluent from its water-treatment facilities, the agency considered installing cooling equipment at the cost of $60 million. Instead, Clean

Water Services, under the authority of a water quality trading permit, elected to spend substantially less money, approximately $6 million, to pay farmers to plant trees that provide shade and thatnaturally cool the water. These riparian restoration projects are financed with a combination of federal and state funds distributed through the Conservation Reserve Enhancement Program (CREP). Ratepayer funds from the sewer and water customers of Clean Water Services supplement the CREP funds, which was insufficient to persuade any participants in the Tualatin Valley to participate. In addition to cooling the water, the improved riparian areas provide aesthetic and recreational benefits for people and habitat benefits for fish and wildlife. Clean Water Services also operates a wetland mitigation bank and has applied for carbon payments to help finance tree planting. The secret to the program's success is creative leadership and a strong, trusting relationship between the district and skeptical stakeholders. This program provides an excellent example of bundling payments for ecosystem services. It will become an active player in the ecosystem marketplace as it evolves.

***Conservation Banking***

Conservation banking for endangered species has been most active in California. In this program, landowners provide endangered species habitat in exchange for payments intended to cover the cost of property and its management in perpetuity. In Oregon, the Department of Fish and Wildlife's conservation strategy proposed a statewide system of conservation banking which reflects the agency's interest in using banking as a conservation tool.

***Carbon Trading***

Carbon trading has tremendous potential to channel investments into ecosystem services. However, at present, the market is voluntary in the United States and investments are focused mostly on emissions reduction. Standards for ecosystem restoration credits have not been developed and remain controversial. For the carbon market to support land conservation, a cap-and-trade system will need to be implemented at the federal, or regional or state level. Capping emissions will stimulate the demand for carbon offsets. In the voluntary market, buyers generally seek high-quality credits or credits that offer multiple benefits. For example, a carbon sequestration project on forestland that includes a conservation easement, a long-term commitment to protect the forest or extend rotations well beyond the typical harvest cycle, and a management

scenario that includes leaving dead and down trees for wildlife would address biodiversity needs while helping to meet emission-reduction goals.

## Policy Issues for Ecosystem Markets

### *Role of Government and the Private Sector*

The confusion surrounding the development of ecosystem markets could lead to their demise if broad agreement on the appropriate role of government and the private sector is not resolved. For example, if public agencies sell ecosystem credits (of any kind) generated through restoration projects on public land, the public credits could easily swamp the market or lower the price to the point that private landowners are not interested in participating. The effect of such a scenario could be to shift the funding of natural resource agencies from general fund sources to credit sales, thereby lowering the overall investment in public-land management. While there may be an appropriate role for public land in ecosystem service markets, the policies need to be carefully considered.

### *Double Dipping*

Another issue concerns the potential for double dipping. For example, if dedicated public conservation funds (for example, federal Partners for Fish and Wildlife) are used for a restoration project on private land and the landowner sells the credits to a developer, there is no net gain in habitat for the public. However, it may be generally beneficial for the landowner to be able to tap multiple revenue streams (wetland, water quality, habitat, carbon) in order to finance a substantial restoration project. A relatively simple and transparent system is needed to assess the present ecosystem values and potential ecological improvement under a restoration plan so agencies, landowners and the public can easily determine the overall impact.

### *Rewarding Strategic Investment*

Another thorny policy issue concerns strategic investment in priority locations. Assuming priorities can be agreed upon by key market participants and other stakeholders, mechanisms are needed to reward investors for seeking the most ecologically valuable land rather than the cheapest land. Incentives could include favorable mitigation ratios, expedited permitting, financial assistance or other inducements to invest in large, strategically placed conservation projects.

### *Markets and Regulations*

The relationship between regulations and markets is an important one. Regulations drive most markets, so policy assessments are needed to develop appropriate regulations. These would encourage participation in ecosystem markets that are fairly distributed across ecosystem values and that produce substantial improvement in ecological functions.

### *Liability and Assurance*

Early investors in the ecosystem market will be taking considerable risk. The various programs assign liability differently. For example, the wetland banker bears responsibility for the success of a wetland restoration project. In water-quality trading, the liability remains with the industry that purchased the credit. Until the rules of the game are clear and the risk is minimized, the markets will remain small. Risk could be addressed with insurance or assurance pools, either on public or private land.

### *Accounting*

Until it is possible to quantify ecosystem services, it will be nearly impossible to develop a market around them. A variety of accounting schemes are under development to support markets, but none have emerged that address multiple credit types, promote ease of use or prove acceptable to regulators.

### *Financing*

The entire purpose of ecosystem markets is to improve ecological performance, invest existing resources more effectively and tap new revenue sources. According to a 2007 report by the Environmental Law Institute, more the $3.4 billion is spent annually on wetland mitigation projects alone. If those funds were strategically invested in priority areas, the benefits would be substantial. Significant new revenue may be generated at the federal level with the passage of energy legislation that establishes a cap-and-trade program that allocates a percentage of the credit sales to state and federal resource agencies for conservation projects to address the adverse effects of climate change. Communities or states that adopt policies that seek no-net-loss of ecosystem services may create opportunities for ecosystem credit sales.

## Conclusions and Recommendations

The Willamette Partnership has invested several years and considerable energy in the creation of a regional ecosystem marketplace. Progress has been made but more slowly than enthusiasts had hoped. Issues, such as shortage of resources, resistance to change, arcane and narrowly focused regulations, fear of litigation and typical turf issues, must be addressed as the project moves forward. It has become obvious that building a marketplace mechanism for a single basin, even a very large one, doesn't make any sense. It is simply too expensive and complicated for each region to re-invent. The challenge is to create national or international standards that are widely applied and understood, while leaving flexibility for local solutions and unique situations.

It has also become obvious that creating an ecosystem marketplace is an exceptionally important thing to do. Without it, existing regulations and investment strategies will not protect and restore ecosystems and certainly will not be adequate to buffer the adverse impacts of climate change. Below are some specific recommendations to implement over the next few years.

### *Establish Policies for No Net Loss of Ecosystem Services*

Establishing no-net-loss policies for ecosystem services could expand the scope of the wetland protection laws to other important natural and seminatural landscapes. It might also stimulate the development of tools to measure losses and gains in ecosystem services and might stimulate active trading in services where impacts require offsets.

### *Develop a User-friendly Ecosystem Accounting Tool*

An ecosystem accounting system is needed that will quantify the ecological values on individual sites, taking into consideration the larger context in which they occur. This system needs to be widely accepted by scientists, agencies and landowners so they can work together to determine what services are available for sale and for what purpose.

### *Build an Ecosystem Credit Registry*

In order to track ecosystem credits and to provide overall transparency and credibility to the market, credits need to be verified, certified, recorded and tracked. The system has yet to be designed, but some progress has been made by the Willamette Partnership to define what it should look like.

***Create a National Ecosystem Services Council***

The Green Building Council develops standards for certified green buildings, and the Forest Stewardship Council oversees the certification of forests under one certification scheme. A national ecosystem services council, with diverse membership from around the United States, can oversee the development of the credit registry and ensure the credibility of the system. The council can also facilitate collaboration among interested public and private partners in different parts of the country, can share experiences and can avoid re-inventing the wheel. Partners in the Willamette Basin have agreed to begin building such a council.

***Encourage Cross-boundary Planning and Monitoring***

One of the greatest barriers to effective land and water conservation is the balkanization among agencies, different jurisdictions, and public and private land owners. Ecosystem services cannot be addressed without looking across boundaries and coordinating planning, monitoring and conservation projects. To the extent that government can encourage and reward coordinated action, it will support effective market development.

***Reward Agency Innovation and Risk-taking***

Employ every possible reward system to encourage agency personnel to be creative and to take risks in experimenting with ecosystem markets. Whether it takes stronger leadership, a redistribution of resources, more public-private partnerships or just a get-out-of-jail-free card for risk takers, agency staff who attempt to improve performance by doing things differently should be rewarded.

# Closing Remarks

**Joanna Prukop**
*Energy, Minerals and Natural Resources*
*Santa Fe, New Mexico*

Please join me in thanking today's speakers for the quality of their presentations and for doing such a good job of articulating the main ideas in their papers. They all did a fine job of delivering their material. I encourage you to obtain a copy of the *Transactions of the 73rd North American Wildlife and Natural Resources Conference* (*Transactions*) to read more of the detail found in their full papers.

As we all know, mitigation is not a new idea. Effective mitigation that is real, measurable and that contributes to sustainable wildlife populations is still a challenge, especially given the landscape-scale impacts we see today—and particularly if the goal is no net loss of habitat, not to mention a net gain, as Sara Vickerman suggested.

From my experience as Chair of the Association of Fish and Wildlife Agencies' Energy and Wildlife Policy Committee, I have learned of many challenges for mitigation efforts. Two examples of the mitigation challenges we face today are: (1) the mountaintop mining occurring in the Appalachian Mountains with its huge impacts to stream systems and terrestrial habitats, and (2) oil and gas development in places like the Jonah Field in Wyoming where intensive 5-acre (2.02-ha) well spacing is occurring that cannot be mitigated effectively on sight. So, efforts have turned to off-sight mitigation, which still causes uncertainty about its effectiveness given the 40-to-60-year lifespan of the gas field.

Today's presentations offer us an opportunity to consider some new mechanisms, tools and models to help wildlife professionals and others deal with the scale and intensity of impacts caused by various types of development. Some of these begin to concretely quantify and put a dollar value on wildlife habitats and natural systems processes. Ironically, new challenges, like climate change, to resource protection have created opportunities for innovation in problem solving and developing economic alternatives that include valuing wildlife habitat protection and restoration.

For the benefit of those who could not be in the room the whole time and to encourage you to read the full papers in the *Transactions*, I'll briefly review the key points in each paper presented this morning. These are as follows.

***John Rogers, The Conservation Fund***. John focused on the importance of partnership, especially with industry, in describing one approach to achieve carbon sequestration in restored forest ecosystems to offset green-house gas emissions or to create a commodity to trade. His paper is about voluntary habitat-improvement projects that sequester carbon while creating environmental benefits. He stressed the importance of a solid set of principles or standards in developing such practices to assure projects produce the intended full range of ecological benefits. He also stressed that the approach begins with being certain it leads to good conservation, is based on good science and is consistent with current policy direction. Principles and process components are results driven to assure benefits are real, permanent and measurable. John defined the conservation capitol being created as the carbon sequestration rights that come from these restored habitats.

***R. Neal Wilkins, Texas A&M Institute of Renewable Natural Resources***. Neal described a proof-of-concept project involving the golden-cheeked warbler (*Dendroica chrysoparia*) in Texas that he hopes can serve as a model for others in providing incentives for private landowners to implement conservation practices. Through 10-to-25-year contracts this project provides financial incentives to landowners for habitat projects on private land through a mechanism called a recovery credit system. This model quantifies conservation by creating conservation credits that can serve as the currency in the associated marketplace that is also created through this process. It too is governed by a set of principles that assure a net conservation benefit is achieved and that all involved parties are accountable for making it a valid process. Cost shares are required of landowners, partnerships are key and new metrics for measuring results are developed.

***Patricia Mulroy, Southern Nevada Water Authority***. Kay stressed the need for entities like the Southern Nevada Water Authority (SNWA) to go beyond compliance with federal, state and local environmental laws and regulations to be proactive and to integrate innovative solutions to water resource management challenges. This calls for changing and growing the roles of water managers at the SNWA, who have become facilitators, environmental stewards and community advocates. Through collaboration, the SNWA has developed mitigation strategies

that restore properly functioning natural systems in a variety of key habitat types to protect and sustain water resources.

***Sara Vickerman, Defenders of Wildlife***. In describing ongoing work in the Willamette Basin in Oregon, Sara explained the concept of mitigation banking, which also creates a multicredit ecosystem marketplace and provides new sources of revenue to finance conservation. This approach creates buyers and sellers of ecosystem services—water filtration, flood control, water temperature moderation, carbon sequestration, etc. Sara stressed that old programs are not working due to imperfect design and ineffective enforcement of regulations, among other problems, and went on to describe the many components and aspects of making this new approach work. She also described the need for national or international standards and additional models for accounting, trading, banking, etc., in a multicredit ecosystem market place, and the need to update laws, policies and regulations to allow development and implementation of new solutions. She stressed the broad range of benefits that can come from such innovative strategies.

I will close by reminding us of the conference theme: Effective Conservation through Partnerships. And, I add that today's papers highlight that theme and stress that partnering is more important than ever. Today's session challenges us to learn from the approaches described and to figure out how to further develop and apply these innovative ideas to other ecological issues. Thank you for participating in this morning's special session.

# Session Three.
# *Conservation Partnerships: Effective Military Natural Resources Conservation*

## National DoD Conservation Partnerships: Examples from the Southwest

**L. Peter Boice**
*Office of the Deputy Under Secretary of Defense, Installations and Environment*
*Arlington, Virginia*

### Background

The U.S. Department of Defense (DoD) manages approximately 29 million acres (12 million ha). Access limits due to security considerations and the need for safety buffer zones have shielded these lands from development pressures and large-scale habitat losses. About 380 installations have significant natural resources, as defined by the Sikes Act, and more than 250 have at least one federally listed threatened or endangered species. In total, about 350 listed species and 550 species at risk may be found on DoD-managed lands.

Management decisions affecting DoD land are guided by the overarching principle that this land was set aside to serve military training and testing purposes. The Sikes Act, DoD's enabling legislation for natural resources management, requires that these lands be managed for "no net loss in the capability. . .to support the military mission." Within these guidelines, the DoD has embraced its stewardship responsibilities for the rich variety of natural resources on the lands it manages. The challenge for the DoD is to balance the need to use its air, land and water resources for military training with its responsibility to conserve these resources for future generations. The DoD uses principles of multiple use, sustained yield, and biodiversity conservation to manage its biological resources through a coordinated set of actions that has as a top priority the conservation and continued survival of endangered species.

### A History of Conservation Partnerships

DoD's conservation program has a long history of using partnerships with federal and state agencies, conservation organizations and other groups to

promote resource stewardship, to increase public awareness and appropriate use of resources, to improve quality of life, to encourage volunteer opportunities, and to improve management efficiencies.

Most early DoD partnerships were one-on-one agreements with traditional agencies and organizations, including the U.S. Fish and Wildlife Service (FWS), state fish and wildlife agencies, and hunting and fishing organizations, such as Ducks Unlimited, Inc. During the 1990s, largely with support from the DoD Legacy Resource Management Program (Legacy), DoD extended its range of conservation partnerships considerably through agreements with groups, such as The Nature Conservancy (TNC), and umbrella partnerships, such as Partners' In Flight. More recently, DoD has continued to expand its partnership network through focused regional workshops and other networking opportunities. This paper briefly summarizes some of DoD's more important national partnership programs and describes each more fully within the context of the southwestern United States.

## National Conservation Partnership Programs

DoD's current natural resources conservation partnerships include:

- integrating DoD's natural resource management plans with state wildlife action plans (SWAPs)
- coordinating research and management on threatened, endangered and at-risk species
- regional ecosystem management initiatives
- national conservation partnerships.

### *Integrating DoD's Natural Resource Management Plans with State Wildlife Action Plans*

DoD is responsible for creating programs and implementing management strategies to conserve and protect biological resources on its land while helping to ensure the long-term sustainability of its resources for military testing and training missions. DoD develops and implements integrated natural resources management plans (INRMPs) at its installations to ensure military operations and natural resources are integrated and consistent with stewardship and legal requirements.

Similarly, state wildlife agencies are responsible for managing and conserving all resident fish and wildlife species. As part of that responsibility,

and as a requirement of the federal State Wildlife Grants program, every state has recently completed a SWAP, also known as a comprehensive wildlife conservation strategy. SWAPs outline actions needed to conserve wildlife and natural resources before both become too rare and costly to protect. The completion of the SWAPs was a historic step forward in the management of protection and wildlife in the United States.

During INRMP development and implementation, an installation is required to consult with its state wildlife agency and the FWS to coordinate its planned course of action. Similarly, a state wildlife agency is required to consult with federal agencies and other resources (e.g. U.S. Forest Service land management plans) when creating its SWAP. However, the degree to which each organization involves the other varies according to a number of factors, including resources present on DoD land, availability of personnel and fiscal resources, and regional interests.

In addition to the requirements stated above, DoD, the FWS and the Association of Fish and Wildlife Agencies (AFWA) signed a formal memorandum of understanding (MOU) in January 2006. The MOU requires that the three parties enter into a cooperative program of INRMP development and implementation with mutually agreed upon fish and wildlife conservation objectives to satisfy the goals of the Sikes Act.

In order to support the goals and objectives set forth by the MOU, DoD has sponsored a series of four workshops to identify and develop potential projects of mutual interest and benefit to all partners. Workshops have been held in the Southeast, Southwest, Central Plains and Mid-Atlantic. A fifth workshop is planned for the Northeast in mid-2008.

### *Coordinating Research and Management on Threatened, Endangered and At-risk Species*

To begin exploring issues related to threatened, endangered and at-risk species (TER-S) on DoD and adjacent land, the Strategic Environmental Research and Development Program (SERDP), the Environmental Security Technology Certification Program (ESTCP), Legacy and the U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC) hosted a national symposium in June 2005, in Baltimore, Maryland. The key objectives of this symposium were to present the most up-to-date information on government and academic TER-S research relevant to DoD; to increase collaboration, information exchange, and technology transfer among stakeholders and

participants; and to identify additional areas of research needed to address TER-S and associated habitat issues facing DoD and other federal land-management agencies. Participants included researchers and managers from nearly 200 government and state agencies, nongovernmental organizations (NGOs), universities and private consulting firms.

Recommendations from the symposium included the need to:

- enhance basic life history research on individual TER-S
- increase proactive conservation and management efforts as appropriate for both species at-risk and invasive species
- develop peer-reviewed data standards and monitoring protocols
- improve predictive models to support management decisions
- focus conservation efforts on ecosystems rather than individual species
- improve information sharing among stakeholders.

As a direct outcome of the national symposium, SERDP, ESTCP and Legacy held a series of regionally focused TER-S workshops aimed at identifying specific scientific research and management gaps for the Pacific Islands, the Southeast and the Southwest.

DoD also has worked with NatureServe and the FWS to analyze patterns of species at risk found on military installations. A national assessment identified high priority installations and species that may warrant federal listing if population declines occur or continue. In that study, NatureServe and DoD identified approximately 550 different species at risk. Additional work begun in 2004 has been undertaken at different scales, including single species, statewide and regional, to identify detailed management guidelines and projects.

A pilot study investigated four species, one for each military service, and covering different parts of the country. Specific species were the round leaf four o'clock (Fort Carson and Piñon Canyon Maneuver Site, Colorado), the San Clemente Island fox, coastal goldenrod (Camp Lejeune, North Carolina), and Florida bog frog (Eglin Air Force Base, Florida). More recent studies have been conducted on the state (Georgia) and regional (four military clusters in Arizona and New Mexico) scales.

***Regional Ecosystem Management Initiatives***

DoD has sponsored regional ecosystem management initiatives since the mid-1990s, primarily through the Legacy program. The first of these regional efforts was the Mojave Desert Ecosystem Program. Other significant ecoregional

efforts have been conducted in the Sonoran Desert, Gulf Coast Plain, Great Basin, Upper Gulf Coast, North Carolina Sandhills, Cook Inlet, Central Shortgrass Prairie, and Puget Sound Prairie.

DoD's ecosystem management policy requires the following:

- shifting from single-species to multiple-species management
- forming partnerships necessary to assess and manage ecosystems that cross political boundaries
- using the best available scientific information in decision-making and adaptive-management techniques in natural resource management
- including associated cultural values
- integrating ecosystem management with mission
- encouraging cooperation with other DoD components, with other federal agencies and with adjoining property uses.

***National Conservation Partnerships***

Finally, DoD is an active member of various multi-agency national partnerships, including the Cooperative Ecosystem Study Units (CESU) program and National Public Land Day (NPLD). DoD has also entered into a suite of national MOUs to promote specific program goals.

***CESU network***. CESU is a partnership of federal agencies, universities and NGOs with the objective of providing research technical assistance and training to federal land-management, environmental and research agencies. The network is comprised of 17 biogeographical regions. DoD is a of member of eight regions, including the Desert Southwest, Chesapeake Watershed, Gulf Coast, Upper and Middle Mississippi Valley, Hawaii Pacific Islands, Southern Appalachian Mountains, Colorado Plateau regions and California. Since joining the CESU network, DoD has funded more than 85 projects totaling in excess of $11 million.

***National Public Lands Day***. DoD has participated in NPLD since 1999. From its initial funding of only a handful of projects per year, DoD has expanded its involvement significantly. For fiscal year 2007, DoD sponsored 37 projects, spanning all four military services and 21 states.

***National memoranda of understanding***. In addition to these broad national partnerships, DoD has entered a wide range of more specific partnerships. In the late 1980s, DoD entered into national agreements with TNC (biodiversity conservation, inventorying and monitoring and site-specific management plans) and the FWS (North American waterfowl management). The early- and mid-

1990s saw agreements with, among others, Partners In Flight. Over the past decade, DoD has signed new agreements with:

- Bat Conservation International
- North American Bird Conservation Initiative
- Partners in Amphibian and Reptile Conservation
- Federal Native Plant Conservation Committee
- North American Pollinator Protection Campaign

## DoD Conservation Partnership Programs: Examples from the Southwest

Each of the national partnerships described above have been applied successfully within the Southwest. The following discussion provides more detailed information concerning these programs.

### *Integrating DoD's Natural Resource Management Plans with State Wildlife Action Plans: Southwest Workshop*

The Southwest INRMP-SWAP Workshop was held in Phoenix in December 2006. The region was defined for workshop purposes as the states of Arizona, Nevada, California and Utah. Natural resource and wildlife personnel attended from a variety of organizations, including the AFWA, U.S. Bureau of Land Management, Arizona Game and Fish Department, California Department of Fish and Game, Nevada Department of Wildlife, Utah Division of Wildlife Resources, FWS, and the four military services (Army, Navy, Marine Corps and Air Force).

Following a format that has been used at each of the four regional workshops, after a day of informational presentations and preliminary discussions, on the second day participants fleshed out potential projects from a larger initial list. These potential pilot projects were then discussed in more detail with the goal of determining a way forward on each project. The five potential pilot projects identified for the Southwest are as follows.

***Burrowing owl project***. This proposal would hold a burrowing owl symposium to discuss some of the strengths and weaknesses of the species. The group's goals are to reassess where the species is located, to map out current conservation efforts, to develop a working charter or mission statement and to partner with various organizations (DoD, Partners In Flight, TNC). Building off a current Burrowing Owl Legacy-funded Project, the group suggested that next

steps would include assessing each partner's burrowing owl management plans and gathering information about what conservation measures are currently in place.

***The Utah project.*** This proposal would form a working group to integrate and implement the SWAP and the multiple INRMPs in the state of Utah. DoD manages several million acres of land in Utah, and the multi-agency workgroup would establish priority conservation areas and identify potential buffer areas.

***The Nevada project.*** This proposal would focus on natural resources and wildlife issues in Nevada, especially spring assessments and sagebrush restoration. The group's goal is to develop lists of priorities and actions for Nevada conservation issues on and near military installations, including the Nellis Air Force Base bombing range.

***The Southwest cooperative data management project.*** This proposal would create a mechanism whereby various partners can share data. The group will develop a partnership to compile a list of available databases and compare or contrast the ***s***tructure and consistency of various databases.

***Partnering workshop for integrating SWAPs and INRMPs—Carlsbad.*** This group proposed a one-day workshop to discuss integrating SWAPs and INRMPs in the Carlsbad, California area. The Legacy program was able to fund this project in April 2007.

## Coordinating Research and Management on Threatened, Endangered and At-risk Species

***Southwest Threatened, Endangered and At-risk Species Workshop***

To successfully manage TER-S and their habitats, it is critical that DoD lands be viewed as part of a broader conservation landscape. It is with this goal in mind, SERDP, ESTCP and Legacy partnered to sponsor the Southwest Region TER-S Workshop in October 2007, in Tucson, Arizona.

The objectives for this regional workshop were to:

- assess TER-S management needs within a regional context, with an emphasis on system-level and cross-boundary approaches
- assess these approaches for their potential to keep common species common, while recovering or enhancing TER-S populations
- assess current understanding of the ecology of arid and semiarid ecosystems—in terms of understanding the dynamics of highly variable

and difficult to predict environments that are also subject to periodic long-term drought—and how that does or should affect management approaches

- examine the current state of practice within DoD for such holistic approaches
- identify gaps in knowledge, technology, management and partnerships that, if addressed, could improve implementation of system-level and cross-boundary approaches
- prioritize investment opportunities to address these gaps.

The workshop opened with a plenary session consisting of presentations summarizing the sponsoring programs, DoD's Western Regional Partnership and commissioned white papers on climate variability and change, on military-land use and natural resource management challenges, on the hydrology and ecology of intermittent stream and dry wash ecosystems, and on spatial scale and TER-S management. A subsequent tour of Fort Huachuca enabled participants to view firsthand some of the installation's efforts to manage TER-S and their habitats, so they could better understand the uniqueness of resources and the challenges of implementing natural resource management on a military installation.

Through concurrent breakout group discussions, participants identified science and management issues related to patterns of rarity in an ecological system context, ecological processes and their variability in space and time, and cross-boundary monitoring, management, and coordination, as well as opportunities to strengthen DoD partnerships with federal and state agencies, academic institutions and NGOs throughout the region.

Priority information gaps and management needs identified at the Southwest Region TER-S Workshop included:

- fire ecology and impacts of altered fire regimes
- impacts of climate variability and change
- impacts of nonnative invasive species
- impacts of fragmentation and habitat reduction
- hydrology and ecology of intermittent streams, dry washes and adjacent riparian zones
- species and population distribution patterns
- indicators to support monitoring efforts.

***Regional Ecosystem Management Initiatives:***
***The Sonoran Desert Ecosystem Initiative***

The Sonoran Desert Ecosystem Initiative (SDEI) evolved from an earlier Legacy project that focused on conservation opportunities within the Sonoran Desert Ecoregion. DoD's interest was to identify a shared blueprint for allocating conservation responsibilities throughout the ecoregion. In part, this interest was based on DoD's concern with the potential for an increase in the federal conservation burden and associated mission impacts in the Southwest as human population growth and associated development progress and continued species impacts and endangerment seem imminent. An ecological analysis of conservation priorities completed in 2000 provided the blueprint by identifying a network of 100 large conservation areas and primary threats to biodiversity within the ecoregion. From that assessment, three main program areas were identified for implementation of site-based conservation planning, ecosystem monitoring and coordinated management, and invasive plant management.

***Site-based conservation planning using a biodiversity management framework***. This framework encourages a more holistic and proactive approach to natural resources planning that facilitates the long-term conservation and management of native species and ecological systems, including associated ecological processes. Because ecological boundaries rarely correspond to jurisdictional boundaries, the framework also identifies opportunities for coordinated management of biological resources held in common between different land managers. The framework is intended to achieve efficiency in which resources need to be managed while capturing the full expression of the biodiversity of an area.

The biodiversity management framework has been developed for three areas within the Sonoran Desert: (1) Barry M. Goldwater Range, (2) Sonoran Desert National Monument and (3) the Kofa Complex (includes the Yuma Proving Ground, Kofa National Wildlife Refuge and BLM lands). For the Barry M. Goldwater Range, the framework provided an information baseline to inform development of the range's INRMP.

***Ecosystem monitoring and coordinated management***. This component of the Initiative is working to create a regional framework for ecosystem monitoring that will detect and describe changes occurring over time across the region, that will provide land managers with the data needed—ideally at multiple scales—to make informed and coordinated management decisions, and that will provide

public and policy makers with information to understand changes that are occurring. As a result, land managers will be able to make better decisions related to maintaining the long-term ecological integrity of the Sonoran Desert ecosystem. Much of the initial effort has focused on building partnerships, sharing information and identifying opportunities for collaborative management. Recent additions are describing the conceptual framework and monitoring components, identifying potential indicators of change and building partnerships in ecosystem monitoring.

***Invasive plant management***. Invasive species are one of the main threats to native biodiversity in the Sonoran Desert. Because these species and their impacts are such a widespread problem, a collaborative approach is needed to address the threat. A series of training workshops on invasive plant management issues, led to interest in forming volunteer Cooperative Weed Management Areas (CWMAs). Additional Legacy funds have enabled the establishment of two CWMAs in the western Sonoran Desert: the Borderlands CWMA and King of Arizona CWMA. In addition, the members of these two groups decided to establish an umbrella coordinating body, which has become the Sonoran Desert Invasive Species Council

***National Conservation Partnerships: The Desert Southwest CESU***

DoD has funded more than nine projects through the Desert Southwest since 2003. Included have been projects on:

- vegetation mapping of Sonoran pronghorn habitat on the Barry M. Goldwater Range
- military vehicle impact analysis on arid and semiarid lands
- sociocultural and ecological studies related to the proposed expansion at Yuma Proving Ground, Arizona
- vertebrate community response to wildlife on Kofa Wildlife Refuge
- desert bighorn sheep response to water removal form their habitat.

## Summary

Effective conservation partnerships are essential to DoD's continued ability to manage its natural resources in support of long-term military and stewardship goals. DoD and its many stakeholders must continue to use existing partnerships and to explore new ways of meeting their mutually agreed upon goals.

# Cooperative Conservation: The Military as a Southwest Conservation Partner

**Benjamin N. Tuggle**
*U.S. Fish and Wildlife Service, Southwest Region*
*Albuquerque, New Mexico*

As one looks across the southwestern landscape for conservation inspiration, one might inadvertently overlook a key conservation partner. The military manages incredible biodiversity and natural resources on its vast land. While its main mission is protecting our nation, the military has a strong mandate to protect our nation's biodiversity. Some of the largest military ranges and installations in the nation are located in Arizona and New Mexico, two of the four states that encompass the U.S. Fish and Wildlife Service's (Service) Southwest Region. Overlay the Service's, the Armed Forces' and the states' mutual conservation missions on top of military land, and one sees significant opportunity for conservation partnerships that provide mutual benefits.

The Service's Southwest Region has taken a leadership role in working with the military and the states in developing key conservation partnership teams in Arizona and New Mexico that include the four military services, state resource agencies and interested parties. These cooperative conservation partnership teams are focusing on military installation integrated natural resources management plans (INRMPs), state wildlife action plans (SWAPs) and outdoor recreation opportunities on military land for adults and children. The Service's mission facets of conservation partnerships are at the landscape level. Natural resource management and conservation focal areas for these partnership teams include species at risk, threatened and endangered species, migratory birds, native fish and aquatic species, bats, fishing and hunting on military land, outdoor recreation, and conservation outreach. Examples of these military conservation efforts can be found in the Southwest.

One such example is the Department of Defense (DoD) species at risk project for military ranges in Arizona and New Mexico, initiated in 2006. Additional listing of species at risk under the Endangered Species Act (ESA) could further encroach on military training and testing missions at military ranges and installations. Because the DoD is concerned about the large number of species at risk that occur on military land, they are working with the Service, states and others in seeking cooperative conservation of such species. As part

of the DoD's commitment to ecosystem-based approaches for managing its land and water resources, and realizing that more than 500 species at risk occur on military land, the DoD Legacy Resource Management Program (DoD Legacy Program) funded a series of projects in the United States for species at risk. The DoD Species at Risk—Arizona and New Mexico Military Ranges project is the first to work with multiple military ranges and installations in a two-state region.

The DoD species-at-risk project focused on groups of military ranges, installations and military operational areas in four ecoregions, in Arizona and New Mexico, all managed by either the Army, Air Force, Navy or Marine Corps. These include the Sonoran desert ecoregion of southwestern Arizona, the Coconino Plateau (montane coniferous forest ecoregion of northern Arizona), the Chihuahuan desert basin and sky islands ecoregion of southern New Mexico, and the southern Rocky Mountains and high desert basin ecoregion of northcentral New Mexico. The four military groups are discussed in detail below.

Each group of military installations developed a project leadership team. Each team focused on a selected group of species at risk and reevaluated the available scientific information working with each state's natural heritage program to develop brief, habitat-based management reports. Team participants included military installations, either Arizona Game and Fish Department (AZGFD) or New Mexico Department of Game and Fish (NMDGF), and the Service's Ecological Services field offices and where appropriate, adjacent national wildlife refuges. Additionally, the teams sought input from other land-management agencies and conservation sources (e.g., The Nature Conservancy [TNC]) as needed.

These four teams original goals were to review the science and management of the selected species at risk, to use habitat-based management guidelines to support existing military installation of INRMPs, to explore developing larger landscape-level partnerships outside the military fence line to further conserve these species at risk with adjacent landowners, and to promote outreach, including the use of a series of posters prepared by an Arizona wildlife artist. The four teams were influenced in their roles by their participation in the two DoD INRMP-SWAP Workshops (December 2006 in Phoenix and May 2007 in Albuquerque) that focused on integrating military installation INRMPs with SWAPs. Each team benefited from having its respective state fish and game agency on the team, which made for early decisions on focusing on certain species at risk acknowledged in the SWAP.

In assessing their roles in 2007, the four teams realized that their efforts would benefit a broader scope of cooperative natural resources management and conservation than just species at risk. At that time, the teams' focus shifted to become permanent conservation partnership teams to better support military installation INRMPs. Their natural resources conservation role expanded to include species at risk, threatened and endangered species, migratory birds, aquatic species, game species, native plants, habitat conservation, and invasive species with partners outside the military fence line. In addition, the four teams began to work more closely with the Southwest Endangered Species Act (SWESA) Team, which is composed of federal and state agencies and of tribal representatives in Arizona and New Mexico. The DoD Threatened, Endangered and Species at Risk (TER-S) Workshop, held in October 2007 in Tucson, further influenced the two southern teams. The workshop focused on the Sonoran, Chihuahuan and Mojave desert ecoregions with breakout sessions, including climate change, water resources, desert basin grassland and mountain sky islands, which helped to shift the two southern teams' focus towards these ecoregion-specific interests.

The Sonoran Desert Military Ranges Conservation Partnership Team includes representatives from the Army, Air Force, Marine Corps, the Service and AZGFD. The team represents Barry M. Goldwater Range (BMGR), Marine Corps Air Station Yuma (MCAS Yuma), and Yuma Proving Ground (YPG) with a total of more than 3.5 million acres (1,416,399.7 ha) in the Sonoran desert ecoregion of southwestern Arizona. TNC, the Sonoran Institute, the Service, the U.S. Bureau of Land Management (BLM), the U.S. National Park Service (NPS) and AZGFD consider the Sonoran desert landscape a high-biodiversity region and have partnership recommendations contained in an earlier project, cofunded by the DoD Legacy Program.

The Sonoran desert military ranges team reviewed and selected such species at risk as the Arizona Sonoran desert tortoise (*Gopherus agassizii*), identified in the AZGFD's SWAP; Le Conte's thrasher (*Toxostema lecontei*), a bird species of concern in the Sonoran Joint Venture, and several desert bat species known to use abandoned mines, caves and structures on military and adjacent federal, state and tribal land. The team became the permanent Sonoran Desert Military Ranges Conservation Partnership Team in 2007, adding to their original charge, to include: (1) supporting sustainable military ranges, the military mission and INRMPs for BMGR, MCAS Yuma and YPG, including multiple

natural resources; (2) continue to evaluate species-at-risk conservation at a Sonoran desert landscape level; (3) use flexibility in their approach; (4) look at using compatible candidate conservation agreements (CCAs) for certain species at risk, with focus on the CCA for the flat-tailed horned lizard (*Phrynosma mcallii*) that the Marine Corps is currently an active partner in implementing in Arizona and California; (5) support conservation partnerships on and around the military installations at a landscape level; (6) evaluate and promote alternate sources of conservation funding that benefit the three military installations and adjacent land managing partners; and (7) continue to promote outreach and outdoor recreation where possible.

In addition, the team recognizes that implementing INRMPs at the military ranges in the Sonoran desert ecoregion is vital to supporting a changing military mission and that bolstering the individual INRMP teams as one new conservation partnership team clearly benefits the military and its conservation partners. The team is supporting AZGFD in its leadership role in developing and implementing the Arizona Sonoran desert tortoise conservation and management plan. This management plan is supported by the Arizona SWAP and is intended to integrate multiple management plans, including the three military installation INRMPs as well as management plans from the BLM, Service, NPS, U.S. Bureau of Reclamation (Reclamation), state agencies and tribes.

The Camp Navajo-Naval Observatory Flagstaff Station (Naval Observatory) Natural Resources Partnership Team includes representatives from the Army, Navy, Service, AZGFD and Arizona Trust Lands (AZTL). The ecoregion of concern to this team includes the Coconino Plateau-Mogollon Rim and mountain ranges of northern Arizona, which contain high altitude mountain peaks, lower mountain slopes and open grassland parks as part of this forested landscape. Camp Navajo and the Naval Observatory occupy a portion of the largest free-standing Ponderosa pine forest in North America. Camp Navajo itself is one of the few high-altitude military training ranges available to all four military services in the nation, with Ponderosa pine and mixed conifer forests, open grassland and wet meadows. The Naval Observatory is also unique in that it is located on a high mountain peak in the forested landscape adjacent to the growing community of Flagstaff, Arizona, and it houses the only fully functioning military telescope system in the continental United States that is available to all four military services.

Because of the forested nature of its ecoregion, the team selected a group of at-risk, cavity-nesting, woodpecker species and a group of forest-bat

species as representative groups of concern. The team also became a permanent natural resources partnership team in 2007, supporting the two military installations and adjacent partners in landscape-level conservation. The Camp Navajo-Naval Observatory Natural Resources Partnership Team has served since 2006 as the catalyst to join the two military partners with Coconino County and other parties to develop a new conservation buffer partnership. The buffer partnership works to protect the military installations from further development encroachment and to support open space for outdoor recreation for adults and children, cooperative fire management, native plant conservation, and conservation of species at risk and listed species, such as the Mexican spotted owl (*Strix occidentalis lucida*). The conservation buffer partnership also strives to protect important wildlife corridors for elk, deer, pronghorn, turkey and migratory birds. It supports AZGFD in its leadership role in conserving and managing forest birds and bats identified in the Arizona SWAP for northern Arizona.

The Chihuahuan Desert Military Ranges Conservation Partnership Team consists of Army, Air Force, Service, U.S. National Park Service (NPS), NMDGF and TNC. The team represents White Sands Missile Range (WSMR), Fort Bliss and Holloman Air Force Base with a total of more than 4 million acres ( 1 618,742.6 ha) in the Chihuahuan desert ecoregion of southern New Mexico. The team is at a critical juncture as all three southern New Mexico military installations are facing military mission changes and challenges, including proposing to increase more ground troop training requirements in areas where several endemic wildlife and native plant species occupy some of the largest remaining Chihuahuan desert habitat in the nation. The Chihuahuan desert landscape is highly diverse in fauna and flora, with desert basins, dunes, streams and springs, and sky island mountain ranges all found on the military land. Similar to the two teams noted above, the Chihuahuan desert military ranges team reviewed and selected species at risk, such as the White Sands pupfish (*Cyprinodon tularosa*), the gray vireo (*Vireo vicinior*), two Colorado Mountain chipmunk subspecies (*Neotamias quadrivitattatus ocuraensis* and *australis*), a large group of mountain woodland and talus snail species, and a group of desert bat species that use abandoned mines and mountain caves and crevices on the military land and adjacent land. The team supports NMDGF in its leadership role in advocating conservation and management for the species at risk selected from the New Mexico SWAP. The team became a permanent conservation partnership team in 2007 to support the three military installations and adjacent partners.

The Kirtland Air Force Base (AFB)-New Mexico Army National Guard Camel Tracks Training Range (Camel Tracks Range) Natural Resources Partnership Team includes Air Force, Army, Service, and NMDGF representatives. Kirtland AFB and Camel Tracks Range occupy a portion of the southern Rocky Mountain and high desert basin ecoregion of northcentral New Mexico. The two military ranges include more than 70,000 acres (28,327.9 ha) of mountain range and high desert basin landscape which includes a diverse area of mixed conifer, ponderosa pine, pinyon-juniper, juniper savannah grassland, high desert scrub – grassland, and remote canyon seeps and springs. The team reviewed and selected species at risk, such as the gray vireo (*Vireo vicinior*), the pinyon jay (*Gymnorhinus cyanocephalus*), and a similar group of bat species picked by other teams. In particular, the team selected the gray vireo to support the NMDGF in developing a statewide conservation and recovery plan for this state-listed bird species highlighted in the New Mexico SWAP. This state-led initiative for the gray vireo directly benefits Kirtland AFB, which may have the second-largest breeding population in the state, in addition to Camel Tracks Range and other military installations, such as WSMR and Fort Bliss in southern New Mexico. The team became a permanent natural resources conservation partnership team in mid-2007 to support the two military installations and adjacent partners.

These four teams in the DoD Species at Risk—Arizona and New Mexico Military Ranges Project are looking at landscape-level conservation partnerships modeled after the successful cooperative conservation efforts for the Sonoran pronghorn (*Antilocapra americana sonorensis*), by the Air Force and Marine Corps at BMGR in southwestern Arizona with the Service, AZGFD and several partners. All four teams are incorporating the seven factors noted above in the text concerning the Sonoran Desert Military Ranges Conservation Partnership Team. The four teams were also modeled after the Navy's successful South Texas Natural Resources Partnering Team. This Navy, Service and Texas Parks and Wildlife team works on cooperative conservation efforts with several partners for species at risk, endangered species, migratory birds, game species and conservation outreach for Naval Air Station Corpus Christi, Naval Station Ingleside, and Naval Air Station Kingsville and Escondido Ranch.

The work of these four Arizona and New Mexico conservation partnership teams is leading to other examples of working with the military as an effective conservation partner. These include the cooperative support for

release of Aplomado falcons (*Falco femoralis*) in 2007 that we participated in at WSMR with the Army, BLM, New Mexico State Lands Office, the Peregrine Fund and Ted Turner's Armendaris Ranch. The Army played a key role in supporting the conservation of a falcon species native to the desert grassland of southern New Mexico and Arizona. This is the first reintroduction of a listed species on a military installation accomplished with an active partnership. The Army (at WSMR) also is engaged with conservation partners in implementing the 2006 White Sands Pupfish Conservation Agreement on Army, Air Force and NPS land. The Army supports important conservation and management of the desert bighorn sheep (*Ovis canadensis*) at both WSMR and at YPG, in both cases working in partnership with two adjacent national wildlife refuges and NMDGF and AZGFD to reintroduce this species back into strategic habitat. The Sonoran Desert Military Ranges Conservation Partnership Team is supporting the Service in evaluating the possible reintroduction of a second population of the Sonoran pronghorn at Kofa National Wildlife Refuge, adjacent to the YPG. The team is supporting the Sonoran Pronghorn Recovery Team in this initiative and is supporting the YPG Natural Resources staff in briefing the YPG chain of command to agree to support the reintroduction. Similarly, we see these teams supporting future landscape-level conservation partnerships for such species as the Arizona Sonoran desert tortoise, Mexican spotted owl, gray vireo, and southwestern bat species.

The DoD Species at Risk—Arizona and New Mexico Military Ranges Project points out the need for collaborative conservation teams to meet the challenges of landscape level conservation partnerships. This project is a role model for the Service, the military and other partners to support the states in implementing key actions as part of their SWAP. As we face the challenges of climate change, wildlife agencies must support these teams and similar partnerships. The Service, in particular, appreciates the military as an effective conservation partner in the Southwest, and it advocates that the military services explore landscape level opportunities throughout the nation. As we overlay our conservation missions on the same landscapes, remember the military is a conservation manager that deals with incredible biodiversity and natural resources on their land, while carrying out their military training and testing mission. We can take the role-model approach used in the Southwest to engage the military services as significant partners in their stewardship of natural resources balanced with their military mission.

# Partnerships between the Arizona Game and Fish Department and the Department of Defense in Arizona

**Duane L. Shroufe**
*Arizona Game and Fish Department*
*Phoenix, Arizona*

**John Hervert**
*Arizona Game and Fish Department*
*Yuma, Arizona*

The need for renewal of the withdrawal of U.S. Bureau of Land Management (BLM) land that made up the Barry M. Goldwater Range (BMGR) and the amendment of the Sikes Act in the mid 1990s were the catalyst for new relationships between the Arizona Game and Fish Department (AGFD) and the Department of Defense (DoD). Not only did we become a full partner in the BMGR Executive Committee (BEC), but we also began communicating, coordinating and partnering with all DoD facilities in Arizona through the renewal of their integrated natural resource management plans (INRMPs).

Management of desert bighorn sheep (*Ovis Canadensis)* within DoD land continues to be a high priority. Tri-annual population surveys are conducted in cooperation with DoD partners (BMGR, Yuma Proving Grounds [YPG], Marine Corps Air Station-Yuma). Thirty-two water developments are maintained on DoD land, enhancing 184,320 acres (74,591.7 ha) of bighorn habitat. A robust population of bighorn on the YPG occasionally supplies surplus animals for translocation and establishment of new populations in southern Arizona. Most DoD land remains accessible to bighorn sheep hunters. Desert mule deer (*Odocoileus hemionus crooki*) and small game also provide recreational hunting opportunities on DoD land. Mule deer are surveyed annually. Twenty-two water developments are maintained for mule deer and small game on DoD land.

The AGFD, U.S. Fish and Wildlife Service, BLM and DoD partners began monitoring the population status and conducting research into Sonoran pronghorn (*Antilocapra Americana sonorenis*) ecology in the early 1990s. Recovery of the endangered Sonoran pronghorn requires active management, including captive breeding, forage enhancement of native plants through irrigation and water development. Sonoran pronghorn are a highly nomadic species,

requiring large tracts of land for survival; consequently, cooperation among federal land management agencies is essential to sound management. Cooperative projects with DoD partners and USFWS have resulted in a dramatic turnaround for this endangered animal. In 2002, the population was estimated at 21 animals. Currently, there are over 100 Sonoran pronghorn in the wild (70 or more) or in captivity (37) in Arizona.

A DoD Legacy Project Team was created to provide support and implementation of INRMPs on BMGR, YPG and MCAS-Yuma,to support the DoD Readiness and Environmental Protection Initiative (REPI) and to support the BEC. It is comprised of DoD, AGFD and USFWS personnel. The team has identified species at risk (SAR) on the installations and has developed detailed reports for these species, including conservation actions. The team supports conservation partnerships on and around DoD land. The Legacy Project Team supports the draft state conservation agreement, assessment and strategy for the Sonoran population of the desert tortoise (*Gopherus agassizii*) and has agreed to develop a DoD Legacy preproposal for desert tortoise conservation. The Legacy Project Team supports the Sonoran Joint Venture, conservation actions within the Arizona Partners In Flight Plan, and the Arizona Birding and Nature Festival. It has identified conservation actions for several bird species and is developing proposals to implement these actions. A component of Arizona Bird Conservation Initiative (ABCI) is the Coordinated Bird Monitoring (CBM) Program. Its mission is to coordinate a statewide, all-bird monitoring program that contributes to informed management decisions for bird conservation. Through cooperative planning, sharing of information and resources, and communication and collaboration across geographic and other boundaries, all stakeholders are focused in the same direction making the best use of resources and furthering the goals of bird conservation. The AGFD has met with the Marine Corps Air Station, MCAS-Yuma to discuss the establishment of CBM surveys on the BMGR. Priority bird species on the range and their specific habitats were identified, including Le Conte's thrasher (*Taxostoma lecontei*), golden eagle (*Aquila chrysetos*) and gray vireo (*Vireo vicinior*). With cooperation from the DoD, the AGFD will be able to make sound management decisions.

AGFD continues to conduct bat surveys on the MCAS portion of BMGR as part of the AGFD's long-term bat monitoring program. The purpose of the monitoring plan is to assess bat population trends in all major biotic communities across Arizona. Cooperation with the military is crucial in accomplishing this

objective and if it were not for the close working relationship with DoD, the AGFD would have huge gaps of information on bat use of the lower Sonoran desert habitats. In addition, we have worked with the military to inventory bat species' use of water sources on YPG and BMGR. Seven species of bats are regular visitors at these scant water sources including the California leaf-nosed bat (*Macrotus californicus*), a sensitive species. AGFD staff was allowed to survey several YPG mines, which led to the discovery of two significant California leaf-nosed bat roosts. YPG officials have coordinated with the AGFD for several years and supplemented equipment needs, like acoustic monitoring devices and mist nets for triple-high capture nets (needed to trap high-flying species). This cooperative effort has allowed the AGFD to learn about bat use in the Sonoran Desert and about their needs for roosting and foraging.

On November 29, 1993, the USFWS proposed an rule to list the flat-tailed horned lizard (*Phrynosoma mcallii*, FTHL) as a threatened species. The FTHL has the most limited distribution of any horned lizard species in the United States. In Arizona, the FTHL is found in southwestern Yuma County, south of the Gila River and west of the Butler and Gila mountains. The majority of the FTHL's range in Arizona is on the western BMGR, managed by MCAS-Yuma.

In 1997, the AGFD and the DoD, along with many other partners, signed a conservation agreement for the FTHL. The involved parties then served on the FTHL Interagency Coordinating Committee (ICC) that, along with the Management Oversight Group (MOG) monitored the implementation of the corresponding rangewide management strategy.

As a result of the effort, the USFWS withdrew the proposed rule to list the FTHL as a threatened species. In the same year, the 1997 Rangewide Management Strategy was updated and the new document further solidified the partnership between the DoD and conservation organizations. The AGFD and the DoD continue to participate on both the ICC and MOG, and they cooperatively determine and conduct research and management for this species.

This is an important partnership, because, although the USFWS determined that the conservation agreement was effective and that listing the FTHL was unnecessary, they retain the ability to reconsider the effectiveness of the agreement. Lack of compliance among the cooperators, a change of circumstances or other reasons may alter the expected result of this strategy. If threats to the FTHL or its habitat are not reduced, the USFWS may proceed

with another proposed or an emergency listing. This reinforces the high importance of this particular partnership with the DoD.

Bald eagle (*Haliaeetus leucocephalus*) management in Arizona has directly benefited by the cooperative partnerships with DoD. Luke Air Force Base became a member of the AGFD chaired Southwestern Bald Eagle Management Committee (SWBEMC) in the 1990s and contributed funds to the monitoring of 12 Arizona bald eagle nests under their military training routes (MTRs) through 2007. Holloman Air Force Base became a member of the SWBEMC in the late 1990s and contributed funds to monitor one Arizona bald eagle nest under their MTR through 2007. In addition to funds, the two bases have adjusted their MTRs, so they do not fly directly over any bald eagle nest, which could disturb the breeding pair and risk loss of productivity for that nest. By using adaptive management, new nest locations are sent to the cooperators of the SWBEMC so that MTRs can be changed as new nests are discovered. This has reduced the disturbance to our breeding bald eagles and has allowed for the population to recover and to be removed from the endangered species list.

The Scotia Canyon Restoration Project was designed to repair a headcut in Scotia Canyon and to restore cienega conditions to the watershed in the Huachuca Mountains. It also involved modification of existing stock tanks to accommodate federally listed or petitioned native species conservation, including Chiricahua leopard frogs (*Rana chiricahuensis)*, Sonoran tiger salamanders (*Ambystoma tigrinum stebbinsi*) and Mexican garter snakes (*Thamnophis eques*). Fort Huachuca contributed funding toward mechanical earthwork that was conducted by The Nature Conservancy and the Coronado National Forest, U.S. Forest Service (FS). This cooperative effort allows for Mexican garter snake salvage, bullfrog (*Rana catesbeiana*) removal (an exotic species) and, hopefully, native species restoration.

DoD resources are also contributing to various research projects and inventories being conducted by the AGFD. Naval Observatory Flagstaff Station and Camp Navajo have funded forest-bird monitoring. In addition, on Camp Navajo, our U.S. National Guard partners have funded research on pronghorn reaction to overflights, wintering bald eagles, turkeys, forest-dwelling bats, songbirds and other species. In Florence, we are studying shovel-nosed snakes (*Chionactus occipitalis*) and diurnal raptors on U.S. National Guard land.

# Camp Navajo's Cooperative Conservation Partnership

**Adrian M. Nagel**
*Camp Navajo*
*Bellmont, Arizona*

Camp Navajo is a 28,000-acre (11, 331.2-ha) Arizona Army National Guard Installation located 11 miles (17.7 km) west of Flagstaff, Arizona. The installation is located within the largest ponderosa pine forest in the United States on the 7,000-foot- (2,133.6-m-) elevation Mogollon Rim. The installation is surrounded by two national forests along with Arizona State Land Department (ASLD) state trust lands and a small amount of private land. Although the installation is midsized by Department of Defense (DoD) standards, by western standards it is actually quite small. Most of the wildlife species that inhabit the installation have home ranges that extend far past the installation boundaries. In fact radiotelemetry studies on animals as diverse as pronghorn and bats indicate that the installation boundary is virtually transparent to wildlife. These and other facts have brought about the need for cooperative conservation partnerships with partners, such as the Arizona Game and Fish Department (AZGF), U.S. Forest Service (USFS) and the U.S. Fish and Wildlife Service.

As a National Guard Installation Camp Navajo's main customer is the Army soldier. At its core, anything that promotes the training and health of soldiers is good; anything that degrades that capability is bad. The natural environment must therefore promote effective soldier training. Obvious examples of natural environments that don't promote effective training are environments that are prone to extreme wildfire, forests too dense to maneuver in, rangelands covered with invasive weeds and maneuver areas prone to impounding of water in training features.

A less obvious example of a natural environment not conducive to effective training is an installation bereft of native vegetation to the point that native wildlife species do not occur within their historic range of variability. When wildlife populations reach such a point, the garrison commander may encounter increased regulation and strained relationships with the installation's regulatory and spatial neighbors. Increased regulation can limit the ways in which we train. If operational flexibility is the trainer's friend, unhealthy wildlife populations are his enemy.

Because wildlife populations span many landownerships, effective conservation must also span those same landownerships. All partners benefit from efforts to maintain healthy populations of species at risk. For many years AZGF has implemented Gunnison's prairie dog (GPD) conservation strategies. Camp Navajo has also implemented GPD conservation strategies since 2002, including soft relocations from firing range and other construction sites, rigorous prohibitions on shooting and frequent population monitoring. Despite apparent GPD-population declines in some portions of their range, GPDs are thriving on Camp Navajo. Other examples of cooperative conservation projects on the installation include the identification of pronghorn movement corridors and the enhancement of corridors that span the installation boundary and monitoring of bald eagle winter roost sites through the use of solar-powered global-positioning-system transmitters.

Another effective way to partner with agencies and the community to complete effective wildlife management projects is through state game agency habitat partnership committees (HPC). Camp Navajo has received an AZGF HPC grant to reduce the amount of waste wire on the installation. Old pasture fences, discarded communications wire and other loose wire can entangle and kill wildlife. With HPC special big game (SBG) funds, Camp Navajo has effectively reduced mortality for many ungulate species. This provides a benefit for all partners; for example, hunters from the general public who hunt on Camp Navajo and neighboring hunt unit 6B benefit from healthier ungulate populations as well as soldiers participating in Camp Navajo's Morale, Welfare and Recreation hunting program.

The most fundamental step in developing a strategy for managing an installation's natural resources is the integrated natural resources management plan (INRMP). This requirement for all DoD installations is also the most fundamental component of a cooperative conservation partnership. When coordination of this document becomes a wholehearted attempt at efficiently developing management strategies with all local stakeholders, an effective cooperative conservation partnership is born.

In order to promote effective partnerships, the focus of the INRMP must clearly be the sustainment of the military mission. This is because all partners must clearly understand the parameters within which conservation will be accomplished on DoD facilities. Developing unrealistic expectations creates unrealistic projects, disappointment and dissatisfaction.

Once sidebars are delineated it is often surprising what conservation strategies can be implemented on military installations. In some cases, efforts to maintain the military mission can complement conservation strategies. An often-encountered synergism of mission preparation and conservation that is being realized at Camp Navajo and many western installations is the implementation of forest fuels reduction treatments. Forest fuels must be reduced with mechanical forest thinning and prescribed fire in order to reduce wildfire risk on training ranges. These efforts can also reduce the potential for wildfire to impact important wildlife habitats. Careful design of forest treatments can create beneficial juxtapositions of dense and open areas for maneuvering and also for wildlife habitat. Programs focusing on the monitoring of the effects of these treatments on wildlife species at risk can be shared with cooperators. Our conservation partners often share similar treatments in similar forest types. Sharing data allows for larger sample sizes and cooperative management. Camp Navajo is currently monitoring effects of forest-fuels-reduction treatments on bird species at risk on USFS, ASLD and DoD land through a DoD LEGACY funded grant. We all benefit when species populations are maintained at healthy levels so that Endangered Species Act (ESA) listing is not necessary.

Camp Navajo is also engaging in an encroachment partnership project. Flagstaff is growing at a rate that rivals much of Arizona, one of the fastest growing states in the union. Much of Camp Navajo's boundary is occupied by ASLD lands. State land department mandates are often to provide financial support for school districts. Thus, this land may be developed for suburban housing. However, homeowners can be disturbed by the noise and dust created by military training, and developing land next to military bases for houses can lead to strained relationships among an installation's neighbors.

Synergies can be achieved when land bordering military installations has conservation or open-space value. Wildland and agricultural areas can be very good neighbors to military installations. A prime example is an area off the southeastern boundary of Camp Navajo known as Roger's Lake. This area is a large ephemeral wetland in an area with few wetlands. The Natural Resources Conservation Service is very interested in acquiring wetland easements in the area. The lake also adjoins several proposed firing and maneuver ranges on the installation. Camp Navajo is partnering with Coconino County, who has voter approved tax funds dedicated to open space to acquire ASLD land as county open space and to acquire conservation easements on ranch land in the area.

Camp Navajo is applying for Army compatible use buffer funds to ensure that land bordering the installation remains open space as conserved wetlands and actively managed ranches.

Camp Navajo has seen that engaging with our neighbors has promoted efficient land management. Being involved in the land-management issues that face our installation and looking into the future to project what issues will arise have provided us with a more stable environment in which to operate. To the degree that certainty can be achieved in an ever-changing natural world and regulatory environment, engaging beyond our borders will provide us with the certainty that is required to achieve our mission long into the future.

# Experiences and Opportunities with Military Partnerships for Wildlife Conservation in New Mexico: A Gray Vireo Case Study

**Bruce C. Thompson**
*New Mexico Department of Game and Fish*
*Santa Fe, New Mexico*

**Mark L. Watson**
*New Mexico Department of Game and Fish*
*Santa Fe, New Mexico*

## Gray Vireo Biology and Ecology

The gray vireo (*Vireo vincinior*) is a small, gray, neotropical migrant songbird that breeds in extreme southern Nevada, southern California, southeastern Utah, southwestern Colorado, western Texas and in dry foothills and bajadas west of the shortgrass prairie in New Mexico (Johnson 2007, New Mexico Department of Game and Fish 2007). In New Mexico, gray vireos select juniper (*Juniperus* spp.), pinyon pine (*Pinus* spp.) and oak (*Quercus* spp.) tree species for nesting. gray vireos have been documented breeding in multiple habitat types in New Mexico, including pinyon-juniper woodland (Johnson et al. 2007) and juniper woodland (Johnson et al. 2007) in the north and northwest, juniper savannah in central and western New Mexico, and juniper-oak woodland and desert riparian areas in the southern part of the state (Johnson et al. 2007). Trees selected for nesting are generally mature, and range in height from 12 to 25 feet (3.7–7.6 m; D. Mehlman, C. Paige, and M. Koenen, unpublished report 1999).

Within New Mexico, the gray vireo occurs in extremely patchy, disjunct populations, and 80 percent of known sites are found in 12 main areas of the state (New Mexico Department of Game and Fish 2007). DeLong and Williams (personal communication 2006) estimated a maximum number of documented territories in New Mexico at 415. Gray vireos arrive in New Mexico in April and breed through August, departing for wintering grounds in Mexico in September (New Mexico Department of Game and Fish 2007). Winter range for the species in western Sonora and Baja, Mexico, closely overlaps the

distribution of a species of elephant tree (*Bursera microphylla*), and wintering gray vireos appear to rely predominantly on elephant-tree fruits, which are abundant from September through April (Bates 1992). Gray vireos may be a principal disperser of elephant-tree seeds, and the high degree of overlap between gray vireo winter range and elephant-tree distribution may be explained by a mutualistic relationship (Bates 1992).

## Threats to Gray Vireo Persistence in New Mexico

Within its North American breeding range, breeding-bird survey data for 1966 through 2005 indicate a negative but nonsignificant trend for gray vireos (Johnson et al. 2007). Declines have been documented in western Texas, northern Arizona, the northern Great Basin, and northwestern New Mexico. Whereas, population increases have been documented in Nevada, eastern Utah, southwestern Arizona and southern New Mexico (D. Mehlman, C. Paige, and M. Koenen, unpublished report 1999).

Breeding success is generally less than 33 percent in New Mexico, largely due to nest abandonment after brown-headed cowbird (*Molothrus ater*) nest parasitism. Nest-parasitism rates on gray vireos are usually higher than 50 percent (DeLong and Williams, personal communication 2006). In four studies conducted in New Mexico, cowbird brood parasitism rates on gray vireos ranged from 24 to71 percent of nests, of which 75 percent of nests were abandoned (DeLong and Williams, personal communication 2006). In a recent study from southeastern New Mexico, 12 of 17 nests (71 percent) were parasitized by cowbirds (New Mexico Department of Game and Fish 2007).

Additional threats to the species include habitat loss from clearing pinyon-juniper woodland for agricultural uses and human development (DeLong and Williams, personal communication 2006). Nest parasitism may be a limiting factor to gray vireos in New Mexico (Barlow et al. 1999, New Mexico Department of Game and Fish 2007).

## State Efforts to Conserve the Gray Vireo

In 1983, the gray vireo was listed as threatened by the New Mexico State Game Commission under the authority of the New Mexico Wildlife Conservation Act, due in part to the small sizes of known populations (DeLong

and Williams, personal communication 2006). The gray vireo also was selected as a species of greatest conservation need for the Comprehensive Wildlife Conservation Strategy for New Mexico (New Mexico Department of Game and Fish 2006). New Mexico Department of Game and Fish (NMDGF) completed a state recovery plan for the gray vireo in 2007 (New Mexico Department of Game and Fish 2007). Key recommendations for recovery are to manage the species on a statewide basis and in four management units within the overall range in New Mexico; to improve our knowledge of the biology and status of the species; to improve communication among management agencies, such as providing guidelines for and sharing information on management of the species; and to determine the effects of habitat alterations (New Mexico Department of Game and Fish 2007). A primary emphasis of the recovery plan is to maintain existing habitats and breeding populations in collaboration and coordination with land managers where the species occurs.

NMDGF anticipates conducting a gray vireo symposium in conjunction with the 2008 New Mexico Ornithological Society meeting to coordinate research activities, to develop standardized survey protocols, to develop mitigation recommendations and to determine research needs. Findings will be published in a special proceedings (H. Walker, personal communication 2008).

## U.S. Department of Defense Efforts to Conserve the Gray Vireo

The U.S. Department of Defense (DoD) manages approximately 25 million acres (10.1 million ha) of land on major military installations in the United States, of which 19 million acres (7.7 million ha) are dedicated to fish and wildlife conservation. DoD land harbors more federally listed and imperiled species than any other federal land, including national parks and wildlife refuges (NaturServe 2008). More than 300 federally listed species occur on DoD land (testimony of Benjamin Tuggle, Chief, U.S. Fish and Wildlife Service, Region 2, before the House Resource Subcommittee, April 10, 2003). The DoD has stewardship over 3 percent (2,560,690 acres [1,036,716 ha]) of New Mexico's land area and hosts a significant portion of the biological diversity of the state (New Mexico Department of Game and Fish 2006).

In recognition that military land contains significant natural resources, in 1960 Congress enacted the Sikes Act to address wildlife conservation on and public access to military land. In 1997, an amendment to the Sikes Act required

that each military base with significant natural resources develop an integrated natural resource management plan (INRMP), in coordination and cooperation with the U.S. Fish and Wildlife Service and state wildlife agencies. A collaborative process was anticipated, reflecting the mutual agreement of the signatory parties regarding the management and conservation of fish and wildlife resources on military land. INRMPs cannot compromise the military mission. However, DoD recognized that working collaboratively with state and federal wildlife agencies in a proactive manner to preclude the need for federal listing of new species benefits the military mission.

In 1990, Congress passed legislation establishing the Legacy Resource Management Program (Legacy) to provide financial assistance to DoD efforts to preserve natural and cultural heritage. The program assists DoD in protecting and enhancing natural resources while supporting military readiness. A Legacy project may involve regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, Native American consultations, and monitoring and predicting migratory birds and other wildlife occurrence (U.S. Department of Defense 2008).

In 2001, New Mexico and Arizona formed an interagency group of state and federal biologists and of threatened and endangered species program managers to develop a comprehensive species-at-risk list for both states. Species at risk have been defined as those species that are rare but are not protected under the Endangered Species Act. In 2006, the New Mexico and Arizona species-at-risk list was finalized by the Southwest Strategy Endangered Species Act Team, with funding from a DoD Legacy grant. The list was developed from consultation with state and federal agency biologists, researchers and academia, and it used existing databases such as NatureServe, Arizona Natural Heritage and the Biota Information System of New Mexico (BISON-M). Selection for the species-at-risk list was based on multiple criteria, which included: (1) federally proposed and candidate species, (2) species which have been federally delisted within the last 5 years, (3) Natural Heritage Rankings of G1-3 or S1-3, (4) state listed as threatened or endangered, (5) species highly sensitive to indirect or cumulative effects of military activities, (6) species that occur at the periphery of their range and can be shown to be important within those peripheral ranges to the conservation of the species and (7) if current knowledge indicated a high level of concern for species persistence (U.S. Department of Defense 2006).

A total of 448 species, including the gray vireo, were selected for the New Mexico-Arizona species-at-risk list (U.S. Department of Defense 2006). The gray vireo was selected based on known limiting factors, such as cowbird parasitism, habitat fragmentation and habitat loss from juniper woodland and savanna treatments for fuel reduction and livestock grazing.

Based on similar ecoregions, vegetation and geomorphology attributes, two military clusters were formed in New Mexico. The White Sands Missile Range, Fort Bliss, and Holloman Air Force Base cluster include over 3 million acres (1.2 million ha) of military land with basins and "sky island" mountain ranges in the Chihuahuan Desert of southern New Mexico. The northern New Mexico cluster includes the 52,000-acre (21,053-ha) Kirtland Air Force Base and New Mexico Army National Guard Cameltracks Training Area, which both contain mountain and high desert basin habitats (U.S. Department of Defense 2006).

Four of these five major military installations in New Mexico contain important breeding populations of gray vireos. These include Kirtland Air Force Base (on which occurs the second largest known population in the state), the New Mexico Army National Guard Cameltracks Training Area and the Army's White Sands Missile Range and Fort Bliss (New Mexico Department of Game and Fish 2007).

Project Leadership Conservation Teams were established for each of the two clusters of DoD installations in New Mexico as a part of the DoD species at risk (U.S. Department of Defense 2006). In addition to the respective DoD installation representatives, team membership includes the U.S. Fish and Wildlife Service, NMDGF, and Natural Heritage New Mexico staff. Project leadership conservation teams for each cluster developed their own species-at-risk list for species occurring on DoD land within their respective military installation clusters. To partner with ongoing state actions to conserve gray vireos in New Mexico as recommended by the Gray Vireo Recovery Plan (New Mexico Department of Game and Fish 2007), and to integrate their respective INRMPs with the Comprehensive Wildlife Conservation Strategy for New Mexico (New Mexico Department of Game and Fish 2006), White Sands Missile Range, Fort Bliss, Kirtland Air Force Base, and New Mexico Army National Guard's Cameltracks Training Area selected the gray vireo as a focal species at risk for conservation efforts. The gray vireo also was selected as a focal species because of its role as an ecological surrogate for other

neotropical migrant birds that rely on pinyon-juniper woodland for nesting habitat, such as the gray flycatcher (*Empidonax wrightii*), black-throated gray warbler (*Dendroica nigrescens*), and juniper titmouse (*Baeolophus ridgwayi*). DoD installations with gray vireo populations have developed conservation actions for inclusion in their respective INRMPs and are collaborating with the NMDGF through the Legacy species-at-risk program to survey for, document and archive gray vireo distribution and habitat information from DoD land (U.S. Department of Defense 2006).

Kirtland Air Force Base is monitoring known nesting pairs to determine territory occupancy, density, nesting success, brood parasitism by cowbirds and nes- site selection preferences. Conservation actions will consist of five subtasks, including: (1) surveys following the distance sampling methodology, (2) mist netting and color banding adults, (3) nest searching and monitoring, (4) banding nestlings and (5) collecting data on microhabitat characteristics of nest locations. Microhabitat characteristics include, but are not limited to: elevation, slope, aspect, tree and shrub density, tree height, canopy cover, nest concealment, and percentage of live and nonlive ground cover. These efforts are components of the DoD Legacy species-at-risk initiatives and a Kirtland Air Force Base INRMP requirement (C. Finley, personal communication 2008).

Fort Bliss has conducted large-scale surveys for gray vireos and is implementing nesting success studies (U.S. Department of Defense 2006). White Sands Missile Range has documented gray vireos nesting on the installation, and is planning larger scale presence-absence surveys for 2009 (Patricia Griffin, personal communication 2008). Cameltracks Training Area also has documented gray vireo nesting territories and has proposed habitat protection actions and continued monitoring in their INRMP (New Mexico Army National Guard 2007).

With Legacy species-at-risk project funding, Natural Heritage New Mexico developed a habitat-based gray vireo management report and predictive gray vireo habitat models for White Sands Missile Range, Fort Bliss, Holloman Air Force Base, Kirtland Air Force Base, and all four New Mexico Army National Guard training installations. The report and predictive habitat models will support conservation partnerships on and around military land on a landscape level and may assist in the development and implementation of candidate conservation agreements for gray vireos (Johnson et al. 2007). Management recommendations summarized in the gray vireo report include the following.

- Survey potential habitat for gray vireos and monitor known populations.
- Conduct research on cowbird impacts and reproductive success in known gray vireo populations, particularly in areas where grazing occurs or is planned.
- Before conducting management actions, such as thinning for fire control or clearing for biomass fuels in juniper savannah or pinyon-juniper woodland, survey for gray vireos. Any management actions where the gray vireo occurs should be accompanied by ongoing monitoring of population effects.
- Coordination between DoD facilities and with the U.S. Fish and Wildlife Service and NMDGF is highly recommended to avoid negative effects and to enhance dissemination of knowledge for conservation and funding opportunities.

The conservation partnership teams have agreed to pursue a DoD Legacy proposal for fiscal year 2009 funds, which would include surveying for gray vireos during migration at three southern New Mexico Army National Guard training areas (Steve Helfert, personal communication 2008).

## Looking to the Future

Persistence of gray vireo in New Mexico may not be possible without the ongoing collaboration of DoD military installations on which important populations and habitat occur. Maintaining and improving existing communication and partnerships with these bases is critical for determining the statewide status, assessing conservation needs and ultimately precluding the need for listing of the gray vireo under the federal Endangered Species Act. The integrated efforts of the two military clusters in New Mexico for gray vireo conservation demonstrate how conservation partnerships can be developed across military and other land-management boundaries to achieve common wildlife conservation goals.

## Reference List

Barlow, J. C., S. N. Leckie, and C. T. Baril. 1999. Gray vireo (*Vireo vicinior*). *The birds of North America, No. 447,* eds. A. Poole, and F. Gill. http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/447.

Bates, J. M. 1992. Frugivory on *Bursera microphylla* (Buseraceae) by wintering gray vireos (*Vireo vicinior*, Vireonidae) in the coastal deserts of Sonora, Mexico. *Southwestern Naturalist*. 37:252–8.

Hawks Aloft. 2006. *Gray vireo population monitoring in southeast New Mexico*. Santa Fe, New Mexico: New Mexico Department of Game and Fish.

Johnson, K., P. Tonne, and J. Smith. 2007. *Species at risk management reports, DoD SAR-AZ/NM legacy project*. Albuquerque, New Mexico: Natural Heritage New Mexico, Museum of Southwestern Biology.

NatureServe. 2008. *Species at risk on DoD installations: Summary*. http://www.natureserve.org/prodServices/speciesatRiskdod.jsp.

New Mexico Army National Guard. 2007. *Final integrated natural resource management plan (INRMP) and environmental assessment of the implementation of the INMRP*. Santa Fe, New Mexico: New Mexico Army National Guard.

New Mexico Department of Game and Fish. 2006. *Comprehensive wildlife conservation strategy for New Mexico*. Santa Fe, New Mexico: New Mexico Department of Game and Fish.

New Mexico Department of Game and Fish. 2007. *Gray vireo (*Vireo vicinior*) recovery plan*. Santa Fe, New Mexico: New Mexico Department of Game and Fish, Conservation Services Division.

Sauer, J. R., J. E. Hines, G. Geogh, I. Thomas, and B. G. Peterjohn. 1997. *The North American breeding bird survey results and analysis, version 96.4*. Laurel, Maryland: Patuxent Wildlife Research Center.

Schlossberg, S. 2006. Abundance and habitat preferences of gray vireos (*Vireo vicinior*) on the Colorado plateau. *Auk*. 123(1):33–44.

U.S. Department of Defense. 2006. *Species at risk report for New Mexico and Arizona: Legacy grant*. Albuquerque, New Mexico: Southwest Strategy Endangered Species Act Team.

U.S. Department of Defense. 2008. *Welcome to the Department of Defense legacy tracker*. http://www.dodlegacy.org/legacy/index.aspx.

# Session Four.
# *Access: The Foundation of a Successful Natural Resources Model*

## Opening Remarks

**Randy Kreil**
*North Dakota Game and Fish Department*
*Bismarck, North Dakota*

Good morning and thank you all for attending this special session entitled: Access: The Foundation of a Successful Natural Resource Model. My name is Randy Kreil, and I am the Wildlife Division Chief for the North Dakota Game and Fish Department. When Dick McCabe, from the Wildlife Management Institute, contacted me about participating in this session, I agreed to help out because the issue of access was very important to me both personally and professionally. I also considered the fact that this issue is critically important to wildlife management agencies and conservation organizations throughout North America and that there would be intense interest in the subject of access. With the renewed and hopefully re-energized emphasis being placed on the importance of reconnecting with the North American Model of wildlife conservation the subject of public access becomes even more important. Remember, one of the key components of this most successful wildlife conservation model is access and opportunity for all.

In today's high tech, rapid paced, me-first world, it seems as if few people fully understand, appreciate or remember the vital role that reasonable and equitable public access plays in the successful management of North America's natural resources. Because access enables public contact with wildlife and other natural resources, this basic concept provides the foundation for public support which is vital to state and federal management programs. The public's ability to access and enjoy these resources in a variety of ways lends to widespread, continued interest and involvement in and support for sustaining these resources. This session is intended to examine the challenges of meeting access needs to public and private lands, of implementing successful programs

and policies that encourage and provide access and of ways that access to fish and wildlife resources impact hunting and fishing participation and the revenue streams that make responsible management possible. How we meet these challenges and at the same time adhere to the North American Model of wildlife conservation in the coming decades is critical.

Today we will hear about a wide range of considerations concerning public access to wildlife and other natural resources, including how to address the issue of recreational liability; the challenges that exist even in a state where public land is plentiful; an approach to providing access in a state that is predominately privately owned; and how nongovernmental organizations interested in wildlife conservation can help meet these challenges. On behalf of my cochair, Becky Humphries, and all the presenters, we hope you find this session interesting and worthwhile. Again, thank you for attending and demonstrating that the issue of public access is indeed a top priority for fish and wildlife management agencies and organizations.

# Improving Access through Strengthening State Recreational Liability Statutes

**Tommy L. Brown**
*Cornell University, Department of Natural Resources, Human Dimensions Research Unit*
*Ithaca, New York*

**John J. Daigle**
*University of Maine, School of Forest Resources, Parks, Recreation and Tourism Program*
*Orono, Maine*

Creating and enhancing public access to land and water has been a challenge to natural resource managers for over 50 years (Fanselow 1952, Wright and Kaiser 1986). Most public lands are open, although entry fees may be charged, and hunting is not allowed in some parks. Thus, the focus of most access initiatives has been on private lands. Private-land access is particularly important to wildlife management, both for recreational hunting access and managing wildlife populations. For the vast majority of the United States, most wildlife occurs on private lands (Brown et al. 2001). Private lands are also important to the development of trail systems, whether for hiking or for snowmobiling and other motorized recreation activities. Most trail systems use available public lands, but private lands are a necessity for long-distance trail systems. A further dimension to the importance of access is that hunting, fishing, and other forms of outdoor recreation generate billions of dollars nationally (Southwick 2001). Many local rural economies are strengthened substantially by the spending associated with trips taken for these outdoor activities.

Historically, the primary indicator of access problems has been posted land. New York studies have monitored increases in the posting of private rural acreage statewide from 25 percent in 1962 to 43 percent in 1972, 50 percent in 1980 (Brown et al. 1984) and 61 percent in 1991 (Siemer and Brown 1993)—the last statewide posting survey. More recently, 69 percent of Pennsylvania owners posted their lands in 2003 (Jagnow et al. 2006). The more recent New York studies found that about as much hunting occurs on posted as unposted land, but, increasingly, owners allowed only family and friends to hunt on posted land.

Other studies show similar reasons for posting: owners had bad experiences with hunters or other recreationists, owners felt unsafe with hunters on their land, or owners want to reserve their lands for their own use or for others whom they designate. Some of the more recent studies show that owners post because they simply want to exercise control over who is on their land and when. This could be related to two factors. First, the size of the average farm has increased substantially over the years, which has increased the difficulty of farmers knowing if recreationists that not ask permission are on their land. Second, in recent years in both farming and nonfarming families, it has become more likely that both household heads are employed outside the home; it is quite common for farmers to take off-farm employment in cold-weather months. Therefore, posting may be seen as an added security measure for rural families who are often away from home.

Recent studies have shown liability concerns to be among the important reasons why landowners limit access. Liability was the leading reason, by a wide margin, given by Illinois owners who did not grant hunting access (Miller et al. 2002), and liability-related concerns were also important for posting in New York (Siemer and Brown 1993). Importantly, liability-related concerns are not limited to accidents that occur on their land; owners are also concerned about the risk of being sued and the accompanying psychological stress, adverse publicity, lost time and litigation expenses (Wright et al. 1990).

All 50 states now have what is hereafter phrased limited liability recreation statutes that offer landowners substantial protection against liability to hunters, anglers and other recreationists. These statutes date from as far back as the 1950s, when they were first enacted in Michigan and New York (Kaiser and Wright 1985). Thirty-four states enacted statutes in the 1960s, eight in the 1970s and the remaining states in the 1980s. Most of the statutes were developed from a model proposed in 1965 by the Council of State Governments. Surprisingly, given their potential importance to access, little analysis of these statutes has occurred over the years, with the most recent reported by Kaiser and Wright (1985).

## Study Background and Methods

This study was done as an extension of a grant from the Northeast States Research Cooperative to researchers in the northern forest states of

Maine, New Hampshire, Vermont and northern New York. In addition to landowner surveys that are currently in progress and are overseen by colleagues, we analyzed both the limited liability recreation statutes and published court cases related to those statutes (generally, cases that had reached the lowest level of state appeals court). We then compared the statutes in those four states to those in other northeastern states, extending as far south as Virginia. These results were published in Brown (2006). We then extended the analysis to a review of the statutes in all other states.

The primary motivation for the effort was the knowledge that, despite these statutes, access to private lands has continued to decrease. Moreover, the statutes in some states contain loopholes; some owners have been found liable in cases where they were not grossly negligent. Some of these cases have been overturned upon appeal. But, nevertheless, owners have suffered financially and in other ways, sometimes over several years, as these cases have been in litigation. It was hoped that by reviewing revisions to these statutes over the past 20 years that we would find innovative ideas and language from individual states that other states could examine and consider, with the goal of providing owners broader liability protection and incentives to provide public access to their land.

These recreational liability statutes are posted on several Websites. American Whitewater (2000) has a table listing the statutes of each state and whether they contain certain key provisions. Links to the statutes of each state are provided on a University of Texas (2003) Website and on a very similar University of Vermont (2003) Website. Researchers are cautioned that state laws are periodically amended and recodified, which may result in renumbering. Also, the liability statutes of several states appear in more than one section. This analysis was performed by seeking the relevant statutes of each state on the academic document, legal portion of the LexisNexis Website through the use of appropriate keywords.

## Typical Coverage and Limitations of Original Statutes

Realizing that this will be a generalization across the states, state limited liability recreation statutes, as originally enacted, provided substantial protection to owners. Formerly, most states delineated three levels of visitor to a property in terms of responsibility for the owner: invitee, licensee and trespasser. Invitees

included but were not limited to commercial enterprises or other situations where a fee was charged. In other cases, where an owner or occupant agreed to care for a child or other person who required special care, even without any payment, such a person might well be classified as an invitee. However, owners generally could leave their lands open or even post signs welcoming public recreational use without such users being classified legally as invitees; this information was incorporated into the statutes of some states. Generally, the limited liability statutes applied to licensees and trespassers, not to invitees to whom owners owe a higher duty of care for their safety. Many states no longer use this categorization, but instead use a general test of foreseeability of an accident. The statutes of many states use the phrase willful or malicious. That is, assuming the statute applies, owners are provided immunity unless they willfully or maliciously fail to guard against a hazard on their property or unless they willfully or maliciously fail to warn a recreationist of such a hazard (Brown 2006). Note that while the statutes typically cover trespassers, it is also true in most states that an owner who willfully or maliciously fails to guard or warn against a hazard could be found liable even for an injury to a trespasser.

Earlier versions of these limited liability recreation statutes usually had a number of limitations to their coverage. Some of those, with commentary, follow.

***The Statute Applied Only to a Given List of Outdoor Recreation Activities***

Hunting was a covered activity in the statute of every state, fishing was typically covered and trapping was often covered. However, hiking, bird watching and other activities were less frequently covered. Many states amended their original legislation to include more activities. Court cases have shown that no matter how many activities were listed, loopholes existed. For example, volunteers who help the owner with trail construction or maintenance, regardless of the purpose of the trails (e.g., easier access for hunting or hiking), would not necessarily be covered. Or, if hunters were involved in an accident on the property, firearm in hand, on their way to or from a hunting location, it could be argued that they were not actually hunting at the time of the accident.

***Who Is Covered by the Statute***

Most statutes covered owners or lessees, and some also included occupants. However, at times, owners or lessees may be away from their

property and may assign decision making related to access to a relative or neighbor. Such a person who grants access would not necessarily be covered by the statute and could incur liability.

***Payment or Other Consideration***

The statutes of many states have allowed owners to receive a payment or other consideration through a governmental program designed to enhance access. Frequently, state statutes have allowed such payments or considerations from state government, but the statutes of some states allow owners to receive payments from the federal government or from local units of government. Such payments allowed further development of trails without violating the original intent of the statutes. They were not applicable if recreationists made direct payments to owners or occupants. However, arguments have been made to allow owners to receive compensation directly from recreationists and still enjoy the benefits of the limited liability statutes. Recreationists typically occupy a parking space on the land. They need an explanation of where they can recreate and of any rules governing use of the property. Their use over time may have some impact on gates, fences and trails, and they may leave litter behind. Allowing no payment or consideration whatsoever provides no incentive for the owner to provide access.

***Definition and Suitability of Land for the Activity***

The statutes of many states intended coverage for rural lands. What constitutes rural in today's era of suburbanization and exurbanization often is not clear. Large, undeveloped parcels remain within counties that were considered rural 50 years ago but now have some type of metropolitan U.S. Bureau of the Census designation. Cases exist where a court ruled that the statute of the state did not apply because the land was unsuitable to the activity being pursued. Why is a landowner who may not have granted permission to a recreationist denied coverage under the state statute because the recreationist chose what a court decided is an unsuitable area?

***Application to Public Agencies and Organizations***

The statutes of many states were enacted specifically to encourage private owners to allow public access to their properties. As a result, those statutes do not apply to public entities. Courts have generally ruled that for state

and local government lands, even minimally developing, actively managing and supervising them implies a higher standard of responsibility for the public's safety. However, why should the burden for a government agency or other public organization be greater than for a private landowner's when land is undeveloped and not managed or supervised?

***Who Pays the Legal Costs?***

Typically landowners pay for the own defense. Even for cases settled out of court, considerable attorney fees may be involved as well as lost time, adverse publicity and psychological stress.

***Lawsuits Could Be for Unlimited Amounts***

Nonfarm landowners typically rely on a homeowner policy for liability coverage for injury to someone on their property. Whereas, farmers and other businesspersons might have a commercial liability policy that is applicable. Homeowner policies often do not contain sufficient coverage for lawsuits that include major medical costs, disability payments, pain and suffering.

## Progress in Closing Loopholes and Increasing Liability Protection

Many states have modified their statutes considerably since original passage. In particular, several states have made innovative changes in the wording of their statutes since 1990 that provide additional liability protection to landowners. Examples are noted below, under the same six topics that are raised above.

***Recreationists and Others to Whom the Statute Applies***

Most states now use wordings that include all recreation activities. If the traditional list of activities still appears in the statute, wording such as "including but not limited to," or "and other recreation activities" now appears. Moreover, a number of states have broadened their statute to apply to other possible uses. For example, California Civil Code 2-2-3-2-846 defines a recreational purpose as including sightseeing, rock collecting, nature study, nature contacting and viewing or enjoying historical, archaeological, scenic, natural, or scientific sites. Maine statute 14 M.R.S. § 159-A (2005) includes (1) environmental education and research and (2) entry of, volunteer maintenance and improvement of, use of and passage over premises in order to pursue covered activities. Massachusetts's statute Chapter 24, Articles 17C-D includes recreational,

conservation, scientific, educational, environmental, ecological, research, religious or charitable purposes. Montana Code 70-16-301 applies to several listed activities "or other pleasurable expeditions."

With regard to those who voluntarily work to build or maintain trails or who engage in other improvements on the land, Vermont Statute 12 V.S.A. § 5791 (2006) defines recreational use to mean any noncommercial activity undertaken without consideration to create, protect, preserve, rehabilitate or maintain the land for recreational uses. New Hampshire has separate trails legislation (RSA 231-A:8) which limits the liability for, "any person performing volunteer management or maintenance activities for or upon any trail established under this chapter, with the prior written approval of the body or organization with supervision over trail management pursuant to RSA 231-A:7."

Iowa Code 461C includes in addition to recreation activities urban deer control—defined as deer hunting with a bow and arrow on private land in a municipality, without charge, as authorized by a municipal ordinance, for the purpose of reducing or stabilizing an urban deer population in the municipality.

***Who Is Covered by the Statute***

The Massachusetts statute (Chapter 21, Articles 17C-D), goes beyond the usual language of "owner, lessee, or occupant," to include "anyone with an interest in the land, waters, structures, and equipment who legally gives permission." Similarly, Utah Code Annotated 57-14-2 defines "owner" to include the possessor of any interest in the land, and includes public as well as private lands.

As to recreationists using the property, the Massachusetts statute specifically includes minors. The statutes of other states are generally nebulous in this regard.

The vast majority of state statutes provide limited immunity to owners who otherwise qualify under the statute regardless of their access policies. A notable exception is Alabama Statute 35-15-28, which states that the liability limitation protection of the statute may be asserted only by an owner who can reasonably establish that the outdoor recreational land was open for noncommercial use to the general public at the time of the injury to a person using such land for any public recreational purpose.

***Payment or Other Consideration***

Changes in the statutes of the various states noted above might be characterized as closing loopholes, but allowing landowners and others with

decision-making authority to receive some compensation while continuing to receive liability protection marks a notable expansion in the benefits provided under the limited liability statutes of some states. In this area, the states that have expanded liability coverage, for the most, part have moved forward in their own way, as opposed to following similar legislation from other states.

Starting with the most basic of considerations, Arkansas Code 18-11-302 defines a "charge" as not including the sharing of game, fish or other product of recreational use, nor does it include "contributions in kind, services, or cash paid to reduce or offset costs and eliminate losses from recreational use." Similarly, Indiana Code 14-22-10-2 removes from "monetary consideration" the "gratuitous sharing of game, fish, or other products of the recreational use of the land; services rendered for the purpose of wildlife management; and contributions in kind made for the purpose of wildlife management." Utah Annotated Code 57-14-4 allows owners to charge $1.00 per person per year and still fall within the protections offered by the statute. The statute of South Dakota Code 20-9-12 allows a nonmonetary gift to the owner of less than $100 in value. Similarly, the Massachusetts statute 21-17C-D allows a voluntary contribution or payment if not connected to use of the land.

Several states now permit owners or others with interest in the land to receive higher cash payments for recreational use and still receive the immunity offered by the limited liability statute of the state. West Virginia Code 19-25-5 allows the owner to receive up to $50 per participant per year. North Dakota Century Code 53-08-05 allows "total charges collected by the owner in the previous calendar year for all recreational uses that are not more than twice the total amount of property taxes, or for agricultural land, not more than four times the total amount of property taxes imposed on the land for the previous calendar year." Similarly, the Texas statute (Civil Practice and Remedies Code 75.003) applies to private owners, lessees or occupants, "whose total charges collected in the previous calendar year for all recreational use of the entire premises are not more than twice the total amount of ad valorem taxes imposed on the premises for the previous calendar year; or four times the total amount of ad valorem taxes imposed on the premises for the previous calendar year, in the case of agricultural land."

Wisconsin Statute 895.52 allows owners to collect recreation use fees of up to $2,000 per year in total. This statute also allows a gift of wild animals or other products taken from the land, noncash benefits that may accrue to the

owner from the recreation activity, a donation made for the management and conservation of the resources of the property, and a fee of up to $5.00 per person for gathering any product of nature on an owner's property.

Maine's limited liability statute goes even further by not imposing any maximum sum that an owner can receive from recreational use. Maine's revised Statute 14-159-A allows for unspecified payments to owners as long as the premises are not used primarily for commercial recreational purposes and as long as the user has not been granted the exclusive right to make use of the premises for recreational activities.

The limited liability statutes of a number of states include various types of gleaning or gathering various natural products, including firewood. Washington and Oregon allow some payment to the owner for firewood. Washington's annotated revised code 4-24-210 allows an administrative fee of up to $25.00 for the cutting, gathering and removal of firewood from the land. Oregon's revised statute 10-105.682-688 provides immunity if the owner charges "no more than $75 per cord for permission to use the land for woodcutting."

***Definition and Suitability of Land for the Activity***

This category is somewhat amorphous but the most obvious difficulty has been the failure of the legislation to specify precisely what types of land or water are covered under the statute. A few examples illustrate how some states have both better defined and broadened their liability coverage with respect to land and water covered by their statutes.

1. Louisiana Revised Statute 9:2795 defines land (covered under the statute) as "urban or rural land, roads, water, watercourses, private ways or buildings, structures, and machinery or equipment when attached to the realty."
2. Missouri Statute 36-537 does not limit the liability for any land within the corporate boundaries of any city, municipality, town, or village in the state. Nor does it cover residential properties of one acre or less or larger tracts used for multifamily residential services. The statute also defines certain noncovered lands used for commercial, industrial, mining or manufacturing purposes.
3. Massachusetts Law 21-17C defines land (covered under the statute) as including the "structures, buildings, and equipment attached to the land, including without limitation, wetlands, rivers, streams, ponds, lakes, and other bodies of water."

4. Oregon Revised Statute 10-105.688 indicates the statute applies to: "(a) all public and private lands, including but not limited to lands adjacent or contiguous to any bodies of water, watercourses or the ocean shore as defined by ORS 390.605; (b) all roads, bodies of water, watercourses, rights of way, buildings, fixtures and structures on the lands described in paragraph (a) of this subsection; and (c) all machinery or equipment on the (above) lands."
5. Washington Revised Code 4.24.210 indicates applicability of the statute to "lands whether designated resource, rural, or urban, or water areas or channels and lands adjacent to such areas or channels."
6. Maine Revised Statute 14-159-A provides immunity from negligence liability for land not normally considered recreational in nature, including commercial or even industrial areas, such as a gravel pit.

***Application to Public Agencies and Organizations***

The statutes of some states are quite clear as to whether they apply to public land or not. Examples of states whose statutes apply to public lands generally include Alabama, Colorado, Idaho, Illinois, Missouri, Montana, Nevada, Oregon, Rhode Island, Tennessee, Utah, and Washington. The Wisconsin Statute (895.52) specifically does not cover the state or other governmental bodies on property where an admission fee is charged for spectators or for similar malicious acts or malicious failure to warn that typically applies to private owners. Texas Civil Practice and Remedies Code 4-75.001 – 75.002 limits the liability of municipalities in a similar manner as to private owners.

Statutes of other states (Minnesota—except for municipal power agencies—North Carolina and Vermont) clearly apply only to private owners. For most states (i.e., those not enumerated above), the statutes are not clear as to whether they apply to the state or other public owners, and one has to analyze court cases to gain an understanding of this. Some state courts have noted that the purpose behind the enactment of the statutes was to encourage private owners to allow public access to their properties. Thus, they may not apply the statute to publicly owned lands or they may apply it in a limited way. New York courts, for example, have generally ruled that the state statute (General Obligations Law 9-103) applies to totally undeveloped public land, such as wildlife management areas or state forests. However, once some development occurs on public land (e.g., a boat launch ramp), the statute no longer applies, not only

to an injury sustained specifically on the developed site (e.g., the boat launch ramp itself) but also on the land and water surrounding the development.

***Who Pays the Legal Costs?***

Maine has taken an innovative step to both reduce court cases in which an owner is not grossly negligent and to reduce the financial burden on an owner who is sued. Maine Revised Statute 14-159a states: "[t]he court shall award any direct legal costs, including reasonable attorneys' fees, to an owner, lessee, manager, holder of an easement or occupant who is found not to be liable for injury to a person or property pursuant to this section."

***Attempts to Limit Liability Suits or Amounts***

Michigan's Statute (324.73301) attempts to prevent frivolous and other suits in which the owner is not grossly negligent. For (a) those on the land for activities covered who do not pay a fee, and (b) those who are on a farm for the purpose of fishing or hunting and who have paid valuable consideration, the statute indicates that "a cause of action shall not arise against the owner, tenant, or lessee" unless the injuries were due to gross negligence, willful misconduct, or negligent failure to warn of a hazard.

Texas Statute 75.004, while providing liability immunity to landowners similar to other states, has also limited the liability owners can incur to amounts that can reasonably be insured against. This statute sets a maximum amount of $500,000 for each person, $1 million for each single occurrence of bodily injury or death and $100,000 for each single occurrence for injury to or destruction of property. In the case of agricultural land, the total liability of an owner, lessee or occupant for a single occurrence is limited to $1 million, and the liability also is subject to the limits for each single occurrence of bodily injury or death and each single occurrence for injury to or destruction of property stated above. Moreover, for owners with agricultural lands who have insurance covering the act or omission in question, the limit of liability insurance coverage may be a combined single limit of $1 million for each single occurrence.

## Remaining Challenges

Although state wildlife agencies, cooperative extension programs and non-governmental organizations have given these statutes some publicity—the

extent of which has varied considerably from state to state—studies in Illinois (Miller et al. 2002) and New York (Siemer and Brown 1993) found that most owners have little knowledge or understanding of these statutes. Thus, owners who permit activities, such as hunting, fishing and hiking on their land without charging a fee, have a substantial amount of liability protection that they are generally unaware of. Better publicity of these statutes should prove helpful in maintaining public access to private land.

Considerable variation now exists in the statutes across the 50 states. A number of states have revised their statutes in recent years, but some states have not in over 20 years. While some states now have incorporated some modern, innovative benefits into their statutes, if one looks across the criteria examined in this paper, there is hardly a single state that could not modify its statute to provide additional liability protection or to clarify specific aspects that, because of vagueness, have required court interpretations previously.

Natural resource professionals can legitimately argue philosophically the extent to which owners should be allowed to receive payments and still receive the extent of liability immunity afforded by these statutes. In many areas of the United States, open public access was once a tradition. Some will feel that allowing owners to receive payments, as several states have now done, just hastens the end of this tradition. Others would argue that owners who allow public use of their land should receive compensation up to the amount that would cover taxes on the open acreage used by recreationists and to do basic management on those land.

Landowners deny or limit access for a variety of reasons, some of which have little relation to liability. For reasons related to liability, many landowners at workshops on this topic over the years have pointed out that no matter how comprehensive the liability statute of a given state in terms of general coverage and elimination of loopholes, the fact remains that a landowner can always be sued in the event of an injury on the property. The fear of a lawsuit, with its accompanying publicity, legal costs and loss of time, seems to be a major concern of landowners. Given the magnitude of this concern, in addition to continuing to improve state statutes in terms of closing loopholes, states may wish to look at methods of reducing lawsuits where willful or malicious neglect is not involved. The Maine statute awarding direct legal costs, including reasonable attorneys' fees, to an owner who is sued and found not liable under that state's limited liability statute seems to go a long way in accomplishing this objective.

The authors have observed that states with more loopholes in their statutes have more cases, while states with tighter legislation, such as Maine, have far fewer cases.

Successfully revising a state's limited liability recreation statute is no small feat. Gaining political consensus from landowner and recreationist stakeholder groups on the desirability of specific revisions takes time. Beyond that, getting enough visibility for a revised bill to see the light of day in the state legislature takes substantial energy. A further complication is the interests in the legal profession that are not well served by bills that would reduce the number of lawsuits. These interests sometimes lobby against such legislation. Nevertheless, some states have managed to successfully revise their limited liability statutes. Hopefully other states will follow suit (pun intended)!

As land use, outdoor-recreation patterns and landowner policies change, stakeholder groups for both owners and recreationists will want to review and update their states' limited-liability statutes. Greater public demand for trails appears to have been a significant influence on some of the more recent modifications of these statutes. The increasing trend of owners to allow only family and friends to hunt on their property in combination with a growth in the prevalence of leasing may have contributed to statutes in some states that now allow owners to receive a payment for recreational use. Also, conservation easements are becoming more popular, and the statutes of several states have been modified to provide liability immunity to land under such easements.

## Reference List


American Whitewater. 2000. *Liability and recreational use statutes*. http://www.americanwhitewater.org/archive/article/123.

Brown, Tommy L. 2006. *Analysis of limited liability recreation use statutes in the Northern Forest states. HDRU Series No. 06-12*. Cornell University Department of Natural Resources. http://www.dnr.cornell.edu/hdru/pubs.

Brown, Tommy L., Daniel J. Decker, and John W. Kelley. 1984. Access to private lands for hunting in New York: 1963–1980. *Wildlife Society Bulletin*. 12:344–9.

Brown, Tommy L., Terry A. Messmer, and Daniel J. Decker. 2001. Access for hunting on agricultural and forestlands. In *Human Dimensions of*

*wildlife management in North America*, 269–88. eds. D. J. Decker, T. L. Brown, and W. F. Siemer. Bethesda, Maryland, The Wildlife Society.

Fanselow, Floyd G. 1952. *Public access to lakes and streams in Michigan*. Lansing, Michigan: Michigan Department of Conservation.

Jagnow, Coren P., Richard C. Stedman, A. E. Luloff, Gary. J. San Julian, James C. Finley, and Jennifer Steele. 2006. Why landowners in Pennsylvania post their property against hunting. *Human Dimensions of Wildlife*. 11:15–26.

Kaiser, Ronald A., and Brett A. Wright. 1985. Recreational access to private land: Beyond the liability hurdle. *Journal of Soil and Water Conservation*. 40:478–81.

Miller, C. A., L. K. Campbell, J. A. Yeagle, and R. J. Williams. 2002. *Results of studies of Illinois hunters, landowners, and participants in Access Illinois. SR-02-01*. Champaign, Illinois: Illinois Natural History Survey.

Siemer, William F., and Tommy L. Brown. 1993. *Public access to private land for hunting in New York: A study of 1991 landowners, human dimensions research unit series 93-4*. Ithaca, New York: Department of Natural Resources, Cornell University.

Southwick, Rob. 2001. *Economic contributions of hunting*. Washington, DC: International Association of Fish and Wildlife Agencies.

University of Texas. 2003. *Recreational use statutes*. http://tarlton.law.utexas.edu/dawson/recreate/recreate.htm.

University of Vermont. 2003. *Recreational use statutes*. http://asci.uvm.edu/equine/law/recreate/recreate.htm

Wright, Brett A., and Ronald. A. Kaiser. 1986. Wildlife administrators' perceptions of hunter access problems: A national overview. *Wildlife Society Bulletin*. 14:30–5.

Wright, B. A., H. K. Cordell, and T. L. Brown. 1990. Public recreational access: A national study of policies and practices of private landowners. In *Social science in natural resources recreation management*, 181–98, ed. Joanne Vining. Boulder, Colorado: Westview Press.

# Recreational Challenges and Solutions in a Public Lands State

**Sal Palazzolo**
*Arizona Game and Fish Department*
*Phoenix, Arizona*

## Background

The western United States has often been perceived as a vast expanse of public land in which an outdoor enthusiast, whether hunter, fisher or hiker, has unlimited opportunities to utilize for their enjoyment. While it is true there are immense stretches of public land available in most western states, these states are not without many of the recreational access issues found further east.

The increase in recreational needs by a growing human population intensifies the demand for access to recreational land. This, coupled with a changing demographic of both users and landowners, has led to a need for western statess wildlife departments to become more deeply involved in recreational access programs, similar to their eastern counterparts.

Other issues that are beginning to arise or intensify are conflicts among user groups and calls by specialty groups for focus by departments to accommodate their specific user group. Growing use of off-highway vehicles has led to conflicts with recreationalists as well as landowners and grazing lessees. All these factors have required western wildlife departments to become more involved in the recreational access arena.

## Changing Landowner Demographic

One significant issue that is affecting western states is the changing of landowner demographics, large ranches that were historically amenable to allowing recreation are increasingly being sold to investment companies or agricultural corporations or are being split and sold to private citizens that want their own slice of the West. In many cases, these new landowners are either concerned about liability or have purchased these areas for the enjoyment of their families and friends and are not interested in allowing the public unlimited access to or through their property.

This is coupled with an increase in the business of guiding and outfitting for big-trophy game. Due to the location of some of these private parcels, a landowner is able to control access to a larger parcel of federal or state land, which allows the outfitter exclusive rights to provide their clients with an undisturbed public-land hunt.

Many of these parcels are also being sold as second homes or vacation ranchettes to people that many not have the same view of hunting as the previous landowners. Thereby closing those lands to hunting, not allowing anybody to drive through their property to hunt on land beyond.

## Landowner Conflict

The populations of most western states have exploded over the last couple of decades. For many years, several western states (Arizona, Nevada, Colorado) have been in the highest percent-growth categories for the entire United States. This has led to increased pressure on landowners as well as increased demand for recreational opportunities. Increasingly, landowners are becoming frustrated with the volume of users on their ranches as well as disturbances, real or perceived, to their agricultural operation. This has led to many closures of formerly open ranches. Other issues stem from the role ranchers and farmers see of themselves as fulfilling—stewards of the land and it natural resources. Some landowners feel that there is too much pressure being placed on wildlife populations within their lands and that it is their duty as good stewards to help give these animals "a break" until there are healthier populations by closing off their lands or restricting use. This is especially true of some big-game species.

Vandalism and damage is also having an effect on recreational access. Often times it only takes one irresponsible individual to drive across a wet meadow, cut a fence or shoot a windmill to close a ranch to everybody. Obviously, the chances of this occurring increase as the number of users increase.

In some cases, there is a desire to exclude one type of user group, but the landowner feels that, due to the size of a ranch, they are not able to regulate who comes in, and, therefore, it is easier to exclude everybody. For example, frustration has been expressed about four-wheel-vehicle enthusiasts; some ranchers oppose this type of activity, and it is easier to just lock the gate to all.

## Two Types of Recreational Issues in the West

Recreational access issues in theWest generally are lumped into two categories: recreational opportunities on private land and getting the public through private land that block or restrict access to federal or state land beyond. These two categories, while both dealing with a landowner, can be perceived in many differing ways. The first really deals with landowners' right to control and make decisions on the land that they rightfully own. The second is often looked at as the right of the U.S. citizen to utilize the land that belongs to them. It has often been described to me as a landowner infringing on the rights of the other citizens of the United States. These perceptions often lead to long philosophical debates about who is right or who is the problem. This debate is also very different in states where land is primarily privately owned; there, the first category is the norm.

## Local Issues within Arizona

Although only 18 percent of Arizona is privately owned, the land represent important recreational opportunities as well as access corridors into other publicly owned land. Public-access restrictions in Arizona have increased over the last decade as more landowners exercise their right to deny access to or through private land. In many cases, access is prevented to state trust and public lands as a result of these closures.

Issues regarding changing demographics, population growth and user conflicts are at play within Arizona. In addition to these challenges, there are border issues (illegal-alien crossings) and drug and human trafficking that cause landowners to close their property and roads to the recreating public.

In addition to assisting the recreating public, the department is also charged with collaborating with private landowners and land-management agencies to enhance opportunities for the public to enjoy wildlife, through maintaining, enhancing and restoring sensitive wildlife habitats on land in Arizona. Implementation of this project is linked to and supports objectives set forth in the Arizona Game and Fish Department's strategic plan: Wildlife 2012.

## Solutions

In an effort to solve some of these issues and to begin to create a cooperative atmosphere between landowners, recreationalists and the

department, the Arizona Game and Fish Department created the Landowner Relations Program. This program was directed to work with private landowners and lessees to develop habitat projects as well as to enhance opportunities for recreation.

Currently the program receives the majority of its recreation-focused funding from the Heritage Program. This program is funded by a percentage of the state's lottery revenue. It also receives funding from a hunter-donation account, a percent of revenue from Native American gaming as well as the federal Landowner Incentive Program (LIP).

Through these funding sources, as well as staff providing technical assistance to landowners and lessees, the program has worked to create a relationship with landowners across the state.

In regards to recreation, the program has both short-term agreements and the ability to purchase rights-of-way or easements. Short-term agreements consist of the department providing a set dollar amount to a landowner to accomplish an agreed-upon habitat or ranch improvement project in exchange for recreation (primarily hunting) occuring on the private property or allowing the public to pass through the private property to access public lands beyond. The second option is the purchase of an access right-of-way or easement. This consists of the Department paying a set value for right-of-way through a private parcel to public land beyond. The right-of-way is a legal document and is recorded on the landowner's deed in perpetuity.

Both of these approaches provide recreation to the citizens of Arizona. Over the past 5 to 6 years, the department has secured 11 perpetual rights-of-way opening up hundreds of thousands of acres of public land. On average the department coordinates and funds 10 to 15 short-term access agreements per fiscal year. Combined the department feels it opens up approximately 2 million acres (809,371.2 ha) of land to recreationalists each year.

Beyond the acres opened for recreation, the main success of the program is the relationship that has been created between the landowners of Arizona and the Arizona Game and Fish Department. This relationship has expanded into numerous habitat projects as well as a better understanding and cooperative spirit of both the landowners' and department's needs and enhancing Arizona's wildlife populations.

# Bridging the Gap: A Nongovernmental Organization's Role in Providing Public Access

**Joel A. Pedersen**
*National Wild Turkey Federation*
*Edgefield, South Carolina*

## Introduction

Hunter numbers have decreased by 10 percent nationally in the last decade (U.S. Fish and Wildlife Service, and U.S. Census Bureau 2006). Nationally, the hunter replacement ratio has been determined to be only 0.69 to 1, not enough to adequately replace hunter numbers to reverse this trend (Silvertip Productions et al. 2007). Lack of access has been identified as one of the top-rated causes of hunter dissatisfaction, and nearly one-third of all hunters identified lack of access as the primary reason they decided to give up hunting (Teddy Roosevelt Conservation Partnership 2005). Besides the direct effect of not having a place to hunt, lack of hunter access has far-reaching implications for natural resource conservation. Access is important so that people continue to care about our natural resources. If current or potential hunters increasingly experience hassles to find a place to hunt, many will not go, and they, in turn, will not introduce a new generation of hunters to the sport. If these former and potential hunters turn their passion to other pursuits, what will be important to them and their children and grandchildren? It will not be the protection of open prairie and prairie chickens, functioning wetlands and waterfowl, or well managed forests and wild turkeys. Hunting creates the connection to the land for many of us. The passion for hunting carries over into a passion for preserving the places and habitats that we enjoy. It is this passion by hunters that has resulted in the restoration of wildlife and habitats in North America that is unmatched anywhere in the world. If our connection to the land is lost, so is our passion to protect it.

Loss of hunting access can also have serious financial consequences for state wildlife agencies. A decline in access leads to a decline in hunter numbers, which results in fewer license sales. Fewer licenses sold leads to a decline in funds for state wildlife agencies to match with federal dollars, which results in a decline in wildlife research and management. Less management leads to a decline in wildlife populations and ecosystem health. It is easy to see that access is the foundation for the North American Model of wildlife management. Improving hunter access will help secure the future of wildlife management.

While the decline in hunter access is not a new phenomenon, the urgency of the situation continues to grow. Increasing land prices, changes in land ownership and landowner attitudes towards hunting, urbanization and shrinking agency budgets have increased the need for agencies and nongovernmental organizations (NGOs) to work together to secure hunter access. In 2007, the National Wild Turkey Federation (NWTF) launched our More Places to Hunt program. The program is designed to bring more attention to the decline in hunter access, to focus our chapter efforts and to improve our ability to raise funds to help our state and federal agency partners with land acquisition and hunter-access programs. We are also developing state strategic plans, as part of our North American Wild Turkey Management Plan, that will help the state chapters identify the most important projects and focus areas in each state that will best improve hunter-access and habitat management opportunities.

If NGOs are to maximize effectiveness in addressing hunter-access issues, we must ensure that our volunteers support our efforts. To this end, the NWTF recently conducted an on-line survey to help us understand the access issues that our members are facing and to determine the type of efforts to improve hunter access. This paper will draw on results from the survey. Therefore, it is important to understand the respondents. The 3,104 hunters who responded to the survey are avid hunters. Seventy-four percent hunt more than 20 days annually. Sixty-three percent indicated that they had hunted out-of-state in the last 5 years. Given that the survey targeted NWTF members, these results were not unexpected. While the results may be biased compared to the hunting community as a whole, they still provide valuable information from our constituents who are passionate enough about the issue to take the time to respond. As an NGO that depends on volunteer commitment and contributions, these are the people that we need to keep happy.

One portion of the survey asked respondents to rate the importance of potential activities that could help to preserve or enhance hunting access (Table 1). All of these activities were overwhelmingly important to the respondents and indicate a broad base of support for the NWTF to expand current programs or develop new programs to address these issues. To illustrate the role that the NWTF and other NGOs can play to bridge the gap and help state and federal agencies improve hunter access, we will look at successful examples and potential projects for each of the activities identified in Table 1. While these examples are drawn from the NWTF experience, other NGOs have similar programs and efforts.

Table 1.National Wild Turkey Federation (NWTF) member support for various activities to preserve or enhance hunter access. The top number indicates number of responses; the bottom number is the percentage of all responses for each activity. From on-line survey conducted by NWTF.

| Activity to provide hunter access | Very unimportant | Unimportant | Neutral | Important | Very important |
|---|---|---|---|---|---|
| Strategic land acquisition | 79 | 64 | 300 | 783 | 1823 |
| | 3% | 2% | 10% | 26% | 60% |
| Conservation agreements with private landowners to allow public hunting | 87 | 99 | 369 | 856 | 1649 |
| | 3% | 3% | 12% | 28% | 54% |
| Support of state-agency, hunter-access programs | 94 | 73 | 345 | 803 | 1736 |
| | 3% | 2% | 11% | 26% | 57% |
| Secure public hunting from corporate landowners | 80 | 41 | 209 | 661 | 2064 |
| | 3% | 1% | 7% | 22% | 68% |
| Educate landowners and managers about benefits of hunting | 82 | 81 | 362 | 808 | 1713 |
| | 3% | 3% | 12% | 27% | 56% |
| Secure access agreements across private property to public land | 160 | 170 | 557 | 819 | 1339 |
| | 5% | 6% | 18% | 27% | 44% |
| Participate in public-agency, land-use planning | 76 | 72 | 387 | 913 | 1586 |
| | 3% | 2% | 13% | 30% | 52% |
| Involvement with state legislative issues | 79 | 51 | 206 | 687 | 2023 |
| | 3% | 2% | 7% | 23% | 66% |
| Help agencies promote available hunting opportunities | 93 | 88 | 319 | 794 | 1752 |
| | 3% | 3% | 10% | 26% | 58% |

## Providing Public Access: The Successes

### *Strategic Land Acquisition*

Land acquisition has been the cornerstone of hunter access efforts for the NWTF. Since 1987, NWTF chapters have spent over $9 million to help wildlife agencies acquire more than 405,000 acres (163,898 ha) of land for public hunting in 31 states and Ontario. Some NWTF state chapters have identified this as a priority for their state and commit up to 70 percent of their annual budget to land acquisition. While occasionally the NWTF is the major contributor towards a land purchase, in most cases the NWTF contribution is a much smaller, critical portion, which provides key matching dollars to leverage Pittman-Robertson funds and grant monies to make the acquisitions possible.

In some states, we have taken a more creative approach to help the chapters and agencies maximize their opportunities. In Alabama, the state agency realized they were missing opportunities for key acquisitions because their appraisal process took longer than many landowners were willing to wait. Now

the NWTF state chapter donates the appraisals to the state agency. This speeds up the process and keeps landowners interested in working with the state. This partnership has resulted in nearly 12,000 acres (4,856 ha) acquired for public hunting in the state of Alabama.

***Conservation Agreements with Private Landowners to Allow Public Hunting***

In addition to outright land acquisition, the NWTF has worked with our partners to purchase conservation easements that allow public hunting on private lands. Often this is a more cost-effective approach because larger acreage can be obtained for a reduced price, and the costs of management stay with the landowner. The NWTF recently partnered with the Ohio Division of Wildlife to help acquire a conservation easement on 15,000 acres (6,070 ha) of land that is open to public hunting. Similarly, the NWTF partnered with Montana Fish Wildlife and Parks (FWP) in a conservation easement that allows hunting on 402 acres (163 ha) of private land. This contribution was also used as matching funds for a grant that will secure additional easements to allow even more public hunting in northeast Montana.

***Support of State Agency Hunter Access Programs***

Several NWTF state chapters financially support agency Walk-in-Hunting-Area programs. In Kansas, this annual support has helped to expand the acreage in the program, particularly in the spring, where there are now more than 150,000 acres (60,703 ha) open to spring turkey hunting. In Wyoming, NWTF funding offsets the cost of areas that include turkey hunting and will allow for an additional 20,000 acres (8,094 ha) to be included in the program. In Colorado, the NWTF took their support one step further. In addition to financially supporting the state's access program, a local chapter has taken the administrative responsibility of enrolling local landowners.

***Secure Public Hunting from Corporate Landowners***

The NWTF has improved hunting access by working with our industry partners. In 2006 we partnered with Consol Energy and CNX Land in Illinois to manage the wildlife populations on 8,300 acres (3,359 ha) of reclaimed mining land known as Burning Star Five. As part of the overall management plan, we acted as a liaison between CNX Land and the Illinois Department of Natural Resources to open the previously closed property to public hunting.

Additionally, the NWTF has utilized our outreach efforts for youth, women, and the disabled to open the door with many corporate landowners to

provide hunting opportunities, especially for these groups. In most cases, the hunted property was previously closed to hunting. We are hopeful that as these landowners learn more about hunting, they will continue to expand the public hunting opportunities.

***Educate Landowners and Managers about Benefits of Hunting***

The New Hampshire Department of Game and Fish (NHDGF) recently surveyed private landowners and found that many of them did not understand hunting and the benefits derived from it. They found that when agency personnel educated landowners by answering their questions about hunting, many were willing to allow hunting, especially when the NHDGF took steps to alleviate their concerns. To assist with these efforts, the New Hampshire NWTF partnered with the NHDGF to produce and distribute safety-zone signs to landowners that allow public hunting.

For more than 10 years, the NWTF's Wisconsin chapter has teamed with the Wisconsin Department of Natural Resources to host landowner-appreciation days. For $5.00, hunters can sponsor landowners and their families at an event that recognizes them for allowing public hunting on their property. This simple token of appreciation has had a positive impact on landowner attitudes towards hunting and has kept considerable acreage open to hunting.

Finally, through *Get in the Game*, a companion television show and landowner field days, the NWTF is educating landowners and land managers about improving habitat management to produce more game and hunting opportunity. We also highlight the role that hunting plays in managing wildlife populations and how hunting is a critical component of wise land management. These efforts reach more than 1 million people annually.

## Providing Public Access: The Challenges

***Secure Access Agreements across Private Property to Public Lands.***

In 1992, the U.S. General Accounting Office (GAO) reviewed the adequacy of access to land managed by U.S. Forest Service (USFS) and the U.S. Bureau of Land Management (BLM). It estimated that 50.4 million acres (20.4 million ha) had inadequate access (Government Accounting Office 1992). This number has likely increased over the last 15 years as a result of changing land ownership. In the West, our survey identified securing access agreements

across private land as the most important activity for the NWTF. This is also an area where great potential for NGO-agency partnership exists.

Agencies face numerous challenges in securing access agreements across private land. Often agencies are reactive, trying to maintain access when a loss is imminent instead of proactively pursuing agreements before access becomes a crisis. At times, they cannot negotiate an agreement quickly enough for the landowner, thus missing the opportunity. An agency's hands can be tied financially. They may be allowed to pay only the appraised value, or slightly more, of the land actually contained in the right-of-way, with little consideration to the access that it provides. In many cases, this amount is not sufficient to entice landowners to allow public access across their property.

Organizations like the NWTF generally do not have these constraints. We can quickly negotiate a deal with a landowner or contract services, such as surveys or appraisals, in a timely manner. NGOs can also pay what access is worth, not just the value of the access route itself. In many cases, a right-of-way appraised at only a few hundred dollars provides access to thousands of acres of public land. We need to place more emphasis on the value of the access provided rather than the value of the right-of-way. If the government cannot pay a reasonable amount to entice the landowner to allow access, then NGOs can make up the difference.

Finally, agencies may not have the legal authority to pursue the type of agreement that is necessary. Some landowners are reluctant to enter into a permanent public-access agreement without prior experience. The NWTF is working with Montana FWP to offer term-access agreements to landowners to provide access to land-locked public lands. At a minimum, these agreements will improve hunter access in the short term, but we believe that they will create a relationship with the landowner that will lead to a permanent access agreement in the future.

In extreme cases, we can help create new access routes to public lands where traditional routes have been closed by private landowners. The NWTF is working with the USFS in New Mexico and Virginia to do just that. These partnerships will help overcome the financial and bureaucratic hurdles that presently are slowing the process and keeping the public from accessing the land.

### *Participate in Public Agency Land-use Planning*

Our survey indicated that 82 percent of our members support the NWTF's involvement with public-agency, land-use planning. However, only 25 percent

of our volunteers expressed an interest in participating in the planning process. This is a troubling scenario, as we all know that if hunters do not get involved their concerns may not be adequately addressed. As an example, the USFS travel-management rule, currently being implemented nationwide, will have a tremendous impact on hunter access. The NWTF has taken an active role, letting our chapters know how it may impact them, notifying them when public comment is needed, providing our members with the pertinent background information and encouraging them to make their voice heard. Despite these efforts, in many places, we are told that comments from the hunting community are underrepresented. The NWTF and other NGOs are challenged to reverse this hunter apathy. We must find an effective method to inform our membership of the issues and make it easy for them participate in the process. Most importantly however, we must find an effective way to motivate them to be involved.

Agencies are similarly challenged to get the hunter involved. Hunters historically have been the strongest proponents for wildlife management and access to public land. It is in agencies' best interest to maintain this relationship. Many hunters have told us that they are frustrated with the length of the process and often have the perception that their comments are not adequately considered. If public input into the planning process is truly desired, then agencies must simplify the process so that individuals are more inclined to get involved.

***Involvement with State Legislative Issues***

The survey also indicated that our members strongly support involvement with legislative issues that maintain or enhance hunting access. The NWTF has successfully rallied its volunteers to ensure that legislation has been passed on a wide variety of topics related to hunter access such as improving landowner liability legislation in Pennsylvania, supporting land acquisition funding in Georgia and supporting no-net-loss of hunting land legislation in Florida. We also have a tremendous track record of improving youth hunting opportunities through our Families Afield efforts in 23 states.

Adequate financing for access-related projects will continue to be a hurdle and one that must often be resolved legislatively. While increases in license costs or additional fees to the agency are often controversial, 61percent of the respondents to our survey indicated they would be willing to pay a general access fee of $15 or less to the agency to support hunter-access programs. The NWTF and other NGOs can help agencies gain support within the hunting community for

proposed funding. For example, in 2005 the Texas Parks and Wildlife Department (TPWD) proposed an upland game bird stamp that was controversial with the turkey hunting community. We worked closely with the TPWD to ensure that our members and others in the hunting community had accurate information about the stamp and how the monies would be used. Our message was met with less skepticism than had it come from the agency and resulted in the passage of the legislation, which may not have happened without NWTF help.

***Help Agencies Promote Available Hunting Opportunities***

In our survey, 57 percent of the respondents indicated that they hunt mostly or exclusively on private land. Sixty-five percent of respondents indicated that their access to private land for hunting had decreased in the last 10 years. While access to public-hunting land may be available, many of these hunters indicated a reluctance to hunt on public land because of their perceptions about public land hunting. We need to be aware of hunter perceptions about available hunting opportunities and do our best to dispel the misperceptions.

For example, in our survey, 52 percent of respondents cited safety concerns as a reason that they do not hunt on public land. Apparently, lack of safety on public land is largely misperception. We compared the proportion of hunter days on private and public land reported by the U. S. Fish and Wildlife Service (U.S. Fish and Wildlife Service, and U.S. Census Bureau 2006) with the proportion of two-party hunting incidents (those where one person shot another) on private and public land as reported in the hunter-incident database of the International Hunter Education Association (2007). This comparison shows that hunter incidents are proportional to the number of hunter days on both private and public land (Figure 1). Despite the perception indicated in our survey, this suggests that it is just as safe to hunt on public land as it is on private land.

***Volunteer Participation***

Over the years, NWTF volunteers have shown that they want to support projects on the ground, giving their time to improve habitat, assist with wildlife surveys and pass on the hunting tradition. These same volunteers expressed a willingness to extend this support to access-related projects, as 57 percent of survey respondents indicated that they were willing to help with on the ground efforts. The NWTF and its partners are challenged to find opportunities to enlist the help of this volunteer army.

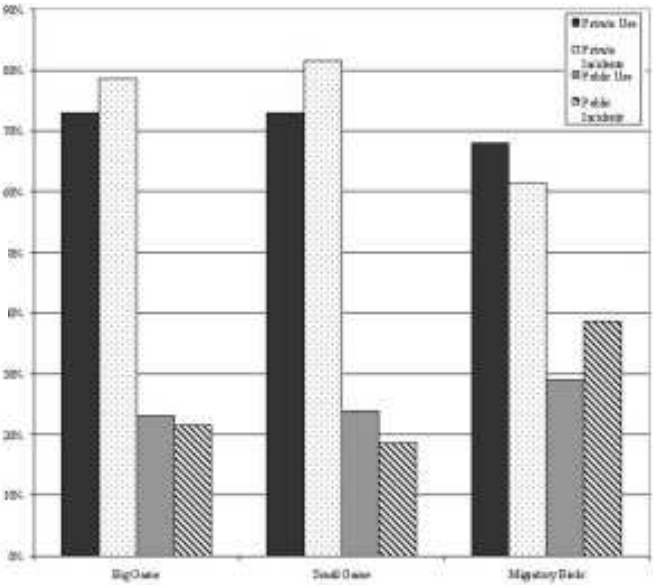


Figure 1. Comparison of the proportion of hunter days of use and two-party hunter incidents on private and public land. No significant differences were found between the expected and observed proportion of incidents by category. Hunter days of use are from U.S. Department of the Interior, Fish and Wildlife Service and from the U.S. Department of Commerce, U.S. Census Bureau (2006). Hunter incidents are from International Hunter Education Association.

Some hunters indicated a reluctance to hunt public land because of inadequate signage or boundary marking. The USFS alone has thousands of miles of boundary that needs to be remarked. Could this be an opportunity to enlist this volunteer army? Some states, like Arizona, utilize volunteer groups to "adopt" a ranch. Through this program, volunteers work with ranchers on projects that benefit them, and, in return, the property remains open to public hunting. Agencies and NGOs should work together to identify opportunities where we can engage the hunting community in on-the-ground projects to improve hunter access.

## Conclusions

The decline in hunter access is not a new issue; however, the urgency of the situation continues to grow. Increasing land prices, changes in land ownership and landowner attitudes towards hunting, urbanization and shrinking agency budgets have increased the need for agencies and NGOs to work together to secure hunter access. As the examples have illustrated, we have a tremendous record of working together in a variety of ways to improve hunter access. However, we are still faced with many challenges. Many individual hunters do

not want to be bothered with the details of maintaining access for the future. They simply want to know that it will be there when they want to use it. NGOs can bridge the gap by representing the hunting community and by providing agencies with the support they need. We must motivate our volunteers to get involved and provide the framework for them to participate in an organized and effective manner. We must educate our members on the importance of hunter access to wildlife conservation and the urgency of the situation.

Hunter access is the biggest threat to the future of wildlife conservation. The loss of hunter access will result in a public that has lost its connection to the land. Without that connection, the passion for protecting wildlife and its habitat are lost. Without that passion, the public that supports wildlife conservation and has passed that passion on through generations will lose their motivation to fight for the conservation of the wildlife and places that have been important to them for so long. They will no longer be willing to spend their time and money to protect something that they cannot enjoy. If hunter access is lost, the North American Model of wildlife management will no longer work. To be successful, we must work together on innovative solutions to maintain hunter access.

## Reference List


General Accounting Office. 1992. *Federal lands: Reasons for and effects of inadequate public access, briefing report to the chairman, subcommittee on national parks and public lands, committee on interior and insular affairs, House of Representatives. GAO/RCED-92-116BR*. Washington, DC: General Accounting Office.

International Hunter Education Association. 2007. *The hunter incident clearinghouse*. http://hic.ihea.com.

Silvertip Productions, Southwick Associates, and U.S. Sportsmen's Alliance. 2007. *Revised youth hunting report for the National Shooting Sports Foundation and the National Wild Turkey Federation.* National Wild Turkey Federation. http://www.nwtf.org/images/youth_hunting_report.pdf.

Teddy Roosevelt Conservation Partnership. 2005. *Annual report of the Teddy Roosevelt Conservation Partnership*. Washington, DC: Teddy Roosevelt Conservation Partnership.

U.S. Fish and Wildlife Service, and U.S. Census Bureau. 2006. *National survey of fishing, hunting, and wildlife-associated recreation*. Washington, DC: U.S. Fish and Wildlife Service, and U.S. Census Bureau.

# WMAN 100: The Tradition of Hunting

**John Edwards**
*West Virginia University,*
*Division of Forestry and Natural Resources*
*Morgantown, West Virginia*

**James Anderson**
*West Virginia University,*
*Division of Forestry and Natural Resources*
*Morgantown, West Virginia*

**Megan Jones**
*University of Wisconsin-Madison,*
*Department of Forest and Wildlife Ecology*
*Madison, Wisconsin*

Support for preservation and promotion of our hunting heritage is especially critical at this time. The historically important role that hunting has played as a management tool and recreational activity has eroded in undergraduate and graduate wildlife programs nationwide. Throughout the United States, the appreciation of hunting is no longer strongly entrenched, and its emphasis within the curricula of most university wildlife programs has greatly diminished. A corresponding change in attitudes among wildlife faculty and students also has occurred. Each year as a new freshmen class of wildlife students enters our program, a trend of fewer hunters among them is apparent. These are kids that you would expect to have come from a hunting background. It was alarming that in the wildlife profession, which is grounded in the use of harvest as a population management tool, many of our students have little experience hunting or in the hunting culture. Seeing this trend in wildlife students at West Virginia University prompted us to develop a hunting course, WMAN 100: The Tradition of Hunting, in 2004.

## Course Description

Our objective was not to teach students how to hunt or to convert nonhunting students into hunters. The impetus to teach a course on hunting came from our desire to influence students on the positive aspects of recreational hunting, both from a wildlife-management and societal aspect. The course is loosely structured in 3 sections, each containing 12 to 14 class periods. The first section defines hunting and its beneficial role in society through lectures on the evolution of hunting and meat eating in humans, what hunting is, why we hunt, demographics of hunters in the United States, European versus North American hunting models, and economics of hunting. In addition to formal lectures, invited speakers give presentations on the politics of hunting, women in hunting, hunter dollars and natural resource management.

The second section focuses on the role of hunting in wildlife management through lectures on harvest management, alternatives to harvest management, overabundance and animal-damage issues. During the second half of this section, students are presented information on modern firearms and bows used for hunting, wounding loss, gun control, child violence and hunting. Students are exposed to both sides of controversial issues of gun control and minimum age restrictions for youth hunters through guest speakers from progun organizations (e.g., National Rifle Association), gun-control advocates (e.g., Coalition to Stop Gun Violence), and experts on youth hunting (e.g., Randall Eaton) among others.

The final section relates hunting to society and explores some of the implications if hunting is lost in the future. Topics include hunters feeding the hungry programs, nutritional value of wild game, hunting ethics, animal rights organizations, antihunting movement, how animals die, hunting heritage and the future of hunting. Discussions in this section often polarize students and guest speakers (e.g., Humane Society of United States) or factions of students within the class (e.g., ethics, animal rights). Such disparity in opinions is important in engaging students in educational debate.

We believe that it is extremely important for students to hear opposing views on issues related to hunting, so they have factual information on which to form their own opinions. Students are required to complete four writing assignments in which they compare their opinion on a topic to those of guest speakers. Following an invited presentation on the politics of hunting during

which the speaker promoted the hunting of endangered species a student wrote: "To be honest I was a bit skeptical when I found out that we were going to listen to a speaker talk about politics. . . .Later it was not only clear that politics play a major role in the decision making process of hunting in North America, but also in the rest of the world as well. This is why it is critical to not be so narrow-minded and to be much more open to the political side of wildlife [management]" (B. Morris, unpublished survey, 2008) Student responses to guest lecturers have been very positive, even when their opinions strongly differ.

## First-hand Experiences

In addition to formal classroom lectures, students are required to complete three out-of-class, first-hand experiences. The choice of the activity is up to the student, but it must be related to hunting and something that the student has not attempted previously. Each activity is expected to last 3 to 5 hours. To receive full credit for their experience students are required to write a one-page essay describing the experience, including what they did, why they chose the activity, whether the experience was positive or negative and how it influenced their views of hunters or hunting or a related topic. As part of the course, we organize two optional activities: (1) a gun and bow demonstration at a local gun club where students have the opportunity to shoot small-caliber rifles, large-caliber rifles, muzzleloaders, crossbow and skeet, and (2) a deer butchering demonstration that includes a culinary treat. Student-selected, first-hand experiences have included: attending a national hunting and fishing day event, trying a new hunting method, taking a nonhunter or youth hunting for the first time, completing a hunter-safety course, processing their own wild game and learning to shoot a novel firearm or bow. One student who took a youth hunting course for the first time wrote: "I was amazed at how positively something so simple as hunting could affect a young boy. I was shocked at how interested he was in being quiet and trying to listen and understand what I was telling him. He had never been hunting before but seemed to fall in love the very first time. I think it really made me appreciate how lucky I am to be able to hunt, and to have a father that took the time to take me hunting" (B. Arbogast, unpublished survey, 2008). A nonhunting student wrote: "I grew up in Suburban Town, U.S.A. My mother is against guns and my father has [only] gone hunting a few times when

he was young with his uncle. The Traditions of Hunting class has opened my eyes and mind to a new world that was previously undiscovered by me. At first, I couldn't see the point of hunting or why people loved it so much. However, I knew that to understand, I had to experience it firsthand. Therefore, over break, a colleague of my dad took the two of us out deer hunting" (L. Carter-Lovejoy, unpublished survey, 2008). Overall, student response and selection of first-hand experiences has been as diverse as the students in the class and probably related to demographics and their previous association with hunting.

## Student Surveys

Concurrent to developing the course in 2003–2004, we surveyed students in several classes at West Virginia University to get a sense of student participation and opinions toward hunting. The objective of the survey was to compare students from different academic disciplines and to use this information in our lectures of hunter demographics and trends. Our survey consisted of nine questions and was administered to five different classes in fall 2003: COMM 102—Human Communication in the Interpersonal Context, SOCA 101—Introduction to Sociology, FOR 140—West Virginia Natural Resources, WMAN 150—Principles of Conservation Ecology and WMAN 431—Wildlife Habitat Techniques. The communication and sociology classes were large and contained a variety of majors but primarily students from within the humanities. Whereas, the forestry and wildlife management (150) classes also contained students from different majors, but primarily from natural resource management disciplines. The Wildlife Management 431 class was restricted to students majoring in wildlife management.

Survey results provided interesting insight into response trends among students (Table 1). As expected, hunting participation was higher in natural resources classes (i.e., FOR 140, WMAN 150 and WMAN 431) and lower in the humanities (i.e., COMM 102, SOCA 101). Despite this disparity, when asked whether they believed that sport hunting is an acceptable practice, greater than or equal to 83 percent of students in each class responded yes. Similarly, when asked if the hunting of wild animals is an effective tool in managing wildlife populations, greater than or equal to 80 percent of students in each class responded that they agreed.

Table 1. Student responses to hunting-related questions survey in five classes at West Virginia University, Fall 2003. Response is recorded as percent of students responding. N represents number of student respondents.

| | Course identification | | | | |
|---|---|---|---|---|---|
| Student response | WMAN 43 (n = 21) | FOR 104 (n = 133) | WMAN 150 (n = 67) | SOCA 101 (n = 389) | COMM 102 (n = 265) |
| Do you hunt? | | | | | |
| Yes | 67 | 63 | 58 | 20 | 19 |
| No | 33 | 37 | 42 | 80 | 81 |
| Family member hunts? | | | | | |
| Yes | 86 | 75 | 70 | 51 | 53 |
| No | 14 | 25 | 30 | 49 | 47 |
| Sport hunting is acceptable? | | | | | |
| Yes | 100 | 91 | 97 | 83 | 86 |
| No | 0 | 9 | 3 | 17 | 14 |
| Hunting is an effective management tool? | | | | | |
| Agree | 95 | 98 | 94 | 82 | 80 |
| Disagree | 5 | 2 | 6 | 18 | 20 |

In our hunting class (WMAN 100), we administered the same survey to students at the beginning of each semester in 2004–2007 (Table 2). Hunting participation among WMAN 100 students was higher (greater than or equal to 75 percent) than found in the five classes surveyed in 2003. Similar to the 2003

Table 2. Student responses to hunting-related questions survey in WMAN 100 class at West Virginia University, 2004–2007. Response is recorded as percent of students responding. N represents number of student respondents.

| Student response | 2004 (n = 92) | 2005 (n = 61) | 2006 (n = 98) | 2007 (n = 78) |
|---|---|---|---|---|
| Do you hunt? | | | | |
| Yes | 83 | 93 | 92 | 75 |
| No | 17 | 7 | 8 | 25 |
| Family member hunts? | | | | |
| Yes | 87 | 84 | 92 | 82 |
| No | 13 | 16 | 8 | 18 |
| Sport hunting is acceptable? | | | | |
| Yes | 98 | 96 | 99 | 99 |
| No | 2 | 4 | 1 | 1 |
| Hunting is an effective management tool? | | | | |
| Agree | 100 | 100 | 98 | 99 |
| Disagree | 0 | 0 | 2 | 1 |

survey, students in WMAN 100 were very accepting of the practice of sport hunting (greater than or equal to 96 percent) and agreed that hunting was an effective management tool (greater than or equal to 98 percent). Students in our hunting class are primarily male (greater than or equal to 76 percent) and residents of West Virginia and the bordering states (Table 3). When asked about the surroundings in which they grew-up the majority of students (greater than or equal to 61 percent) indicated a rural setting. Both the male-gender bias and rural background would support a higher hunting participation rate. Although West Virginia has one of the highest hunting participation rates (about 14 percent) among eastern states, the proportion of state residents (greater than or equal to 57 percent) in the hunting class is similar to that found among other classes at West Virginia University.

Table 3. Student demographics in WMAN 100 class at West Virginia University, 2004–2007. Metrics are reported as percent of students responding. N represents number of student respondents.

| | 2004 (n = 92) | 2005 (n = 61) | 2006 (n = 98) | 2007 (n = 78) |
|---|---|---|---|---|
| Gender | | | | |
| Male | 81 | 95 | 91 | 76 |
| Female | 19 | 5 | 9 | 24 |
| State residency | | | | |
| West Virginia | 83 | 57 | 66 | 67 |
| Pennsylvania | 8 | 11 | 8 | 6 |
| Maryland | 4 | 4 | 9 | 8 |
| Ohio | 1 | 7 | 8 | 8 |
| Virginia | 4 | 9 | 5 | 6 |
| Childhood surroundings | | | | |
| Rural | 69 | 61 | 62 | 64 |
| Suburban | 17 | 20 | 18 | 19 |
| Small city | 13 | 18 | 15 | 11 |
| Large city | 1 | 5 | 5 | 6 |

We have made a concerted effort to promote WMAN 100 throughout the University to increase the enrollment of female and nonhunting students in the class. Students with diverse backgrounds, opinions and experiences tend to engage in more productive and stimulating discussions on hunting-related topics (i.e., ethics, wounding loss, gun control, animal rights). Whereas in a class where

the overwhelming majority of students are male and hunters, there is little divergence in opinions, which results in an atmosphere of preaching to the choir. Beginning in Fall 2008, WMAN 100 will fulfill a General Education (GEC) requirement at West Virginia University, which will allow students from outside of wildlife and related disciplines to receive GEC credit for completing the course instead of taking it as a free elective. Prior to this change, many students that were probably interested in taking WMAN 100 may not have done so because it did not fulfill any of the course requirements for their major. We anticipate enrollment and diversity in student backgrounds to increase in the coming years as a result of its recognition as a GEC course.

## Extended Learning

As evidenced by the increasing number of new initiatives to promote hunting heritage by the conservation community, prohunting organizations and agencies recognize the need for increased education at all levels, from youth to adult. WMAN 100 is open to all West Virginia University students and is required for all wildlife majors. Although popular among students as evidenced by the high enrollment, we only have the opportunity to promote hunting heritage and the positive aspects of recreational hunting to relatively few of the 28,000 or more students enrolled at West Virginia University. Declining interest in hunting among students and reduced emphasis on its importance as a management tool in undergraduate and graduate wildlife curricula nationwide also is a growing concern for many members of the conservation community (e.g., National Wild Turkey Federation, University Curricula Committee, Conservation Leadership for Tomorrow). Although very successful as a course at West Virginia University, is it realistic to presume that all university wildlife programs have the desire, expertise and resources to develop and teach their own version of WMAN 100? Wildlife programs nationwide are facing financial challenges that require them to do more with less, including fewer faculty positions. An alternative approach to offering similar courses in all wildlife programs would be to offer an on-line course that students would complete via extended learning and receive credit for within their respective wildlife program. Currently, we are collaborating with many organizations and agencies to develop an on-line version of WMAN 100 that would be available to wildlife students and others via extended learning.

Once available, such a course could influence many times the number of students completing the course through the traditional classroom-based format. We believe an extended learning course is critical if we expect to reverse the declining trend in wildlife students that hunt and appreciate the important role of hunting in the wildlife profession and in society.

## Closing Comments

**Rebecca Humphries**
*Michigan Department of Natural Resources*
*Lansing, Michigan*

I want to thank everyone who presented today on this important topic of how we can improve public access to our natural resources, and Randy, our chair!

It's interesting to note that improving access for hunting and fishing has been something of an issue for more than 50 years and is limited by many factors—not just urban sprawl but other more recent factors that have a negative impact on access.

Public land simply cannot meet the demands for a high-quality hunting experience for everyone. Thus, more pressure will be put on private lands.

This issue will continue to be problematic for state fish and wildlife agencies to confront, given that many of us are struggling with tight budgets and limited staff.

Impacts on our ability as wildlife managers will be significant because decreasing harvest will lead to inadequate harvest rates for some game species in overabundance.

Landowners who buy land for hunting or recreational purposes, to guarantee themselves a place to hunt, are, in many cases, closing it to other hunters, making adequate harvest hard to achieve.

And landowners who are concerned with liability, antihunting or who have perhaps had one bad experience with a hunter are also restricting access to hunting opportunities.

Declining access equates to a decline in revenue for the state wildlife and fish agencies that are already grappling with a decline in licensed hunters and anglers.

And, declining revenue means less management of species, which can result in lower populations, disease and habitat issues.

This also has a negative impact on local, rural economies that are dependent on outdoor recreation activities and the business it brings to town.

As with many things in life, it is a domino effect. Lack of access often leads to declining license sales and improperly managed game, which leads to

population decreases and the inability for us to pass on our passion for the out-of-doors and hunting.

Lack of access, coupled with other issues we face, such as conflicting use, will continue to force fragmentation in land use and control. This does not bode well for natural resource managers in the future.

This is an area that is ripe for innovative ideas and programs, and we heard of several good ones here today, as well as legislative improvements, such as liability law. How can we couple the management of our game and fish with the need for more public access to hunting opportunities on private land?

How can we work with the public that is wary of or opposed to hunters, and yet ensure that wildlife and its habitat is properly managed on the land?

What groups or nongovernmental organizations can we partner with to assure that public access remains a top priority for not just some hunters but all hunters?

Creating more opportunities for hunting and fishing will be a vital part of our agencies' missions in the coming years.

I look forward to more of these discussions with my colleagues from around the country. Thank you for your time and attention today. It has been a valuable and informational session.

# Workshop 1.
# *The North American Model of Wildlife Conservation: Affirming the Role, Strength and Relevance of Hunting in the 21st Century*

## Mirror, Mirror, on the Wall: Reflections from a Nonhunter

**Michele Beucler**
*Idaho Department of Fish and Game*
*Boise, Idaho*

**Gregg Servheen**
*Idaho Department of Fish and Game*
*Boise, Idaho*

### Preface

In the fairy tale "Snow White," the princess's stepmother, the Queen, was very beautiful but very vain. She had supernatural powers and every day asked her magic mirror, "Mirror, Mirror, on the wall, who's the fairest of us all?" to which the Magic Mirror replied, "'Tis you." However, on the day that Princess Snow White turned 7 years old, the Magic Mirror replied "Queen, you are full fair, 'tis true, but Snow White is fairer than you." The Queen was furious and ordered a huntsman to take Snow White into the woods and kill her, bringing back her heart as proof.

Lest we get hung up on this metaphor, we want to make one point: the huntsman was an ethical one, and he spared Snow White!

We find this tale a useful metaphor for offering our observations on the relevance of hunting in the 21st century because we all know from personal experience how we see ourselves in the reflection most likely is very different than what another sees. And, we hope for a much less spiteful reaction than the Queen had!

### Introduction

According to the U.S. Fish and Wildlife Service and U.S. Census Bureau (2007), annual participation in hunting appears to have declined since 1975 (Figure 1).

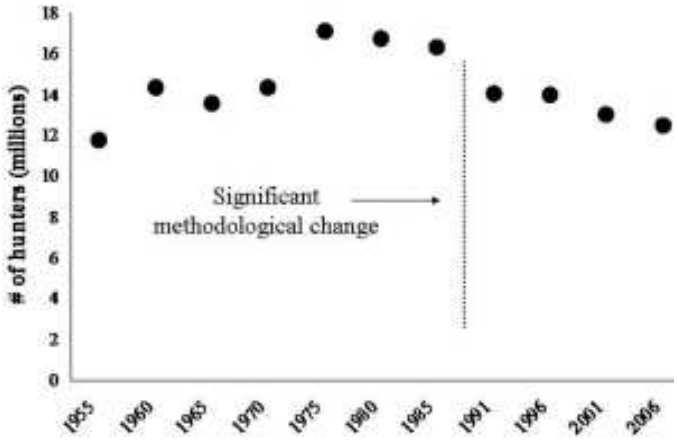



Figure 1. The number of hunters who participated within a calendar year, estimated at 11 points between 1955 and 2006. Participation appears to have declined since 1975 (U.S.Fish and Wildlife Service 2007). Note that survey methodologies changed significantly between 1985 and 1991; therefore, direct statistical comparisons are inappropriate.

There has been much attention given to the declining participation in hunting—so much attention that it has become a major strategic issue for most state wildlife agencies and has led to a plethora of recruitment and retention efforts. But, recruitment and retention efforts will not compel the vast majority of citizens—nonhunters—to engage in hunting. What state wildlife agencies seem to keep missing is that most nonhunters *already* care deeply about their wildlife. In Idaho, for example, 91 percent of adult Idahoans said wildlife issues were important to them (McMullin 2003), yet only 11 percent hunted in 2006 (U.S. Fish and Wildlife Service 2007). Although there is much discussion within and among state wildlife agencies about broadening constituencies, our concern is that the attention on recruitment and retention may confuse the message and inadvertently repel the nonhunting citizenry.

In discussing hunter recruitment and retention, we believe it essential to revisit the North American Model of Wildlife Conservation (the Model)—to understand its origins, successes and limitations and to then adapt the Model for wildlife conservation in 21st-century society. We are concerned that dwelling on the past short-circuits the deeper meaning and value of the Model and keeps us from moving forward. We want to bolster efforts to move forward by offering reflections not necessarily as *affirmation* but as *information.* First, we describe four different images of the Model in the mirror. Second, we more deeply describe "declining participation" within four different contexts that we think can improve

recruitment and retention efforts. Third, we present different perspectives on why recruitment and retention may actually be diverting attention from engaging the larger citizenry and thus broadening wildlife conservation. Finally, we suggest that reaffirming the "old" Model within the context of recruitment and retention may be undermining the Public Trust Doctrine and the relevance of state wildlife agencies in the 21st century.

## Expanding the Conversation

In the past few years, there has been a noticeable effort to publicize the Model and to educate people about its successes. Concurrently, we have read many newspaper and magazine articles and have watched television news and outdoors programs highlighting the decline in hunting. The two outreach efforts clearly are related, and we find it refreshing and exciting to watch our profession organize around a campaign. But, we also feel something is amiss, although the messages about the Model and declining participation in hunting are being broadcast, we suspect the messages do not resonate with the vast majority, and the growing number, of citizens—the nonhunters (Figure 2). As with most stories, there usually is more to it than meets the eye, and there usually is more than one side. To deepen the conversation about the Model and to learn from its successes and failures, we present four reflections from the Magic Mirror.

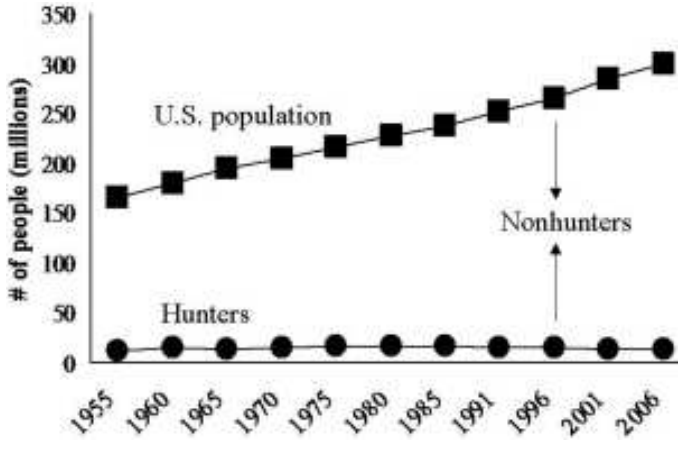



Figure 2. Estimates of the annual hunting participation based on estimated U.S. population (U.S. Census Bureau 2008, U.S. Fish and Wildlife Service and U.S. Census Bureau 2007). Annual hunting participation appears steady, while the U.S. population grew. The space between the two lines represents the majority of citizens, nonhunters.

***Four Reflections of the Model***

***The Handsome Prince***. The Model is rightly touted as a success in resource management, both in terms of providing abundant game and of drastically changing who had access to it. Without question, the Model has been very successful in recovering decimated populations of game animals, initiating habitat conservation efforts and providing a harvestable surplus for hunters. Likewise, ownership of wildlife successfully was taken from nobody and given to everybody, with management authority provided through a democratic government.

***The Myopic Ogre***. Wildlife management has been practiced using a mechanistic and agrarian approach to provide an optimal yield of game for hunting. Ecological outcomes of this have included persecution, reduction and extirpation of predators; introduction of nonnative and invasive species; habitat damage from an overabundance of herbivores; artificial propagation of game animals; and several others. Socioeconomic outcomes have included disenfranchised stakeholders, such as nonhunters, landowners and environmentalists; an iron triangle of state wildlife agencies, commissions and hunters; self-limiting revenue streams to state wildlife agencies; and fragmented and polarized biopolitics and management.

***The False Hero***. The Model matured as wildlife managers increasingly used science as the foundation for management. However, wildlife managers and researchers have used the scientific method to disassemble ecosystems and to manage species-by-species. This mechanistic approach initially provided the understanding of basic life histories and ecology but neglected to consider the ecosystem as more than the sum of its parts. As a result, single species of game have been managed for optimum yield for hunters even when it has conflicted with the existence, sustainability and conservation of other species and ecosystems as well as social values other than hunting (Botkin 1990).

***The Bourgeois***. The Model denounces commercial hunting, so by definition hunting became a recreational pursuit. Today, hunting is recreation in a social and economic sense (although not necessarily in a personal sense), and it arguably has become an expensive one at that. In 2006, a hunter in the United States spent an average of $1,814 on hunting—3.2 percent of which ($59) was for licenses, tags, and permits. The costs associated with participating not only are related to equipment, travel and fuel, but also include those associated with spending time in leisure and not working. A clear relationship exists between household income and hunting participation (Leonard 2007). Between 1990 and

2005, hunting initiation rates of children noticeably dropped in households with incomes of less than $40,000, whereas there was virtually no decline at all for children in households with incomes of $40,000 or more. Hunting retention rates declined sharply among households with incomes less than $40,000 while there was virtually no decline in retention among individuals from households with $100,000 or more. To put this in perspective, the median household income in Idaho is about $42,865 (the national is about $48,500) (U.S. Census Bureau 2008). That means that close to half of the households in Idaho fall below the $40,000 threshold, for which the costs associated with hunting may be a significant factor in deciding whether or not they will participate.

These four reflections hopefully will help state wildlife agencies to adapt the Model so it resonates with the majority of citizens who do not hunt. We don't want the Handsome Prince to neglect the vast majority of citizens, to fail to garner their financial and political support or to fail to address more insidious threats to wildlife conservation, such as increasing housing development (Figure 3) and nature-deficit disorder (Louv 2005). We don't want the Myopic Ogre to ostracize or exclude nonhunters as it argues for its own interest. We don't want the False Hero to use science only as a tool to collect raw knowledge rather than to form policy and management that addresses the 21st-century threats to wildlife conservation (i.e., adaptive management). And, we don't want the Bourgeois to make wildlife conservation a members-only club or to price the working class out of it.

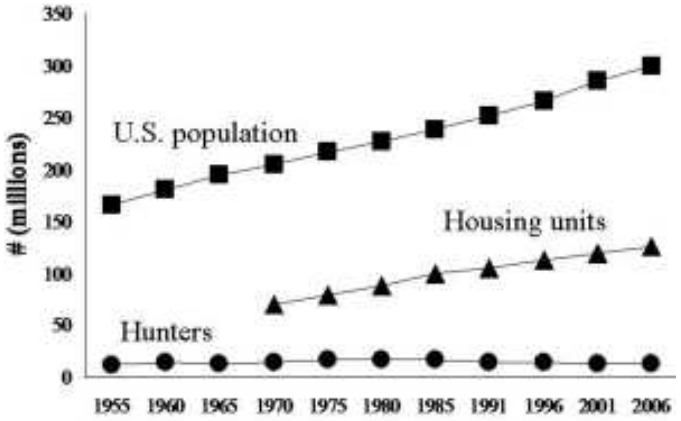



Figure 3. The number of housing units compared to the U.S. population and to hunter participation from 1955 to 2006. (U.S. Census Bureau 1970, 1975, 1980, 1985, 1991, 1997, 2001, 2006).

***The Four Contexts of Declining Participation***

Similar to our reflections on the Model, we think reflections of "declining participation" in the Magic Mirror would deepen the conversation, would provide greater clarity and would create more tailored and more durable solutions. We suggest that declining participation be described within four different contexts: (1) agency revenue, (2) wildlife management, (3) hunting legacy and (4) political support.

***Agency revenue***. License revenues are the mainstay of most state wildlife agencies' annual budgets. For example, the Idaho Department of Fish and Game's (IDFG) license revenue in fiscal year 2007 was $33,859,277, accounting for 49.8 percent of the agency's direct receipts (Division of Financial Management 2007). Thus, state wildlife agencies most likely see declining participation in terms of revenue.

***Wildlife management***. Hunting is a management tool for reducing agricultural depredations, predation on livestock and game, habitat degradation and urban wildlife problems. There is concern that wildlife management will get more difficult as game populations increase and hunters decrease (Barker 2007, Enck et al. 2000).

***Hunting legacy***. Whether one calls it subsistence, recreation or their passion—hunting has been a part of human culture since the beginning. Many hunters and state wildlife agencies are concerned about the right and access to hunting being chipped away. Some actually worry that hunting altogether could be outlawed.

***Political support***. By this, we simply mean the degree to which citizens trust and support its state wildlife agency. State wildlife agencies are increasingly assessing the public's approval or satisfaction or support of the agency. Despite the scientific assessments, support often is still described in terms of license sales.

Recruitment and retention is only one of many possible alternatives within each of the revenue, wildlife-management, hunting-legacy, and political-support contexts (Figure 4). Not only is increasing hunters just one of many possibilities, but consideration also must be given where it might directly conflict with other alternatives. For example, allowing technologies that improve harvest odds conflicts with the idea of restricting technologies under hunting legacy. Likewise, simplifying hunter education as a recruitment tactic probably conflicts with alternatives under the contexts of hunting legacy and political support.

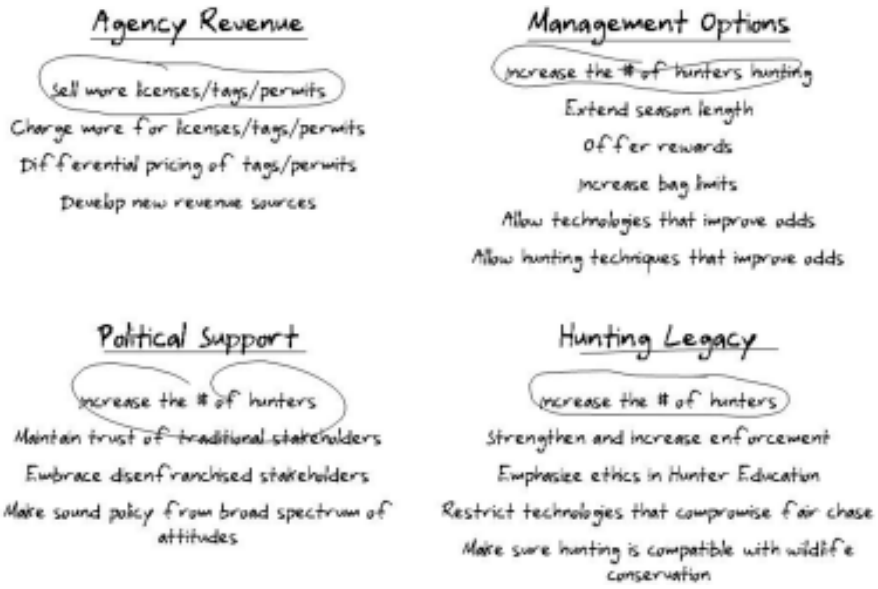



Figure 4. Alternative approaches to address declining participation in four contexts. Recruitment and retention efforts (circled) represent one of many possible alternatives. Deepening the definition of declining participation into the four contexts can lead to more focused and tailored solutions.

## Reassessing Recruitment and Retention

We think that some degree of recruiting citizens into hunting is good business. However, we also feel that it has become misdirected and overemphasized. As a result, recruitment and retention efforts may be ineffective and may be distracting state wildlife agencies from engaging nonhunters and from broadening wildlife conservation. Below, we give several reasons why we think state wildlife agencies should modulate recruitment and retention efforts.

First, recruitment efforts *cannot* address many of the main barriers to hunting by youth. For example, in a 2001 analysis of IDFG's license database, T. J. McArthur (personal communication 2001) discovered that only 57 percent of hunter-education graduates in Idaho bought hunting licenses their first year after graduating and that the percentage of graduates buying licenses appeared to decline each year after receiving their certification. Subsequently, T. J. McArthur and M. Beucler (unpublished data 2001) interviewed hunter-education graduates who had not purchased a hunting license and their parents. Eighty-three youth and eighty-two parents completed the questionnaire-interview. Both

youth and parents gave a broad array of reasons for not getting a hunting license and going hunting, and most respondents gave more than one reason (Figure 5a). The two most common reasons given by youth for not getting their hunting license and going hunting were that they did not want to hunt and that they were busy with other activities. Parents most frequently cited that their child was not ready to hunt and that they themselves (the parents) did not hunt. Several youth and parents said that lack of opportunity and lack of time were reasons they did not go hunting. When asked what IDFG could do to help make it easier or more likely to go hunting, *by far* the most common response—from both children and parents—was that there was *nothing* IDFG could do (Figure 5b). Reducing costs was a distant second-most common suggestion by both graduates and their parents. Several youth and parents suggested specific modifications in season structures. And, there were several references to existing seasons and structures as being intimidating to children.

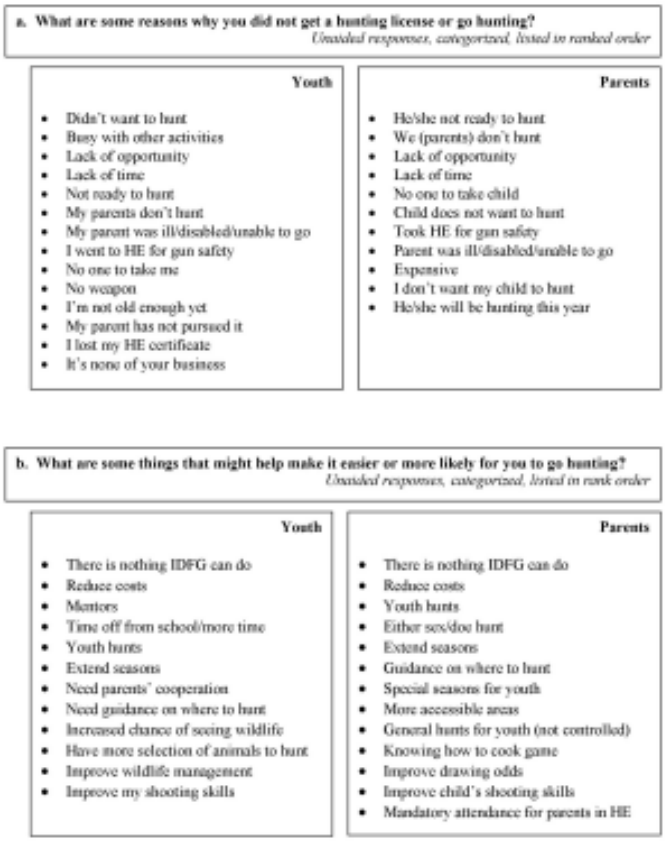



Figure 5. (A) Reasons hunter education graduates (youth) and parents in Idaho gave for not purchasing a hunting license or for going hunting after graduating from hunter education. (B) Ideas that hunter education graduates (youth) and parents suggested for Idaho Department of Fish and Game to make it easier to go hunting (T. J. McArther and M. Beucler, unpublished data 2001).

Second, recruitment and retention efforts treat symptoms but neglect the causes—or even worse, foster denial—of the need to adapt! For instance, wildlife values are shifting away from wildlife use/utilitarian towards wildlife protection/mutualism (Teel et al. 2003, Teel et al. 2005). These shifts are due to large social forces, such as urbanization, industrialization, and growing economies (Manfredo et al. 2003), forces over which no government agency has control. State wildlife agencies must accept that values are changing and must adapt to them rather than fight them. Indeed, we continue to hear colleagues say that we (i.e., state wildlife agencies) need to change people's values!

Third, is it even appropriate for a government agency to advertise, market, or recruit—particularly when it focuses on such a narrow segment of the citizenry? For example, in an evaluation of IDFG's Take Me Fishing™ in Idaho program Fedler (2007) conducted a mail survey to determine the effectiveness of advertising (print, radio, television) and direct-mail campaigns. Based on the results, he noted that respondents apparently do not consider direct-mail postcards sent by IDFG as advertising. This raised some intriguing questions for us: should government agencies advertise, or is it more appropriate to remind or simply just to be available? Does advertising a license—required formal permission from the legal authority—to hunt or fish even make sense? In terms of marketing, several state wildlife agencies have purchased professional marketing software to focus recruitment and retention efforts. Although the sophistication is exciting and impressive, it hovers around the fine line between being smart about how we provide opportunities to citizens who want to participate and venturing too far into a capitalist approach of managing a public resource. Finally, in terms of actively recruiting hunters, there are data to suggest not all citizens think that's the role of state wildlife agencies. For example, Gigliotti (2006) noted that although 54 percent of Idaho residents supported the statement "IDFG should encourage more young people to hunt and fish," one in five (19 percent) opposed the statement. When the data were analyzed based on attitudinal models, traditional agency stakeholders (hunters) were more supportive of recruiting than were the nontraditional stakeholders (nonhunters).

Fourth, we are concerned that the industry foundations that promote and often fund recruitment efforts are setting the priority for state wildlife agencies. These foundations are excellent partners with state wildlife agencies, and by no means are we suggesting these partnerships end. What we are suggesting is that state wildlife agencies must be very cognizant about setting

priorities based on more than just having available funding. Rather, state wildlife agencies should first set priorities and then seek funding to address those priorities.

Fifth, "God forbid 20 percent of the public decides to hunt!" (S. Mahoney, conference presentation 2005). Twenty-five years ago, IDFG staff was concerned about having too many hunters (T. T. Trent, personal communication 2007). Now, staff is concerned about having too few despite the fact that there are more hunters now than 25 years ago! There is a social carrying capacity of hunters (as well as a biological carrying capacity) that needs to be researched and considered in setting goals for recruitment and retention programs.

## Restoring the Public Trust

We have indicated that recruitment and retention efforts, no matter how large or sophisticated, will fail to engage the nonhunting citizenry to the extent needed for addressing contemporary wildlife conservation issues. Worse yet, we wonder if recruitment and retention efforts actually are causing state wildlife agencies to fall further out of phase with nonhunting citizens, further alienating themselves from the vast majority of citizens and inadvertently undermining the Public Trust Doctrine. How can state wildlife agencies connect with and engage nonhunters? How can the Model be adapted to broaden wildlife conservation beyond creating a harvestable surplus for hunting?

### *Adopt a Citizen-based Business Model*

The Model is a governance model; it is not a business model. At various points in time, the mechanisms to pay for wildlife management have evolved. The primary mechanisms, as we all know, essentially are user-fees: hunters pay directly through purchasing licenses and indirectly through paying excise taxes on hunting equipment. Through time, the state wildlife agency-hunter relationship morphed into a business-customer relationship and is, to a great extent, why the Model has been and remains a Handsome Prince. But, look again, and we also see the image of the Myopic Ogre: a customer-based approach of managing a public resource *to the exclusion of the significant majority of citizens* (Figure 2).

The customer stance is very different than the citizen stance. The customer says, "It's my money; I paid for it; serve me." Whereas, the citizen stance is a much more complicated dialogue of give-and-take (Klein 2004). Thus, state wildlife agencies (the businesses) have become very good at tailoring

experiences for hunters (customers), and game animals and hunting experiences have become a sort of Bourgeois commodity that is being produced, sold and purchased. Somewhere along the way the agency-commission-hunter iron triangle decided that license revenues will be used primarily for managing game species, further fostering the notion that wildlife is owned by those who purchase hunting licenses. So, it becomes this vortex of hunters pay, hunters benefit, hunters pay, hunters benefit, *ad infinitum*. This undermines the Public Trust Doctrine and leaves no room for breaking out to engage the nonhunting citizenry and broader wildlife conservation!

State wildlife agencies have taken the customer stance to heart in large part because hunting has been a significant part of state wildlife agencies' organizational culture. For example, although the culture within IDFG has shifted over the years, we continue to observe both IDFG staff and the public interpret IDFG's legal mission (*Idaho Code* Section 36-103) in two divergent ways. One interpretation lends itself more towards the citizen stance:

> *All wildlife, including all wild animals, wild birds, and fish, within the state of Idaho, is hereby declared to be the property of the state of Idaho. It shall be preserved, protected, perpetuated, and managed.* It shall only be captured or taken at such times or places, under such conditions, or by such means, or in such manner, as will preserve, protect, and perpetuate such wildlife, and provide for the citizens of this state, and, as by law permitted to others, continued supplies of such wildlife for hunting, fishing, and trapping.

The other interpretation lends itself towards the customer stance:

> All wildlife, including all wild animals, wild birds, and fish, within the state of Idaho, is hereby declared to be the property of the state of Idaho. It shall be preserved, protected, perpetuated, and managed. It shall only be captured or taken at such times or places, under such conditions, or by such means, or in such manner, as will preserve, protect, and perpetuate such wildlife, and *provide for the citizens of this state, and, as by law permitted to others, continued supplies of such wildlife for hunting, fishing, and trapping*.

In the long-run, we think having a customer-based business model is the Achilles heel of the Model as it is now being used. Not only is a small minority paying for

managing the public's wildlife, but a large and increasing majority is becoming ever more disenfranchised. We suggest an evolution of the Model and its seven tenets to fully embrace the Public Trust Doctrine, to encompass the 21st-century conservation challenges, and to expand recruitment and retention beyond hunting and into broader outdoor experiences (Table 1).

Table 1. The seven tenets of the Model as they look past/present and how they might be adapted for wildlife conservation in the 21st century.

| The seven tenets the model | Past/Present | 21st century |
|---|---|---|
| Public trust | Game animals are owned by the people. | Fish, wildlife, plants and their ecosystems are stewarded for benefit of all citizens. |
| Prohibition on commerce | Fish and wildlife are to be taken individually and are not for sale or barter. | Species and their habitats may not be possessed unless provided by law. |
| Democratic rule of law | Management is composed of rules, statues, and law as prescribed by fish and wildlife management agencies. | Ecosystems and their plant and animal species are held in trust for the public and are protected by such public rights. |
| Opportunity for all | Fishing and hunting may be enjoyed by anyone. | The benefits of access and opportunity to fish, wildlife, plants and their ecosystems shall be enjoyed by all citizens. |
| Nonfrivolous use | The animal taken must be consumed and not wasted. for their sustainability. | Neither animals nor their habitats may be taken without allowance |
| International resource | Wildlife does not respect political boundaries and must be managed accordingly. | Management and law transcend political and administrative boundaries to sustain species and their ecosystems. |
| Scientific management | Objective and scientifically-based information will be used t to maximize fish and wildlife for harvest. | Objective and scientifically-based information sustains the inter-dependence, health, and resilience of species and their ecosystems. |

### *From Narrowcasting to Broadcasting*

State fish and wildlife agencies have focused on marketing techniques for recruiting and retaining traditional customers. Marketing analyses are conducted to create homogenous groups for which advertising and sales can be targeted. Swire (2004) calls this "narrowcasting," where people are pigeon-

holed into smaller and smaller groups. We think hunters and hunting have been subjected to narrowcasting: big-game hunter, waterfowl hunter, upland-game hunter, trophy hunter, youth hunter, senior hunter, pheasant hunter, elk hunter, mule deer hunter, slob hunter, subsistence hunter, meat hunter, varmint hunter, hound hunter, motorized hunter, wilderness hunter, outfitted and guided hunter, etc. As we earlier indicated with recruitment and retention, we feel uncomfortable about some marketing practices and think they may be inappropriate for governments. As Swire (2004) noted, marketing is "using hard data to pigeonhole consumers…but the hope is that real customers out there, real people out there, won't really know how they're being pigeonholed." The upside of marketing is that customers more specifically get what they want. The downside, however, is that aside from being manipulative, it breaks down solidarity. The lack of solidarity in the hunting community alone has been evident, let alone the nonhunting citizenry who also cares about wildlife!

***The Many Faces of Hunter***

We think one of the biggest mistakes state wildlife agencies make is defining "hunters" and "hunting" as purchasing a license and harvesting an animal. This administrative definition is narrow, self-limiting and exclusionary. First, we know that many hunters don't hunt every year, yet we continue to observe license sales being used as indicators of participation. Certainly, a relationship exists but using annual license sales and annual participation underestimates the actual number of hunters (Enck et al. 2000, U.S. Fish and Wildlife Service and U.S. Census Bureau 2007). Second, Enck et al. (2000) noted that the best indicator of whether or not somebody is a hunter is their own recognition as one. In the IDFG study of hunter education graduates, a slight majority of the youth already considered themselves hunters whether or not they have had their own hunting license, and hunting appeared to be on the radar screen for most of the families that were contacted (T. J. McArthur and M. Beucler, unpublished data 2001). Third, because nonhunters don't buy licenses they frequently are viewed as freeloaders by those within the agency-commission-hunter iron triangle. Not only is it not their fault that only a customer-based model exists in most states, but also many nonhunters want to and *do* contribute to wildlife conservation either directly to state wildlife agencies (e.g., tax check-offs, wildlife license plates) or to nongovernmental organizations that provide viable alternatives to protecting species, habitats, and ecosystems they care about.

Therefore, we suggest the definition of both hunter and hunting be expanded to include what Stedman et al. (1993) called "hunter associates." The term hunting needs to represent all of the roles involved in the experience regardless of who has the hunting license. This could include people doing preseason scouting, caring for and training hunting dogs, understanding the biology and habits of the prey, flushing and retrieving, killing the animal, field-dressing, processing the meat, cooking and eating the meat, processing hides, using bones and feathers for art, and even holding down the fort while the hunters are out hunting. By broadening what is called the experience of hunting, the face of the hunter expands from the typical guy in camouflage with his bagged animal to a spectrum of ages, gender, and ethnicities that are scouting, training, cooking, eating or making art (Figure 6). We think this would be a powerful move towards engaging the nonhunting majority of citizens in wildlife conservation within the existing context of hunting. We truly believe that if they can get beyond the narrow context of hunting, state wildlife agencies could be *the* champions of addressing nature-deficit disorder (Louv 2005), which we guess resonates with the significant majority of citizens, hunters and nonhunters alike. Thus, the broader citizenry would have a compelling reason to engage with their state wildlife agency and perhaps to actively promote the adoption of a citizen-based business model.

## Conclusion

We believe hunting will remain an important thread of the North American tapestry regardless of how many people participate. However, state wildlife agencies have focused too much on a small minority of the citizenry (hunters) to the exclusion of a growing majority (nonhunters). Despite all of its successes in the past, the Model needs to be adapted for successful wildlife conservation in the 21st century. As a way to move towards engaging the larger citizenry in wildlife conservation, we suggest that state wildlife agencies discuss declining participation in hunting within the contexts of agency revenue, wildlife management, hunting legacy and political support. Doing so can help modulate recruitment and retention efforts within state agencies while providing an environment more conducive to a citizen-based business model. And, by expanding the definition of hunters and hunting beyond purchasing a license and harvesting an animal, we believe agencies can begin to resonate with the vast majority of citizens—the nonhunters—who care deeply about their wildlife.

Figure 6. The many faces of "hunter" when the term "hunting" is expanted to all aspects of the experience. Photo credits from left to right are (row 1) Mike Baird; Idaho Department of Fish and Game (IDFG); IDFG (row 2) srslyguys; IDFG; Collin Anderson; (row 3) Josh Berglund; public domain; IDFG; Michele Beucler; (row 4) IDFG; lowcloud; IDFG; (row 5) IDFG; IDFG; Lucy Byrd.

## Reference List


Barker, R. 2007. *Boise residents get in the way of expanding elk migration*. Idaho Statesman.com: Rocky Barker's blog, Sept. 13, 2007. http://www.idahostatesman.com/localnews/v-print/story/157620.html.

Botkin, D. 1990. *Discordant harmonies: A new ecology for the twenty-first century*. New York, NY: Oxford University Press.

Division of Financial Management. 2007. *Performance measurement report*. Idaho Division of Financial Management. http://dfm.idaho.gov/cdfy2009/publications/perfreport/perfrpt_fish_game.pdf.

Enck, J. W., D. J. Decker, and T. L. Brown. 2000. Status of hunter recruitment and retention in the United States. *Wildlife Society Bulletin*. 28(4):817–24.

Fedler, T. 2007. *Take Me Fishing™ in Idaho: Aan evaluation of the Idaho Department of Fish and Game's 2006 angler recruitment and retention program*. Report prepared for Recreational Boating and Fishing Foundation and Idaho Department of Fish and Game. Gainesville, FL: Human Dimensions Consulting.

Gigliotti, L. M. 2006. *Wildlife values and beliefs of Idaho residents—2004*. Pierre, SD: Human Dimensions Consulting.

Klein, N. 2004. *The persuaders: Persuading the consumer and the citizen*. Frontline. http://www.pbs.org/wgbh/pages/frontline/shows/persuaders/themes/citizen.html.

Leonard, J. 2007. *Fishing and hunting recruitment and retention in the U.S. from 1990 to 2005 (addendum to the 2001 national survey of fishing, hunting, and wildlife-associated recreation)*. Report 2001-11. Arlington, VA: U.S. Fish and Wildlife Service.

Louv, R. 2005. *Last child in the woods: Saving our children from nature-deficit disorder.* Chapel Hill, NC: Algonquin Books of Chapel Hill.

Manfredo, M. J., T. L. Teel, and A. D. Bright. 2003. Why are public values towards wildlife changing? *Human Dimensions of Wildlife*. 8(4):285–304.

McMullin, S. M. 2003. *Idahoan's views of fisheries and wildlife management: A summary of public input into planning for the future of Idaho Department of Fish and Game*. Boise, ID: Idaho Department of Fish and Game.

Stedman, R. C., D. J. Decker, and W. F. Siemer. 1993. *Exploring the social world of hunting: Expanding the concepts of hunters and hunting. Department of Natural Resources, Human Dimensions Research Unit Publication 93-7*. Ithaca, NY: Cornell University.

Swire, P. 2004. *The persuaders: Persuading the consumer and the citizen*. Frontline. http://www.pbs.org/wgbh/pages/frontline/shows/persuaders/themes/citizen.html

Teel, T. L., A. D. Bright, and M. J. Manfredo. 2003. *Regional results from the pilot phase of the research project entitled "Wildlife Values in the West." Project Report No. 55. Project report for the Western*

*Association of Fish and Wildlife Agencies*. Fort Collins, CO. Colorado State University, Human Dimensions in Natural Resources Unit.

Teel, T. L., A. A. Dayer, M. J. Manfredo, and A. D. Bright. 2005. *Regional results from the research project entitled "wildlife values in the West." Project report no. 58. Project report for the Western Association of Fish and Wildlife Agencies*. Fort Collins, CO. Colorado State University, Human Dimensions in Natural Resources Unit.

U.S. Census Bureau. 2008. *2006 American community survey data profile highlights (Idaho)*. U.S. Census Bureau. http://factfinder.census.gov/home/saff/main.html?_lang=en

U.S. Census Bureau. 1970, 1975, 1980, 1985, 1991, 1997, 2001, 2006. *American housing survey*. U.S. Census Bureau. http://www.census.gov/hhes/www/housing/ahs/nationaldata.html

U.S. Fish and Wildlife Service. 2007. *2006 national survey of fishing, hunting, and wildlife-associated recreation: State overview*. Washington, DC: U.S. Fish and Wildlife Service.

U.S. Fish and Wildlife Service and U.S. Census Bureau. 2007. *2006 national survey of fishing, hunting, and wildlife-associated recreation*. Washington, DC: U.S. Fish and Wildlife Service.

# Public Opinion on and Attitudes toward Hunting

**Mark Damian Duda**
*Responsive Management*
*Harrisonburg, Virginia*

**Martin Jones**
*Responsive Management*
*Harrisonburg, Virginia*

## Introduction

As debate over hunting in the United States continues, an objective analysis of public attitudes toward and opinions on legal hunting provides a fundamental context for any discourse on the controversy. Research indicates that most U.S. citizens support hunting in general; however, support for and opposition to hunting can vary dramatically based on numerous factors, including personal values and characteristics, attitudes toward hunters, attitudes toward animal welfare, the motivation for participating, and the species involved.

Personal values and perceptions of hunters affect support for and opposition to hunting. For example, some U.S. citizens support hunting in general, but, because of faith-based reasons, oppose hunting on Sundays. An illustration of this is in North Carolina, where 81 percent of residents approve of hunting, but only 25 percent support the legalization of Sunday hunting (Responsive Management 2006a). Others are concerned about the behavior of hunters, despite approving of hunting. Indeed, a majority feel that a lot of hunters violate hunting laws or practice unsafe behavior while hunting (Duda et al. 1998). In short, attitudes toward hunting are different from their attitudes toward hunters themselves.

Attitudes toward hunting also involve attitudes toward animal *welfare* and animal *rights*. As typically defined, animal welfare allows the use of animals, as long as the animals are treated humanely and with respect, but animal rights dictates absolutely no use of animals. While very few U.S. citizens support animal rights, many of them support animal welfare. Indeed, most fall in the middle between no use of animals at all and complete animal utilization with no constraints. A study of public opinions on animal rights and animal welfare found

that 17 percent agree that animals have rights like humans and should not be used in any way and, on the other side, 30 percent agree that animals are here for human use and can be utilized regardless of the animal's welfare or rights, both at much lower agreement than the middle ground—that animals can be used by humans as long as the animal does not experience undue pain and suffering (84 percent agree with this; Responsive Management 2006d). Another study suggests that only 3 percent actually live by an animal rights philosophy (Responsive Management 1996a).

This support of animal welfare colors opinions on hunting. For instance, many people, hunters included, approve of hunting in general but do not approve of hunting over bait, which is perceived as *not* providing fair chase and is antithetical to animal welfare. A case in point is Mississippi, where only 28 percent of the public supports legalizing the hunting of white-tailed deer over bait, a much lower percentage than those who otherwise approve of hunting (Responsive Management 2005b).

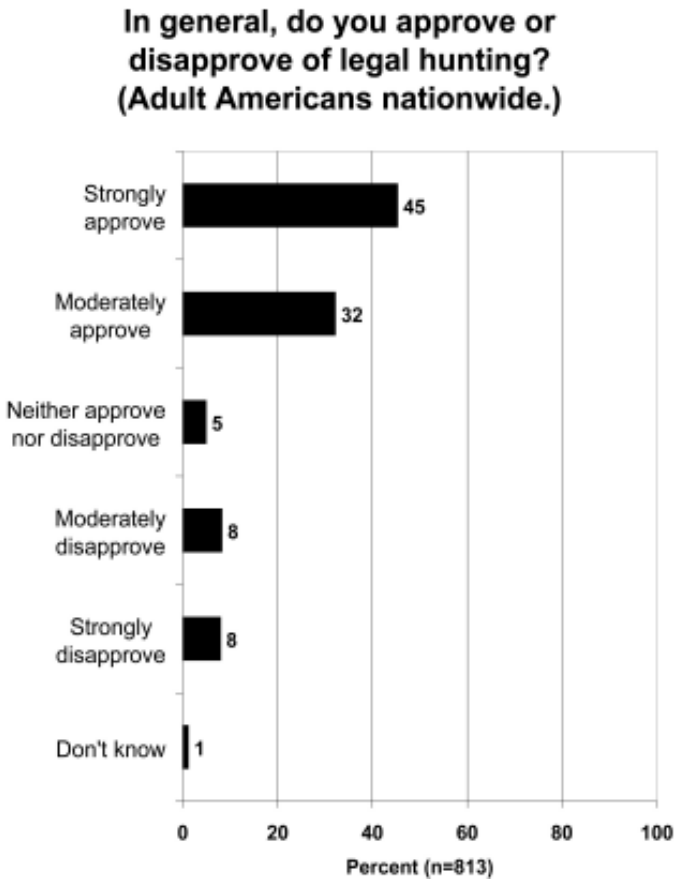
Furthermore, attitudes toward hunting are not fixed. Public opinion changes based on the amount and type of information that people receive on the issues, and it changes based on circumstances within wildlife populations—particularly when the populations of certain species greatly increase. Although attitudes toward hunting are not simple, but involve a multitude of nuances, the attitudes are not a mystery. Nor are they erratic or confusing. They can be explained based on several defined variables.

## Support for and Opposition to Hunting

### *General Overview*

About three-quarters of U.S. citizens support hunting. One nationwide survey found that 77 percent of adults approve of legal hunting (45 percent strongly approve), while 16 percent disapprove (Figure 1) (Responsive Management 2006c). Another nationwide study found that 75 percent of adults approve of legal hunting (48 percent strongly approve), while 17 percent disapprove (Responsive Management 2003b). In these surveys, the phrase "legal hunting" was used to ensure that respondents would not confuse the term "hunting" to include poaching and other types of illegal hunting because focus-group research has found that many people include these forms of illegal hunting in their conception of the term, hunting (Responsive Management 1993a). In a

Figure 1. Approval and disapproval of hunting nationally (Responsive Management 2006c).




nationwide survey that asked a question specifically about the legality of hunting, 81 percent of adults agree that hunting should continue to be legal (Responsive Management 1995).

Note that disapproval of hunting does not always translate into wanting to ban hunting altogether. For example, one study found that, although a substantial percentage personally disapprove of hunting, women generally do not go so far as to say that others should not hunt. One survey asked women if it was okay for women to hunt and for men to hunt. Ninety-five percent of them say that it is okay for women to hunt, and ninety-six percent say that it is okay for men to hunt; these numbers are both higher than the percentage who personally approve of hunting (Responsive Management 2005a).

***Support for and Opposition to Hunting among Youth***

Support for hunting is slightly lower among youth than among adults. Nationally, 58 percent of youth approve of hunting, while 33 percent disapprove (Responsive Management 2003a). Similar results were found in the early 1980s among children—that they supported hunting at a lower rate than did adults—leading researchers at that time to conjecture that a broad, attitudinal change was taking place in society which would lead to substantially lower support for hunting in coming years as those children became adults (Westervelt and Llewellyn 1985). However, recent research shows that a downward trend in support did *not* occur, which suggests that a broad, attitudinal change did *not* take place; instead, the implication is that, as children become adults, they become more supportive of hunting. Rather than showing a broad, attitudinal shift taking place, the lower rate of support of hunting among children suggests that children simply have lower rates of support than do adults, but they do not necessarily stay opposed to hunting as they age.

***Support for and Opposition to Hunting for Various Reasons in General***

***Motivation***. Public opinion on hunting varies when the motivation for hunting is considered. For example, more approve of hunting for food, hunting to manage game populations, hunting to protect humans from harm and hunting for animal population control than approve of hunting strictly for recreation, for the challenge or for a trophy (Duda et al. 1998, Responsive Management 2006c). Interestingly, one study found that even many hunters (27 percent of those who hunted in the year prior to the survey) oppose hunting strictly for recreation (Minnesota Department of Natural Resources 1992). Figure 2 shows approval and disapproval of hunting for various reasons, nationally, with a wide disparity among the various reasons (Responsive Management 2006c).

There are a multitude of reasons that people oppose hunting. Some of the prominent ones include moral opposition, feelings regarding animal pain and suffering, hunter behavior, safety issues, perceived (erroneous) damage to wildlife populations and ecosystems and firearm issues.

One of the most prominent reasons that some people oppose hunting is that they perceive it as being morally wrong: 56 percent of antihunters in one national survey gave this reason for their opposition, the top answer (Kellert 1980). In a study in Minnesota, the top reason for opposition to hunting was morally based: 79 percent of those who opposed hunting for recreation agreed

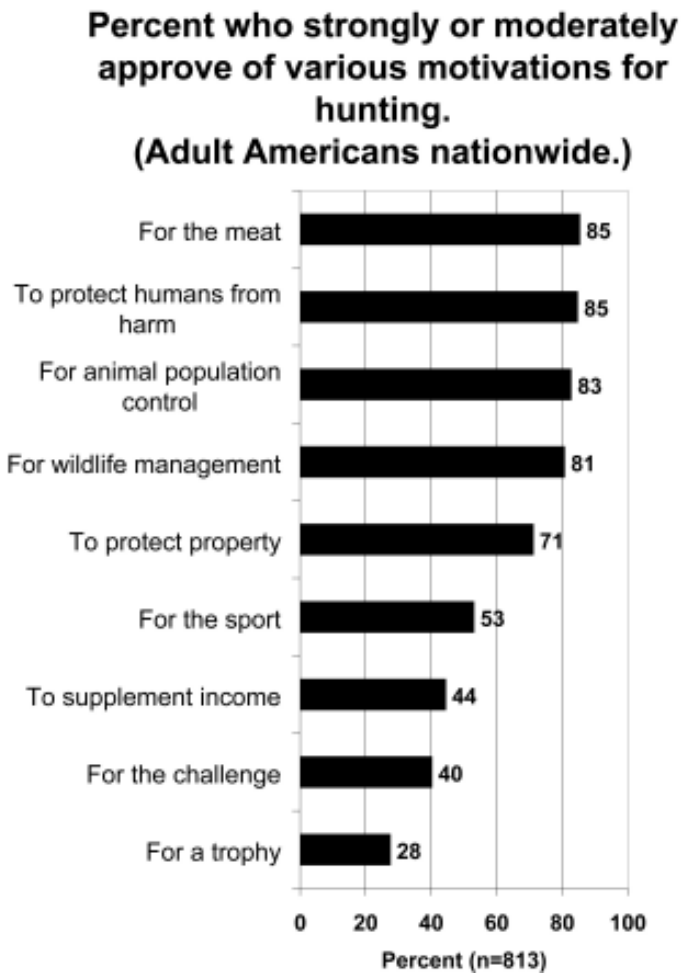



Figure 2. Approval and disapproval of hunting for various reasons nationally (Responsive Management 2006c).

that it is morally wrong to kill animals (Minnesota Department of Natural Resources 1992).

***Animal welfare***. The pain and suffering of animals also plays a part in opposition to hunting. The national study discussed above found that 18 percent of antihunters were opposed because of the pain inflicted on animals and 15 percent because they love animals, the second- and third-ranked reasons in that study (Kellert 1980). The aforementioned Minnesota study found that a large majority was concerned about animal pain: 74 percent of those who oppose recreational hunting agree that they are bothered by disrespect for animal life, and 52 percent

agree that they believe the animals experience a great deal of pain and suffering (Minnesota Department of Natural Resources 1992).

The perception among some that many hunters are unskilled concerns the public. One study examined numerous reasons that may fuel antihunting sentiment and found that there was much concern about wounding an animal and about the animals' suffering, rather than the killing of the animal; in short, the public does not express concern for quick kills by skilled hunters as much as for slow, sloppy kills (and wounding) by unskilled hunters. Put another way, the researchers found that the public is concerned about the suffering of animals, which they see as being caused by hunter ineptness rather than intentional cruelty (Rohlfing 1978).

One researcher has suggested that an underlying ethical concern for animals is a more common basis for antihunting sentiment than is a strong affection for and emotional attachment to animals (Kellert 1980). Related to this is that wildlife population reductions are acceptable to benefit wildlife, habitat or the environment (e.g., to reduce habitat damage that overpopulation of deer can cause) than to benefit people. For example, whereas a majority would support an increase in the deer herd even if it meant more damage to gardens and crops, a majority would *not* support an increase in the deer herd if it meant less food or poorer health for the deer herd or poorer quality habitat for other wildlife (Duda et al. 1998). In a study in New Hampshire, respondents who were in favor of an increase in the deer herd in the state were asked about whether they would continue to favor an increase in the herd with six specific consequences (each consequence asked about individually). The three consequences that related to negative effects on deer or habitat—that more deer would starve, that deer health would decline, and that habitat would decline—were of great concern to respondents (i.e., most would no longer favor an increase in the deer herd given the consequence). Meanwhile, the three consequences that related to negative effects on humans—damage to gardens and landscaping, more vehicle collisions and losses to farmers and timberland owners—were not of great concern to respondents (i.e., most did not change their opinion that the deer herd should be allowed to increase) (Responsive Management 2004a).

***Hunter behavior***. Another common reason that people oppose hunting is poor behavior of hunters themselves. One study found that hunter behavior strongly affected opposition to hunting, with the researchers concluding that, in general, the public is not against hunting, but the public "sure feels differently about the

hunter" (Rohlfing 1978:408). These researchers found that the top problems perceived by the public to be associated with hunting had little to do with hunting itself (at least not ethical hunting) but were associated with individual hunters and their poor behavior (e.g., hunters fail to track wounded animals, shoot animals that they are not allowed to shoot, ignore safety regulations, trespass, shoot too close to highways, don't know what they are shooting at). The aforementioned study of Minnesota residents found that 73 percent agree that they are bothered by disrespectful conduct of some hunters (Minnesota Department of Natural Resources 1992). Another researcher found that disrespectful and unethical conduct of some hunters was among the reasons given for opposition to hunting (Kellert 1980). Even among hunters, poor behavior of other hunters is a reason for opposing hunting strictly for recreation: 27 percent of hunters in one study opposed hunting strictly for recreation, and they most commonly said their opposition was because of the disrespectful conduct of some hunters (Minnesota Department of Natural Resources 1992).

There is one belief among some members of the public related to hunter behavior that should be noted. The aforementioned study in Minnesota found that 40 percent of antihunters believe that hunting for recreational reasons leads to violent behavior (Minnesota Department of Natural Resources 1992). It appears that this argument is based on the connection between animal cruelty and violent, antisocial behavior. The incorrect leap here is that hunting is the same as animal cruelty. Although there is some evidence that hunters are more aggressive than nonhunters (T. Heberlein, personal communication 2008), this does not mean that such aggressiveness leads to antisocial behavior or to violent crime. In fact, there is no evidence or research to indicate that hunters are more likely than nonhunters to exhibit antisocial behavior or to commit violent crime. One study directly addressed the belief that hunting is linked to violent, antisocial behavior and found no connection (Causey 1989).

***Safety***. There is some opposition to hunting (and, more importantly, reticence to participate in hunting when not otherwise opposed) based on safety concerns. For instance, one national study found that approximately two of five respondents feel that hunting is an unsafe recreational activity (Responsive Management 1995), and a study in Washington found that 30 percent of residents think hunting is unsafe (Responsive Management 2002a). Finally, nearly one-third of Indiana residents (31 percent) disagree that hunting is a safe activity (Responsive Management 2006b). However, when standard safety procedures are followed,

hunting is safer than a multitude of other activities, particularly many competitive team sports (National Shooting Sports Foundation 2006).

***Wildlife populations***. There is also some opposition to hunting based on the erroneous belief that hunting endangers wildlife populations, an example being that 17 percent of residents of the southeastern states think that overharvesting by hunters, trappers and anglers is causing some species to become threatened or endangered (Responsive Management 2005c). However, legal, regulated hunting does not negatively affect wildlife populations. Indeed, it was the codification of legal hunting and the concomitant regulation of it that protected wildlife species, which were negatively affected by *unregulated* hunting that was occurring prior to hunting's codification and regulation. Furthermore, the revenue that hunting licenses provide has been used to properly manage wildlife species to bring back their populations and even has allowed them to be reintroduced into some areas.

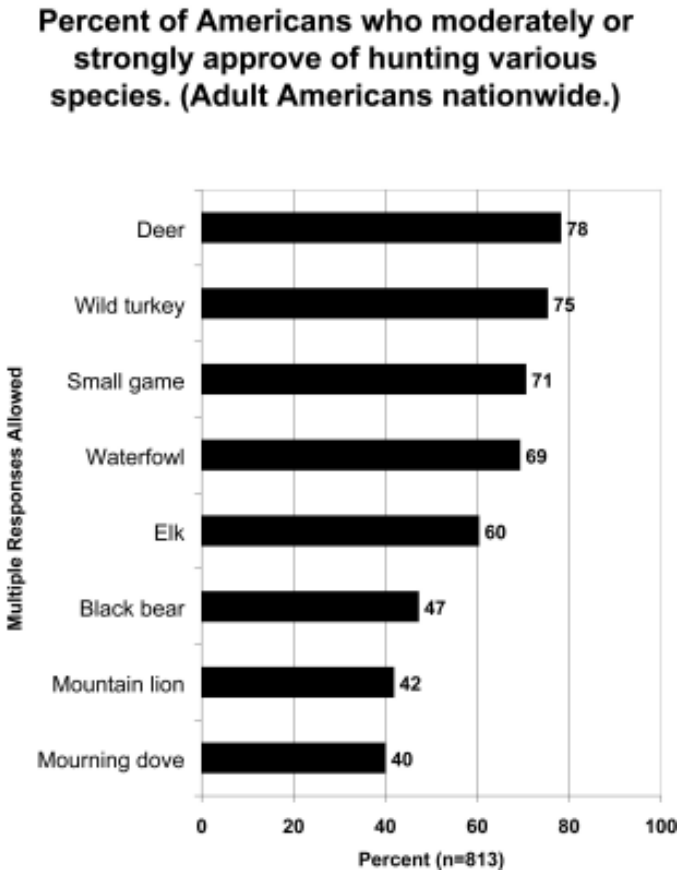
Opposition to firearms is given by some people for their antihunting sentiment. In the Minnesota study, approximately one-third of those who oppose recreational hunting oppose the use of firearms (Minnesota Department of Natural Resources 1992). In the national study also discussed previously, opposition to firearms was among the handful of reasons given for opposing hunting (Kellert 1980).

Finally, a study suggests that feelings and beliefs that people hold about specific situations has more influence on their support or opposition to specific hunts than does their general beliefs about hunting overall. The case in point relates to a proposed moose hunt in New Hampshire. A study found that opposition to the proposed moose hunt centered more on people's beliefs about aspects of the proposed hunt (whether there were enough moose to support a controlled hunt, whether too many moose would be killed and whether the moose hunt would leave enough moose for subsequent wildlife viewing) rather than on their general beliefs about hunting (Donnelly and Vaske 1995). A study in Vermont reiterates this finding: while only 27 percent of Vermont residents unconditionally say that hunting is acceptable, a majority (69 percent) say that hunting is acceptable under some circumstances (Glass et al. 1995). Also, a study pertaining to hunting black bears in Maryland found varying support of a proposed hunt based on the conditions associated with the hunt—support was highest when residents were asked if they would support black bear hunting if they knew that the black bear population as a whole would not be endangered (Responsive Management 2004b).

## Support for and Opposition to Hunting Various Species

Attitudes toward hunting vary according to the species being hunted. Research indicates that the hunting of ungulates, such as deer or elk, or waterfowl is more acceptable than is the hunting of predators, such as bear, mountain lions or wolves. In one nationwide study, approval of hunting for deer, wild turkey, small game, waterfowl and elk exceeded approval of hunting for black bear, mountain lion, or mourning dove (Figure 3) (Responsive Management 2006c).

Figure 3. Support of hunting for various species (Responsive Management 2006c).




Other studies show differences in approval of hunting for various species, mirroring the nationwide results above. For instance, in Vermont where moose are involved in many vehicle accidents, 80 percent of residents support hunting

to manage the moose herd, while only 14 percent oppose it (Responsive Management 1996c). The hunting of black bear, on the other hand, does not have that level of support (albeit in a different state): 65 percent of Maryland residents support hunting as a way to control black bear populations in the state, while 29 percent oppose (Responsive Management 2004b). One study found much opposition to hunting mourning doves, not because of a general opposition to hunting but because many think that mourning doves should be classified as songbirds, not game birds (Linder et al. 1974).

A study of attitudes toward hunting in Washington found large differences in support for hunting according to the species to be hunted. While 86 percent of Washington residents support hunting deer, 82 percent support hunting elk, 81 percent support hunting small game (like pheasants and turkey) and 79 percent support hunting waterfowl, only 56 percent support hunting black bear and 55 percent support hunting cougar (Responsive Management 2002a).

## Trends in Support for and Opposition to Hunting

Studies suggest that approval of hunting has increased slightly over the past decade (Figure 4). In 1995, 73 percent approved of legal hunting, while 22 percent disapproved (Responsive Management 1995); in 2003, 75 percent approved and 17 percent disapproved (Responsive Management 2003b); in 2006, 78 percent approved and only 16 percent disapproved (Responsive Management 2006c).

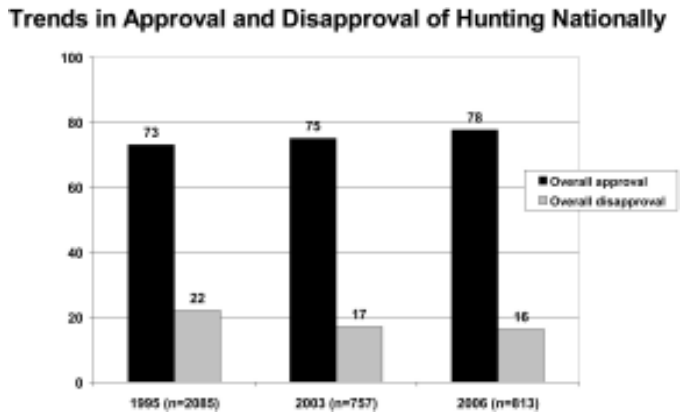



Figure 4. Trends in approval/disapproval of hunting nationally (Responsive Management 1995, 2003b, 2006c).

One researcher tracked public attitudes over several decades in New Jersey, asking residents if they approved of deer hunting. Throughout the 1970s and early 1980s, the approval rate fluctuated from 55 percent to 49 percent. But, by 1992, the approval rate had risen to 65 percent. Note that the study asked specifically about deer hunting (Applegate 1995).

Research in Maryland suggests that approval of hunting increased from 1993 to 2003. Although the wording in the surveys is slightly different (the 1993 survey asked whether respondents were in favor of or opposed to hunting, and the 2003 survey asked about approval or disapproval; the 1993 survey asked about hunting, while the 2003 survey asked about legal hunting), opposition or disapproval went from 41 percent in 1993 to 17 percent in 2003 (Responsive Management 1993b, 2004d).

Among youth, approval of hunting for various reasons is, by and large, the same now as it was two decades ago. One study, using the same questions as an earlier study, found almost no difference among youth in agreement or disagreement that hunting animals for food is okay (Responsive Management 2003a).

## Characteristics of Those Who Support and Those Who Oppose Hunting

A demographic analysis of survey data found that the likelihood to approve of hunting increases as the population density decreases: 70 percent of urban residents, 72 percent of suburban residents, 80 percent of residents in small cities or towns and 89 percent of rural residents approve of hunting (Responsive Management 2006c). Studies at the state level also found urban-rural differences: 43 percent of rural residents in Ohio support hunting for recreation, while 33 percent of Ohio urbanites support hunting for this reason (Miller 1992). In Pennsylvania, 71 percent of urban residents, 76 percent of suburban residents, 84 percent of small city or town residents and 89 percent of rural residents support hunting (Responsive Management 1996b). A study in Texas found that the majority of state residents who were members of or who expressed a desire to become members of an antihunting organization (which made up only 5 percent of the general population) were urban (Adams and Thomas 1990).

Gender also has a considerable effect on approval of hunting, with males more likely than females to approve of hunting. While 84 percent of males

approve of hunting, only 72 percent of females approve of it, and, conversely, only 13 percent of males disapprove of hunting, while 20 percent of females disapprove (Responsive Management 2006c). At the state level, this holds true: 90 percent of men in Pennsylvania, but only 74 percent of women in Pennsylvania, approve of hunting (Responsive Management 1996b). A study of landowners in Texas found that those who prohibited hunting on their land were more likely to be female than were those who allowed it (Wright et al. 1988). Another study in Texas found that a majority of state residents who were members of or who expressed a desire to become members of an anti-hunting organization were female (Adams and Thomas 1990).

When conditions are placed on hunting, gender again makes a difference: 47 percent of men from Minnesota approve of hunting mammals, such as deer, for recreational reasons, but only 19 percent of women approve. And, 52 percent of men from Minnesota approve of hunting ducks for recreational reasons, while only 25 percent of women approve (Minnesota Department of Natural Resources 1992). In Ohio, 49 percent of men support hunting for recreation, but only 24 percent of women do. And, 17 percent of men support hunting for a trophy, while only 3 percent of women do (Miller 1992). Among youth, gender makes a difference in attitudes toward hunting, as well. For example, one study of youth found that 67 percent of boys support hunting, while only 48 percent of girls do (Responsive Management 2003a).

Higher levels of education are negatively correlated with approval of hunting. One study found that 46 percent of those with no college experience and 51 percent of those with some college but no degree strongly approve of hunting, while only 43 percent of those with a Bachelor's degree and 40 percent of those with a post-graduate degree strongly approve of hunting (Responsive Management 2006c). This finding holds true at the state level. In Pennsylvania, as the level of education rises, the percentage who approve of hunting declines: high school graduate (87 percent), some college or trade school but no degree (81 percent), Bachelor's degree (79 percent), and post-graduate degree (70 percent) (Responsive Management 1996b). The aforementioned study of landowners in Texas found that those who prohibited hunting on their land were more educated than were those who allowed it (Wright et al. 1988).

Age affects approval rates of hunting, with older people more approving of hunting. For example, a national study found that 83 percent aged 65 years and older approve of hunting, while only 55 percent aged 18 to 24 years approve

(Responsive Management 2006c). Looking at the results of this study in a different way, those who are the median age or above have an approval rate of 85 percent, but those younger than the median age have an approval rate of 70 percent. Another study found that those aged 18 to 24 years are less likely to approve of hunting than are those over 24 years of age: 61 percent of the younger group approves of hunting, compared to 74 percent of the older group (Responsive Management 1995). In Texas, a majority of state residents who were members of or who expressed a desire to become members of an antihunting organization (which, as previously mentioned, made up only 5 percent of the general population) were from 18 to 34 years old (Adams and Thomas 1990).

Among youth, age makes a difference in approval of hunting, and this may be related to cognitive and emotional development. While 40 percent of youth in first through fourth grades approve of hunting, 64 percent of youth in ninth through twelfth grades approve of it (Responsive Management 2003a).

Ethnicity is linked to approval of hunting. Caucasians have a higher approval rate (83 percent) than do non-Caucasians (61 percent) (Responsive Management 2006c). A study in Connecticut supports this finding; 30 percent of minority respondents disapprove of hunting, but only 18 percent of Caucasian respondents disapprove (Responsive Management 1997).

One researcher found that antihunters are more likely to be female than male and to live in urban areas with a population of more than 1 million than to live in more rural areas (Kellert 1980). Another researcher had similar findings, writing that antihunters are, in general, well-educated, female and urban (Shaw 1975).

An important characteristic associated with support of hunting is simply having family or friends who hunt. Indeed, one researcher noted that the best predictor of attitudes toward hunting is a person's affiliation with hunters, finding that people who know hunters are much more likely to favor hunting than those who do not know hunters (Applegate 1977). Another research team found that one of the strongest correlations to having positive attitudes toward hunting was having a family member who hunts (Responsive Management 2002b).

## Public Opinion on and Perceptions of Hunters and Hunting

A national study showed that the perception of hunter behavior is not stellar: 64 percent of U.S. citizens agree that a lot of hunters violate hunting

laws or practice unsafe behavior while hunting, while only 23 percent disagree (Responsive Management 1995). In a related question, 74 percent of hunters say that when a hunter violates a hunting law, the hunter knows the law but intentionally violates it, while only 16 percent of hunters feel that such violations are because the hunter does not know the law. In another question about hunter behavior, 50 percent feel that a lot or that a moderate amount of hunters drink alcohol while hunting. It is this negative perception of hunters that leads most to favor mandatory hunter education (Responsive Management 1995).

Statewide studies also point out that a substantial percentage of the general public have a negative perception of hunter behavior. In Washington, nearly one-third (29 percent) of the public rated hunter behavior as fair or poor (although fair may seem to be a positive rating, note that in the scale in which it is used—excellent, good, fair and poor—it is in the bottom half) (Responsive Management 2002a). Similarly, 24 percent of Indiana residents characterize the behavior of hunters, in general, as fair or poor, and an equal percentage of Indiana licensed hunters characterize the behavior of hunters, in general, as fair or poor (Responsive Management 2006b). Also, in this same study in Indiana, 19 percent of licensed hunters had witnessed a game law violation within the 2 years previous to the survey.

## Conclusions

Discussing hunting can be an emotionally charged conversation. Antihunters and hunters both feel quite passionate about hunting, so some communication strategies are useful in such conversations. When discussing hunting, one should not assume that the public interprets the word hunting the same way that wildlife professionals do. When communicating about hunting, it is best to refer to hunting as legal hunting or regulated hunting. Doing so ensures that recipients of the communication do not lump poaching in with hunting as meant by the speaker. Support for and opposition to hunting varies based on a number of individual characteristics, including personal values, attitudes toward hunters, attitudes toward animal welfare, the motivation for participating and the species involved.

Research has suggested that appeals to ecological concerns over sport or recreation concerns will resonate better among the general population. As

stated previously, U.S. citizens are more willing to accept wildlife population reductions to benefit wildlife, habitat or the environment (e.g., to reduce habitat damage that overpopulation of deer can cause) than to benefit people. The example given to support this statement was that a majority would support an increase in a deer herd even if it meant more damage to gardens and crops, but a majority would not support an increase in a deer herd if it meant less food or poorer health for the deer herd or poorer quality habitat for other wildlife (Duda et al. 1998). Tangentially, public opinion varies widely based on the species being hunted; for example, if the public thinks a certain species is endangered (even if in reality it is not), they will not support the hunting of that species; additionally, discussions should focus primarily on hunting ungulates, which the majority support.

A corollary to this is that hunting, if done for perceived unacceptable reasons, does not become more acceptable when concomitant benefits to the species are proffered; the basic reason for hunting has to be acceptable. As discussed by one researcher, pointing out hunting's benefits (that it reduces the problem of overpopulation of the species) has not changed opinions that wild animals should not be killed for sport (Bossenmaier 1976). In short, if people object to the primary reason for hunting, no amount of discussion of other benefits will change many peoples' minds. This same researcher suggested that hunting promotion must strive to put hunting into the context of ecological goals (species management) rather than as a form of recreation or sport. Likewise, almost all approve of legal hunting for food, and survey findings indicate that 95 percent of hunters nationwide eat the animals they kill (Responsive Management 2008). Since hunting for food is a motivation that is much more acceptable to the public than some other reasons for hunting, such as hunting for a trophy, both the ecological goals and utilitarian motivations of hunting should be highlighted whenever feasible.

A fact that relates to ecological concerns is that hunters, through both the revenue from license fees and sporting equipment taxes as well as through voluntary contributions to not-for-profit organizations, have been responsible for much of the conservation of land and protection of wildlife in the United States. After all, the primary source of funding for fish and wildlife agencies in the United States is sportsmen and sportswomen. Indeed, it may be argued that wildlife in North America, especially game species, is better off than in any

other continent in the world. Fortunately, research suggests that the majority understand and agree that hunting is part of scientific management of healthy wildlife populations (79 percent of residents of the northeastern states and 80 percent of the southeastern states); the word needs to be disseminated to the small portion (11 percent of residents of the northeastern states and 10 percent of the southeastern states) who are not aware of or do not agree with this (Responsive Management 2004c, 2005c).

Hunters, not antihunters, hold the key to public opinion on hunting. Good behavior in the field counts. Overall, the public supports hunting, and that support appears to be increasing; however, there appears to be a discrepancy between the public's opinion on hunting and the public's opinion of the hunter. The perception of hunting can be threatened by poor hunter behavior. Some negative public attitudes toward and opinions on hunting appear to be more a result of damage from the inside out rather than from the outside in. Efforts to further enhance public perceptions and attitudes toward hunting must begin with hunter behavior. Money spent on hunter ethics or hunter-education programs is money spent on improving the overall perception of hunters and, ultimately, hunting itself.

Another difference in terminology is important in communicating about hunting. As previously discussed, there is a difference between animal rights and animal welfare. Animal-rights groups espouse a philosophy that prohibits any and all use of animals, a philosophy that is not supported by the vast majority; indeed, it is a philosophy that even many vegetarians do not hold. In fact, in a nationwide study that asked respondents whether they agree or disagree that animals can be used by humans as long as the animal does not experience undue pain and suffering, only 8 percent disagreed (Responsive Management 2006d). Animal welfare, however, refers to humane, respectful treatment of animals. Legal, ethical hunting is not anathema to animal welfare, and communications about hunting need to be clear in this distinction between animal rights and animal welfare. Wildlife managers must convey the human, caring and emotional side of wildlife management. Professional wildlife managers care deeply about the wildlife resource. This must be conveyed to the people whenever possible. More than wanting to know how much you know, they want to know you care. Biological and ecological facts are certainly important, but the public wants to see the side of the profession that cares, as well. Focus on the facts, but don't forget the heart.

## Reference List


Adams, Clark E., and John K. Thomas. 1990. Identifying and responding to antihunting sentiment. *Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies*. 44:401–7.

Applegate, James E. 1977. Dynamics of the New Jersey sport hunting population. *Transactions of the North American Wildlife and Natural Resources Conference*. 42:103–16.

_____. 1995. *Attitudes toward deer hunting in New Jersey: 1972–1992*. Presented at the Northeastern Fish and Wildlife Conference. Ocean City, MD: Association of Fish and Wildlife Agencies.

Bossenmaier, Eugene F. 1976. Ecological awareness and sport hunting: A viewpoint. *Wildlife Society Bulletin*. 4(3):127–8.

Causey, Ann. 1989. On the morality of hunting. *Environmental Ethics*. 11(4):327–43.

Donnelly, Maureen P., and Jerry J. Vaske. 1995. Predicting attitudes toward a proposed moose hunt. *Society & Natural Resources*. 8(4):307–19.

Duda, Mark Damian, Steven J. Bissell, and Kira C. Young. 1998. *Wildlife and the American mind: Public opinion on and attitudes toward fish and wildlife management*. Harrisonburg, VA: Responsive Management.

Glass, Ronald J., Thomas A. More, and Rodney Zwick. 1995. Public acceptance for hunting, fishing, and trapping in Vermont. *Northeast Wildlife*. 52:77–92.

Kellert, Stephen R. 1980. *Public attitudes toward critical wildlife and natural habitat issues: Phase I of the U.S. Fish and Wildlife Service study, 024-010-00-623-4*. Washington, DC: Government Printing Office.

Linder, Raymond L., Robert T. Wagner, Robert M. Dimit, and Robert B. Dahlgren. 1974. Attitudes of South Dakota residents toward dove hunting. *Transactions of the North American Wildlife and Natural Resources Conference*. 39:163–72.

Miller, S. E. 1992. *1992 public attitude survey, inservice note 664*. Columbus, OH: Ohio Department of Natural Resources, Division of Wildlife.

Minnesota Department of Natural Resources. 1992. *Constituent inventory: What Minnesotans think about hunting, fishing and native plant management*. St. Paul, MN: Minnesota Department of Natural Resources, Division of Fish and Wildlife.

National Shooting Sports Foundation. 2006. *Industry Intelligence Report* 1(12).

Responsive Management. 1993a. *Factors related to hunting and fishing participation in the United States: Hunting focus groups*. Harrisonburg, VA: Responsive Management.

_____. 1993b. *Wildlife viewing in Maryland: Participation, opinions, and attitudes of adult Maryland residents toward a watchable wildlife program*. Harrisonburg, VA: Responsive Management.

_____. 1995. *Factors related to hunting and fishing participation in the United States: Final report*. Harrisonburg, VA: Responsive Management.

_____. 1996a. *Americans' attitudes toward animal welfare, animal rights and use of animals*. Harrisonburg, VA: Responsive Management.

_____. 1996b. *Pennsylvania residents' opinions on and attitudes toward nongame wildlife*. Harrisonburg, VA: Responsive Management.

_____. 1996c. *Vermont residents' opinions and attitudes toward species management*. Harrisonburg, VA: Responsive Management.

_____. 1997. *Connecticut residents', hunters', and anglers' attitudes toward wildlife, fisheries, and forest management*. Harrisonburg, VA: Responsive Management.

_____. 2002a. *Washington residents' opinions on and attitudes toward hunting and game species management*. Harrisonburg, VA: Responsive Management.

_____. 2002b. Special data release from *Public awareness of, attitudes toward, and propensity to become a member of Ducks Unlimited in the United States*. Harrisonburg, VA: Responsive Management.

_____. 2003a. *Factors related to hunting and fishing participation among the nation's youth*. Harrisonburg, VA: Responsive Management.

_____. 2003b. *Public awareness of, attitudes toward, and propensity to become a member of the Izaak Walton League of America: Research implications for increasing public awareness of and membership in the Izaak Walton League of America*. Harrisonburg, VA: Responsive Management.

_____. 2004a. *New Hampshire residents' and hunters' opinions on the status and management of big game populations*. Harrisonburg, VA: Responsive Management.

_____. 2004b. *Public attitudes toward black bear management in Maryland*. Harrisonburg, VA: Responsive Management.

_____. 2004c. *Public opinion on fish and wildlife management issues and the reputation and credibility of fish and wildlife agencies in the Northeast United States*. Harrisonburg, VA: Responsive Management.

_____. 2004d. *Public opinion on fish and wildlife management issues and the reputation and credibility of fish and wildlife agencies in the Northeast United States: Maryland*. Harrisonburg, VA: Responsive Management.

_____. 2005a. *Assessment of and recommendations for the Women in the Outdoors program.* Harrisonburg, VA: Responsive Management.

_____. 2005b. *Opinions of Mississippi residents regarding deer baiting*. Harrisonburg, VA: Responsive Management.

_____. 2005c. *Public Opinion on fish and wildlife management issues and the reputation and credibility of fish and wildlife agencies in the Southeastern United States: Southeastern region report*. Harrisonburg, VA: Responsive Management.

_____. 2006a. *Sunday hunting in North Carolina: Results of a telephone survey of North Carolina residents*. Harrisonburg, VA: Responsive Management.

_____. 2006b. *Indiana hunting recruitment and retention report*. Harrisonburg, VA: Responsive Management.

_____. 2006c. *Sportsmen's attitudes*. Unpublished survey about various hunting and fishing issues. Harrisonburg, VA: Responsive Management.

_____. 2006d. *The public's attitudes toward and participation in the shooting sports*. Harrisonburg, VA: Responsive Management.

Rohlfing, A.H. 1978. Hunter conduct and public attitudes. *Transactions of the North American Wildlife and Natural Resources Conference*. 43:404–11.

Shaw, William W. 1975. *Wildlife Division report 2740: Attitudes toward hunting, a study of some social and psychological determinants*. Lansing, MI: Michigan Department of Natural Resources.

Westervelt, Miriam O., and Lynn G. Llewellyn. 1985. *Youth and wildlife*. U.S. Fish and Wildlife Service. Washington, DC: Government Printing Office.

Wright, Brett A., Ronald A. Kaiser, and James E. Fletcher. 1988. Hunter access decisions by rural landowners: An East Texas example. *Wildlife Society Bulletin*. 16:152–8.

# The Economic Contributions of Hunting in the United States

**Rob Southwick**
*Southwick Associates, Inc.*
*Fernandina Beach, Florida*

## Introduction

Hunting is enjoyed by 12.5 million U.S. citizens (U.S. Fish and Wildlife Service 2006). In the course of their hunting activities, hunters spent nearly $25 billion. These expenditures, in turn, create numerous and significant benefits for state and national economies, for conservation, government and for the millions of households and businesses that receive a share of hunters' dollars. When used effectively, economic information can increase legislative, public, business and media awareness of the importance of fish and wildlife. As a result, it can help boost conservation efforts and public recreational opportunities. With funding from the Pittman-Robertson Federal Aid in Wildlife Restoration Program, the Association of Fish and Wildlife Agencies (AFWA) undertook an effort in 2007 and 2008 to measure and communicate the economic contributions of hunting at the state and national levels. The work was subcontracted to Southwick Associates, Inc. This paper explains the work accomplished and the major results.

## Methodology

### *Data Sources*

The methods used to estimate hunting economic impact are separated into two stages: (1) tabulate the expenditures made by hunters and (2) estimate the economic effects of hunters' spending through the use of an input-output model.

***Tabulating expenditures***. Hunters' expenditures were obtained from the *2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation Survey* (Survey). The Survey is conducted approximately every 5 years by the U.S. Fish and Wildlife Service (USFWS) and the U.S. Bureau of the Census at the request of state fish and wildlife agencies. The Survey provides data required by natural resource management agencies, industry and private organizations at the local, state and national levels to assist in optimally managing natural resources.

The Survey is funded through excise taxes on hunting and fishing equipment through the Federal Aid in Sport Fish and Wildlife Restoration Act.

To generate the statewide economic results, expenditures were categorized into resident and nonresident files. Both files included information on trip and equipment expenditures divided into resident and nonresident data. Together, these files represent all hunting-related expenditures made in the United States in 2006.

The Survey contains data on equipment expenditures (such as vehicles and camping equipment) reported by sportsmen and sportswomen for the primary purpose of hunting and fishing. The USFWS (2006) does not attempt to allocate unspecified hunter and angler expenditures. Therefore, these allocations were made by prorating each participant's fishing and hunting expenditures for these activities based on the number of days the respondent reported hunting and fishing in 2006. As a result of allocating expenditures, the retail sales reported in this paper are higher than the hunting- and fishing-specific expenditures reported in the USFWS Survey reports.

The Survey does not have separate expenditure categories for activities related to specific species, such as deer hunting. Therefore, these had to be estimated. To do this, we used two different methods—one for the trip-related expenditure data and another for the equipment-expenditure data. Deer hunting will be used as the example to explain methods.

To allocate expenditures to specific species, we first calculated the following ratio for each observation: Ratio 1 equals DHD/DYHD, where DHD equals days spent hunting for deer, and DYHD equals total days spent hunting. We then multiplied each trip-related expenditure reported by survey respondents by its corresponding ratio 1. This same step was then applied to the days spent hunting for each species reported by the respondent to assign the respondent's expenditures to deer , migratory-bird and upland-game-bird hunting.

Statistical analyses here are based upon samples of the population contacted through the Survey. The primary purpose of the Survey was not to specifically contact hunters pursuing particular species. Instead, the goal was to collect enough samples for big-game hunting to ensure basic sampling needs were met. As a result, some species reported in the Survey have small samples. Small samples can lead to results that are influenced by a single, unusual observation or results that are not representative of the population at large. Results dependent on small samples are footnoted in the tables and should be

interpreted with extra caution. Steps were taken to adjust for outlier data, with the results sometimes causing numbers reported in this project to be less than the amounts reported in the Survey reports.

***Applying the economic model***. To estimate economic contributions, the expenditure data were analyzed with the IMPLAN input-output model. The IMPLAN model is provided by MIG, Inc. of Stillwater, Minnesota. IMPLAN was originally developed for use by the U.S. Forest Service. Input-output models describe how sales in one industry impact other industries. For example, once a purchase is made, the retailer buys more merchandise from wholesalers, who buy more from manufacturers, who, in turn, purchase new inputs and supplies. In addition, the salaries and wages paid by these businesses stimulate more benefits. Simply, the first purchase creates numerous rounds of purchasing, which, in turn, support jobs, generate tax revenue, and more. Input-output analysis tracks how the various rounds of purchasing benefit other industries and feed the economy.

The relationships between industries are explained through multipliers. For example, an income multiplier of 0.09 for industry X would indicate that for every dollar received by the industry under study, nine cents would be paid to the employees of industry X for its products or services. The IMPLAN model provides multipliers for all major industries in the United States and for each state. The IMPLAN model includes output, earnings and employment multipliers. The output multiplier measures the total economic effect created by the original retail sale. The earnings multiplier measures the total salaries and wages generated by the original retail sale. The employment multiplier estimates the number of jobs supported by the original retail sale. IMPLAN also estimates federal, state and local tax revenue.

To apply the IMPLAN model, angler expenditures are each matched to the appropriate output, earnings and employment multipliers. For example, dollars attributed to gasoline refinement are multiplied separately by the earnings, output and employment multipliers specific to gasoline refinement. The resulting estimates describe the salaries and wages, total economic effects, and jobs supported by the refining industry as a result of fuel purchases made by hunters. This same process is repeated for all reported expenditures. The model divides retail sales into portions accruing to, and again spent by retailers, wholesalers, manufacturers and service providers. After all expenditures and multipliers have been applied, the retail, wholesale and manufacturing results for each category are summed.

## Results

### *Total Effects on the U.S. Economy*

In 2006, 12.5 million people 16 years old and older hunted in the United States. These hunters spent $24.7 billion for a wide range of products and services in support of their hunting activities. Table 1 presents the expenditures made by hunters for all hunting activities combined and for specific types of game. In turn, as these dollars moved from hunters to businesses and their employees, significant economic impacts were generated. These jobs, tax revenues and other impacts are listed in Table 2, which presents expenditures and impacts for each state and for the United States as a whole. The total of economic effects, reported as the total-multiplier effect in Table 2, report how much the U.S. economy would shrink if hunters no longer hunted and did not spend their dollars.

Table 1. Hunting expenditures by state and game type.

| | Hunting, all types | Deer hunting | Migratory bird hunting | Upland game hunting |
|---|---|---|---|---|
| Number of hunters | $12,509,592 | $10,839,924 | $2,513,459 | $2,970,709 |
| Days of hunting | $219,925,495 | $132,192,027 | $19,869,718 | $26,587,818 |
| Food, drink and refreshments | $2,177,229,448 | $1,238,688,686 | $203,010,979 | $279,444,587 |
| Lodging (motels, cabins, lodges, campgrounds, etc.) | $614,015,621 | $283,343,065 | $57,212,786 | $110,202,033 |
| Airplane fare | $159,592,842 | $23,740,447 | $5,714,626 | $23,597,424 |
| Public transportation, including trains, buses, taxies | $54,794,000 | $16,795,450 | $5,906,607 | $13,064,542 |
| Transportation by private vehicle | $2,482,537,455 | $1,301,558,376 | $251,100,075 | $342,145,255 |
| Boat fuel | $56,941,232 | $16,626,122 | $23,824,260 | $3,939,125 |
| Guide fees, pack trip or package fees | $416,529,307 | $164,312,545 | $25,262,445 | $73,729,496 |
| Public land use or access fees | $47,268,114 | $20,724,470 | $11,447,968 | $6,166,315 |
| Private land use or access fees (except leases) | $395,696,905 | $218,354,347 | $65,150,704 | $30,486,703 |
| Boat launching fees | $7,815,356 | $2,909,674 | $3,185,807 | $291,467 |
| Boat mooring, storage, maintenance, insurance, etc. | $37,497,943 | $8,752,102 | $16,710,692 | $983,546 |
| Equipment rental, such as boats, camping equipment | $80,729,349 | $27,156,779 | $12,392,133 | $1,157,267 |
| Heating and cooking fuel | $146,853,019 | $96,951,204 | $6,727,612 | $11,152,430 |
| Rifles | $1,119,900,422 | $635,915,304 | $37,929,905 | $45,105,659 |
| Shotguns | $764,933,615 | $166,428,017 | $328,976,363 | $135,621,601 |
| Muzzleloaders and other primitive firearms | $183,571,628 | $148,313,062 | $505,371 | $1,249,471 |
| Handguns | $382,621,361 | $105,340,730 | $56,624,225 | $17,978,099 |

Table 1 (continued). Hunting expenditures by state and game type.

| | Hunting, all types | Deer hunting | Migratory bird hunting | Upland game hunting |
|---|---|---|---|---|
| Bows, arrows and archery equipment | $671,176,425 | $492,747,648 | $8,708,098 | $5,658,039 |
| Telescopic sights | $402,804,818 | $203,755,220 | $11,208,418 | $7,176,730 |
| Decoys and game calls | $178,683,338 | $52,261,516 | $82,250,106 | $5,140,269 |
| Ammunition | $693,249,814 | $266,678,173 | $151,490,175 | $73,665,212 |
| Handloading equipment and components | $139,291,957 | $58,010,943 | $9,494,344 | $11,384,861 |
| Hunting dogs and associated costs | $493,490,673 | $57,941,267 | $146,633,817 | $146,381,071 |
| Other hunting equipment (cases, knives, etc.) | $315,224,246 | $153,315,561 | $38,150,265 | $9,927,866 |
| Camping equipment | $243,174,136 | $76,153,070 | $4,043,006 | $1,522,283 |
| Binoculars, field glasses, telescopes, etc. | $213,555,555 | $117,633,531 | $14,634,924 | $2,615,084 |
| Special hunting clothes, foul weather gear, boots, waders | $516,500,133 | $267,955,146 | $58,610,340 | $19,381,685 |
| Processing and taxidermy costs | $486,305,565 | $316,498,057 | $21,520,751 | $14,461,235 |
| Books and magazines devoted to hunting | $116,590,912 | $41,068,724 | $10,790,677 | $2,975,497 |
| Dues or contributions | $312,583,744 | $122,002,018 | $74,444,922 | $19,406,064 |
| Other support items (snowshoes, skis, equipment repair, etc.) | $62,098,289 | $22,180,815 | $3,237,262 | $4,529,585 |
| Bass boat | $7,084,686 | $0 | $0 | $0 |
| Other motor boat | $82,834,713 | $0 | $22,941,806 | $0 |
| Canoe, nonmotor boat | $16,442,158 | $0 | $6,752,124 | $0 |
| Boat motor, trailer, hitch or accessories | $30,609,443 | $2,322,854 | $4,373,473 | $50,977 |
| Pick-up, camper, van, travel tent trailer, motor home house trailer | $3,670,278,809 | $915,186,743 | $112,398,667 | $94,590,277 |
| Cabin | $529,606,148 | $413,743,133 | $24,119,686 | $7,377 |
| Off-road vehicle: trail bike, 4 x 4 vehicle, 4-wheeler snowmobile, etc. | $1,731,412,704 | $899,031,456 | $74,497,895 | $16,657,414 |
| Other special equipment (ice chests, airplane, etc.) | $160,022,243 | $23,999,477 | $2,290 | $28,060,974 |
| Licenses, tags, permits and other similar fees | $611,485,152 | $367,653,199 | $54,450,891 | $73,324,086 |
| Land owned for hunting, 2006 expenses and payments | $3,130,126,270 | $2,099,031,895 | $462,123,171 | $319,174,032 |
| Land leased for hunting, 2006 expenses and payments | $749,012,019 | $484,265,308 | $148,641,629 | $27,772,601 |
| Total | $24,692,171,564 | $11,929,346,131 | $2,657,201,294 | $1,980,178,239 |

Table 2. Economic contributions of hunting.

| | Retail sales | Total multiplier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Alaska | $132,314,335 | $188,610,428 | $59,643,699 | $2,020 | $13,593,169 | $12,635,474 |
| Alabama | $846,607,925 | $1,388,634,035 | $426,934,839 | $17,487 | $82,708,487 | $95,576,324 |
| Arkansas | $877,430,173 | $1,376,253,610 | $391,642,245 | $17,823 | $99,246,297 | $99,550,595 |
| Arizona | $325,858,039 | $554,551,807 | $173,497,561 | $4,788 | $30,995,547 | $37,692,546 |
| California | $926,577,638 | $1,645,120,235 | $533,749,531 | $13,774 | $123,535,170 | $124,988,347 |
| Colorado | $464,044,078 | $817,261,886 | $297,081,040 | $9,258 | $51,568,940 | $68,404,422 |
| Connecticut | $70,104,010 | $114,601,486 | $39,177,572 | $1,144 | $8,049,224 | $10,980,062 |
| Delaware | $63,837,799 | $87,026,594 | $29,855,196 | $880 | $5,775,237 | $6,556,529 |
| Florida | $402,478,561 | $702,684,027 | $251,851,225 | $10,313 | $43,599,095 | $58,193,793 |
| Georgia | $679,541,843 | $1,128,226,211 | $367,110,061 | $14,714 | $82,118,364 | $86,762,722 |
| Hawaii | $29,533,971 | $39,676,045 | $13,539,833 | $517 | $2,548,882 | $2,792,950 |
| Iowa | $299,398,609 | $469,829,900 | $150,787,736 | $6,231 | $32,376,135 | $33,847,420 |
| Idaho | $284,030,006 | $441,053,831 | $159,210,324 | $5,713 | $33,442,787 | $32,319,322 |
| Illinois | $388,881,335 | $693,475,942 | $236,920,109 | $8,421 | $49,093,240 | $57,675,177 |
| Indiana | $265,048,066 | $436,644,153 | $138,573,361 | $5,132 | $30,248,922 | $32,601,862 |
| Kansas | $270,981,258 | $464,436,938 | $142,771,519 | $5,864 | $29,695,037 | $32,210,464 |
| Kentucky | $439,471,631 | $694,427,486 | $205,826,351 | $8,400 | $52,596,675 | $48,438,294 |
| Louisiana | $594,435,590 | $975,249,784 | $306,067,276 | $13,084 | $62,248,488 | $62,343,675 |
| Massachusetts | $71,125,154 | $121,140,373 | $45,196,577 | $1,284 | $8,148,282 | $11,336,689 |
| Maryland | $257,316,836 | $424,917,873 | $153,019,503 | $4,450 | $32,890,971 | $35,324,190 |
| Maine | $280,831,620 | $367,315,113 | $113,845,092 | $4,509 | $30,418,808 | $26,408,402 |
| Michigan | $1,334,000,075 | $2,296,402,842 | $690,135,969 | $19,560 | $153,506,053 | $161,443,647 |
| Minnesota | $637,270,173 | $1,099,730,694 | $353,609,923 | $11,911 | $75,882,194 | $86,158,974 |
| Missouri | $1,227,087,240 | $2,085,985,187 | $628,068,032 | $24,505 | $147,006,353 | $149,834,435 |
| Mississippi | $562,674,243 | $863,586,448 | $238,776,899 | $12,094 | $65,771,581 | $52,887,207 |
| Montana | $405,817,077 | $608,276,252 | $161,217,991 | $7,005 | $31,547,133 | $37,975,030 |
| North Carolina | $511,546,347 | $856,474,235 | $251,130,695 | $8,851 | $48,743,257 | $58,037,991 |
| North Dakota | $132,694,072 | $211,087,266 | $61,290,560 | $2,996 | $11,581,923 | $13,411,694 |

Table 2 (continued). Economic contributions of hunting.

| | Retail sales | Total multiplier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Nebraska | $259,231,163 | $417,304,662 | $139,695,653 | $5,163 | $31,515,062 | $29,706,444 |
| New Hampshire | $82,889,961 | $132,378,626 | $47,988,010 | $1,546 | $8,600,731 | $12,114,358 |
| New Jersey | $193,411,974 | $325,384,572 | $109,864,454 | $2,746 | $19,568,592 | $28,099,285 |
| New Mexico | $183,607,572 | $300,648,082 | $97,056,936 | $3,740 | $20,259,416 | $19,692,331 |
| Nevada | $145,208,313 | $223,547,853 | $65,886,230 | $1,854 | $11,717,320 | $15,183,041 |
| New York | $788,091,714 | $1,340,205,905 | $448,518,078 | $11,438 | $112,542,656 | $111,636,896 |
| Ohio | $859,321,607 | $1,488,555,466 | $437,681,782 | $13,762 | $90,731,302 | $94,813,442 |
| Oklahoma | $492,065,447 | $843,349,642 | $251,611,907 | $9,871 | $49,499,185 | $53,637,675 |
| Oregon | $505,874,654 | $827,488,316 | $259,238,784 | $8,913 | $54,601,132 | $61,151,103 |
| Pennsylvania | $1,734,082,321 | $3,029,151,411 | $932,666,740 | $28,041 | $214,118,683 | $228,704,030 |
| Rhode Island | $10,232,988 | $12,765,911 | $4,333,917 | $187 | $937,197 | $1,070,504 |
| South Carolina | $288,011,510 | $440,130,049 | $151,444,817 | $7,238 | $32,239,827 | $32,934,599 |
| South Dakota | $196,063,154 | $303,570,715 | $99,907,412 | $4,514 | $19,981,361 | $21,773,429 |
| Tennessee | $588,423,673 | $1,076,653,687 | $308,755,396 | $10,126 | $49,034,965 | $66,784,875 |
| Texas | $2,334,329,825 | $4,117,303,334 | $1,339,454,869 | $46,917 | $262,226,970 | $310,097,641 |
| Utah | $293,808,223 | $523,147,903 | $163,059,713 | $6,487 | $31,107,631 | $34,094,522 |
| Virginia | $528,578,198 | $880,166,592 | $287,465,157 | $9,376 | $53,304,750 | $67,988,705 |
| Vermont | $190,714,942 | $269,390,116 | $81,347,118 | $2,414 | $14,225,738 | $18,111,667 |
| Washington | $394,021,171 | $628,263,974 | $195,712,308 | $5,595 | $35,202,901 | $46,410,817 |
| Wisconsin | $1,394,050,097 | $2,197,983,821 | $604,107,185 | $25,298 | $197,141,707 | $153,773,668 |
| West Virginia | $302,413,973 | $453,467,141 | $133,145,185 | $6,337 | $29,666,372 | $31,616,573 |
| Wyoming | $146,801,378 | $225,131,920 | $77,061,651 | $3,071 | $13,361,942 | $17,403,175 |
| United States | $24,692,171,564 | $66,013,310,496 | $20,939,838,614 | $592,944 | $4,178,957,748 | $4,951,442,274 |

Texas led the nation with $2.334 billion in hunting expenditures in 2006, and accounts for nearly 10 percent of the total hunting dollars in the United States. The next top four states in order were Pennsylvania ($1.734 billion), Wisconsin ($1.394 billion), Michigan ($1.334 billion) and Missouri ($1.227 billion).

***Expenditures and Impacts Per Hunter***

The amount spent by hunters varies by state and by type of activity. These are presented in Tables 3 and 4 respectively. These results can be used to estimate the additional economic impacts that could result from creating new public hunting opportunities, can demonstrate hunting's value to rural economies, and can communicate the potential losses associated with habitat destruction or harmful legislation.

In addition to the effects per hunter and per day of hunting, nonresident impacts are also available. These can be found at http://www.southwick associates.com/impacts/default.aspx, which also provides details on impacts per hunter and per day for upland-game-bird hunting, migratory-bird hunting, deer hunting and all types of hunting combined.

***Putting Economic Impacts into Context***

Not many topics are tougher to communicate than long lists of numbers combined with economic text and discussions. To explain the economic significance of hunting and to place the big numbers into context, we use short factoids. A list of factoids was developed for use by different audiences. These include:

- If hunting were ranked as a corporation with $24.9 billion in sales, it would fall in the top 20 percent of the Fortune 500 list of the United States' largest companies, slightly ahead of such global giants as General Dynamics and Coca-Cola.
- More in the United States go hunting than play softball or tennis.
- The number of U.S. hunters age 16 and over—12.5 million—is about three times the number of people attending baseball games at Yankee Stadium over a full season.
- Hunting as a leisure-time activity ranks higher than skiing, volleyball or skateboarding, according to the National Sporting Goods Association.
- The amount of federal, state and local tax revenues—about $9.2 billion—generated by hunter spending in 2006 is equal to nearly 90 percent of the entire budget for the U.S. Department of the Interior.

Table 3. Economic contributions per hunter.

| | Retail sales | Total multiplier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Alaska | $1,865.44 | $2,659.14 | $840.89 | 0.028 | $191.64 | $178.14 |
| Alabama | $2,166.02 | $3,552.77 | $1,092.30 | 0.045 | $211.61 | $244.53 |
| Arkansas | $2,477.73 | $3,886.33 | $1,105.94 | 0.050 | $280.26 | $281.12 |
| Arizona | $2,050.34 | $3,489.31 | $1,091.67 | 0.030 | $195.03 | $237.17 |
| California | $3,293.08 | $5,846.79 | $1,896.96 | 0.049 | $439.05 | $444.21 |
| Colorado | $1,788.36 | $3,149.61 | $1,144.91 | 0.036 | $198.74 | $263.62 |
| Connecticut | $1,858.92 | $3,038.84 | $1,038.86 | 0.030 | $213.44 | $291.15 |
| Delaware | $1,507.03 | $2,054.45 | $704.80 | 0.021 | $136.34 | $154.78 |
| Florida | $1,703.15 | $2,973.51 | $1,065.75 | 0.044 | $184.50 | $246.26 |
| Georgia | $1,413.93 | $2,347.51 | $763.85 | 0.031 | $170.86 | $180.53 |
| Hawaii | $1,602.35 | $2,152.60 | $734.60 | 0.028 | $138.29 | $151.53 |
| Iowa | $1,190.99 | $1,868.96 | $599.83 | 0.025 | $128.79 | $134.64 |
| Idaho | $1,518.43 | $2,357.89 | $851.14 | 0.031 | $178.79 | $172.78 |
| Illinois | $1,230.78 | $2,194.79 | $749.83 | 0.027 | $155.38 | $182.54 |
| Indiana | $973.53 | $1,603.81 | $508.99 | 0.019 | $111.11 | $119.75 |
| Kansas | $999.28 | $1,712.68 | $526.49 | 0.022 | $109.50 | $118.78 |
| Kentucky | $1,508.22 | $2,383.20 | $706.38 | 0.029 | $180.51 | $166.24 |
| Louisiana | $2,197.66 | $3,605.54 | $1,131.54 | 0.048 | $230.14 | $230.49 |
| Massachusetts | $973.71 | $1,658.42 | $618.74 | 0.018 | $111.55 | $155.20 |
| Maryland | $1,601.82 | $2,645.15 | $952.56 | 0.028 | $204.75 | $219.90 |
| Maine | $1,608.92 | $2,104.40 | $652.23 | 0.026 | $174.27 | $151.30 |
| Michigan | $1,771.83 | $3,050.10 | $916.64 | 0.026 | $203.89 | $214.43 |
| Minnesota | $1,190.37 | $2,054.21 | $660.52 | 0.022 | $141.74 | $160.94 |
| Missouri | $2,017.54 | $3,429.71 | $1,032.65 | 0.040 | $241.70 | $246.35 |
| Mississippi | $1,852.90 | $2,843.81 | $786.30 | 0.040 | $216.59 | $174.16 |
| Montana | $2,056.53 | $3,082.51 | $816.99 | 0.035 | $159.87 | $192.44 |
| North Carolina | $1,681.59 | $2,815.46 | $825.53 | 0.029 | $160.23 | $190.79 |
| North Dakota | $1,038.42 | $1,651.90 | $479.64 | 0.023 | $90.64 | $104.96 |

Table 3 (continued). Economic contributions per hunter.

| | Retail sales | Total multiplier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Nebraska | $2,192.11 | $3,528.82 | $1,181.30 | 0.044 | $266.50 | $251.20 |
| New Hampshire | $1,369.66 | $2,187.40 | $792.95 | 0.026 | $142.12 | $200.18 |
| New Jersey | $2,174.93 | $3,658.97 | $1,235.43 | 0.031 | $220.05 | $315.98 |
| New Mexico | $1,857.39 | $3,041.37 | $981.83 | 0.038 | $204.95 | $199.21 |
| Nevada | $2,303.95 | $3,546.93 | $1,045.39 | 0.029 | $185.91 | $240.90 |
| New York | $1,393.30 | $2,369.41 | $792.96 | 0.020 | $198.97 | $197.37 |
| Ohio | $1,719.31 | $2,978.27 | $875.71 | 0.028 | $181.53 | $189.70 |
| Oklahoma | $1,963.63 | $3,365.46 | $1,004.08 | 0.039 | $197.53 | $214.05 |
| Oregon | $2,136.57 | $3,494.91 | $1,094.90 | 0.038 | $230.61 | $258.27 |
| Pennsylvania | $1,660.60 | $2,900.80 | $893.15 | 0.027 | $205.05 | $219.01 |
| Rhode Island | $743.60 | $927.65 | $314.93 | 0.014 | $68.10 | $77.79 |
| South Carolina | $1,384.22 | $2,115.32 | $727.86 | 0.035 | $154.95 | $158.29 |
| South Dakota | $1,148.00 | $1,777.48 | $584.98 | 0.026 | $117.00 | $127.49 |
| Tennessee | $1,788.87 | $3,273.13 | $938.65 | 0.031 | $149.07 | $203.03 |
| Texas | $2,119.64 | $3,738.63 | $1,216.27 | 0.043 | $238.11 | $281.58 |
| Utah | $1,765.95 | $3,144.41 | $980.08 | 0.039 | $186.97 | $204.93 |
| Virginia | $1,279.83 | $2,131.11 | $696.03 | 0.023 | $129.06 | $164.62 |
| Vermont | $2,613.88 | $3,692.17 | $1,114.92 | 0.033 | $194.97 | $248.23 |
| Washington | $2,159.49 | $3,443.30 | $1,072.63 | 0.031 | $192.93 | $254.36 |
| Wisconsin | $1,999.45 | $3,152.52 | $866.46 | 0.036 | $282.76 | $220.55 |
| West Virginia | $1,124.77 | $1,686.59 | $495.21 | 0.024 | $110.34 | $117.59 |
| Wyoming | $1,435.16 | $2,200.93 | $753.37 | 0.030 | $130.63 | $170.14 |
| United States | $1,973.86 | $5,277.02 | $1,673.90 | 0.047 | $334.06 | $395.81 |

Table 4. Economic contributions per day of hunting.

| | Retail sales | Total multi-plier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Alaska | $154.98 | $220.92 | $69.86 | 0.00237 | $15.92 | $14.80 |
| Alabama | $97.89 | $160.56 | $49.36 | 0.00202 | $9.56 | $11.05 |
| Arkansas | $111.32 | $174.61 | $49.69 | 0.00226 | $12.59 | $12.63 |
| Arizona | $216.01 | $367.61 | $115.01 | 0.00317 | $20.55 | $24.99 |
| California | $274.50 | $487.36 | $158.12 | 0.00408 | $36.60 | $37.03 |
| Colorado | $195.34 | $344.03 | $125.06 | 0.00390 | $21.71 | $28.79 |
| Connecticut | $137.70 | $225.10 | $76.95 | 0.00225 | $15.81 | $21.57 |
| Delaware | $97.63 | $133.09 | $45.66 | 0.00135 | $8.83 | $10.03 |
| Florida | $106.79 | $186.45 | $66.83 | 0.00274 | $11.57 | $15.44 |
| Georgia | $82.59 | $137.13 | $44.62 | 0.00179 | $9.98 | $10.55 |
| Hawaii | $70.25 | $94.38 | $32.21 | 0.00123 | $6.06 | $6.64 |
| Iowa | $77.79 | $122.06 | $39.18 | 0.00162 | $8.41 | $8.79 |
| Idaho | $134.16 | $208.32 | $75.20 | 0.00270 | $15.80 | $15.27 |
| Illinois | $82.95 | $147.92 | $50.53 | 0.00180 | $10.47 | $12.30 |
| Indiana | $55.13 | $90.82 | $28.82 | 0.00107 | $6.29 | $6.78 |
| Kansas | $89.83 | $153.97 | $47.33 | 0.00194 | $9.84 | $10.68 |
| Kentucky | $80.95 | $127.92 | $37.92 | 0.00155 | $9.69 | $8.92 |
| Louisiana | $99.42 | $163.11 | $51.19 | 0.00219 | $10.41 | $10.43 |
| Massachusetts | $61.92 | $105.46 | $39.35 | 0.00112 | $7.09 | $9.87 |
| Maryland | $113.77 | $187.87 | $67.66 | 0.00197 | $14.54 | $15.62 |
| Maine | $123.01 | $160.89 | $49.87 | 0.00198 | $13.32 | $11.57 |
| Michigan | $112.05 | $192.90 | $57.97 | 0.00164 | $12.89 | $13.56 |
| Minnesota | $98.17 | $169.41 | $54.47 | 0.00183 | $11.69 | $13.27 |
| Missouri | $126.32 | $214.73 | $64.65 | 0.00252 | $15.13 | $15.42 |
| Mississippi | $82.32 | $126.34 | $34.93 | 0.00177 | $9.62 | $7.74 |
| Montana | $189.46 | $283.99 | $75.27 | 0.00327 | $14.73 | $17.73 |
| North Carolina | $104.82 | $175.49 | $51.46 | 0.00181 | $9.99 | $11.89 |
| North Dakota | $98.73 | $157.05 | $45.60 | 0.00223 | $8.62 | $9.98 |
| Nebraska | $160.88 | $258.98 | $86.70 | 0.00320 | $19.56 | $18.44 |
| New Hampshire | $78.43 | $125.26 | $45.41 | 0.00146 | $8.14 | $11.46 |
| New Jersey | $132.78 | $223.38 | $75.42 | 0.00188 | $13.43 | $19.29 |
| New Mexico | $215.44 | $352.78 | $113.89 | 0.00439 | $23.77 | $23.11 |
| Nevada | $236.24 | $363.69 | $107.19 | 0.00302 | $19.06 | $24.70 |
| New York | $76.60 | $130.26 | $43.59 | 0.00111 | $10.94 | $10.85 |
| Ohio | $80.82 | $140.00 | $41.16 | 0.00129 | $8.53 | $8.92 |
| Oklahoma | $88.92 | $152.40 | $45.47 | 0.00178 | $8.95 | $9.69 |
| Oregon | $185.38 | $303.24 | $95.00 | 0.00327 | $20.01 | $22.41 |
| Pennsylvania | $102.83 | $179.63 | $55.31 | 0.00166 | $12.70 | $13.56 |
| Rhode Island | $65.92 | $82.24 | $27.92 | 0.00121 | $6.04 | $6.90 |
| South Carolina | $66.70 | $101.93 | $35.07 | 0.00168 | $7.47 | $7.63 |
| South Dakota | $114.03 | $176.55 | $58.10 | 0.00263 | $11.62 | $12.66 |
| Tennessee | $102.71 | $187.93 | $53.89 | 0.00177 | $8.56 | $11.66 |
| Texas | $166.15 | $293.05 | $95.34 | 0.00334 | $18.66 | $22.07 |

Table 4 (continued). Economic contributions per day of hunting.

| | Retail sales | Total multi-plier effect | Salaries and wages | Jobs | State and local taxes | Federal taxes |
|---|---|---|---|---|---|---|
| Utah | $171.32 | $305.05 | $95.08 | 0.00378 | $18.14 | $19.88 |
| Virginia | $78.07 | $130.00 | $42.46 | 0.00138 | $7.87 | $10.04 |
| Vermont | $171.59 | $242.37 | $73.19 | 0.00217 | $12.80 | $16.30 |
| Washington | $185.32 | $295.50 | $92.05 | 0.00263 | $16.56 | $21.83 |
| Wisconsin | $138.59 | $218.51 | $60.06 | 0.00251 | $19.60 | $15.29 |
| West Virginia | $76.76 | $115.11 | $33.80 | 0.00161 | $7.53 | $8.03 |
| Wyoming | $162.34 | $248.96 | $85.22 | 0.00340 | $14.78 | $19.24 |
| United States | $112.28 | $300.16 | $95.21 | 0.00270 | $19.00 | $22.51 |

Additional factoids are available from the Congressional Sportsmens' Foundation by visiting http://www.sportsmenslink.org/programs/report/index.html.

### *Hunters' Contributions to Conservation*

By spending money to support their hunting activities, hunters become one of the nation's most powerful forces for the environment. Our 12.5 million hunters invest hundreds of millions of dollars every year in wildlife conservation and management. Much of this comes from hunting-license sales, which totaled almost $612 million nationwide for 2006 and are a primary funding source for most state fish and wildlife agencies.

Special federal excise taxes and import duties on hunting gear—taxes that were originally requested by hunters themselves—added up to another $267 million for 2007 under the long-running Pittman-Robertson Federal Aid in Wildlife Restoration Program (U.S. Fish and Wildlife Service 2007). That money is apportioned to the states and is likewise critical in supporting state wildlife programs.

All told, that's nearly $900 million that hunters directly invest every year to preserve, protect and enhance not just their sport but also the healthy environment that makes such sport possible. Across much of the country, these hunter dollars are often the only money that states have for protecting or improving wildlife habitat, along with wildlife-related public education.

## Conclusion

In 2006, hunting was enjoyed by 12.5 million (U.S. Fish and Wildlife Service 2006). In the course of their hunting activities, hunters spent nearly $25

billion. These expenditures in turn create numerous and significant benefits for state and national economies, for conservation, government and for the millions of households and businesses that receive a share of hunters' dollars. Examples include nearly 600,000 jobs supported nationally, $4.2 billion in state and local tax revenues, $5 billion in federal tax revenues, and total U.S. economic activity worth $66.7 billion. Through the excise taxes collected on the sale of many hunting equipment items and from hunting license sales, hunters contribute nearly $900 million annually to conservation. A report summarizing these impacts in an easy-to-read fashion is available at www.southwickassociates.com/freereports. The deep pockets of hunters not only help local, state and national economies, they also are the primary source of wildlife conservation funding benefiting all who appreciate wildlife, both hunters and non-hunters.

## Reference List


Fortune Magazine. *Fortune 500 list of America's largest companies*. April, 2007.

National Sporting Goods Association. 2006. *Research and statistics*. http://www.nsga.org.

U.S. Fish and Wildlife Service, and U.S. Census Bureau. 2006 *National survey of hunting, fishing and wildlife-associated recreation*. Arlington, Virginia: U.S. Fish and Wildlife Service, and U.S. Census Bureau.

U.S. Fish and Wildlife Service. 2007. *Federal aid in wildlife restoration collections*. http://wsfrprograms.fws.gov.

# Reducing the Churn Rate: Effective Ways to Get Lapsed Hunters Back

**Phil T. Seng**
*D. J. Case and Associates, Inc.*
*Mishawaka, Indiana*

## Introduction

Analysis of automated-license-system (ALS) data shows that, in most states, less than 25 percent of hunters buy a license every year (R. I. Southwick and T. Allen, personal communication 2006). Rather, they hunt one year, then lapse for a year or two before returning to the field. Reducing this churn rate of active license buyers has become a priority for many state fish and wildlife agencies. Data mining within ALS databases can give state agencies and their partners great insight into their hunting license buyers, and can set the stage for scientifically based, integrated marketing campaigns to reduce the churn rate and to get more hunters back into the field.

With financial assistance from the National Shooting Sports Foundation's (NSSF's) 2006 and 2007 Hunting Heritage Partnership (HHP) Program, D. J. Case and Associates, Inc. (DJ Case) partnered with Southwick Associates (Southwick) and the states of Tennessee, Montana and South Carolina to conduct data mining and integrated marketing to improve license sales among lapsed hunters. The purpose was to discover demographic trends shared by lapsed hunters and then to test specific communication strategies designed to encourage them to once again purchase hunting licenses and participate. This paper explains the work accomplished and the major results and lessons learned to date.

Marketing is the process of identifying what consumers want or need, then providing products and services to meet those wants and needs. In this case, we already know what consumers want—they want to go hunting. We know this because they have bought hunting licenses in previous years. The state agency already has the product they need—the hunting license—so the major task at hand is to identify messages that convince hunters to continue to buy licenses every year, then to deliver these messages to the right people at the right time to get them to take action. While this seems simple in theory, it is very complex in practice. People and hunting cultures are different in nearly every

state, so marketing approaches must vary by state. One approach may succeed in one state yet fail in another. It is important for each state to implement pilot efforts to identify which approaches work best for their hunters, then to expand those efforts. This takes time.

### *Do Not Expect a Home Run in Year One*

In the business world, when a company implements a new marketing venture, it doesn't generally expect to see a big profit the first year. It is commonly understood that it takes time for the marketing process to work. Yet, many state agencies have implemented campaigns of one kind or another, then have pulled the plug after a single year if there wasn't an immediate positive response. This is shortsighted. The key is to use year-one results to identify the type of hunter that responds to your marketing messages and to the types of messages and approaches that are most effective. Then in the second year, the state can refine the approaches and focus on the type of hunter who will respond best. Based on year-two results, some states will be ready to implement more expansive programs designed to boost agency revenues in year three. All biologists know that when you're trying to manage living things, such as deer or turkeys, at a population level, there are hundreds of complexities that make clean, clear results very elusive. An adaptive approach to management is required to home in on the results you seek. In the case of marketing campaigns, states are working with the most complex population of all—humans—so to expect anything less than complicated is folly. However, when approached as a scientific process, marketing will yield substantive and measurable results and benefits over time.

## Methodology

These efforts involved a six-shot process to develop, implement and evaluate integrated marketing campaigns to increase hunting license sales. In Tennessee and Montana, DJ Case and Southwick worked with the respective states to design and implement the process outlined below. South Carolina implemented a similar process on its own, with evaluation help from DJ Case and Southwick.

### *First Shot—Situation Analysis, Research*

The first step was to analyze previous license sales data and marketing efforts. Southwick combined ALS hunting license records for previous years to

identify individual hunters who had lapsed, hunted occasionally or hunted regularly. The lapsed hunters then were prioritized based on lifestyle characteristics. Lifestyle data came from ESRI's Community Coder service, which identifies the lifestyles, habits and consumption characteristics of households on nearly every block in the United States. Results of this analysis allow researchers to identify the characteristics of the hunters more likely to drop out or to hunt regularly. By adding in an additional data layer of hunters who had lapsed most recently, it was possible to develop mailing lists of lapsed hunters that were prioritized by who was likely to respond to a promotion campaign. By combining these data with information from previous hunter-outreach and research efforts, detailed marketing plans were developed for reaching the target audience.

***Second Shot—Team Development***

Prior to developing the marketing campaign, each state established a marketing director and internal team. It is very important to assemble a team that includes all appropriate levels and divisions of the agency. An integrated marketing campaign must have buy-in and commitment from all parts of the agency that impact its outcome. Having a diverse and comprehensive team helps ensure everyone knows what needs to be done and by when. In Tennessee and Montana, DJ Case served as part of the team, provided recommendations and guidance as needed and assisted with various aspects of campaign implementation when agency staff were unavailable.

***Third Shot—Campaign Plan Development***

Based on results of the situation analysis (market research), DJ Case and the state marketing teams developed detailed, integrated, hunting-license-sales campaigns. In Tennessee, the campaign focused on bought media, coupled with direct mail and earned media. In Montana, the effort focused on a three-wave direct mail campaign, with other earned media opportunities in one pilot area. The campaign plans were submitted to all marketing team members for feedback and buy-in.

***Fourth Shot—Finalize Campaign Plan***

DJ Case and Southwick worked with each state's marketing team to ensure the campaign plan included specific, actionable goals, measurable objectives, target audiences, strategies, budget, timeline and evaluation

components. A stipulation of NSSF HHP grants is that all projects incorporate sound evaluation strategies, so the marketing teams placed special emphasis on that aspect.

***Fifth Shot—Implementation***

The teams in each state used NSSF HHP grant resources, matched by state resources, to implement the campaigns. DJ Case assisted with actions team members did not have time or expertise to implement. For instance, in Tennessee, DJ Case conducted four focus groups across the state to test messages for use in the campaign. DJ Case also provided recommendations on the best approach for implementing strategies. Southwick assisted with issues relating to target markets and mail lists.

***Sixth Shot—Evaluation***

To be most effective, evaluation of any effort should begin at the start of the project, in the design phase. The evaluation process followed for these projects was two-fold: (1) set measurable objectives at the beginning of the campaign plan, then determine if those objectives were met and (2) determine how each implemented strategy and action affected the goals and objectives defined in the plan. Each state worked with DJ Case and Southwick to be sure measurable objectives were developed, then tested. Following the campaign, DJ Case conducted an on-line survey with target audiences to assess which (if any) of the strategies resonated with them. This allowed DJ Case, Southwick and the states to assess effectiveness of the overall campaign as well as individual strategies within the campaign.

## Results

The first step for each project involved identifying lapsed hunters in the ALS databases. After combining multiple years of hunting-license data, not only could lapsed hunters be identified, but trends regarding the type of person who lapses also were identified. This information was used to prioritize the target audience and to develop the messages expected to resonate the best with them. Tables 1 and 2 present this type of information produced for South Carolina.

Once all data analyses were complete, background information reviewed and the agency marketing teams assembled, the integrated marketing campaigns

Table 1. Sample lifestyle data used to identify which market segments are more likely to hunt than the average resident in response to a hunting-license sales campaign in South Carolina.

| | |
|---|---|
| Southern satellites (rural, lower income) | 64 percent more likely |
| Rooted rural (rural, lower income) | 55 percent more likely |
| Top rung (wealthiest of 65 segments that define the United States) | 47 percent more likely |
| Rural bypasses (small towns, few economic opportunities) | 43 percent more likely |
| Midland crowd (middle income, suburban) | 41 percent more likely |
| Green acres (above-average income in rural areas near metropolitan areas) | 37 percent more likely |
| Salt of the earth (rural, lower income) | 28 percent more likely |
| Rural resort dwellers (mostly retired, on a budget in rural areas) | 24 percent more likely |
| Boomburbs (growing suburbs, with kids) | 23 percent more likely |
| Exurbanites (outer edges of suburbs, higher income, families) | 23 percent more likely |

Table 2. Sample of South Carolina lifestyle data used to prioritize who to contact as part of a marketing campaign.

| Tapestry segment | Percent change in number of licenses issued from 2006–2007 | Percent of all licenses issued from 2006–2007 | Percent change in market share from 2006–2007 |
|---|---|---|---|
| Southern satellites | 2.6 | 17.2 | -1.3 |
| Rural bypasses | 6.5 | 15.4 | 2.5 |
| Midland crowd | 2.7 | 13.5 | -1.2 |
| Crossroads | 6.2 | 5.9 | 2.2 |
| Up-and-coming families | 4.3 | 3.9 | 0.4 |
| Green acres | 2.2 | 3.1 | -1.6 |
| Rooted rural | 6.1 | 2.8 | 2.1 |
| Prosperous empty nesters | 4.4 | 2.7 | 0.5 |
| Salt of the earth | 3.1 | 2.7 | -0.8 |
| Exurbanites | 4.9 | 2.6 | 0.9 |
| Rural resort dwellers | 4.5 | 2.2 | 0.6 |
| Midlife junction | 3.5 | 2.2 | -0.4 |
| Sophisticated squires | 4.2 | 2.1 | 0.3 |
| Boomburbs | 4.4 | 1.9 | 0.5 |
| Rustbelt retirees | 3.3 | 1.7 | -0.6 |

were developed. The teams developed messages that they thought would convince lapsed hunters to participate again. In Tennessee, these messages were tested in focus groups of actual lapsed hunters. Some very interesting results emerged. For instance, an ad that used a play on words to describe hunting as "fast food" (i.e., deer and quail are *fast* animals) was disliked nearly unanimously. Participants liked to see children and people obviously having a good time in the ads, and they were adamant about ensuring that all hunting

safety measures were displayed prominently. The team used the information gained through focus-group testing to refine the messages used in the campaign.

Integrated marketing uses a combination of media resources, including broadcast (radio, TV), Internet, print and direct mail. Examples of a radio schedule used in the 2006 Tennessee campaign are presented in Table 3.

Table 3. Media schedule used by the Tennessee Wildlife Resources Agency in a 2006 integrated marketing campaign.

| Media type | Dates | Market |
|---|---|---|
| Radio—99.7 | August-November<br>12 weeks<br>Thursdays only<br>"Morning Drive" (host Kevin Miller)<br>9a.m.-12p.m. -G. Gordon Liddy<br>1:00–4:00 p.m. (host Dave Ramsey)<br>Saturdays- 5:00–7:00 a.m.<br>"Outdoors" (host Doug Markham) | Nashville |
| Radio—106.7 | | Nashville |
| Radio—WNWS | August-November 2006<br>Wednesday, Thursday and Friday<br>morning and afternoon drives | Jackson |
| Radio—WMUF | August-November 24, 2006<br>100 spots | Paris |
| Radio—WHBQ | August-November 2006<br>Monday to Friday 8:00–9:00 a.m.<br>(Sports Talk) (host George Lapides) | Memphis |
| TV—Comcast<br>Outdoor Life Network (OLN)<br>ESPN2<br>Discovery Channel (TDC)<br>Fox News Channel (FXNC)<br>Spike TV (SPK) | August—November 2006<br>6:00 a.m.–12:00 a.m. | Nashville |
| TV—Comcast<br>Outdoor Life Network (OLN)<br>ESPN2<br>Discovery Channel (TDC)<br>Fox News Channel (FXNC)<br>Spike TV (SPK)<br>The Weather Channel (TWC) | August—November 2006<br>6:00 a.m.–12:00 a.m. | Memphis |
| TV—WBBJ Channel 7 | September<br>6:00 p.m. news most<br>Thursday and Fridays | Jackson |

A series of television ads used in Tennessee can be viewed at http://www.hunttn.org. In Montana, the campaign focused mostly on a three-wave direct mailing that featured the slogan, "ReConnect with the Montana Hunt." This theme was carried throughout the campaign. The mailings included a letter from the director of Montana Fish, Wildlife and Parks, a refrigerator magnet with the "ReConnect" message (see Figure 1), and a newsletter with local hunting tips and other information. Regional staff in the treatment area also placed stories with local newspapers, conducted media interviews and held a hunting workshop to encourage the target audience to buy a license again.


Figure 1. Theme and logo used on all materials in the Montana campaign.

Campaigns were evaluated to examine:

a. overall response in terms of people who bought licenses and the associated revenues
b. response to the treatments, compared to control groups that did not receive them
c. comparison among various types of hunters—based on lifestyle characteristics—who responded better or worse to the treatments
d. license sales per day to help track the effectiveness of specific ads and promotions.
e. effective campaign strategies reaching target audiences.

Table 4 shows that South Carolina had a number of demographic segments that responded well to the campaign. The rural segments did not

Table 4. Types of lapsed hunters who responded best in South Carolina.

| Tapestry segment | Percent treatment | Percent control | Sample size | Percent difference | Treatment sample size |
|---|---|---|---|---|---|
| Boomburbs | 22.2 | 13.5 | 562 | 8.7 | 126 |
| Milk and cookies | 21.3 | 13.5 | 511 | 7.8 | 244 |
| Modest-income homes | 18.6 | 13.4 | 335 | 5.2 | 59 |
| Metropolitans | 17.3 | 12.4 | 402 | 4.9 | 104 |
| Exurbanites | 19.2 | 15.8 | 819 | 3.5 | 426 |
| Up-and-coming families | 16.6 | 13.6 | 1,362 | 3.0 | 610 |
| Metro city edge | 14.5 | 13.7 | 230 | 0.8 | 69 |
| Young and restless | 15.9 | 15.3 | 221 | 0.7 | 44 |
| Crossroads | 17.6 | 17.0 | 2,232 | 0.6 | 940 |
| Southern satellites | 19.5 | 19.1 | 7,148 | 0.5 | 958 |
| Midland crowd | 17.6 | 17.4 | 5,056 | 0.2 | 1074 |
| Salt of the earth | 20.5 | 20.3 | 1,043 | 0.2 | 205 |
| Rooted rural | 17.2 | 17.5 | 970 | -0.3 | 204 |
| Rustbelt retirees | 15.6 | 16.1 | 587 | -0.5 | 77 |
| Rural bypasses | 16.1 | 16.8 | 5,924 | -0.7 | 964 |
| Green acres | 17.4 | 18.3 | 1,112 | -0.9 | 253 |
| Heartland communities | 16.8 | 18.1 | 590 | -1.3 | 125 |
| Family foundations | 12.4 | 14.0 | 205 | -1.6 | 105 |
| Prosperous empty nesters | 17.5 | 19.4 | 809 | -1.9 | 309 |
| Great expectations | 12.3 | 14.3 | 304 | -2.0 | 122 |
| Rural resort dwellers | 14.0 | 16.8 | 856 | -2.7 | 164 |
| Cozy and comfortable | 16.5 | 19.3 | 439 | -2.8 | 206 |
| Urban chic | 16.9 | 20.2 | 179 | -3.3 | 65 |
| College towns | 10.0 | 13.3 | 145 | -3.3 | 40 |
| Home town | 13.1 | 17.5 | 547 | -4.4 | 61 |
| Sophisticated squires | 11.4 | 16.1 | 725 | -4.8 | 167 |
| Midlife junction | 10.4 | 15.1 | 777 | -4.8 | 77 |
| Retirement communities | 9.8 | 16.0 | 76 | -6.2 | 51 |
| In style | 9.9 | 16.2 | 521 | -6.4 | 71 |
| Old- and newcomers | 9.6 | 16.2 | 283 | -6.6 | 73 |
| Rustbelt traditions | 4.9 | 16.0 | 490 | -11.2 | 41 |

respond well to direct mailers but did respond to the fully integrated marketing approach (mailers plus other strategies). This lesson will be applied in future marketing efforts.

Tennessee's pilot efforts were divided into two regions, eastern Tennessee and western Tennessee. Eastern Tennessee's efforts in 2007 were a replication of 2006 efforts to see if results would be repeated. Of the three segments that responded well (southern satellites, green acres and salt of the earth), southern satellites and green acres both responded positively. While the

revenue increase from these segments only amounted to approximately 1 percent more in the treatment groups compared to the control, this increase appears to have come in the face of an overall 11 percent drop in revenues for eastern Tennessee's treatment area. In addition, in 2006, a trend towards upgrading to higher priced licenses was noticed in the treatment groups compared to the control groups, and this trend was seen again in 2007. The campaign encouraged many treatment-group hunters to buy their licenses a month or two earlier when a higher priced license is justified.

Tables 5 and 6 present the overall result for the western Tennessee area. Demographic segments with statistically valid sample sizes responded well to the campaign. While the overall number of treatment area, lapsed hunters did not respond better than the control area, the treatment area did experience an overall 3-percent increase in revenue. This is attributed to a greater rate of hunters upgrading to higher priced licenses. Fewer in the treatment area downgraded to lower priced licenses than seen in the control area. Many who previously bought a regular hunting license moved up to a license. Future efforts could be built around this response to the campaign. Further message testing and other delivery techniques could be tested to try to find a combination that works. Also, it may be possible that reaching out to lapsed hunters is not an effective strategy in this region, and other approaches, such as retention or recruitment efforts, may be better suited.

Table 7 shows that the response rates in the two Montana test regions (Flathead and rest of the state) were better for occasional hunters (those who hunt one year, skip the next, then come back). The level of hunting activity, measured in terms of how frequently licenses were purchased, is described using tiers:

- Tier 1, bought a license in 2002–2005, but not in 2006
- Tier 2, bought a license in 2003–2005, but not in 2002 or 2006
- Tier 3, bought a license in 2004–2005, but not in 2003 or 2006
- Tier 4, bought a license in 2002, 2005 and 2005, but not in 2003 or 2006
- Tier 5, bought a license in 2004 and 2005 only, but not in the other years
- Tier 6, bought a license in 2003 and 2005, but not in the other years
- Tier 7, bought a license in 2004 only

The occasional hunters, or those who responded better, are represented in tiers 3 through 7. For reference purposes, tier 1 includes hunters who hunted in all past years except the most recent. We have not seen this result in all states or for fishing.

Table 5. Response of specific hunter segments to first-year campaign efforts in western Tennessee, 2006. Only segments with reasonable sample sizes are included.

| Tapestry segment | Net result* in percent | Tapestry segment description |
|---|---|---|
| Southern satellites | 0.80 | Primarily found in rural South, 37 years, most married, some with kids, below-average income, one-third without diploma, fishing, NASCAR fans |
| Up and coming families | 0.60 | Fast growing segment, average age is 32, married with kids, affluent, own home on suburban fringe, little time, fast food |
| Milk and cookies | 0.20 | Young families but affluent for their age, two incomes, prefer single-family homes, focused on family and future, leisure time means kid time |
| Salt of the earth | 0.00 | Two-thirds are married with kids, blue collar, average income, Midwestern, often rural, own single-family homes, conservative |
| Midland crowd | -0.10 | Average age is 36, married, half with kids, typical income, new housing in rural areas, blue collar, conservative, like Fords and fishing |
| Home town | -0.60 | Young, tend to remain in hometown, low average income, some married, one-third without diploma, suburban but prefer country lifestyle |
| Exurbanites | -0.70 | Affluent, likes open space on urban edge, married or empty nesters, golf, kayakers, active in volunteer groups and donate to causes |
| Green acres | -1.50 | Married with kids, blue collar, baby boomers with college education, above-average income, suburban fringe, do-it-yourselfers, outdoors |
| Rooted rural | -2.80 | Slightly older, rural, empty-nesters, lower income, less likely to have college experience, trucks, do-it-yourselfers |
| Midlife junction | -4.30 | Exiting child-rearing, mix of married and single, slightly below-average income, 33 percent live in apartments, suburban, conservative, budget-conscious |
| Heartland | -6.30 | Above-average age, married, modest income, small Midwestern communities towns, hunt, fish, bowl, country music, do-it-yourselfers |
| Total | -0.20 | |

* treatment area response rate and control area response rate

Table 6. Rate of change in license downgrades and upgrades, in percent (treatment areas and control areas): do marketing efforts cause western Tennessee hunters to migrate to differently priced licenses?

| | Down | Same | Up |
|---|---|---|---|
| Total | -0.4 | -1.6 | 2.0 |

Table 7. Response rates, in percent: does the length of time hunters have lapsed affect how they respond to Montana marketing campaigns?

| Region and type of effort | Tier | | | | Total |
|---|---|---|---|---|---|
| | 1 and 2 | 3 and 4 | 5 and 6 | 7 | |
| Flathead | 25.3 | 19.5 | 22.5 | 13.6 | 20.2 |
| Control | 26.3 | 17.7 | 21.3 | 14.0 | 20.2 |
| Treatment | 23.7 | 22.5 | 24.4 | 12.9 | 20.2 |
| Rest of state, treatment | 23.1 | 18.7 | 21.1 | 13.7 | 19.2 |
| Rest of state, control | 23.2 | 18.7 | 20.0 | 12.2 | 18.7 |

## Conclusion

Reducing the churn rate among license buyers is a very complex process. Since people and hunting cultures are different in every state, marketing approaches vary by state. The efforts presented here represent the different approaches taken by several states to boost agency revenues. One state, Tennessee, is completing its second year but has found minimal areas of success. More work will be needed to identify marketing approaches that will succeed and will be embraced by agency personnel. South Carolina and Montana, in their first year, found segments of the hunting community who responded to the pilot campaigns, and the states will further investigate these in their second year. Altogether, all three states are on track to protect their agencies' future by identifying how to effectively re-engage lapsed hunters back into the hunting tradition.

## Reference List

D. J. Case and Associates, Inc. 2007. *Hunting license sales campaign results*. Nashville, Tennessee: Tennessee Wildlife Resources Agency.

D. J. Case and Associates, Inc. 2008. *Hunting license sales campaign results*. Nashville, Tennessee: Tennessee Wildlife Resources Agency.

# Portraying Hunting in the Media

**Chris Chaffin**
*Chaffin Communications, Inc.*
*Melbourne Beach, Florida*

It is no secret to this gathering of wildlife management professionals that today's mainstream media largely discounts hunting as a relevant lifestyle—unless it serves their purpose as a story that can be sensationalized for short-term audience recruitment. Sadly, the sensationalism seems to work, luring readers and viewers to these news and information vehicles, which, in their business model, equates to dollars from subscribers and substantial revenue from advertisers.

Often, if not typically and apparently without knowing the facts, both news and feature coverage of hunting and the community of hunters nationwide, are dismissed as unnecessary in today's society, irrelevant to the general public and politically incorrect. Little distinction is made between guns used in hunting and other gun stories. They are routinely lumped together, especially when a hunting accident makes the news.

Larger, mainstream news media, in spite of their once loudly proclaimed objectivity and fairness philosophies, have become more politically active and appear to have their own, clear-cut, political agendas. They have advisory boards and committees setting policy, and they routinely establish positions that influence decisions on what constitutes news, what stories will make the big headlines, what slant a story will have and, in a broader but realistic sense, set a news budget that determines what stories are newsworthy and will be released to the public.

Today, there is little question the big-market, urban media have profound influence on suburban and rural news outlets. Unquestionably, the smaller and more rural media take their lead from the major, big-city media for front-page stories and, to a somewhat lesser degree, social positions and posturing.

It is important to recognize today's news media live and die by competing with other news vendors for scooping a major story or having exclusive coverage. That almost always makes wildlife and hunting news a minor, buried-in-the-middle-pages-of-section-D story.

Even casual observation of current news sources makes clear the unbalanced coverage given to stories and news about hunting. For example, in

spite of the complete turn-around and impressive records of improving hunter safety and training throughout all of North America, there are no headlines that tell the public of the 700,000-plus hunter education graduates each year and the tens of thousands of future conservationists who hunted safely and conscientiously next to their mothers and fathers.

To be fair, however, it should also be recognized that some media, both large and small, continue to cover the hunting story—and even celebrate it—using it as a promotional tool and revenue-generating topic in areas where the hunting, outdoor lifestyle is prevalent.

Further examination of contemporary media reveals that coverage of hunting is further reduced by the broader influence of national politics, decisions by and policies of national entertainment conglomerates, as well as news organizations, newsdesk editors and reporters who have urban backgrounds and interests—many of whom have an eye set on careers in highly urbanized, large city markets. . .where the visibility (and the pay) is notably greater.

## Outdoor Television

In addition to the news media, one other significant medium tells the outdoor, hunting story to broad audiences across the continent—outdoor television.

This dynamic, powerful medium, which in recent history has been the medium of choice for both news and entertainment for the majority of North America's population, is—in spite of its reach into millions of homes—still a niche media and serves only niche markets. None of the networks broadcasting outdoor programming are fully distributed, which is to say they are not available in every home that has television service.

They do, however, serve an emotionally attached and passionate audience that cares deeply about the outdoors. They embrace hunting as a lifestyle, and the outdoor programming, for many, serves to validate that lifestyle choice.

While it might seem this medium is financially and philosophically free to produce exactly the kind of programming that would serve current and future hunters the best—there are real-world considerations for them, too.

Outdoor television is a business. Each company has its own business plan and a business model—which is essentially an advertising-based model—complete with a targeted audience, income needs, budgets, advisory committees

and boards of directors. Some are even publicly traded. They have chief executive officers and chief financial officers, human resource officers, programming directors, salespeople, public relations and marketing people, production teams, etc.

In order to stay in business, they have to make business decisions every day that will enable them to compete with other outdoor television providers and mainstream media—as well as with today's plethora of other activities—for people's attention and time.

They make programming decisions based on business priorities, i.e. the ability to sell programming to advertisers and sponsors as well as to distributors, the potential impact of the current political atmosphere, research and other factors that indicate how many potential viewers will tune in, and comparison and competition with programs on other networks.

The cost of contracting for or producing shows is an important component in the overall business decision-making process, as a wide variety of programming quality exists—including everything from home movies with bad music in the background to full-blown, Hollywood-quality productions.

Other real-world observations about today's outdoor television providers include:

1. They are largely funded by the endemic industry, which has finite resources to support programming.
2. The endemic industry is bombarded by media and other endemic groups and organizations for support (products and money).
3. Decisions by network personnel and by those who distribute the programs (satellite and cable operators) are sometimes based on the personal attitudes of decision makers—sometimes even at local levels.
4. Programming managers and producers have varying degrees of outdoor experience—some have extensive experience, some would be comfortable only on guided hunts, others see the outdoor lifestyle only as a job and are not participants in the outdoors.
5. Some shows are slaves to sponsors.
6. There are a limited number of hours per day to program.
7. The outdoor audience is only a small percentage of the total audience.
8. Many networks are struggling with the contemporary consolidation trends of national entertainment industry.
9. Consolidation is driving many of the smaller, independent producers and sponsors out of the field because it has become too costly.

10. Regional networks have smaller pieces of the pie—hence, smaller budgets and less distribution.
11. Today's audience specifies the content it wants and demands access to that programming when it wants it, not when networks decide to air it, i.e., like video on demand services.

Essentially, all wrestle with the bottom-line questions. What programming will the largest number of people watch? And, who is willing to pay how much to put their advertising with which shows?

It is important to mention that outdoor magazines, and to a lesser extent online magazines, also play a role in portraying hunting to the public, and it would be an oversight to not point out that they face many of the same challenges as outdoor television. Added to the list is the undeniable fact that, with each passing generation, fewer people are reading printed publications, opting in significant numbers in recent years to get both their information and their entertainment via electronic media, notably from streaming sources over computers and handheld devices.

## The Good, the Bad and the Future?

All that being said brings this discussion to a pivot point and to the questions of: what does the media do well, where does it fail and what could or should it be doing?

Before launching into a pointed critique of today's outdoor media, a word of caution is in order. It's easy to expect it to produce shows and articles that directly reflect ourselves. One of the oldest platforms of the modern hunting community is that hunting is an activity, a lifestyle, enjoyed by people from all walks of life. In North America, under the guiding light of the North American Wildlife Management Model, the opportunity to take gun in hand, to head to the field and to legally pursue wild game has been a dependable value and commonality. Hunters have long shared and embraced other hunters with differing social and financial status, who wear different outdoor clothes, who have a different drawl or accent.

Even with recent turf wars over issues, such as black powder versus archery and general rifle versus dog-hunting seasons, there is general agreement on the importance of maintaining hunting seasons and of preserving our hunting

heritage. It's far more important to have outdoor media producing articles and shows that help us preserve fond memories of times spent afield and that start our spirits soaring in expectation of hunts to come—as opposed to having shows that capture the hunt just the way you prefer it.

What the shows and articles need to reflect is a legal, ethical hunt that compels us to revere our outdoor resources and opportunities, while being mindful (not *apologetic*, mind you, but *mindful*) of how our behavior might affect others, hunters and nonhunters alike.

Outdoor television shows are likely critiqued more often and more harshly than print stories as the emotions of language and action are more visible. The good and the bad are often readily apparent: the pronghorn skylined on the horizon in a hunter's scope, guided hunts with hunters in prescouted stands and locations, the poorly placed shot all-too-evident in the slow-motion video or the hunter's dialog speaking of values only in terms of spread and points and trophy scores.

But just as clearly, television captures and relays the camaraderie of friends and families afield, the decision not to take a low-percentage shot, the clean, one-shot kill of a skilled outdoorsman or outdoorswoman, the reverence and the joy of hunters once again testing their abilities and connecting with nature—playing out their contemporary role as modern predators and a dynamic and crucial component in today's science-based, wildlife management process.

Clearly the good and the bad exist. Often, it can be the small, subtle things that make the difference: happy, smiling, successful hunters with a dead deer's tongue hanging out or rough, disrespectful handling of a duck tossed into the corner of a blind or a pheasant crammed into a hunting vest.

The media, with television being specifically noted, is a powerful tool of influence and change, and today's subject begs the questions: can it be better, and what role can agencies, organizations and individuals play in making it better?

## Moving Ahead

The keys to retaining and improving hunting programming in the media—and to improving the nation's image of hunting and hunters—is to understand and meet the needs of the business models that drive programming or space allocation and distribution. The key to having that programming reflect positively on hunting is making hunting relevant to contemporary society—a daunting

challenge that will include broad needs for education, self-governance, cooperation, funding, political activism, creative thinking and effective marketing.

Recognizing that many agencies and organizations are already working on various components, following are suggested activities that can make a difference in the future of hunting, in how it's portrayed in the media and in how it's accepted by the public.

One, get involved: work with producers to create opportunities to present your point of view and the meaningful facts and figures about hunting and sportsmen and sportswomen. Producers are small businessmen and women. They will respond to offered opportunities that will result in entertaining, informative hunting shows—especially if you can help make it cost- and time-effective for them. Hosting them will give you the chance to exchange points of view and share ideas about what makes good outdoor television and to get some exposure for your state's management program at the same time. Take the time to write constructive letters or to call them on the telephone.

Several years ago, Florida needed to harvest more alligators to meet management objectives and, obviously, more awareness of and participation in their hunts. Recognizing that alligator hunts were rarely shown on outdoor television shows, I contacted a local outfitter who supports conservation and knows the value of promoting hunting opportunities on outdoor television. He jumped at the chance to host a producer and a time and place was set for the hunt.

Next, I contacted a regional tourism and visitor's bureau. Once they learned this hunt would be on national television, they were happy to work within their network to find a motel manager who comped rooms for the TV crew in return for a minimal amount of recognition on the episode featuring the gator hunt.

To make the story more informative and meaningful, I arranged for the Florida Wildlife Conservation Commission to send a regional information officer and the alligator program manager for interviews. In that one show, we taped authoritative summaries of both the alligator management or sporthunting program and the nuisance alligator program.

The producer reported enthusiastic response to the shows—meaning viewers watched the show and saw the sponsors' advertisements. The visitor's bureau was pleased with the coverage and comped additional rooms the next year. The outfitter was so pleased he set up a management hunt the following

year taking the producer onto private land with 100 management tags to be filled, opening the door for the show to talk about cooperative efforts between private landowners and state wildlife agencies.

Two, generate positive, constructive interaction with networks and sponsors. Look for companies in your state that sponsor outdoor television programs. Take the time to meet company executives and create opportunities to exchange ideas. Take them to lunch. Take them hunting. They have real influence with producers who rely on sponsors for their livelihood.

You can identify companies that advertise on outdoor television by watching the shows, by researching on the Internet—where almost every producer and advertiser has a Web site, or by looking at the directories from the Shot Show or the Archery Trade Association's annual events, as well as other similar shows.

Three, develop a campaign targeting cable and satellite delivery companies to make sure they know how many people want good outdoor programming and what kind of programming you prefer. Make sure they know how important the outdoor lifestyle is to you and to other outdoorsmen and outdoorswomen. Take the time to make them aware of the economic impact hunters have both locally and nationwide. Use this campaign to build stronger working relationships with sporting clubs; species-group members, angler and shooting organizations, etc. by making it a cooperative effort.

Four, conduct social research to identify messages and details about hunting and hunters that ring true with the general public; then develop a broad marketing plan to get the messages out to key opinion leaders, decision makers and other influential community members. Be sure to put careful thought into the delivery tools and messengers. Make certain they are the right tools and the right people for the job. Find partners that can help make the campaign more effective and affordable.

If you don't have the budget for the research, contact industry friends like Responsive Management or the Recreational Boating and Fishing Foundation, which have done this kind of research and are willing to share their findings.

Five, develop a program to have key outdoor-industry leaders initiate contact and dialogue with leaders of the outdoor media to educate them about vital hunter-conservation concepts, challenges and needs and to gain understanding of how the conservation industry can work with outdoor-television industry. Look for venues where business travel may already be scheduled—

American Fish and Wildlife Association (AFWA) or North American Wildlife and Natural Resources conferences, the Shot Show or other trade shows, wildlife expos, industry meetings, outdoor-writer groups, etc.

As an alternative, create an event with special invitations extended to the outdoor media, creating a specific opportunity to interact with agency administrators and program managers. Take clues from current news headlines or management-plan priorities to develop topics of concern or interest. Generate prioritized lists of hunts and associated field activities at which your agency could host outdoor media that would allow you to explain the need and importance of specific decisions, activities or programs.

Six, develop a campaign to involve today's outdoor-television producers and hosts in using key messages (from number 2) in their productions and encourage the evolution of outdoor programming to embrace important values and experiences of hunting while de-emphasizing existing trophy-mentality or other behavior the outdoor community find problematic.

An easy-to-produce DVD, hosted by a recognized wildlife authority, with a message direct to outdoor television producers, could communicate the need—and opportunity—for producers to relay important messages to their audience. It could be authored by AFWA, Wildlife Management Institute or an individual state, federal or provincial wildlife agency, and it could include facts and figures producers might not otherwise take the time to find.

Seven, use messages and materials developed as a result of social research to extend support for and expansion of existing programs that work: National Hunting and Fishing Day, Step Outside, Families Afield, Project Wild, National Wild Turkey Federation's Jake's, Becoming an Outdoor Woman, Ducks Unlimited, Inc.'s Greenwings, U.S. Sportmens Alliance's Trailblazers, the Big Brothers/Big Sisters "Pass it On" and other mentoring programs, etc.

Each of these and many similar programs have a ready-made audience that has shown an interest in the outdoors. Having agency personnel directly involved with their events and providing well designed, age- and event-appropriate take home material will educate participants on hunting concepts and information and will give them vital insights into what and where the next steps are to becoming an active participant in the outdoors.

Eight, conduct research on how to make wildlife conservation relevant to urban populations; develop communication vehicles based on findings and effective delivery mechanisms; include existing knowledge from agencies, such as Missouri and Arkansas tax campaign materials.

Nine, conduct social research to better understand minorities' connections with and attitudes about wildlife conservation; learn how to communicate effectively with these groups and to evaluate what your agency is doing to find correlations between the cultures and attitudes of minorities and the programs of your agency. Both advisory and focus groups can be helpful.

Ten, train spokespersons on effective messages and delivery. Get the most effective communicator(s), not necessarily the person with the highest rank or position.

Our hunting heritage and our hunting opportunities are being challenged on many fronts—from a growing population with no connection to the land, from unchecked urban sprawl, from politicians and political agendas that originate in and focus on the concerns of city dwellers, from the dwindling access to hunting land and from the media that tells us reality is a completely scripted, artificial and temporary community created on some distant, tropical island.

The outdoor media is challenged, too, by having to compete with mainstream media for our attention, for advertising dollars and for bandwidth on the distribution networks.

I contend that the forward motion and trends of today's outdoor coverage will not change on their own. And that only the educated, intelligent and dedicated involvement of those who care the most about wildlife and hunting will generate positive change and the rebirth of a country that honors hunter-conservationists and the hunting traditions.

## Broader Concepts—The Public's View of Hunting

Conservation is a motherhood-and-apple-pie concept and research shows it rings true with a strong percentage of the public. It needs to be more broadly applied in our communication efforts—and used intelligently, applying both existing and new research to favorably tie it directly to hunters.

It is a concept central to the larger arena of the public's view of hunting, where there are just as many opportunities as there are challenges to educate the public about hunters and hunting, as well as influence their points of view. A few ideas are offered for consideration.

1. Find and involve conservation heroes who will help fund and champion the hunter-conservationist cause (e.g., Johnny Morris, Cabela's brothers). Use their networks to find/recruit others.

2. Initiate a rebirth of conservation-wildlife programs in elementary schools—live people, live critters and high-quality, age-specific video, computer and printed material developed by professionals. Make it fun and interesting. Get their minds involved with wildlife.
3. Get kids outdoors where they can discover, explore and experience nature—through organized programs as well as through informal opportunities with family and friends. Nature is hard to resist when it becomes a hands-on activity.
4. Develop mass media vehicles that bring the sights and sounds, emotions and experiences of the outdoors to people who aren't already exposed to it—movies, video games or programming, books, on-line magazines and newsletters for age-specific audiences. Have the right people do the job.
5. Become an active supporter of and contributor to the Hunting Heritage steering committee's project to coordinate the efforts, resources and energy of hunter-conservationists to develop and implement a campaignlike the North American Waterfowl Plan—a plan currently under development by the Wildlife Management Institute—to assure the future of hunting.
6. Consider a campaign for national legislation and funding of a marketing campaign to increase understanding of and participation in hunting—similar to the legislation that supports the Recreational Boating and Fishing Foundation campaign.
7. Elect officials that understand and support hunting and the hunter's role in wildlife conservation.

# Workshop 2.
# *Climate Change Impacts on Wildlife, Fisheries and Outdoor Recreation in North America*

## Development of Recovery Credit Systems as a Policy Innovation for Threatened and Endangered Species

**R. Neal Wilkins**
*Texas A&M Institute of Renewable Natural Resources*
*College Station, Texas*

**David Wolfe**
*Environmental Defense*
*Austin, Texas*

**Linda S. Campbell**
*Texas Parks and Wildlife Department*
*Austin, Texas*

**Susan Baggett**
*U.S. Department of Agriculture, Natural Resources Conservation Service*
*Temple, Texas*

### Introduction

A goal of cooperative conservation is to stimulate collaborative approaches to mutually agreeable conservation goals through incentive-based programs. When these conservation goals include endangered species recovery, the greatest overall potential for gain can sometimes come from habitat conservation on private lands. Thus, a primary challenge is to create programs that encourage private landowner participation in conservation commitments and that sufficiently reward them for measurable conservation gains. This has been the idea behind conservation banking and other market-based approaches for meeting the goals of the Endangered Species Act (ESA). Conservation banking has demonstrated the power of market-based approaches, and several

banks appear as successful conservation ventures. As described here, a recovery credit system may be an additional tool for contributing to species conservation.

The overall approach to recovery crediting is to build measurable conservation benefits leading to recovery goals for a species of interest. In the process, some of the conservation benefits that accrue to a sponsor may be used to offset adverse impacts to the species. A primary qualification for a successful recovery credit system is that the expected benefits of credits will last at least as long as the expected adverse impacts of any actions for which they compensate.

Following are guidelines or policy considerations for establishment of recovery credit systems. These are based on the authors' experiences in designing and implementing a proof-of-concept recovery credit system for the endangered golden-cheeked warbler (*Dendroica chrysoparia*) in central Texas. Our experiences in developing and operating this recovery credit system may prove helpful as other recovery crediting efforts are initiated. The U.S. Department of Interior (USDI) has recently published a draft of *Guidance on Recovery Crediting for the Conservation of Threatened and Endangered Species* (Federal Register. Vol. 72, No. 212, November 2, 2007). We intend our discussion here to stimulate further dialogue and improvements for recovery crediting as a policy tool for meeting the recovery goals of the ESA.

## Background and Development of a Recovery Crediting Proof-of-Concept

In late 2005, a working group was convened by the Texas Department of Agriculture to design the Recovery Credit System for golden-cheeked warblers. The idea was to create a means for quantifying the off-site endangered species conservation efforts funded by the Army at Fort Hood. Fort Hood had chosen to fund habitat-conservation efforts on private land as part of their response to a 2005 biological opinion—although the metrics for quantifying such an effort (and thus the flexibility that might be afforded Fort Hood) were not yet developed. The initial criteria for developing and managing the recovery credit system was completed in early 2006 and shared with officials at USDI. The outcome was establishment of a 3-year pilot or proof-of-concept program being applied to a portion of the species' range on private lands near Fort Hood.

The proof-of-concept is administered by the Texas A&M Institute of Renewable Natural Resources (IRNR) under contract from the U.S. Department of Defense, the Army, and additional implementation funds are provided by U.S. Department of Agriculture, Natural Resources Conservation Service and U.S. National Fish and Wildlife Foundation. Field implementation is through a subcontract partnership with the Texas Watershed Management Foundation. Staff biologists with Environmental Defense provide field validation of suitable habitat and endangered species management prescriptions. The remainder of this paper provides commentary on guidelines and relevant policy issues that should be useful when designing and implementing similar systems.

Thus far, this proof-of-concept has invested $725,687 in fixed duration contracts to secure conservation actions across 7,158 acres (2,896.7 ha) of private land. Of that area, 1,174 acres (475.1 ha) of occupied endangered species habitats are being conserved, enhanced and expanded with limited-duration contracts ranging from 10 to 25 years. Our model utilizes a reverse auction whereby landowners make competitive bids to enter the program. As a result, Fort Hood has gained credits that may be used to offset future impacts to the species on the installation.

## What Is a Recovery Credit System?

A recovery credit system is a policy innovation to aid in the implementation of the ESA. An appropriately designed recovery credit system is a tool that: (1) provides a means for quantifying the conservation benefit of habitat protection, management and enhancement for threatened and endangered (T&E) species, (2) establishes a framework for sponsors to invest in T&E species recovery in a cost-efficient manner, (3) creates market-based incentives for landowners to commit to effective T&E species habitat management, (4) provides a mechanism for sponsors to accumulate credits that later may be used to offset adverse impacts to a species and (5) establishes assurances that sponsored conservation actions are effectively implemented through a standardized verification and monitoring system.

## Establishing a Recovery Credit System

A recovery credit system may be developed by a team of biologists, land managers and other decision-makers and organizational sponsors—this is

the *development team*. The participants in a recovery credit system must perform several functions as detailed below. The system may also be divided into *credit accrual* and *debiting processes*. These processes may be site-specific or programmatic.

***Functional Components of a Recovery Credit System***

The operation of a recovery credit system requires several coordinated functions. The organizations responsible for each of these functions should be designated at the time the program is proposed. Each participating organization may serve more than one function. However, there should be sufficient division to avoid conflicts of interest and to assure independence of functions. The combination of organizations, duties and functions are likely to vary according to interests and local circumstances.

***Sponsorship***. Sponsorship includes financial investments in the creation of recovery credits. Sponsorship may be provided by the individuals, agencies or organizations interested in investing in species recovery efforts.

***Financial management***. Financial management includes receipt, transfer and accountability of funds invested in the establishment of recovery credits.

***Program management***. Program management includes overall administration of contract negotiations, operations, implementation, contract enforcement and implementation monitoring. These functions are performed by a program manager.

***Monitoring and research***. Monitoring and research includes effectiveness monitoring and research and validation efforts necessary to facilitate adaptive management.

***Program oversight***. Program oversight includes validation of recovery credit calculations, review and approval of endangered species habitat protection and management contracts, periodic reviews of implementation monitoring, as well as monitoring and research reports.

***Program consultation***. Program consultation includes preparation of programmatic biological assessments or evaluations of the recovery credit accrual system and credit debiting system—along with the associated ESA Section 7 consultation process.

***Credit Determination and Accrual Process***

The credit determination and accrual process for a recovery credit system starts by defining a species-specific and biologically based definition of a

conservation unit that is of significance to the species (or suite of species) to be addressed. Conservation units would typically be a specified spatial extent of suitable or occupied habitat that is significant for the species. Depending upon the ecology of the species, there may be thresholds of habitat area, habitat-patch size or other criteria that may serve as a trigger for identifying eligible conservation units. For optimal use of conservation unit criteria, the thresholds and conservation units may be modified to account for prevailing ownership sizes and other operational concerns. But, the net product must provide conservation units, or multiples of conservation units, that are of effective size for species persistence and productivity.

Conservation units are then converted to eligible recovery credits. In some cases, eligible conservation units may be directly converted to eligible recovery credits, or specific multipliers may be applied to favor those conservation units that are likely to provide a greater recovery benefit to the species. For example, greater weight may be given to those conservation units within a certain distance from relatively large existing populations of the species. In the same fashion, greater weight may be given to those conservation units within priority recovery regions—perhaps those that have not yet met recovery goals. In this latter case, the rationale is to provide a greater incentive for habitat protection and enhancement in high-priority areas of the species range. The end product is a specified number of recovery credits.

Next, a process is designed for prescribing specific management actions to protect and enhance habitat function, habitat development and other factors contributing to species persistence and productivity associated with eligible conservation units. This action is best accomplished through developing criteria (or using suitable existing criteria) for site-specific management plans to be implemented through the duration of a contract period.

A system for screening eligible lands must be established. Eligible lands will typically include all of the landscapes with habitat patches that are of sufficient size to ensure a minimum acceptable level of species viability. While detailed population viability analyses and other rigorous analyses are ideal for providing the foundation for screening lands for determining conservation values, these are not available in many cases. In these cases, we recommend the use of best judgment from a science committee of species experts combined with a well-designed monitoring program. For many species, the screening system may include the use of remote sensing and geographic-information-system-based

habitat occupancy or suitability models based on known species—habitat relationships. Once eligible lands are identified, the program manager arranges for access and site visits to confirm habitat suitability or species occupancy. Communication with landowners and land managers is one of the most important factors to consider here, and we have found it important to include landowner interests on the development team.

After agreement from a candidate landowner, management plans are drafted for those lands with eligible conservation units. The costs of habitat protection, management and enhancement practices are calculated by the program managers. Contracts for implementing the management plans are negotiated with the landowner. Contract lengths may be for fixed periods, for variable lengths or perpetual. The range of acceptable contract lengths should be established by the development team and should consider the length of anticipated habitat recovery on properties where a pool of recovery credits might be used to offset either temporary or permanent habitat loss. Contract costs may include all or part of the costs of implementing the management plan or annual payments to the landowner. For cost efficiency, a system of reverse auctions may be established whereby landowners submit competitive bids for the amount of cost-share management practices and annual payments they are willing to accept to implement the plan throughout the life of the contract. In this case, the cost per recovery credit unit can be used to gauge the most cost-efficient expenditure of program funds.

### *Accounting for Accrued Credits*

As credits accrue, they are held in trust for an individual sponsor by program and financial managers. Each credit has a vintage (year established), a term (number of years of eligibility) and a service area (geographic area for which the credit applies). The service-area concept is the same as that developed for conservation banking—i.e., the credit may apply to the entire distribution of the species or to only a specific and designated geography. At any one point in time, the program manager can project the balance of credits in force for any future year. If there is more than one sponsor in the system, this projection can be determined on a sponsor-by-sponsor basis. Sponsors might include public agencies, private landowners, corporations, utilities, conservation organizations, and private foundations. Sponsors may invest in recovery credits with different objectives. For example, sponsors may invest in recovery credits as a means to

offset management actions or unanticipated habitat loss through either the ESA Section 10 habitat conservation planning or the ESA Section 7 consultation process. Sponsors may initially invest in the accrual of recovery credits to assist in establishing the credit system. These sponsors might not have a need for using the credits to offset any future activities. Other sponsors may yet choose to invest in recovery credits simply as a contribution to species recovery. Sponsors essentially have an ownership interest in these credits, and they may be transferable.

***Debiting Process***

Debiting occurs when a credit needs to be used to offset a loss of habitat function. The process for debiting recovery credits from an account requires an assessment of two independent factors—the number of recovery credits impacted and the duration of impact. In general, the number of recovery credits impacted can be assessed by calculating the number of credits existing prior to the impact then by comparing that to the number of existing credits. If the impact involves permanent and irreversible habitat destruction and removal, then the recovery credits lost may only be offset by recovery credits under perpetual agreement. Under all other circumstances, the duration of impact includes that period for which the habitat is projected to either recover to a predetermined suitability for the species or for the duration of the disturbance, whichever is most appropriate to the specific impact. The number and duration of credits are then withdrawn from the sponsor's account. For the system to maintain a net positive balance, a sponsor's account may not at any time go into deficit. In addition, as an extra hedge against unforeseen circumstances, the system should include some base percentage of each sponsor's credits that remain unavailable for debit—e.g., 10 percent of any vintage of credits accrued remain unavailable.

As with conservation banking, we anticipate authorization for use of credits through one of two means: (1) through Section 10 incidental-take permits that require the use or purchase of credits from an approved recovery credit system; or (2) through Section 7 biological opinions that address a proposed federal action for which the agency has agreed to purchase or use credits from an approved recovery credit system as a way of ensuring that its action meets the standards of ESA Section 7. As of the date of drafting this manuscript,

however, the draft guidance issued by the USDI only addresses the use of recovery crediting for the latter of these two means.

***Comparison of Recovery Credit Systems to Conservation Banks***

As with conservation banking, recovery crediting has among its goals the enhancement of endangered species recovery through establishment of larger conservation areas and enhancing habitat connectivity. Both are also designed to enable conservation to be implemented within a market framework by creating a benefit out of ownership and management of endangered species habitat, rather than a liability. As argued by Fox et al. (2006), conservation banking has relied largely on preserving existing habitats rather than restoring them. With proper development, it may be that recovery credit systems can be developed in such a manner that they complement the habitat preservation functions of conservation banks by encouraging habitat restoration and creation. Some key differences between recovery credit systems and conservation banks are described below.

1. Under conservation banking, a conservation easement must be placed on the property. A recovery credit system could operate separately, or in addition to, a conservation easement. As proposed, a recovery credit system also allows for credits to be accrued through agreements with terms shorter than perpetuity. These term agreements are intended to provide a means for a sponsor to accrue credits that are then available to offset temporary degradation of habitat.
2. The price of a credit purchased from a mitigation bank is generally fixed and is based on the capitol expenses and ongoing management costs of establishing and maintaining the bank. The price of a credit purchased through a recovery credit system agreement may be based on a bidding process by individual landowner participants.
3. A recovery credit system allows for credits to be valued and accrued potentially anywhere within the breeding range of the species. Specific locations for the execution of agreements and the accrual of credits may be established through the development and implementation of a screening and ranking process that is designed to place the highest credit value on sites with the greatest contribution to recovery.
4. The complexity, expense and perpetual nature of conservation banks limit their implementation feasibility to a relatively small subset of

landowners. The ability to participate in endangered species recovery efforts through term agreements that are part of a recovery credit system may facilitate the participation of a broad range of landowners.

5. Recovery credit systems have the potential to accommodate substantial shifts due to climate change, disease, invasive species or other reasons in endangered species habitat distribution or quality over time. Term agreements may be allowed to expire (i.e., not renewed) in areas where habitat value may be declining due to one of the aforementioned reasons, and new agreements may be executed in areas where habitat value is higher or increasing.

***Principles of a Recovery Credit System***

For maintaining system integrity and to add assurances that a recovery credit system provides a net benefit to endangered species, we recommend the following principles be applied to any recovery credit system.

*Use of best available science*. Each system should be based upon the best available information for species recovery (this may be a recovery plan or other information). This information must be referenced in the recovery credit system documentation, and, if the recovery credit system deviates from this information, there must be justification for doing so. Using the best available information, target areas (priority landscapes) for accrual of conservation units should be identified as part of the recovery credit system to ensure that the program is (a) providing the greatest possible contribution to recovery and (b) implemented in such a manner as to enable scientifically based effectiveness monitoring.

*Net benefit to the species*. The design of a recovery credit system must ensure a net benefit to the species. Recovery crediting builds measurable conservation benefits leading to recovery goals for a species of interest. In the process, some of the conservation benefits (i.e., credits) that accrue to the species in one place may be used to offset adverse impacts to the species in another place. On the whole, a recovery credit system must have features that assure an overall net benefit to the species. The system must include specific practices that will lead to net benefits. This may be accomplished through yearly set-asides of credits (that may not be debited and that will accrue over time), rounding down to determine off-site conservation units and rounding up to determine on-site conservation units. For example, if a conservation unit is defined as 20 acres (8.1 ha), then 21 acres (8.5 ha) of off-site habitat is equivalent to one conservation

unit (one conservation unit equals a patch of habitat ranging from 20 to 39 acres (8.1–15.8 ha), two units equals 40 to 59 acres (16.2–23.9 ha), etc.). In these off-site cases the acreage is rounded down. For on-site habitat in this scenario, 21 acres (8.5 ha) would be equivalent to two conservation units (one conservation unit equals a patch of habitat ranging from 1 to 20 acres (0.4–8.1 ha), two units equals 21 to 40 acres (8.5–16.2 ha), etc. In on-site cases the acreage is rounded up. This practice provides a safety factor that will help ensure overall net benefits to the species.

***Use measurable and verifiable conservation units***. A measurable habitat-based conservation unit must be defined for the species for the purposes of crediting and debiting. This conservation unit must be based on the ecological needs of the species and must meet certain minimum criteria of size, quality and landscape context so as to be beneficial to species productivity and viability.

***Recovery contribution is the means for valuing conservation units***. Conservation units should be valued based on their contribution to the recovery of the species. The highest value will be given to units that have the greatest positive impact on recovery per the best available information. The specific valuation will rely on the best available species-specific information across the range (population sizes and distribution, threats, degree of landscape integrity, etc.) as well as general principles of conservation biology (e.g., large blocks of habitat are better than small, high-quality habitat that is better than low quality, etc.).

***Balance the duration of benefits and impacts***. Each credit has a duration of benefit—i.e., the length of time for which a species is expected to receive benefits from the conservation actions. And, each adverse impact has a duration—i.e., the length of time for which a species is expected to suffer the adverse impacts of an action. A primary qualification for a successful recovery credit system is that the duration of credits is at least as long as the duration of adverse impacts of any actions for which they compensate.

***Clear ownership and possession of credits***. In establishing a recovery credit system, the agency or organization holding the credits must be specified at the outset, and assurances and safeguards must be in place to assure that credits are verifiable. The financial sponsor of the actions that result in a credit must be able to claim ownership rights over their credits, and these credits may be transferred, sold or retained as directed by the sponsor but within the constraints of the established system.

***Strong monitoring and research component***. The implementation of conservation actions under a recovery credit system must be assured through compliance monitoring—the outcome of the conservation actions must be followed through effectiveness monitoring—and the underlying scientific basis for management should be validated through research. All of which should be integrated into a recovery credit system.

***Additional Procedural Considerations***

1. For sponsors that anticipate a need for recovery credits to offset management actions or habitat degradation the recovery credit system should specify (or perhaps recommend) a certain minimum amount of credits of various terms that should be accrued by the sponsor within a certain period to provide an adequate level of credit accrual prior to a debiting event. This portfolio of credits should take into account the extent and quality of on-site habitat and the estimated types and magnitudes of events that would trigger a debiting action.
2. A process must be in place to specify the quantity or proportion of credits held by an agency or organization to be made available for offsetting unintentional habitat loss or for offsetting modification of habitat elsewhere.
3. Recovery credits should be secured through some form of contractual relationship with a landholder. This contractual relationship should explicitly state terms of compliance and include penalties for noncompliance or breach of contract.
4. For credits to be available for offsetting habitat loss, all contractual obligations for establishing the credit must already be in place—i.e., credits are established in advance of any offset.
5. Habitat that is temporarily degraded on-site, and for which off-site, fixed-term credits are debited, must be allowed to recover and return to suitability for the species. The fact that off-site, fixed-term credits are debited does not mean that the on-site degraded habitat can be altered in any way that would hinder its recovery to original baseline conditions.
6. Both permanent and term-credit agreements will require active habitat enhancement and management to ensure a net benefit for the target species. All agreements must include a management plan that identifies the activities necessary to enhance and maintain the value of conservation

units. Performance standards must be set and monitored to ensure compliance.

## Conclusion

Market-based programs for providing incentives to private landowners to participate in endangered species conservation efforts can provide the basis for reversing some of the historic disincentives of implementing the ESA. There are several outstanding opportunities for developing recovery credit systems throughout the country. Many of these opportunities could be realized through development of a national policy that specifically promotes such innovation.

One of the more powerful elements of recovery crediting is the potential for implementing a market-based approach for assigning value to conservation measures. As currently proposed, recovery crediting could provide a strong incentive for private landowners to participate in actions that contribute to federal obligations for T&E species recovery. With expanded policy guidance, recovery crediting could provide a mechanism for implementing recovery plans for a variety of species.

## Reference List

Fox, J., G. C. Daily, B. H. Thompson, Jr., K. M. A. Chan, D. Davis, and A. Nino-Murcia. 2006. Conservation banking. In *The Endangered Species Act at thirty: Conserving biodiversity in human-dominated landscapes, volume 2*. 228–43, eds. J. M. Scott, D. D. Goble, and F. W. Davis. Washington, DC: Island Press.

# Mitigating Climate Change and Enhancing Wildlife Habitat: A Partnership Approach

**John G. Rogers**
*The Conservation Fund*
*Chapel Hill, North Carolina*

Global climate change is widely acknowledged and at the front in every environmental conversation; the need to take action is clear. The science is strong, but policies supporting action are lacking. Thus, mitigation is sporadic and required only in a few places in the United States. According to the Intergovernmental Panel on Climate Change, more than 17 percent of global anthropogenic carbon dioxide emissions are due to deforestation and decay of biomass (Watson 2001). Furthermore, it is estimated that as much as one-half of the increase in diurnal temperature over the last 50 years may be due to the effects of land-use change (Kalnay and Cai 2003).

On the bright side, some farsighted and concerned corporations are voluntarily working with conservation organizations by undertaking projects to mitigate the impacts of their activities on climate. As these companies consider a portfolio of possible actions associated with reducing or offsetting their carbon dioxide emissions, they have begun to integrate strategies that help to reverse deleterious land-use activities. To this end The Conservation Fund (The Fund) has been working with Fortune 500 corporations as well as organizations like the U.S. Fish and Wildlife Service's National Wildlife Refuge System and state wildlife management agencies to carry out projects that conserve land, restore historic forests, improve fish and wildlife habitat, and sequester carbon dioxide from the atmosphere. These projects represent a true partnership from which each participant benefits. The governmental agency receives land (donated or at a discounted price), restored habitat and some funds to assist in future management; the corporate partner acquires the right to claim the carbon sequestered as an offset against its emissions or as a commodity to trade; The Fund gets the opportunity to further its land-conservation mission; all receive public recognition of their joint effort.

Carbon sequestration, as we practice it, takes advantage of a process we all learned in eighth grade—photosynthesis. Solar energy, in the presence of chlorophyll, converts sugars and carbon dioxide into plant tissue, thus incorporating

atmospheric carbon dioxide into the structure of the plant. As a carbon-mitigating policy and practice, carbon sequestration usually takes the form of encouraging plant growth where plants (usually trees) are not currently growing or where they can be made to grow more efficiently (Noonan and Rogers 2002). However, as an activity designed to mitigate carbon dioxide emissions to meet registration and crediting requirements, carbon sequestration is more complex and goes beyond planting trees.

Much is still unknown about what form carbon crediting will take in the United States, but there are established requirements in the field to assure that benefits are real, permanent and measurable. These were established in the Kyoto Accord but have carried forward to requirements of virtually all of the various registries developing in this country. These overriding requirements that must be demonstrated for each project are:

- leakage: the tendency of a project to merely displace the avoided activity to a different location
- permanence: assurance that the project will remain an enduring part of the landscape
- additionality: a demonstration that the project results in conditions that would not have occurred in the absence of the project.

In addition, to assure that these requirements are met and that the broader environmental benefits are realized, The Conservation Fund carries out its projects to meet a number of overarching goals:

1. projects must represent sound conservation
2. projects must be based upon state-of-the-art science
3. projects must conform to the current state of policy
4. projects must reflect and respect the needs of all of the partners.

To assure that projects meet the broad requirements and accomplish the overarching goals, The Fund and its partners—including representatives of the U.S. Fish and Wildlife Service, Environmental Protection Agency, Illinova (a utility), the Edison Electric Institute, Chevron-Texaco and Environmental Synergy Inc. (an organization that specializes in planting trees for carbon sequestration)—developed a set of principles that would constitute a positive mitigation action and would guide development of projects. These have been refined and today are:

- design: restoration of fully functioning natural ecosystems using native species
- additional: results in carbon accumulation beyond that which would have occurred without the project
- leakage: does not displace a productive land use and is not part of required mitigation
- permanent: The Fund works with the nation's leading public natural resource agencies to ensure that trees are planted in permanently protected areas that have long-term management plans to ensure accuracy and certainty of carbon sequestration; project areas with high risk of natural disaster (fire, storm) are carefully evaluated and may not qualify
- baseline: the project establishes a carbon baseline and a defined monitoring system so that greenhouse gas (GHG) removal can be independently verified
- registration: the project meets the standards and protocol consistent with an established registry, for example, the 1605(b) program of the 1992 Energy Policy Act, administered by the Energy Information Administration of the U.S. Department of Energy, the Climate Registry, and GHG Registry® Program
- environmental benefits: projects provide additional environmental benefits including restored wildlife habitat, improved air and water quality, and enhanced recreation areas.

Each project has six components that must be addressed in the planning and execution phases. First, the site must be identified. It sounds simple, but the partners must agree on where the project is to be carried out in order to achieve the anticipated benefits. Second, appropriate rights to carry out the project must be acquired. With The Fund's projects, this has typically resulted in a fee title purchase of the land on behalf of the state or federal agency. Other organizations have developed and executed easements. The third project component requires site preparation and tree-planting under the direction of the wildlife agency. Agency biologists are responsible for determining the species mix to be planted. Fourth, and vitally important, provisions must be made for long-term management of the site. In most cases, a management plan is developed under which all parties understand how the land will be managed. This generally specifies that

the site will be managed as wildlife habitat and that commercial silvicultural treatments will not be allowed. Fifth, the methods and timing of carbon monitoring and verification are specified and the responsibility for carrying out those responsibilities determined. The sixth and final step is to assure that all partners receive appropriate recognition for their contributions to the long-term success of the project.

As a true partnership, each stakeholder brings its individual expertise to the table to assure that these components are fulfilled in the best possible manner. Thus, The Fund generally initiates early discussions with interested corporate sponsors, acquires the land or rights to the land and generally fosters the partnership. Environmental Synergy, Inc. performs the restoration and assists in the carbon monitoring; Winrock International designs the monitoring protocol and carries out some of the field monitoring; the land-management agency manages the land as a natural ecosystem for wildlife habitat; the sponsoring company provides funding.

At the field level, each project is different, reflecting the varying nature of company needs, land availability, agency requirements and reforestation costs. In general, projects have moved forward as follows.

1. An agency identifies land that it would like to own as part of a conservation unit then determines if it should be restored as a forest.
2. The Fund purchases the land or appropriates rights from willing sellers.
3. In order to meet a predetermined cost per ton of carbon dioxide sequestered, it is often necessary to identify land already in the possession of the agency that needs to be restored. This land is reforested, and the sequestered carbon is reserved to the corporate sponsor.
4. A baseline calculation is determined to calculate the amount of carbon that would be present in the without-project case—baseline calculation. (Note, carbon credits are awarded for all carbon accrued above the baseline).
5. The land identified for the project is reforested.
6. When steps 1 through 5 have been successfully carried out, the purchased land is donated to the agency on behalf of the sponsoring corporation, along with some funds to help defray initial management costs.
7. Simultaneously, rights to all carbon sequestered by the project are reserved to the company for a period of 99 years.

To date, The Fund has pursued this model with 8 companies in 14 separate projects preserving or restoring more than 20,000 acres (8,093.7 ha) that will sequester 8 million tons of carbon dioxide over the life of the projects. Several additional projects are being developed and negotiated. We have successfully demonstrated that voluntary mitigation is compatible with goals for protecting and restoring land and managing it for wildlife habitat in this era of limited funding for wildlife management agencies and their land acquisition programs.

Land conservation and restoration through carbon sequestration is a model that has served The Fund, its conservation agency partners, and other nongovernmental organization colleagues well for the past several years. It has resulted in major habitat gains for fish and wildlife as well as outdoor recreation. The future is less certain. We do not know if projects like these will fare well in a compliance market where companies will be required to reduce or offset carbon emissions. Also, for these projects to be competitive, agencies must continue a positive approach—they will need to make their land available and continue policies that enable projects to compete financially with other approaches. Requiring, optional activities that drive costs up will reduce the financial viability of terrestrial carbon sequestration. Land prices are on the increase; the pressure of the corn ethanol market, among other pressures, is driving land prices up and is competing directly with carbon sequestration interests.

Finally, climate mitigation through carbon sequestration has represented a true partnership in which all partners have measurably gained. It has evolved into an important source of conservation capital in these times of shrinking agency budgets. With continued recognition that this is a real and productive partnership, continued cooperation, and ingenuity, we can continue to mitigate climate and conserve and restore land for future generations.

## Reference List

Kalnay, E., and M. Cai. 2003. Impact of urbanization and land-use change on climate. *Nature*. 423:528–31.

Noonan, P. F., and J. G. Rogers. 2002. The role of carbon sinks in ameliorating climate change. In *U.S. policy on climate change: What next?*, 87–95. ed. John A. Riggs. Washington, DC: The Aspen Institute.

Watson, R. T., ed. 2001. *Climate change 2001: Synthesis report. A compilation of working groups I, II, and III to the third assessment report of the intergovernmental panel on climate change*. New York, NY: Cambridge University Press.

## Gary T. Myers Receives Grinnell Award

Gary T. Myers, Tennessee Wildlife Resources Agency, receives the Grinnell Award from Steve Williams, WMI President.

One of the longest serving leaders of a state conservation organization in U.S. history, Gary T. Myers, was honored with the Wildlife Management Institute's (WMI's) 2008 George Bird Grinnell Memorial Award for Distinguished Service to Natural Resource Conservation.

The Grinnell Award salutes a person whose career in conservation has been exemplified by integrity, leadership, foresight and achievement. Its honorees have been individuals who, sometimes at personal and occupational risk, invariably made decisions in the interest of progressive resource management. "Gary has been doing just that for the Tennessee Wildlife Resources Agency and the citizens and natural resources of Tennessee for more than 30 years," remarked Steve Williams, WMI President, when conferring the award during the 73rd North

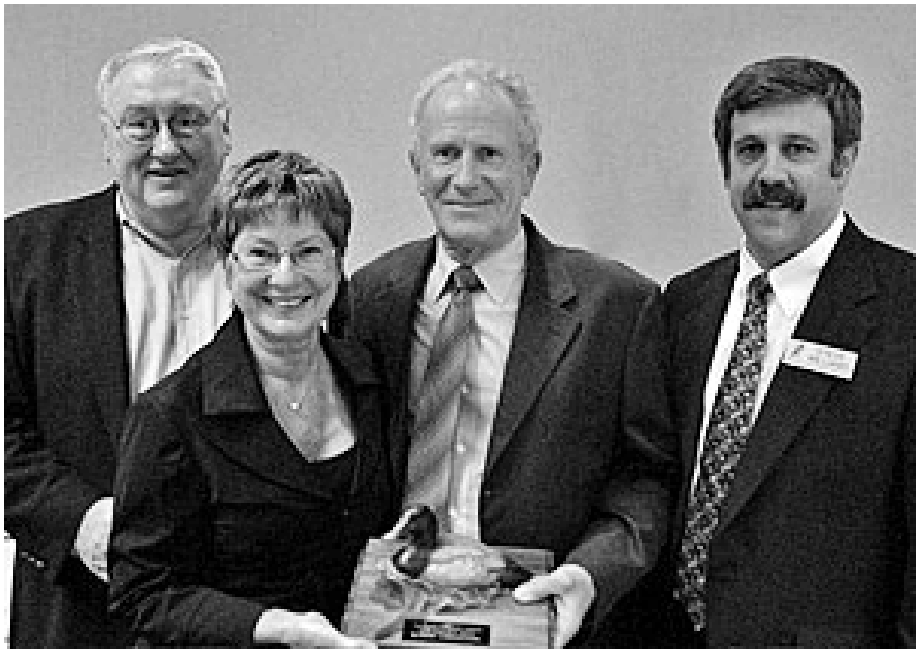
American Wildlife and Natural Resources Conference this past month in Phoenix, Arizona.

"As remarkable as the length of Gary's tenure as executive director for the Tennessee agency," added Williams, "is the leadership he has shown for progressive conservation throughout North America."

Among Myers' many credits is serving a key role in the annual expansion of Dingell-Johnson funds. He was directly involved in both the national and international implementation of the North American Waterfowl Management Plan, and he secured funds for the first waterfowl joint venture. Gary has served on the North American Wetlands Conservation Council and has been actively involved with the North American Bird Conservation Initiative. He is a staunch supporter of the Southeastern Aquatic Resources Partnership Initiative. And he is former president of the Association of Fish and Wildlife Agencies.

Said Steve Williams, "There is no greater honor that the Wildlife Management Institute can bestow and, with this award, comes the appreciation and respect of the entire professional conservation community. Congratulations, Gary."

## Bob Carmichael Receives Presidents Award



Don MacLauchlan, Association of Fish and Wildlife Agencies, and Carol Anne Carmichael attend as Bob Carmichael, Delta Waterfowl Foundation, receives the Presidents Award from Steve Williams, WMI President.

During the 73rd North American Wildlife and Natural Resources Conference, held last month in Phoenix, Arizona, Wildlife Management Institute (WMI) President Steve Williams announced that Bob Carmichael was the recipient of WMI's 2008 Presidents Award. The recipient is a wildlife biologist, whose career has spanned six decades.

Carmichael began as a field worker and only recently retired after more than 20 years as a wildlife agency administrator. In those capacities and others, he proved to be accomplished and, in the process, earned the respect and admiration of those with whom he worked. "Among the most distinguishing qualities of the recipient," said Williams, have been Bob's "undaunted willingness to take on some of the most onerous and sensitive issues facing natural resource management and his remarkable ability to deal with them effectively."

The WMI Presidents Award recognizes ingenuity, tenacity and accomplishment in the interest of advancing natural resource management and stewardship, in the tradition of WMI's former presidents.

During Bob Carmichael's tenure with the Manitoba Wildlife Branch, from 1974 to 2005, including in the capacities as Chief of Commercial Wildlife Management and as Chief of Game, Fur and Problem Wildlife Management, he tackled humane-trapping protocols, animal rights issues, agriculture-wildlife conflicts, aboriginal interests and interprovincial relations, among others. Emphasis was placed on the recipient's advocacy for cooperative Canadian-U.S. wildlife policies, practices and science-based conservation. "Not least of all," said Williams, "as his many friends and colleagues know, Bob Carmichael is a gentleman of ingenuity, tenacity and accomplishment."

Currently residing in Keewatin, Ontario, with wife Carol Anne, Bob now serves as Senior Advisor of Operations and International Programs for the Delta Waterfowl Foundation.

## Addendum to Session Five: A View from the Trenches: Reflections on the North American Model of Fish and Wildlife Conservation from a State Agency Perspective

**Ronald J. Regan**
Association of Fish and Wildlife Agencies
Washington, DC
**Joanna Prukop**
New Mexico Energy, Minerals, and Natural Resources Department
Santa Fe

Prukop and Regan (2005) articulated recommendations for state fish and wildlife agency engagement regarding the North American Model of Wildlife Conservation (Model). These recommendations were part of a formal position statement adopted by the Association of Fish and Wildlife Agencies – a strategic platform, in effect, for advancing the Model in the future. But, the question remains, how do agency leadership teams apply the Model on a day-to-day basis given the complexity of issues, fast pace of decision-making, leadership turnover, and broadening missions to name a few influences.

We reiterate the need for the Model (i.e., inherent Public Trust responsibilities) to be applied with some measure of policy rigor to all taxa of fish and wildlife under the legal authority of state agencies, including the habitats upon which they depend. We suggest that demonstrating a full-orbed commitment to wildlife conservation, via Model-based management decisions, will be an important mechanism to maintain support for hunting programs by non-hunting publics.

We propose a simple, "interest-based" decision framework for state agency leaders that relies on three lines of questioning: What is best for the wildlife resource? What may be best for constituent groups with some vested interest in the policy decision on the table? What is best for the agency? An institutionally conscious effort to drive decisions based on such principled questions, in the context of Model precepts, provides for continuing Model relevancy within a fish and wildlife organization and before the public.

### Strategic Engagement: Broad Application of the Model

State fish and wildlife agencies have a commendable record of conservation success on many fronts. It is not our intent to recite those achievements, the development of the fish and wildlife profession, or to review the seven precepts or footings of the Model (cf. Geist et al. 2001). It is sufficient to note that early fish and wildlife conservation initiatives focused on game species for a variety of reasons including the diminished population distribution and abundance of species of interest to hunters and the emergence of "user-based" funding (e.g., excise taxes, license fees) in support of stateside research and management. Game Management for example, *the* textbook for the nascent wildlife profession of the 1930's, and for students even decades later, was informed by the results of Leopold's systematic game surveys funded by the Sporting Arms and Ammunition Manufacturers' Institute (Lorbiecki 2005). Game species remain a centerpiece of fish and wildlife conservation to this day, fueled in large measure by the hunter-conservationist and industry funding paradigm.

Funding aside, all fish and wildlife species are Public Trust resources, and we aver there needs to be a strategically conscious commitment to all wildlife that permeates the heart and soul of fish and wildlife agencies in the same way game species branded these agencies 100 years ago. In other words, the Model has a broader reach, beyond game species and hunting, and state agencies should articulate its relevance to nongame species. We acknowledge, of course, that a strategic investment in nongame has

already been made across the country -- symbolically (e.g., organizational name changes from game agencies to wildlife agencies), institutionally (e.g., hiring of ecologists, invertebrate specialists), programmatically (e.g., restoration of endangered species), and inter-jurisdictionally (e.g., Partners in Flight). Indeed, for at least the past thirty years, state fish and wildlife agencies have ramped up attention for a broader suite of species including reptiles and amphibians, small mammals, and nongame fishes, and embraced ecosystem constructs with concomitant funding from conservation license plates, income tax check-offs, and federal dollars. The new state wildlife action plans are a catalyst or institutional driver to accelerate this sort of engagement.

But, what does it mean to rigorously apply the Model to all species and their habitats? For one thing, we believe it means ensuring the same level of public trust commitment to all nongame species. For example, reptiles and amphibians would benefit from concerted regulatory attention in terms of collection, importation, and possession, not unlike that seen with migratory birds and mammals (J. Organ, personal communication 2007). The worldwide interest in collecting and displaying reptiles and amphibians as attested to by shows, web sites, and pet shops make this point abundantly clear. Even though state agencies may be actively involved with monitoring and managing native, wild herptofauna, insufficient focus may be given to the possession and interstate transportation of such species.

State fish and wildlife agencies already have full plates, and it may take a serious commitment of time and money to enter the regulatory arena for reptiles and amphibians. Conservation officers may feel unprepared to investigate cases regarding reptiles and amphibians or how to safely handle venomous or large snakes. In Vermont, the fish and wildlife department, had evidence of home-based, illegal trade with a variety of turtle species. This required an undercover operation, and the officer assigned to the case, long experienced in dealing with deer poachers and waterfowl violations, had to educate himself about turtles and the related pet trade, so he could "walk the talk." His continuing education led to a successful arrest and prosecution.

Wildlife biologists may feel ill-prepared to handle, identify, or regulate these species – not having an understanding about which are common to the pet trade, which are captively propagated, and which may be at risk in the wild. Fish and wildlife commissions, or boards, may struggle with their need to regulate these species, given there may be some jurisdictional uncertainty and precious little public interest to begin with. So, why bother? The answer is a relatively simple one -- these species are Public Trust resources and merit legal protection to the benefit of the underpinnings of all wildlife conservation programs.

Whether applying Model precepts to reptiles and amphibians or any other species, due diligence by state fish and wildlife agencies can manifest itself in a variety of ways. First, a review of existing laws and regulations could be undertaken – assessing loopholes or gaps in jurisdiction that may need redress. Second, assuming there may be some shared regulatory authority with another agency, explore how and what needs to be accomplished in terms of regulatory oversight. Third, based on this inter-governmental collaboration, draft new laws or regulations with the added participation of affected constituents (e.g., pet owners, collectors, breeders). Finally, ensure staff have the appropriate level of training to engage in what may be a new regulatory arena. For example, in recent years Vermont wardens have received in-service training on how to handle dangerous reptiles.

On the habitat front, we again squarely face the Public Trust Doctrine. Organ and Mahoney (2007) in their review of the Public Trust Doctrine clearly articulate the importance of this legal foundation to both "properly enforce protection of sensitive habitats and species." If sustainable or viable populations of fish and wildlife are to be conserved, then by logical extension habitats must also be conserved. Sometimes, however, it is possible for agencies or boards to get ensnared in property rights or

economic growth issues, diversified agriculture or development, respectively, thereby creating a barrier to habitat conservation, especially at the landscape or connectivity levels of interest.

State fish and wildlife agencies have long "made the case" for habitat protection and developed both voluntary management initiatives (e.g., technical assistance, educational resources) for landowners and land managers as well as regulations. But, can or should state agencies do more to ensure that the habitat-Public Trust connection has more meaningful legal and programmatic connections?

Over the years a number of state entities have acted to deliberately create legal platforms that tie fish and wildlife and habitat protection to public policies and programs. Vermont's Act 250, dating back to the early 1970's, provides for the protection of necessary habitat in permitting for development projects and offers the opportunity to address the "…economic, environmental, or recreational loss to the public from the destruction or imperilment of the habitat or species…" In 1994 the Conservation Services Division was created within the New Mexico Department of Game and Fish by the New Mexico State Legislature and is responsible for "…management, enhancement, research and conservation of public wildlife habitat…"

One of the most recent and deliberate actions occurred in the 2007 Colorado General Assembly when both houses of the Assembly unanimously adopted HB 1298, which was subsequently signed into law by Governor Ritter. Section 34-60-102 of this new Colorado law says:

> "It is declared to be in the public interest to….Plan and manage oil and gas operations in a manner that balances development with wildlife conservation in recognition of the state's obligation to protect wildlife resources and the hunting, fishing, and recreation traditions they support, which are an important part of Colorado's economy and culture. Pursuant to Section 33-1-101, C.R.S., it is the policy of the state of Colorado that wildlife and their environment are to be protected, preserved, enhanced, and managed for the use, benefit, and enjoyment of the people of this state and its visitors."

Section 34-60-128-3d of this new state law, cited as the "Colorado Habitat Stewardship Act of 2007," directs the Colorado Oil and Gas Conservation Commission (COGCC) and the Colorado Wildlife Commission "to establish standards for minimizing adverse impacts to wildlife resources affected by oil and gas operations and to ensure the proper reclamation of wildlife habitat during and following such operations." The law instructs the commissions to do this through various actions, including developing rules to address impacts to fish, wildlife, and their habitats from oil and gas exploration and development operations. The Colorado Division of Wildlife (CDOW), acting under the auspices of their Commission, now has a responsibility and a clear opportunity to connect their Public Trust responsibilities with habitat protection and wildlife management objectives. The CDOW has been working directly with the COGCC on the initial rulemaking process to incorporate wildlife concerns into new oil and gas rules.

For the first time, statutory requirements call for the CDOW to have direct input and influence on rules governing oil and gas development having landscape-level effects on habitat for a wide variety of species. Under HB 1298 not only must the COGCC consider impacts to fish, wildlife, and their habitats in rulemaking, but where appropriate, require oil and gas developers, operators, and producers to avoid or mitigate adverse impacts to these resources. Before an operator submits an application to locate an oil and gas facility, consultation with CDOW is required in areas delineated as containing important or significant wildlife values. As oil and gas development increases in Colorado, cooperative and collaborative development planning, development of avoidance and mitigation recommendations, monitoring of activities and practices, and more, will become core functions at the CDOW and for the COGCC. The Public Trust Doctrine is the platform underlying this work to conserve fish and wildlife and associated habitats in the face of energy development.

Now you may ask, isn't this a symposium on preserving the hunting heritage? Are we not a bit astray? We assert absolutely not for two reasons. First, even though hunters are valued conservation partners, making both important contributions to the funding stream for fish and wildlife conservation and to policy and management decisions regarding game species, the hunting community is, in fact, a minority one. More people, with broader sets of interests are increasingly involved in influencing wildlife management policy and new, broader funding mechanisms will give standing, if you will, to their concerns. We believe that if state agencies, and hunters, are perceived by all members of the public as wildlife stewards, then it is more likely a true wildlife constituency can develop with more common cause than not, including broader support for hunting. Holsman (2000) presents the case for developing a holistic or ecosystem stewardship ethic among hunters and writes "Agencies should seek opportunities to encourage hunter consideration of and participation in broad-based management goals to develop a constituency that understands the provision of recreational opportunity in the context of a larger mission." Peyton (2000) notes: "Fair chase will be less problematic to the nonhunting public if *they trust the hunting community to be truly a steward of society's resource values* (emphasis added)." If, conversely, such a full-orbed commitment is not transparent, perhaps state fish and wildlife agencies will be turned to *only* for hunting-related programs, especially those to control nuisance wildlife, thereby creating a long-term loss for agency mandates and credibility, which can only hurt position and relevance for hunting and game management. In other words, a united wildlife front is a far better position of strength for all parties than one that remains compartmentalized into nongame and game interests, and the best way to accomplish that is by demonstrating principled application of the Model to all wildlife. In addition, to the extent there is any management or jurisdictional vacuum within agencies, the public may, in fact, assume that certain wildlife stewardship practices are the purview of others, such as non-governmental organizations, even though such entities have no statutory standing for management.

Second, and relatedly, the Public Trust obligations to all wildlife are important to the future of the Model. To the extent there is any weak underbelly on the habitat front or the taxonomic front, we can only assume this creates the potential for harm to the whole, such as game management and hunting. If, for example, state fish and wildlife agency legal authority for small mammals in the pet trade is challenged, rebuffed, or denied, might that not also create a precedent for concern with regards to state agency authority over the possession or movement of cervids? We believe the answer is yes.

**Tactical Engagement: Interest-Based Decisions**

Even with an organizational commitment to the broad application of the Model, how is the Model kept fresh, alive, and relevant institutionally? It is not sufficient to append Model precepts to an organization's strategic plan. There must be mechanisms to force relevancy of the precepts in the organization. One way to accomplish that is through leadership engagement, perhaps by infusing the decision-making processes of leadership teams with grounding back to the Model, and by doing so, anticipate likewise consideration at the staff level over time.

One way to accomplish this is by developing a decision model that creates an atmosphere of questioning that at least forces some reflection about Model considerations. One line of questioning that is probably intuitive for most administrators who have grown up in a fish and wildlife agency concerns three focal areas -- what is in the best interest of the resource, the constituents, and the agency.

When we address resource management and policy issues, we ask science-based questions. We think in terms of laws and conservation outcomes. But, as any agency leader will acknowledge, the public square can still make it difficult to know where to land. If other factors, political, economic, or social, are in conflict with the recommended conservation outcome, what should be done?

Questions about constituent interests assume that any given organization (e.g., a hunting club) may be so focused on its particular agenda, that it might not consider the broader, long-term benefit of a particular outcome. This is not a question of government knows best but simply recognizing that in the midst of a complicated issue, it is possible to miss the forest for the trees. If state fish and wildlife agencies have any "stewardship" role for the hunting tradition, and we believe they do, then important or controversial policy decisions benefit from asking what is best for the long-term relevance of hunting (or wildlife observation, for that matter).

Likewise, leadership teams must look for internal congruence, between decisions and agency values, mission, and vision. Staff (and the public) will take notice of whether or not a commitment to the Model actually manifests itself in decision outcomes, and questions to probe that connection will ensure this important dimension is not neglected.

These biological, constituent, and agency questions can and should be asked in the context of the Model – its foundations and heritage. By doing so, we create an environment that fosters its relevance. We hasten to add that this is not rocket science, but it does take some measure of discipline to provide for this kind of reflection in the press of often quick policy decisions. In addition, constituent polarization and a tendency to see any outcome in black and white terms can actually make asking the questions uncomfortable, maybe even risky, but hopefully leadership teams have a culture where it is safe to ask hard questions.

There is no shortage of issues that would benefit from careful or thoughtful discussion based on the line of questioning articulated in this paper. We look at three issues, from which we have personal experience, to demonstrate relevance to the future of the Model.

***Predator Contests***

Predators still evoke a fair amount of passion – it seems like you either love them or hate them; or at least such polarization is prevalent in the discourse over management. Wolf restoration, coyote control, and mountain lion hunting are issues with common themes about values of predators, human safety, cervid impacts, and predation on farm or range resources. These considerations, alone, can be enough to bring deer or furbearer management programs to a standstill. But, what if a sportsman's club proposes a friendly weekend coyote contest, one where hunters vie for shooting the biggest coyote or the most coyotes? Perhaps the agency head is asked to provide some media support for the event or drop by a private weigh-in station at a general store. Maybe proceeds, if any, will be donated to a conservation fund the agency manages.

If we use the line of questioning developed above, agency leaders would first need to assess the biological implications. Are coyote populations secure? Will there be any negative biological impact on coyote abundance or distribution? If the answer to the first question is yes, and the second is no, perhaps one would conclude the answer is simple – either actively support the contests or stay neutral – because coyote hunting is legal, contests are not prescriptively illegal, and there are no negative population outcomes.

But, if we factor in Model precepts, would not one conclude that such contests may encourage the frivolous harvest of wildlife or wanton waste, assuming some of the carcasses would never be used, in direct contradiction to the Model precept of "killing wildlife for legitimate purposes?" In other words, allegiance to the Model may lead to a different decision – despite there being no biological harm per se, there could be negative conservation implications for hunting in this country – an erosion of the hunter-conservationist paradigm, and therefore, support for the Model in the future.

This possible conclusion offers a good segue to the second question concerning constituents. First, agency leaders must revisit the question about who is a constituent -- hunters only?; farmers and wildlife observers, too? We use the term revisit, because this question should hopefully have been addressed in a broader strategic planning context. But, given that hunters likely fund the bulk of agency programs, do they receive first consideration, perhaps to the exclusion of other constituent interests? Consider the variety of interests and positions that may emerge: some hunters and most non-hunters alike may be concerned about the perceived indiscriminate killing of coyotes, especially for financial rewards or otherwise; landowners may be upset either about the killing or "new" use of their land and threaten to post their property to all hunting; other hunters may see this in terms of basic rights and that a state agency has no business regulating such events; and conversely, other wildlife advocates may seek regulations or legislation to ban such contests. As noted earlier, here is a situation where polarization can easily turn the issue into a black and white situation – in essence, pro-hunting versus anti-hunting -- when it is really all about responsible use of a Public Trust resource.

Here, we suggest, more questions are helpful. What is gained versus what is lost in terms of the identity for all involved, especially the hunting community? If an agency leadership team is applying Model constructs, perhaps it will be important for the agency to try and manage through this by pointing out whatever short term value may accrue symbolically, from having such contests, there may be serious damage to the hunter-conservationist image. This is the stewardship view, if you will. Maybe sportsmen leaders have not thought through all the implications of going down this path. Should state agencies wade into that water – we suggest, yes. Why? Because we believe it is truly in the best interest of wildlife conservation *and* the hunting community.

Finally, what is best for the long-term credibility of the agency and how will staff view this decision? If, for example, there has been institutional acceptance of the Model, perhaps in a mission statement or strategic plan, it is important to demonstrate the reality of that commitment through the test of actual decisions. Staff will watch for congruence and so will external constituents – does the decision measure up to commitments to all wildlife and to the Model. This is especially important as state fish and wildlife agencies seek to make the case for broader funding.

In this case, the Model's relevance informs a practical policy decision. Even though biological impacts may be neutral, the image of hunting may suffer before the broader constituent base and staff may question the agency's true commitment, values, or vision for wildlife conservation if anything other than a negative position is taken. We feel compelled to add a few additional observations at this point. First, we do not intend to make light of the difficulty of making such decisions – a state agency director will have his or her hands full when it comes to reconciling the three streams of questioning. Second, such decisions can be far more complicated than we portray in this brief narrative because legislators, commissions, and Governor's offices may create new expectations to manage through. Finally, we note that service is done to no one – constituents or staff -- by trying to avoid the issue or remain silent on it. Stewardship of agencies, resources, and the Model requires far better than that.

### *High Fence Hunting*

Hunting behind high fences has generated a fair amount of professional debate. State agencies are faced with decisions regarding their establishment and/or management. For the purposes of this paper, let's assume the issue surrounds the establishment of new facilities. Answers to biological questions are likely to emerge with unequivocal concern for disease and parasite transmission, the natural movements of wildlife on the landscape, and enforcement considerations. Even though Chronic Wasting Disease certainly validates that it is not biologically wise to confine cervids or contribute to economic factors that create incentives for moving these animals from one jurisdiction to another, there will still likely be advocates that conclude vaccines, testing, and husbandry can, in fact, mitigate most risks from these

practices. Nonetheless, it would seem to us, that more likely than not, fish and wildlife agencies would conclude the biological risks alone merit an opposing position.

When it comes to constituents, some hunters will see no problem with high fence hunting or side with property rights advocates as justification for the practice. The farming community may view high fence hunting as a reasonable alternative for economic viability of their property. Fish and game commissions may want to focus exclusively on biology and not address the ethics or fair chase considerations that are sure to crop up. And, many wildlife advocates will have a visceral negative reaction to shooting wildlife behind high wire.

Here again, we think the Model offers helpful guidance – the model thrives on the notion of fair chase and equitable distribution of wildlife resources. Even were all biological risks managed away, it would seem that the Model cannot sustain the legitimacy of high fence hunting from the standpoint of wildlife conservation and the historic value of hunting opportunity for all. There is no room for privatization of cervids, or other wild animals, as a long judicial history upholds (Organ and Mahoney 2007).

In terms of an agency's identity, if, in fact, the agency has embraced Model precepts, here would be another opportunity to stand tall – use science to defend a position, but also to support fair chase principles. In our experience, some within an organization might question whether or not an agency should be addressing the "ethics" dimension at all. We believe it cannot be avoided in this day and age and it is an appropriate consideration. State agencies have a history of addressing such issues through baiting regulations and minimum caliber restrictions for big game (to ensure clean, humane kills), and hunter education classes certainly provide instruction unto such an end.

This offers an opportunity to suggest that such decisions offer teachable moments, perhaps not easy ones in the midst of decision-tension, but opportunities nonetheless, to speak up on behalf of the Model – its connection to the decision of the day and its importance for conservation in the future.

***Energy Development***

The North American Model does not work, for that matter there is no future for hunting, without healthy habitats to sustain productive fish and wildlife populations. Today no greater threat highlights the need for fish and wildlife agencies to rapidly embrace their responsibilities under the Public Trust Doctrine, the foundational precept of the Model, than the massive amount and variety of energy development occurring across the continent. The potential for significant landscape-scale impacts, including habitat loss and fragmentation, is alarming given the land surface requirements for oil and natural gas development and all its associated infrastructure, commercial-scale wind and concentrating solar power facilities, mountain-top mining for coal, and the large acreages needed for biofuel production from a variety of commercial fuel crops. In the face of these fast-moving developments, how does a state fish and wildlife agency get out in front of the issues and consider questions like, "What's best for the resource, constituents, and the agency?"

Biological impacts of energy development are not neutral and, in many cases, the state-level laws and rules governing energy development do not specifically require consideration of fish and wildlife impacts as a part of the decision-making process governing energy development, generation, or transmission. As previously mentioned, recent action by the Colorado General Assembly for oil and gas development is one exception. Other laws, rules, policies and management plans at the local, state, and federal level, however, do create opportunities to influence how some kinds of energy development will go forward. Because of the potential for energy development to adversely impact many fish and wildlife

species, state agencies should apply the Model broadly and use every avenue available to pursue their responsibilities under the Model.

In the Rocky Mountain West, for example, wildlife populations are directly impacted by oil and gas development. The San Juan Basin in northwest New Mexico and southwest Colorado is home to migrating herds of mule deer and elk among many other wildlife species. The same basin is also the largest producing coalbed methane (CBM) basin in North America, with the Powder River Basin in northeast Wyoming being the second largest. Both basins have been and continue to be extensively developed for CBM. From the air both look like a checker board of networked roads and pipelines connecting thousands of well pads. The Piceance Basin in northwest Colorado appears to be on a similar track for gas development, as does the Pinedale Anticline in southwest Wyoming. Perhaps soon the Roan Plateau in northwest Colorado, as well as the fragile remnant of Chihuahuan Desert on Otero Mesa in southeast New Mexico, will face similar impacts as gas exploration in these areas progresses. Nearly all will concede that the highly impacted Jonah Field in southwest Wyoming leaves little habitat for wildlife with its 5 to 10 acre well spacing for gas development. Opportunities to avoid or mitigate impacts to fish and wildlife in the Jonah Field are so limited a new strategy of off-site mitigation has been implemented. In this particular case the Wyoming Game and Fish Department is working closely with industry partners, the Bureau of Land Management, citizens groups, landowners, and others to find effective ways to offset impacts to fish and wildlife resources in this heavily impacted part of the state by attempting to enhance fish and wildlife habitats, and hence populations, in adjoining areas.

In each of these cases large areas of big game and other species' habitats are, or stand to be, seriously impacted. With limited manpower, funding, and other priorities, state fish and wildlife agencies struggle to fully embrace their Public Trust responsibilities and to gather and apply the scientific data needed for management of affected fish and wildlife species. Additionally, because these areas of energy development will be disturbed for at least 40 to 60 years through exploration, development, and production, state agencies are challenged to develop new, meaningful strategies and recommendations to avoid, lessen or mitigate impacts to fish and wildlife over time.

Already in Wyoming and Colorado effects of oil and gas development are compounding impacts from other factors such as chronic drought and invasive plant species on Greater Sage Grouse (*Centrocercus urophasianus*.). The long-term trend is reduction in population numbers in large areas of intensive development. Traditional mitigation measures are not working, and wildlife/game commissions are considering reductions in bag limits and season lengths, if not outright hunting closures, yet oil and gas development continues to expand.

Exacerbating fish and wildlife agencies' ability to respond to energy development pressures is the fact that under current rules, development of many energy resources typically progresses at a much faster pace than baseline information and monitoring tools can be established and faster than meaningful strategies and recommendations can be adopted. For example, large scale wind farms (100-300 MW) can be sited and built in six months to a year and infill development of an existing oil or gas field can occur within a year's time. Collecting adequate baseline data, especially at a landscape scale, takes longer.

State fish and wildlife agencies in all states where energy development is occurring must fully engage in assessing impacts to fish and wildlife resources, just as they would enforce game laws, pass regulations and stock fish. They must be proactive in seeking state-level policies to secure habitats for all affected species; engage aggressively in resource management planning efforts with federal land management agencies, regional organizations, other state agencies and local governments; and engage with a wide range of constituents concerned about the future of wildlife, for whatever reason. In the West particularly, adverse impacts are occurring now and there is no time to waste if the Model, including its hunting component, is to be maintained.

Dealing effectively with the sometimes overwhelming pace and volume of energy development pressures should cause state fish and wildlife agencies to take stock of their own resources and evaluate what if any shifts in priorities are necessary to deal with the long-term effects of this challenge. Where should the focus and emphasis be? What are the priority policy areas today, and for the near-term and the far-term? How do we lead staff through this shift? How do we manage our own agency, personnel, and properties to be consistent with our goal of minimizing energy development impacts on the fish and wildlife resource? As examples of what can be done, two state wildlife agencies, the Colorado Division of Wildlife and the Wyoming Game and Fish Department, have clearly established new priorities to deal with energy development and have acquired or reassigned personnel and resources to focus on these challenges (B. McCloskey and Terry Cleveland, personal communication).

At this time across the continent the risks to fish and wildlife populations and their habitats from energy development are huge, in large part because states don't know what they need to know right now to assess the risks and impacts; nor do they know yet how to meaningfully avoid or mitigate these impacts. The scale and pace of energy development is simply exceeding our capacity to react, or more importantly, to proactively address the potential impacts of energy development. Addressing the needs of fish and wildlife resources, constituents, and agencies is a complicated matter. However, the implication of not addressing these issues to the future of hunting and the Model is clear—without the ability to effectively assess the impacts of energy development for all species of wildlife and their habitats and then avoid or mitigate these impacts, the ability to sustain and hunt populations of game animals at levels we have previously known is in jeopardy.

**Putting It All Together**

Managing Public Trust resources like wildlife has always been a challenge because of the democratic opportunities for public input into many management decisions, including those providing hunting opportunity. Decreases in hunter numbers have lead Peyton (2000) and Heberlin (1991) to reflect on the viability of the hunter and wildlife agency partnership for the future. We believe the Model is a tremendous beacon for steering the conservation ship through uncertain waters -- in a way that enhances the visibility, credibility, and relevance of hunting and ensures a place on deck for all wildlife.

In summary, we believe the Model compels state agencies to systematically and comprehensively apply it to all wildlife, particularly the Public Trust Doctrine as it applies to species and habitat conservation. Wildlife is wildlife, hunted or not, and demands equal protection in the application of laws and regulations, particularly for species that have flown under the radar in the past – reptiles and amphibians, small mammals, and nongame fishes. We also hold that agencies must act as stewards of the Model – ensuring first that science is applied in the discharge of management obligations while equally ensuring that constituents and agencies themselves are held accountable to the foundations rooted in a hunter-conservationist paradigm. The mechanism suggested here is intended to promote a dialogue unto that end with regards to all major policy and management decisions. The credibility of state agencies, the security of wildlife resources, and the identity of the hunting community will all benefit under such an approach.

**References**

Geist, V., S. P. Mahoney, and J. F., Organ. 2001. Why hunting has defined the North American model of wildlife conservation. Transactions of the North American Wildlife and Natural Resources Conference. 66: 175-185.

Holsman, R.H. 2000. Goodwill hunting? Exploring the role of hunters as ecosystem stewards. Wildlife

Society Bulletin. 28:808-816.

Heberlein, T. A. 1991. Changing attitudes and funding for wildlife – preserving the sport hunter. Wildlife Society Bulletin. 19:528-534.

Lorbiecki, M. 2005. A fierce green fire. Guilford, Connecticut: The Globe Pequot Press.

Organ, J., and S. Mahoney. 2007. The future of Public Trust. The Wildlife Professional. Summer: 18-22

Peyton, R. B. 2000. Wildlife management: cropping to manage or managing to crop? Wildlife Society Bulletin. 28:774-779.

Prukop, J., and R. J. Regan. 2005. In my opinion: the value of the North American model of wildlife conservation – an International Association of Fish and Wildlife Agencies position. Wildlife Society Bulletin. 33:374-377.