

LOSING GROUND: THE WAR ON BUFFELGRASS IN THE SONORAN DESERT

OVERSIGHT FIELD HEARING

BEFORE THE

SUBCOMMITTEE ON NATIONAL PARKS, FORESTS
AND PUBLIC LANDS

OF THE

COMMITTEE ON NATURAL RESOURCES

U.S. HOUSE OF REPRESENTATIVES

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OVERSIGHT FIELD HEARING ON “LOSING GROUND: THE WAR ON BUFFELGRASS IN THE SONORAN DESERT.”

**Saturday, April 10, 2010
U.S. House of Representatives
Subcommittee on National Parks, Forests and Public Lands
Committee on Natural Resources
Tucson, Arizona**

The Subcommittee met, pursuant to call, at 10 a.m., City Council Chambers, 255 West Alameda, Tucson, Arizona, Hon. Raúl Grijalva [Chairman of the Subcommittee] presiding.

Present: Representative Grijalva.

STATEMENT OF THE HON. RAÚL M. GRIJALVA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

Mr. GRIJALVA. I'll call the Subcommittee to order. Today we're having a hearing here in Tucson, a field hearing, on the buffelgrass issue.

And I want to thank all of the panelists for being here and all of you who have taken the time on a weekend to join us today. Thank you so much.

I just realized why I never made it to the City Council. I would probably have needed a booster chair. But having said that, there are some students here that I want to acknowledge before opening statements, middle school students who have volunteered on the buffelgrass eradication. They are in the back of the room somewhere, and I'd like to have them stand up so we can acknowledge them and thank them. Are they here yet? OK.

Like I said, thank you for taking time on a weekend. It's tough to sit inside on a day like today, but I believe that the business at hand is vital to not only this region but everyone in the State.

The issue we will address today, from our panelists, is helping us formulate what the Federal response needs to be, both in terms of resources and in necessary legislative initiatives.

It's home for all of us and it's home for me. I grew up here. Ramona and I raised our family here. Our grandkids are being raised here, and like most people in the room, it's not only my home but it's the landscape and what this area means to all of us that is not only important, but part of our lives.

And as you came over today, you saw the palo verdes are blooming. There's that fragrant, nice desert smell out there that's so good, and the prickly pears on the side of the road are starting to flower. That's the beauty of this region and that's why it's so special.

And everybody has that picture in their minds of Arizona, that kind of draw for millions and millions of people to come and visit us and to spend their tourism dollars here in our region.

Yet there's imminent danger to this beautiful land. For the last 50 years, buffelgrass has spread so rapidly that large portions of Pima and surrounding counties are now covered with this invasive weed. Throughout Southern Arizona, this noxious plant flourishes wherever it grows.

And buffelgrass burns hotter and more frequently than native grasses. Small isolated fires of native plants are not likely to harm saguaro, but if a fire takes hold, if it's a large forest, with a large infestation of buffelgrass, the forest will be completely wiped out.

And climate change will only make matters worse. It will create conditions that encourage buffelgrass and it will spread farther north and literally march across the State.

If we fail to fight this invasion, this exotic weed could forever change our landscape that we all love so much.

Many of us have played a critical role in slowing the spread of this weed, and you have my thanks for all of you who have been volunteers, both working with the agencies, thousands of hours spent pulling weeds, protecting our homes, preserving our desert.

I know the city and the county, as well as our friends in the Saguaro National Park and the National Forest and the Bureau of Land Management, not to mention hundreds of homeowners and residents, continue to work in addressing this problem collaboratively and in earnest.

Today we will hear from many of those out on the front lines about methods they have found to be effective in the battle against the weeds, and I look forward to their recommendations on how to better coordinate and support these efforts.

[The prepared statement of Mr. Grijalva follows:]

**Statement of The Honorable Raúl M. Grijalva, Chairman,
Subcommittee on National Parks, Forests and Public Lands**

On a beautiful day like today, it's tough to sit inside, but the business at hand is vital to everyone in the State. The issue we will address today truly hits home for me. I grew up here, my wife and I raised our daughters here, and like most of the people in this room, I know this landscape very well.

As you made your way to City Hall today, you saw why we chose to call this place home: the palo verdes blooming along the Santa Cruz, fragrant desert willows lining the washes, prickly pears flowering by the side of the road. This is the natural beauty that makes Tucson so special.

This splendor in our own backyard is vital to Tucson and southern Arizona's leading industry—tourism. Those saguaro cacti covering the hills and mountainsides near our homes—that is what people everywhere picture in their mind's eye when they think of Tucson. Arizona's iconic beauty continues to draw millions of visitors to this paradise every year.

Yet we face an imminent threat to this precious landscape. For the last 50 years, buffelgrass has spread so rapidly that large portions of Pima and surrounding counties are now covered with this invading weed. Throughout southern Arizona, this noxious plant flourished wherever it has gone.

Buffelgrass burns hotter and more frequently than native grasses. A small, isolated fire in native plants is unlikely to harm many saguaros. But if a fire takes hold in a saguaro forest with a large infestation of buffelgrass, that forest could be completely wiped out.

And climate change will only makes matters worse—it will create conditions that encourage buffelgrass to spread ever farther north, as if marching across the State. If we fail to fight this invasion, this exotic weed could forever change the landscape that we so love.

Many of you have played a crucial role in slowing the spread of this weed and you have my thanks. You have spent thousands of hours pulling weeds, protecting our homes and preserving this desert. I know that the city and county, as well as our friends at Saguaro National Park, in the national forests and the Bureau of

Land Management, not to mention hundreds of home owners and residents, continue to work on addressing this problem collaboratively and in earnest.

Today, we will hear from many of those on the front line about methods they have found to be effective in the battle against this weed. And I look forward to their recommendations on how to better coordinate and support those efforts.

With that, I think we are ready to begin hearing from our witnesses.

Mr. GRIJALVA. Let me thank all of you for being here today. Let me welcome our first panel. The rules of engagement are five minutes oral presentation.

Any written material that you may have will be automatically part of the record as will your full statement and then there will be time for me to ask questions.

And I would also encourage all the panelists and other members of the community, if they have testimony or additional information that they want to be made part of the record, that it be provided to the Committee staff and it will be incorporated as part of the record of this hearing.

We have regrets from colleagues. Some of our colleagues are conducting a field hearing in Las Vegas right now. For some reason they had a higher draw. And so their regrets, and they look forward to the testimony, the information that's generated from this field hearing so that we can, at the Federal level, begin to respond much more proactively than we have.

Let me welcome the first panel and begin with Mr. Frost, the Associate Director, Natural Resource Stewardship and Science, National Park Service. Good to see you again. I had quite a good time in the Grand Canyon the other day, and thank you for being here today. I look forward to your testimony.

**STATEMENT OF HERBERT C. FROST, ASSOCIATE DIRECTOR,
NATURAL RESOURCE STEWARDSHIP AND SCIENCE,
NATIONAL PARK SERVICE**

Mr. FROST. Good morning, Chairman Grijalva. It's good to see you again too. I'm glad we all made it down the road safely. Thank you again for the opportunity to testify this morning. On behalf of the Department of the Interior and the challenges followed by an unprecedented spread of invasive species on Federal land in the Desert Southwest, the Department appreciates the Subcommittee's interest and the support of efforts to address the impact of invasive plants on the Sonoran Desert.

Our protected areas are no longer protected. Over thirty-nine million acres of land managed by the Department of the Interior are infested with invasive plants. Preventing the introduction of additional invasive species and controlling the spread of those already present is one of the most significant challenges.

Invasive species have the ability to displace and imperil native species, alter entire ecosystems, damage critical infrastructures, impact visitor experience and result in a loss of productivity to private landowners.

Isolation and careful management do not insulate our public lands, and recognizing that invasive species cross geographic and jurisdictional boundaries, collaborative efforts among Federal, State and local entities with landowners are highly effective.

Our testimony today will focus on buffelgrass. Buffelgrass is a fire-adaptive perennial bunchgrass introduced from the African savanna that grows in dense stands, produces large quantities of seeds that readily germinate in both disturbed and undisturbed desert sites.

Scientists have been studying the impact of invasive plants on native species and lands throughout the Southwest. Researchers have determined that there are increased risks to the survival of native species, including the iconic saguaro cactus, in desert forests, by exposure to the fires carried by non-native grasses.

Fire is an infrequent occurrence in the Sonoran Desert, which is frequently estimated to be greater than 250 years. Buffelgrass and other invasive species increase the fire fields which carry fire throughout the desert.

Buffelgrass stands can burn at over 1400 degrees Fahrenheit, almost three times hotter than fire generated by native vegetation. In addition, buffelgrass reestablishes readily with each burn and progressively increases the frequency, intensity and extent of wild fires.

Buffelgrass is impacting public and tribal lands throughout this area. In Arizona, currently two national park service sites, four refuges and BLM Ironwood Forest National Monument are being impacted.

Because buffelgrass spreads aggressively, we can expect several other impacts in the Desert Southwest. In response to buffelgrass invasion, land managers, scientists and local communities have formed the Southern Arizona buffelgrass Coordination Center and the buffelgrass Working Group.

Over the past decade, control efforts have culminated in the treatment of thousands of public lands in rights-of-way in 2008.

In the spring of 2009, over 100 volunteers pulled buffelgrass in the Tucson Basin in each month and a similar volunteer effort is well underway in Phoenix.

In addition, volunteers in Saguaro National Park contributed over 3,000 hours mapping and hand-pulling buffelgrass in 2009.

The Ironwood Forest National Monument local volunteers, Friends of the Ironwood Forest and Tucson Weedwackers and other groups are conducting regular buffelgrass removal projects.

The Save the Waterman Project has nearly eradicated buffelgrass in the Waterman Mountains. Building on this success, BLM is helping in planning for a new Save the Silverbell Campaign, which would target buffelgrass in the nearby Silverbell Mountains.

Other collaborative efforts include the Bureau of Indian Affairs and tribal partnership that are addressing buffelgrass in over three million acres of tribal land; local cooperative weed management areas; local weed organizations and partnerships between DOI and the U.S. Forest Service on management, aerial mapping and research projects.

The ecological transformation we've experienced in the Southwest are also occurring across the border in Mexico. Buffelgrass has been widely planted as a pasture grass in Mexico, and populations are expanding North across the border.

In addition, a new variety of buffelgrass that can withstand colder temperatures was recently released and planted in South Texas and Mexico. This cold tolerant variety has adapted to a much wider geographic range and could expand buffelgrass populations northward into Arizona and beyond.

Illegal border activities and associated national security measures are resulting in conditions that make control of buffelgrass more difficult. And increased border activities create ground disturbances and pathways for dispersal of buffelgrass along the border.

Researchers are only beginning to understand the changes in the Southwest desert as a result of the invasion. The problem of non-native plant invasions and our increased fire frequency are inter-related and require innovative research programs required for managers.

Southern Arizona has already organized around this issue through cooperative efforts, local business, citizens, academia, conservation organizations, fire departments and local and state governments. The Department will continue to actively participate in all endeavors to help combat this problem. Thank you.

Mr. GRIJALVA. Thank you, Doctor.

[The prepared statement of Mr. Frost follows:]

Statement of Herbert C. Frost, Associate Director, Natural Resource Stewardship and Science, National Park Service, U.S. Department of the Interior

Chairman Grijalva and members of the subcommittee, thank you for this opportunity to testify on behalf of the Department of the Interior (Department) on the challenges posed by the unprecedented spread of invasive species on federal lands in the desert Southwest. We appreciate the subcommittee's interest and support of efforts to address the impacts invasive plants are having in the Sonoran desert ecosystem.

My testimony will focus on three main areas: the current threat from invasive plants to native ecosystems, the Department's response, and how we are addressing the threat posed by buffelgrass through cooperation and collaboration with our partners.

Background

Executive Order 13112 defines an invasive species as "an alien [with respect to the ecosystem under consideration] species whose introduction does or is likely to cause economic or environmental harm or harm to human health." Invasive species proliferation is considered one of the greatest threats to our natural and cultural resources, food-producing systems, agricultural commodities, and human health. The United States is experiencing an increase in the number of invasive species crossing our borders through various pathways, and, given the global nature of our economy and transportation systems, we expect this trend to continue. EO 13112 charged all federal departments and agencies to prevent and control invasive species and created the National Invasive Species Council (NISC). NISC provides high-level interdepartmental coordination of federal invasive species actions. NISC is co-chaired by the Secretaries of the Interior, Agriculture, and Commerce.

The introduction and spread of invasive species is fundamentally changing our natural and cultural landscapes. Isolation and careful management do not insulate our public lands. Collaborative efforts among federal, state, and local entities and willing private landowners can be highly effective in managing a shared problem when we recognize that invasive species cross geographic and jurisdictional boundaries.

Our protected areas are no longer protected; over 39 million acres of land managed by the Department are infested with invasive plant species (US Department of the Interior, 2010). Managing invasive species is one of our most significant challenges, and preventing the introduction of additional invasive species and controlling the spread of those already present is an important focus of the Department.

Buffelgrass (*Pennisetum ciliare*), is a fire adapted, perennial bunchgrass introduced from the African savanna. Buffelgrass grows in dense stands, producing large quantities of seed that readily germinate and is able to invade both disturbed and undisturbed desert sites. It is spreading rapidly across Arizona's deserts, threatening the ecological integrity of the Sonoran desert ecosystems and public as well as private lands.

Conversion of the Sonoran Desert into non-native grasslands will significantly affect biodiversity, including not just threatened, endangered and at-risk plant and animal species, but also iconic species including the saguaro cactus. Species dependent on the desert community and threatened by buffelgrass invasion include cactus ferruginous pygmy-owls, desert tortoises, lesser long-nosed bats, and many other species common to desert life. Effects include loss of habitat as the desert converts to grassland, the inability to move through dense stands of buffelgrass, and the direct effects from fire (Rice et al, 2008; Flanders et al, 2006; Esque et al, 2003; Burgess et al, 1991; Morales-Romero and Molina-Freaner, 2008; Wilson et al, 1995; Williams and Baruch, 2000; Clarke et al, 2005; and Búrquez-Montijo et al, 2002).

Unlike some other areas in the U.S., fire is an infrequent occurrence in the Sonoran desert, with fire frequencies estimated to be greater than 250 years (Humphrey, 1974; McLaughlin and Bowers, 1982; Schmid and Rogers, 1988; and Schussman, Enquist, and List, 2006). Buffelgrass and other invasive grasses like red brome increase the combustible materials or fine fuels, which help carry fires through the desert. Buffelgrass stands can burn at over 1,400 degrees—almost three times hotter than fires generated by native vegetation. A low intensity fire in 1994 in Saguaro National Park killed 11 desert tortoises and 25% of saguaros (Esque and Schwalbe, 1994-1996); mortality is expected to be much greater from fires where buffelgrass is present. In addition, buffelgrass reestablishes readily with each burn at the expense of less-fire adapted native species, inducing a grass-fire cycle that progressively increases the frequency, intensity and extent of wildfires (Cardille et al, 2001; D'Antonio et al, 1992; Thomas, 1991; Esque et al, 2007; and Búrquez-Montijo et al, 2002).

Climate induced changes in temperature and precipitation patterns will further stress native communities and will likely increase natural disturbances, such as drought, flooding, fire and temperature extremes. These disturbances can weaken the ability of native ecosystems to compete with invaders. We are already beginning to see some of these changes in the southwest, where buffelgrass has been able to respond more quickly to recent variations in climate (Ward, Smith, and McClaran, 2006).

Buffelgrass Impacts and Management Response on Lands Managed by the Department of the Interior

National Park Service (NPS)

Buffelgrass is impacting most parks in the southwest, but effects are the most pronounced at Organ Pipe Cactus National Monument (Organ Pipe) and Saguaro National Park (Saguaro) in Arizona. It was first detected at Organ Pipe in the mid 1980s, but was initially dismissed by southern Arizona land managers as primarily a roadside weed, not well adapted to expanding to the native desert environment. In the early 1990s, an active management program based on manual removal was launched in response to the rapidly expanding buffelgrass population. Despite early success, the populations continued to expand along with other invasive grasses. It is now viewed as one of the most serious threats to natural and cultural resources in the park.

Buffelgrass was first observed at Saguaro National Park in 1989, and NPS land managers estimate that buffelgrass populations are doubling in size every two years. Inventories between 2002 and 2004 indicated that buffelgrass covered 175 acres of the park and was expanding. Buffelgrass is now found on 2,000 acres of park land (or 2%), and current estimates have buffelgrass increasing in area by 35 % per year and potentially covering 60 % of the park's desert habitat by 2020.

In response, the park developed an aggressive management control program, by using a combination of manual and chemical methods. In 2009, these treatments included 3000 hours contributed by local community volunteers. The park has also joined with the local communities, the University of Arizona, the Forest Service and BLM in investigating aerial and other state-of-the-art application methods.

US Fish and Wildlife Service (FWS)

Buffelgrass is an existing and potentially widespread threat to FWS refuges in Southern Arizona and beyond. The introduction of a cold-adapted variety in Texas and Mexico is expected to begin to impact desert grasslands and woodlands upslope and in higher latitudes, and climate change may exacerbate this spread. Specific

threats include the saguaro cacti, the iconic symbol of the Sonoran Desert landscape and the Arizona tourist industry. Imminently threatened are the Sonoran Desert and desert grassland refuges in Arizona and New Mexico including the Cabeza Prieta, Kofa, Leslie Canyon, San Bernardino, San Andres National Wildlife Refuges and refuges and protected areas throughout the borderlands region into south Texas. The Service has responded to this threat on many levels through increased interagency and partner coordination, monitoring for early detection, integrated buffelgrass control measures (e.g., herbicide, mechanical and manual removal), and through buffelgrass Burned Area Rehabilitation projects to restore sustainable native habitats. Effective control continues to be a challenge due to the abundance of buffelgrass seed sources that invade from adjacent lands and Mexico.

Bureau of Land Management (BLM)

The BLM is working to control infestations of buffelgrass which occur on an estimated 14,750 acres within the Tucson Field Office. Most of this is on the Ironwood Forest National Monument. The need to control and manage these existing infestations is part of the BLM's early detection and rapid response program, which is coupled with control and management of the species. To do so, the BLM applies an integrated pest management approach using various treatment methods such as manual, mechanical, and chemical control methods. Even more importantly, prevention is of the highest priority to ensure that infestations of buffelgrass and other weed species are not introduced or spread into other fragile parts of the Sonoran Desert and north and west into the Mohave Deserts. Control of buffelgrass is important to prevent its movement to the north and west where the BLM is trying to control and manage other invasive annual grasses that have become detrimental to the Mohave Desert and the Great Basin.

On Ironwood Forest National Monument, the BLM, along with local volunteers, Friends of the Ironwood Forest, Sonoran Desert Weed Whackers and other groups conduct regular buffelgrass removal projects. For example, The Waterman Mountains, which contain rare and unique vegetative communities, have been the target of the "Save the Watermans" project. This project has nearly eradicated buffelgrass from the Waterman Mountains following a concerted three-year effort which is aimed at completely controlling the species in this area by the end of 2010. In recognition of the remarkable success of the project, and their unrelenting efforts, John Scheuring and the Friends of the Ironwood Forest have been selected to receive the BLM's 2010 "Making a Difference" National volunteer award.

Building on the "Save the Watermans" success, the BLM and its partners have now begun planning for a new "Save the Silverbells" campaign, which will target buffelgrass in the nearby Silverbell Mountains, also located on the Ironwood Forest National Monument. The BLM will treat 285 acres of buffelgrass on the Monument in 2010. This is a combination of first-year, second-year and third-year treatments. Forty of the 285 acres of buffelgrass eradication treatment planned for 2010 will be a third year treatment, and we expect to have buffelgrass completely eradicated from this 40 acres by the end of 2010.

Bureau of Indian Affairs (BIA)

The Bureau of Indian Affairs, along with Arizona tribes, has the responsibility for managing invasive species on over 3 million acres within the Sonoran Desert region. In addition to the Tohono O'odham Nation, consisting of 2,789,047 acres, there are five urban tribes with a land base of about 350,000 acres susceptible to buffelgrass invasions within the vicinity of Phoenix. The Sonoran Desert Museum 2006 Buffelgrass Survey Report stated that distribution of buffelgrass is along all major highway routes including Interstate 10 west of Phoenix to the California border. It is present north and east of Phoenix near several Indian reservations (Van Devender, Thomas, and Dimmitt, 2006). Since 2006, the spread of buffelgrass has increased and weed specialists are concerned. Recent rains in Phoenix have turned vacant lots and disturbed areas into carpets of buffelgrass (Morrison, 2010).

Foresters and range specialists align the buffelgrass invasion with the cheatgrass problem on tribal and public lands. Both are extreme fire hazards, disturb the natural ecosystem and are serious problems within the wildland/urban interface.

United States Geological Survey (USGS)

USGS scientists have been studying the impacts of invasive plants to native species and lands in the Southwest desert. In collaboration with the National Park Service and Bureau of Land Management, USGS researchers have determined that there are increased risks to the survival of saguaros and tortoises by exposure to the more frequent fires caused by nonnative grasses. Fires are a rare occurrence in the saguaro-palo verde plant communities that characterize this desert and losses are considered to be catastrophic among long-lived species (Esque and Schwalbe,

1994-1996; Esque and others, 2007). Researchers are only beginning to understand the changes in Southwestern deserts that result from these plant invasions and fires. The problems of nonnative plant invasions, increased fire frequency, and restoration are interrelated and require an integrated research program to gain valuable information for managers. In addition to fire related impacts, researchers are also studying the seedbank characteristics of buffelgrass and native plant species to assist in restoration efforts following successful buffelgrass control efforts.

Interagency Cooperation

The growing concern for buffelgrass invasions has galvanized area land managers, scientists and local communities into action, forming the Southern Arizona Buffelgrass Coordination Center and Buffelgrass Working group. On February 9, 2007, more than 120 representatives from state and federal agencies (including NPS, FWS, BLM, USGS and USDA-Forest Service), county and municipal governments, academia and private conservation organization from across southern Arizona joined concerned citizens at the first Buffelgrass Summit. Together we developed and are implementing a 5-year Southern Arizona Buffelgrass Strategic Plan for regional buffelgrass control that includes identification of buffelgrass sites using GPS mapping for purposes of monitoring, control, management, and eradication. In addition, the Invasive Species Advisory Committee (ISAC) which is the Federal Advisory Committee Act chartered group of nonfederal stakeholders that advise NISC, met in Tucson, AZ in May of 2009. This group toured buffelgrass areas and had extensive discussion of this issue within the larger context of invasive plants contributing to the frequency and severity of wildfires.

In 2005, Arizona declared buffelgrass a noxious weed. Local governments followed with ordinances to encourage utilities, developers, and private landowners to control buffelgrass on their properties and right-of-ways. Both the public and private sectors are quickly ramping up to meet the buffelgrass challenge, and, over the past decade, control efforts have accelerated, culminating in treatment of thousands of acres on public lands and right-of-ways in 2008. In spring 2009, over 100 volunteers pulled buffelgrass in the Tucson Basin each month, and a similar volunteer effort is well under way in Phoenix.

The non-profit Southern Arizona Buffelgrass Coordination Center was established in November 2008 to educate the public about buffelgrass infestation and eradication. Other collaborative efforts include local Cooperative Weed Management areas, local weed management organizations, Bureau of Indian Affairs and tribal partnerships, and partnerships between DOI and the U.S. Forest Service on management, aerial mapping and research projects.

Ongoing Challenges

The ecological transformations we are experiencing in the southwest are also occurring across the border in Mexico. Buffelgrass has been widely planted as pasture grass in Mexico and populations are expanding north across the border. In addition, a new variety of buffelgrass (Frio) that can withstand colder temperatures was jointly released and planted in South Texas and Mexico. This cold tolerant variety is adapted to a much wider geographic area and could expand invasive buffelgrass populations northward into northern Arizona and beyond (Hussey and Burson, 2005).

Illegal border activity and associated national security measures have resulted in conditions that make control of buffelgrass more difficult. Movement of goods and people and increased border activity creates ground disturbances and pathways for dispersal of buffelgrass and other invasive species along the border, and increasing security concerns make it difficult for land managers to detect and control border buffelgrass populations. Finally, even if we can eradicate the invasive plant species from an area, the damage they cause together with the extremely arid environment makes restoring native species very difficult.

Conclusion

While this hearing is focused on buffelgrass we must consider the many invasive species that threaten desert ecosystems in the southwest. Species such as red brome, schismus, fountain grass, and Sahara mustard threaten upland sites, while other species are impacting riparian areas along rivers and streams. More than 100 non-native species have been recorded in parks in the southwest and more than 10% of the flora is not native to the parks. The explosion of buffelgrass and these other invasive species is a major concern to land managers in the Sonoran desert ecosystem.

There are current and developing tools that will allow us to address this growing problem, but only with a sustained and increased commitment to the problem. All solutions must be based on a coordinated landscape approach that includes all the

land owners and jurisdictions in the area. The approach must include all invasive species and look past control to restoration of sustainable native plant communities. Southern Arizona has already organized around the issue through cooperative efforts involving local businesses, citizens, academia, conservation organizations, fire departments, and local, state and federal governments. The Department will continue to actively participate in this regional effort.

Thank you for the opportunity to testify and I welcome any questions you or the subcommittee members may have.

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Mr. GRIJALVA. Let me now ask Ms. Faye Krueger, Deputy Regional Forester, Southwest Region, U.S. Forest Service. Welcome again and thank you.

STATEMENT OF FAYE KRUEGER, DEPUTY REGIONAL FORESTER, SOUTHWESTERN REGION, U.S. FOREST SERVICE

Ms. KRUEGER. Good morning, Chairman Grijalva. Thank you again for this opportunity to appear before you and provide the Department's perspective on losing ground to the war on buffelgrass in the Sonoran Desert.

At the Forest Service, we are also very concerned about invasion of noxious weeds on National Forest Service land.

Buffelgrass is an invasive grass species from Africa that was first introduced into the United States, in the 1930s, as livestock forage and for soil stabilization purposes, where it was often planted on hillsides.

It often competes with native vegetation using water, nutrients, sunlight, and it forms dense stands that allow fire to spread across the landscape.

In the Sonoran Desert, the saguaro cactus are fire intolerant. Almost all our native communities can be destroyed by a single buffelgrass fire. Buffelgrass is a fire-adaptive species that reestablishes in these burned areas and effectively becomes a dominant species.

Comprehensive research to evaluate effective combinations of mechanical and herbicide treatment is needed; also re-evaluation of the feasibility of biological control, such as insects or fungi, that could depress or slow the spread of buffelgrass.

Both the Coronado National Forest and the Santa Catalina Ranger District have been affected by buffelgrass. The Santa Catalina Ranger District, on the Coronado National Forest, is seeing about three thousand areas along the southwestern foothills of the Santa Catalina mountains.

Also new stands of buffelgrass are being established, within the forest, through transportation of seeds by vehicles, humans, human activities and animals.

On the Nogales Ranger District, in southernmost Arizona, isolated populations of buffelgrass have been introduced by activities between Mexico and the U.S. Border.

The Santa Catalina Ranger District has a hefty volunteer program for treatment of buffelgrass. They also have been working with the Arizona State Department of Forests to treat buffelgrass at new elevations along the Mt. Lemmon Highway.

Coronado National Forest employees were involved in the formation of the Buffelgrass Working Group, which developed the Southern Arizona Buffelgrass Strategic Plan, which turned into the Southern Arizona Buffelgrass Coordination Center, and we are active participants.

Buffelgrass is also found on the Tonto National Forest in central Arizona. The noxious weed coordinator on the Tonto National Forest devotes nearly half of her time to buffelgrass control with help from volunteers.

Buffelgrass is now common throughout the greater Phoenix area, and buffelgrass moved onto the Tonto National Forest from the interstate highway as well as other highways.

The Forest Service is working closely with the Arizona Department of Transportation to control infestations that will occur around the highway during construction projects.

The Forest Service is currently working with several multi-agency projects at the regional level. We worked with the National Park Service and did aerial surveys to map locations of buffelgrass infestations on public lands.

The Forest Service recently provided funding to investigate the effectiveness of several herbicides on buffelgrass, in conjunction with the University of Arizona.

The Forest Service is also part of a multi-project feasibility test to use helicopters in the Sonoran Desert. It's about a 12-acre area in Pima County that we're working to put herbicide application on to understand the rates needed to control buffelgrass and minimize damage to the native vegetation.

Mr. Chairman, this concludes my prepared statement. I will be pleased to answer any questions you might have.

Mr. GRIJALVA. Thank you very much.

[The prepared statement of Ms. Krueger follows:]

Statement of Faye Krueger, Deputy Regional Forester, Southwestern Region, U.S. Forest Service, U.S. Department of Agriculture

Chairman Grijalva, Ranking Member Bishop and members of the subcommittee, thank you for the opportunity to appear today to provide the Department's perspective on "Losing Ground: The War on Buffelgrass in the Sonoran Desert."

At the Forest Service, we are very concerned about the aggressive and persistent nature of invasive and noxious species colonizing National Forest System lands. We view the establishment of buffelgrass stands on National Forest System lands in Arizona as a direct conflict with the Forest Service mission "to sustain the health, diversity and productivity of the Nation's forests and grasslands to meet the needs of present and future generations". Indeed, the establishment of buffelgrass stands in the Sonoran Desert ecosystem has become a direct threat to the iconic saguaro cactus, one of the defining plants of the Sonoran Desert and a grand symbol of the American West.

Buffelgrass (*Pennisetum ciliare*) is an invasive grass species from Africa that threatens broad areas of the Sonoran Desert ecosystem through its expansion into southern Arizona and the State of Sonora in Mexico. Buffelgrass was first introduced into the United States in the 1930s as livestock forage and for soil stabilization purposes. Buffelgrass has invaded roadsides and other disturbed areas, and it also occupies relatively steep hillsides of the desert landscape. The threat from buffelgrass comes from its ability to outcompete native vegetation for water, nutrients, and sunlight, and its formation of dense buffelgrass stands that allow fires to

spread over the landscape. The Sonoran Desert evolved without fire and most of its native plants such as the saguaro cactus (*Carnegiea gigantea*) are fire intolerant. Nearly all of a native plant community can be destroyed by a single buffelgrass fire. Since buffelgrass is fire adapted, it reestablishes in these burned areas and effectively becomes the dominant species. There is a concern that a cold-tolerant buffelgrass cultivar newly developed and recently released for use for forage will allow the invasive species to grow at higher elevations and extend its range further northward thereby increasing the potential for buffelgrass invasion and ecosystem degradation.

Although buffelgrass is possibly the greatest current threat to the Sonoran Desert ecosystem, it is only one of a number of invasive species that can impact the desert. Invasive species such as the cactus moth (*Cactoblastis cactorum*), sweet resinbush (*Euryops subcarnosus*), and fountain grass (*Pennisetum setaceum*) also threaten the Sonoran Desert. Red brome (*Bromus rubens*) is another invasive grass that has converted large areas of native desert vegetation on alluvial fans or outwash plains locally known as bajadas in the upper Sonoran Desert through the introduction of a fire cycle.

Complete eradication of buffelgrass in the Sonoran Desert is no longer feasible due to the extensive spread of buffelgrass over the landscape. There is still a lack of knowledge on cost effective techniques to control buffelgrass over a broad-scale desert environment as outlined in USDA's principles for integrated pest management. A particular need is for comprehensive research to evaluate effective combinations of mechanical and herbicide treatments that will control buffelgrass in desert conditions. Although small scale efforts involving volunteers have been successful in reducing localized buffelgrass populations on a short-term basis, there is less understanding of the costs and effectiveness of treatment options that could be accomplished on a larger scale. In the long term, there is a need to evaluate the feasibility of biological controls, such as insects or fungi, which would suppress or slow the spread of buffelgrass within the Sonoran Desert ecosystem. The Forest Service's Research and Development branch could play a role in developing these technologies.

Both the Coronado National Forest and the Tonto National Forest have been infested by buffelgrass. In particular, the Santa Catalina Ranger District on the Coronado National Forest is heavily infested with about 3,000 acres of relatively dense buffelgrass along the southwestern foothills of the Santa Catalina Mountains near Tucson. These foothills have patches of buffelgrass of about two acres in size that serve as a highly flammable fuel that threatens populations of the unique saguaro cactus within the Pusch Ridge Wilderness and homes in the wildland-urban interface bordering the Forest. New stands of buffelgrass are being established within the Forest through transportation of seed by vehicles, wind, and animals. The Nogales Ranger District (Coronado National Forest) in southernmost Arizona has isolated populations of buffelgrass that have been introduced in part by extensive human activities along the U.S.-Mexico border. As a consequence of buffelgrass seed being transported by these various mechanisms, existing populations of buffelgrass on the Forest are expected to continue to spread. Once treated buffelgrass stands need to be monitored and re-treated as necessary for several years.

Since buffelgrass was first detected on the Santa Catalina Ranger District near Tucson in 1969, the Coronado National Forest has conducted activities to control it including one-time events for community service by local service organizations such as Eagle Scouts and schools. The Forest sponsors ongoing annual events such as "Beat Back Buffelgrass Day" and "National Public Lands Day." Community interest and involvement have been high and targets for buffelgrass removal have been exceeded each year. The Forest also uses crews from the Arizona State Department of Forestry to grub buffelgrass at mid-elevations along the Mount Lemmon Highway to minimize a fire hazard along the road. Follow-up treatment must be done periodically to keep the highway free of buffelgrass.

Along with other concerned organizations, the Coronado National Forest participated in the Buffelgrass Summit that was held in Tucson in February, 2007. Forest personnel were also involved in the formation of a Buffelgrass Working Group and subsequent development of the Southern Arizona Buffelgrass Strategic Plan. This plan led to the establishment of the Southern Arizona Buffelgrass Coordination Center (SABCC). The purpose of the SABCC is to serve as a regional information center on buffelgrass that emphasizes an integrated management approach to control this invasive species. The center is supported by organizations and agencies concerned with buffelgrass management in southern Arizona including the Forest Service.

Buffelgrass is also found on the Tonto National Forest in central Arizona with infestations occurring on four of its six Ranger Districts. Most infestations on the Forest have not been mapped, but buffelgrass plants are scattered over thousands of acres on the Forest. If left untreated, these small infestations are expected to be-

come denser over time and cause problems similar to other areas with heavy buffelgrass populations such as the Santa Catalina District of the Coronado National Forest. Control is time consuming and expensive. The noxious weed coordinator of the Tonto National Forest devotes at least half of her time to buffelgrass control together with help from volunteers. However, new infestations are occurring in remote areas on the Tonto National Forest at such a rate that mapping or controlling the spread is not feasible at this time.

Buffelgrass is now common throughout the greater Phoenix and Tucson metroplex, and the urban ecosystem can serve as a major source of seed. This invasive grass grows along urban, suburban and rural streets and roads and populates parks, yards of residences and industrial areas, which are sometimes not in the forefront of control efforts. The Arizona Legislature has enacted a series of statutes to address, prohibit and control the impact of all invasive and noxious species in Arizona and has identified the Arizona Department of Agriculture and the Arizona Department of Transportation as leads for prohibition, eradication and control.

In general, people within the metro area are unaware of the potential for buffelgrass to impact wildland areas. Although a volunteer organization (the Phoenix Weedwackers) does exist to remove buffelgrass in mountain preserves of Phoenix, the city itself does not currently have a specific program for buffelgrass control. Northward-bound traffic from the city continuously brings buffelgrass seed onto the Tonto National Forest. Buffelgrass has moved onto the Forest from access roads originating from Interstate Highway 17 and from highway road corridors that cross the Forest including U.S. 60 and State Highways 87, 88, and 188. The Forest is working closely with the Arizona Department of Transportation to control new infestations that occur along the highways during construction projects.

The Forest Service is committed to working with agencies, educational institutions, community service organizations, local fire departments, and other entities in preventing and controlling buffelgrass. This includes coordinating with the Southern Arizona Buffelgrass Coordination Center on a wide array of projects and activities. The Forest Service is currently involved with several multiagency projects at a regional level to increase knowledge of buffelgrass expansion and management. In November 2008, the Forest Service and National Park Service jointly conducted an aerial survey of the Coronado National Forest and Saguaro National Park to map buffelgrass infestations on these public lands. The Forest Service recently provided FY 2010 funding to the University of Arizona to investigate the effectiveness of several herbicides on buffelgrass under the (U.S. Forest Service) State and Private Forestry—Forest Service Pesticide Impact Analysis Program (FSPIAP). The Forest Service is also part of a multiagency project to test the feasibility of using helicopters in the Sonoran Desert to apply glyphosate herbicide at application rates that can control buffelgrass while minimizing damage to native vegetation. The project is based on the need to develop a technology that can handle buffelgrass infestations in remote, inaccessible areas or areas with steep, rocky terrain that do not allow control by manual methods or ground application of herbicide. Testing with the herbicide by helicopter application will be conducted on 12 acres of public land owned by Pima County during the summer of 2010. The project is jointly sponsored by Pima County, City of Tucson, Forest Service, National Park Service, Bureau of Land Management, and the University of Arizona.

The Forest Service has an active and vibrant program to address invasive species on National Forest System lands and to assist in partnerships for all lands. We are committed to work to restore and maintain forest ecosystem health using the best available science and technologies to accomplish this goal of the Secretary. Mr. Chairman, Ranking Member Bishop, this concludes my prepared statement. I am pleased to answer any questions you may have.

Mr. GRIJALVA. Let me now ask Dr. Ned Norris, Junior, Chairman of the Tohono O'odham Nation. Welcome, Mr. Chairman, and I look forward to your comments.

**STATEMENT OF DR. NED NORRIS, JR., CHAIRMAN,
TOHONO O'ODHAM NATION, SELLS, ARIZONA**

Dr. NORRIS. Thank you, Mr. Chairman, and members of the Committee. It's always good to see you, Congressman Grijalva, and thank you for your continued leadership.

Today the Subcommittee on National Parks, Forests and Public Lands invited me to testify about the invasion of buffelgrass on the Tohono O'odham Nation. The Tohono O'odham Nation is a Federally recognized tribe located in the southwestern part of the State of Arizona.

Buffelgrass was introduced to the Nation in the 1980s for cattle forage and erosion control. Since then, buffelgrass has spread and established itself over a large portion of the Tohono O'odham Nation.

The buffelgrass problem, on the Nation, is being compounded by an increasing number of wildland fires. In the past five years, the Nation has experienced more frequent wildland fires, which are partially fueled by buffelgrass. Unfortunately these fires have largely occurred in the biologically diverse mountain ranges of the nation.

These fires set the stage for further buffelgrass establishment in our most important land. For example the Green fire, in November of 2009, consumed 5,700 acres of Tohono O'odham Nation land, Arizona State Land and Bureau of Land Management Federal land in the Baboquivari Mountains. It is estimated that 8 to 10 percent of the fuel for that fire was from buffelgrass.

The Baboquivari Mountains are culturally important to the O'odham, and this fire will open the door for further buffelgrass invasion on these mountains.

Additionally the San Juan fire, in July of 2009, consumed 9,000 acres of Tohono O'odham Nation land and set the stage for buffelgrass establishment farther up-slope on the Quinlan Mountains, which are adjacent to the Baboquivari Range.

Buffelgrass threatens the landscape that forms O'odham culture and puts at risk species such as saguaro, bear grass and the Sonoran Desert Tortoise.

Cultural sites are also at risk due to buffelgrass establishment. The O'odham use saguaro and bear grass for cultural purposes, and the threat that buffelgrass poses, of turning the Sonoran Desert into a flammable Africanized grassland, threatens the Tohono O'odham way of life.

Although the true extent of buffelgrass on the Nation is not currently known, we are currently working with the Southern Arizona buffelgrass Coordination Center to map the extent of the invasion. This will help us to prioritize areas in need of treatment.

However the Nation needs funding in order to treat the prioritized areas. The Tohono O'odham Nation has hosted local buffelgrass removal events; however, the Federal government needs to reach out to a wider range of government groups and institutions in order to mitigate the spread of buffelgrass in Southern Arizona.

Buffelgrass needs to be treated on surrounding Federal lands and funds need to be provided to help local governments fight buffelgrass invasion. We must mitigate the buffelgrass problem to ensure the O'odham way of life for generations to come.

In conclusion, Mr. Chairman, members of the Committee, we ask the Committee to consider assisting Southern Arizona in its fight against buffelgrass, to preserve the Sonoran Desert for future generations.

Mr. GRIJALVA. Thank you, Mr. Chairman.
[The prepared statement of Dr. Norris follows:]

Statement of Dr. Ned Norris, Jr., Chairman, Tohono O'odham Nation

Good morning, my name is Dr. Ned Norris, Jr. and I am the Chairman of the Tohono O'odham Nation. Today, the Subcommittee on National Parks, Forests and Public Lands has invited me to testify about the invasion of buffelgrass on the Tohono O'odham Nation. The Tohono O'odham Nation is a federally recognized tribe located in southwestern Arizona.

Buffelgrass was introduced to the Nation in the 1980s for cattle forage and erosion control. Since then, buffelgrass has spread and established itself over a large portion of the Nation.

The buffelgrass problem on the Nation is being compounded by an increasing number of wildland fires. In the past five years, the Nation has experienced more frequent wildland fires, which are partially fueled by buffelgrass. Unfortunately, these fires have largely hit the biologically diverse mountain ranges of the Nation. These fires set the stage for further buffelgrass establishment in our most important lands.

For example, the Three Peaks Fire in November, 2009, consumed 5,700 acres of Tohono O'odham Nation land, Arizona state land, and Bureau of Land Management federal land in the Baboquivari Mountains. It is estimated that 8-10% of the fuel for that fire was from buffelgrass. The Baboquivari mountains are culturally important to the O'odham and this fire will open the door for further buffelgrass invasion on these mountains. Additionally, the San Juan Fire in July, 2009, consumed 9,000 acres of Tohono O'odham Nation land and set the stage for buffelgrass establishment further upslope on the Quinlan Mountains, which are adjacent to the Baboquivari range.

Buffelgrass threatens the landscape that forms O'odham culture and puts at risk species such as saguaro, beargrass, and the Sonoran Desert Tortoise. Cultural sites are also at risk due to buffelgrass establishment. The O'odham use saguaro and beargrass for cultural purposes and the threat that buffelgrass poses—to turn the Sonoran desert into a flammable, Africanized grassland—threatens the O'odham way of life.

Although the true extent of buffelgrass on the Nation is not currently known, we are currently working with the Southern Arizona Buffelgrass Coordination Center to map the extent of invasion. This will help us to prioritize areas in need of treatment. However, the Nation needs funding in order to treat the prioritized areas. The Tohono O'odham Nation has hosted local buffelgrass removal events. However, the federal government needs to reach out to a wider range of governments, groups and institutions in order to mitigate the spread of buffelgrass in southern Arizona. Buffelgrass needs to be treated on surrounding federal lands and funds need to be provided to help local governments fight buffelgrass invasion. We must mitigate the buffelgrass problem, to ensure the O'odham way of life for generations to come.

In conclusion, we ask the Committee to consider assisting southern Arizona in its fight against buffelgrass, to preserve the Sonoran desert for future generations.

Mr. GRIJALVA. Let me begin with some questions, Dr. Frost—and if some of your colleagues from BLM, Fish and Wildlife want to participate in the response to any of these questions, feel free to comment, and just identify yourself for the record and we can go from there.

Mr. Frost, can you tell us what some of the primary obstacles are to effectively combating buffelgrass invasion? For instance, is it a funding issue? Is it a coordination issue? And if so, what are those risks and challenges because, despite all of the integrative efforts, the weed still appears to be winning.

And you can correct that comment, if I'm wrong, but what are the challenges? Is it a funding resource capacity or is it a coordination capacity between agencies, other interested jurisdictions and groups?

Mr. FROST. I believe a little of both of those. I mean obviously resources, additional resources can greatly enhance the ability for the Department's bureaus to address these issues.

It's very labor-intensive to get into some of these areas because of the remoteness of some of the sites, the safety issues associated with getting into those places and doing the type of work that needs to be done.

You know I would argue it doesn't matter how much we coordinate, we can always coordinate better. I've worked on a number of interagency issues, and it always seems like, when we do coordinate, obviously we're going to get a lot more done. I think we can always better coordinate.

It's even more important out there because it's not just between the bureaus within the Department of the Interior, but our friends with the Forest Service, our friends within the tribes, the local entities and state entities and the private interests, and when you get all those parties interacting, sometimes the coordination effort gets more difficult.

So I think we need better coordination and obviously more resources, and then we could start to make some better progress than what we're making now.

Mr. GRIJALVA. Is much of what you've accomplished either in jeopardy or has it already returned to the previous state of disrepair due to the buffelgrass? I think all this is related to the current problems along the border. Not all, but a portion of it.

Is it a contradiction or is it not, or how can your agency deal with the imminent threat of buffelgrass while you're simultaneously having to deal with preventing access to border-related areas?

Mr. FROST. Yes, that's a tricky issue because one of the logistical constraints is just the safety of the people out doing the work down there closer to the border. And so that makes it more difficult, which requires more resources, and so there's no easy answer.

I think our working with the border patrol to make sure that they're not exacerbating the problem, making sure that our agencies on our side of the border are doing everything they can to address the issues. And until the assorted border issues get resolved, that's one of the facts of life we have to deal with. But I don't think we can give up because if we give up, then we've lost the fight.

Mr. GRIJALVA. One of the gallant efforts is the volunteers. Is there a need, for the Department of the Interior, to invest a little money in the management of volunteer programs, which involves staff time and tools, because the Federal Government is getting a great return on its dollar.

This is one of the most cost-effective options that is out there, but does the Department have the resources to continue to provide robust support for these volunteer organizations?

Mr. FROST. Secretary Salazar has made the volunteer effort and youth working his high priority. I know, at the National Parks Service, we got an additional \$10 million to increase our ability to work with the volunteers and work with the youth programs. And I know that, in the 2011 president's requests, there are additional funds to increase that even more. I don't know the number off the top of my head, but again resources, we can always use more resources. But the secretary has made this a high priority and has

made those funds available so we can engage volunteers to address this issue and a variety of other ones.

Mr. GRIJALVA. You stated that the battle against invasion can only succeed with a sustained and increased commitment to the problem, and nobody argues that.

I translate that into a spending commitment to having to deal with it as well. The commitment to say we don't like buffelgrass and we wish it would go away is a commitment, but to put resources and funding behind the effort for coordination and for staff resources that would be required for the type of linkages, between the agency, tribal government and other jurisdictions, that need to be made, it's a resource question to me. I'm sure we're going to hear from other panelists today.

So in this challenging time, are we talking about where the dollar goes or where the dollar doesn't go, in the Department of the Interior? How do we prioritize this as a critical issue given the fact that sometimes other funding requests fall under the radar, not the attention, but the attention after the fact.

One of the reasons for this hearing is to draw attention and not to keep the issue under the radar. How would you respond to the fact that—this is my first question—the funding priorities and commitment issues as well.

Mr. FROST. Let me talk a little bit about what we do at the national level, and then maybe I can ask Superintendent Sidles to come up and she can talk about how she prioritizes at the park.

At the national level, in our national resources science program, we've made a significant commitment. I think we spend, I think, on park service-wide, we spend around \$50 million a year on invasive species.

And so we understand it is a critical issue that we have to deal with, and we are dealing with it on a day-by-day basis.

And we have people like the folks from the park, they live, breathe and die invasives, and with that sort of commitment, and with additional resources, we can make significant progress.

But we do prioritize, but there are other priorities. So it's one of those balancing acts that we have to do, but we do have significant resources committed to the process. Maybe I'll turn the time over to Darla for a minute and maybe Jim McKenna from BLM, too.

Mr. GRIJALVA. Anybody want to speak on the same question?

Ms. SIDLES. Chairman Grijalva, thank you for the opportunity to speak. Darla Sidles, Superintendent of Saguaro National Park.

And in answer to your question about the priority of buffelgrass, it is the highest priority and upmost urgency at the park. We don't always have the dollars to do what we need to do, so therefore it's kind of a catch-and-catch-can approach, but we find it is so important to do that we do just about anything we have to do to get it done. If we treat buffelgrass one year and then let it go another year, another year, it will increase by 35 percent to 50 percent each year we don't give it the same or more resources. So we haven't had a consistent funding base to carry on the buffelgrass program that we probably need to do.

We use over 3,000 hours of volunteer time, and that goes back to one of your previous questions about why can't we just use volunteers, and the reason is that they're obviously a great resource

and many of them are here today—they're very committed. But buffelgrass is moving at an exponential rate and we cannot keep up with it.

We're using two different methods, both chemical and manual, but we don't yet have the technology using chemical means to get into some of the steep and rocky and dangerous country, and we don't want to put people at risk, people on the ground.

So we need to find new research methods, new ways to be more efficient to treat buffelgrass, and it's not necessarily always going to work if they're volunteers.

Mr. GRIJALVA. I'm assuming that your point is that, in some of those areas that you described, that that becomes more of a department responsibility as opposed to the volunteer efforts that can be coordinated at other sites?

Ms. SIDLES. That's correct. And in terms of urgency of the problem, I think the reason why we need a more coordinated, concerted effort is because there are so many agencies involved. It's Federal, state, city, county, nonprofit, citizen volunteers.

There's such an amazing collaboration of partners that are dealing with this issue. The rural fire departments, even the city fire departments are dealing with this because of the problem that is threatening to overtake not only the town of Tucson but Sonoran Desert.

A better coordinated response is needed so that everybody has the proper resources to tackle the problem. As I said, it's kind of a catch-as-catch-can approach from agency to agency, and we do the best we can, but as Bert said, we can always do better.

Mr. GRIJALVA. Dr. Frost, in this coordinated effort that I think is essential to that, all the jurisdictions, interest groups, tribal governments, is there a need to identify a czar, a frontrunner of responsibility for the coordination and funding?

Mr. FROST. I don't know. I might defer that to one of the locals. I have my own opinion. Sometimes I think that—I'll just say what I think.

I'm not sure czars work very well all the time. I think, in terms of the park service, the number one priority in the park is dealing with this issue.

Mr. GRIJALVA. Anything you'd like to add to that?

Mr. MCKENNA. I would echo that point. To my way of thinking, there's also a risk if you identify a czar. The risk that I would see is this effort has gathered momentum. I think we probably didn't realize its scale soon enough, but we did have the success in the Watermans, and we're about to be able to move to the Silver Bell.

We have prioritized, recognizing the vegetation communities and Ironwood National Monument are—monuments are obviously—the monuments, we are placing very high priority on them.

We have people that have put considerable personal commitment and effort into this. The Friends of the Ironwood were there to help with the surveys. The Friends of the Ironwood were there to help with the eradication. They went into some very difficult areas. The Sonoran Desert Museum has been involved. Rural fire departments have gotten involved.

So what I think the opportunity here is in the community effort—and let me add one other thought here. We have in recent

years worked with Tohono O'odham Nation, with their youth group, who has been working along the boundaries between the monument and the Nation and have done some tremendous work in terms of cleanup and other issues.

We've talked about the opportunity to expand this effort over time and this seems like an area that also could have value.

Mr. GRIJALVA. Do you wish to make a comment?

Dr. NORRIS. I just wanted to comment that there are—as I stated earlier, the Nation has hosted a number of opportunities, through the use of volunteers, to address this issue. And I guess my comment really surrounds—surfaces around the fact that, as you know, Mr. Chairman and members of the Committee, the O'odham have lived in this region since time immemorial, and there's much on the desert lands that we use in our daily lives, as far as consumption purposes and cultural purposes.

And the invasion of the buffelgrass to our continued use of bahidaj, which is the saguaro fruit that we harvest just before the monsoon rains come or ibhai, which is the fruit off of the prickly pear, or the wild spinach and other natural vegetation that we use for consumable purposes are threatened by continued use by this buffelgrass.

So if we can assist in some way, as the assistant mentioned, through the use of our youth or the use of other members of the Nation to help address this issue, we would like to be able to continue to do that, but without having financial resources and other resources available to us, it makes it difficult for us to play an active role in the effort to address this issue.

Mr. EISEN. My name is Mark Eisen. I'm a fire ecologist and also the deputy fire coordinator for the Fish and Wildlife Service Southwest Division.

Chairman Grijalva, regarding your last question and prioritization of this issue, I'd like to speak to it in consideration of the scale and magnitude we're talking about.

I think no one would argue, in the Southwest here, that this is a pressing issue; however, the scale is much broader than just Southern Arizona, as you know.

One of the factors I think is that buffelgrass is a different invasive species. We cannot lump buffelgrass with the other invasive exotics. It's much different than what we've seen and how aggressively it invades arid lands and subtropical existence. I'd like to add the scale of buffelgrass extends down into Central America. And for the Wildlife Service, although we have much smaller refuges compared to our sister and brother agencies, our mission can be much broader with our trust species, migratory waterfowl, threatened and endangered and rare species.

And this is what I'm talking about, the proliferation of buffelgrass in Mexico and Central America and South America and the very diverse subtropical systems and the threat to many of the tropical birds, threatened and endangered species and rare species in these areas, that also live in North America, here in the U.S.

So the implications and threats to biological diversity is immense and should be considered a pandemic and truthfully is much broader basically than what we're talking about here.

Mr. GRIJALVA. Thank you. The issue that was just stated in the opening comments, some of you have international implications not just what we do here on American soil.

So I've learned to ask about what efforts are going on and what efforts need to be concentrated so that there's a bi-national response and coordination with the Mexican government, Mexican communities.

And the efforts are ongoing here because, as you indicated, that's a source of the invasion. And so how do we deal with that part of the source and what is being done now and what should we be looking at doing with our neighbors to the south.

Mr. FROST. We need to work with our friends in Mexico, on the conservation side and the research side, and we have really good connections. They understand the severity of the issue and the complexity of issue, but where the difficulty comes is when you're talking about livestock, farming and ranching and just plain economics.

Some of the poor people can harvest buffelgrass and go out and sell it to farmers as forage, and that's a source of their economic income. So they see that as a great opportunity.

At the same time, it's causing great economic harm up in the United States. So while I think we have the conservation agencies and the research agencies working very diligently to address the issue, we need to better engage the livestock industry and some of the local communities across the border so they can understand why we shouldn't be perpetuating this species.

Mr. GRIJALVA. And the long-term damage.

Mr. FROST. Right.

Mr. GRIJALVA. Ms. Krueger, as one of the parks and land managers in Southern Arizona, you have a unique responsibility for much of the public land. And a considerable amount of your budget is spent on fire management, as we both know, and realizing budgets are tight, but the funds dedicated to fire management, is some of it better spent trying to limit the problem rather than having to cope with its effects at a later date?

Ms. KRUEGER. Yes. We do forecast buffelgrass both as hazardous fuel, a threat to wild and urban interface and also as a noxious weed. So there are several line items, from our budget, that we can use to fight this buffelgrass. We can use our hazardous fuels money. We can use our vegetative management dollars, wildlife, watershed and erosion money.

Last year we took \$140,000 out of our hazardous fuels program, and we hired a coordinator to help fight buffelgrass on the Santa Catalina district, and we intend to make that a permanent position. You're right, there are opportunities. We started that.

Mr. GRIJALVA. And the same question I asked your colleagues, is this a funding or a coordination issue, in terms of adequately responding?

Ms. KRUEGER. Some of the obstacles we face, we haven't had the resources, that's one thing. We have done recently landscape oral review in the Santa Catalinas, and we have just begun to identify how we best want to attack buffelgrass and where we should invest our money, and we'll be prepared to protect homes on the southwest rim of the Santa Catalinas.

So again, as Mr. Frost said, challenges with steep slopes are a second obstacle we face. Another one, it's not a one-time treatment. It has to occur over at least five years.

Our volunteers are the backbone of helping get rid of buffelgrass, but at the same time, we believe that there has to be herbicide treatment applied as well. So these are just some of the obstacles we face.

Mr. GRIJALVA. So it's about stable funding committed over the long term—five, six years?

Ms. KRUEGER. Yes, that's important, but this is long term. We don't believe in five years this is all going to be taken care of. We believe this is a long-term problem that we're going to have to continue to fight.

Mr. GRIJALVA. Mr. Chairman, it appears as though Federal land agencies are working together with local, state, private entities as well as the tribes to coordinate strategies to combat buffelgrass.

From your nation's perspective, do you feel that the coordination is helping the Nation combat the buffelgrass, why and why not, and more importantly, do you see that coordination? And the point of the resources, which you mentioned earlier, is well taken. What would make that process better?

Dr. NORRIS. Mr. Chairman, members of the Committee, I have to admit, yes, that the Nation is cooperating and working closely with the Federal entities on this particular issue.

I think though that we could probably improve our relationship and improve our level of working together on this particular issue, and I think for us, like I said in my comments, my prepared comments, we still—we, O'odham, still don't fully understand the extent of the buffelgrass situation on the Nation. We continue to study that. We continue to identify those areas that are most prevalent than others.

So for us, we're still trying to figure out the extent of the issue on the Nation, and we know it is there. We know that it's creating an invasion, as we've termed it here. But what I would like to respond to also, Mr. Chairman and members of the Committee, is that when we talk about relationship and we talk about—I think your comment about this being a bi-national issue for the United States and as well for Mexico. I'd like to look at it as a tri-national issue, a tri-national issue involving the O'odham Nation, involving sovereign tribal nations with this issue and involving the United States government as well as the government of Mexico.

As you know, the Tohono O'odham Nation villages historically have been mapped as far south as Hermosillo, Mexico. Currently we have nine villages that continue to exist as O'odham villages immediately south of the international border.

So the relationship is a tri-national relationship that needs to be developed more closely with our counterparts, our friends with the United States government as well as our counterparts in Mexico, in order for us to begin to collectively work together and address this issue.

You know the Nation is indebted to the resources that come from outside resources off the Nation because, when we've dealt with these fires that I referenced in my prepared comments, we didn't

have the resources to be able to fight those fires. We could only address that to a certain extent.

When those fires got to a certain acreage and size, we had to call on the assistance of the range fire people from outside the Nation, and they have been more than willing and able to come and help the Nation address those issues.

So for us, it's really a lack of resources, a lack of funding resources, a lack of clearly identifying the extent of the problem within the Nation. And once we are able to do that, once we continue to work with the Federal entities and the Mexican entities, I think we can begin to have a better grasp on how we can address this issue.

Mr. GRIJALVA. I appreciate that, and you answered partially the other question I had having to do with resources, and I'm talking about specifically dedicating funding to the effort that would involve the Nation. And the point about the tribe approaches is very good. Thank you for that.

If the resources were available, as you have indicated in your testimony, Mr. Chairman, that would, I'm assuming, expedite the identification and response?

Dr. NORRIS. Most definitely.

Mr. GRIJALVA. Let me thank the panelists today for being here. There are additional questions that we're going to submit in writing and hope to get your response and it can also be part of the record. For the Forest Service, there are specific questions that I asked Mr. Frost having to do with the border issues and how that complicates the ability, in terms of resources and priorities, to deal with the buffelgrass invasion, and also some additional information from the BLM as to why that particular Waterman had been so successful and the lessons learned and applicable to other situations.

And I appreciate the comments from Fish and Wildlife about the immensity we're dealing with in this region. The implications go much further than that, and I thank you for that. We get so territorial, we forget about the broader implications.

And for the Tohono O'odham Nation, I think the issue of people partnering, I think that was basically very clear.

We'll submit those to you and hope to get your speedy response so that we'll have the result of this hearing and have it out and help us formulate some response. Thank you very much.

Mr. GRIJALVA. And let me now invite the second panel up.

Thank you very much. Let me begin with our first witness, Sara Smallhouse, president of the Thomas R. Brown Foundation, Tucson.

And I realize, Ms. Smallhouse, you have a time constraint, so after your testimony, with the indulgence of the other panelists, I'd like to ask you the questions I will be asking after all of the panelists are done, so you're not late.

**STATEMENT OF SARAH BROWN SMALLHOUSE, PRESIDENT,
THOMAS R. BROWN FOUNDATIONS, TUCSON, ARIZONA**

Ms. SMALLHOUSE. I'm not under time constraints. Thank you for your consideration. Thank you for the opportunity because I know you went to great effort to organize all this. It is a matter of critical

importance to our community, and the threat is growing, so thank you very much.

For the record, I'll give a little background on myself. I'm a native Tucsonan. My parents moved here from the East because they were attracted here by the friendly community and beautiful desert setting. They were entrepreneurial and started Burr-Brown Research Corporation which manufactured high precision electronic equipment. And when the company sold to Texas Instruments in 2000, it was the largest sale in the State's history.

Our family has prospered here, and they have given back proudly and shared our wealth through philanthropy and are very committed to the future here.

I serve on the board of the Regional Economic Development, and I'm an active member of the Southern Arizona Leadership Council. And both of these organizations are aware of buffelgrass and are very concerned about it.

I became aware of the buffelgrass issue at a meeting of the Southern Arizona Leadership Council Strategic Initiative Committee in 2008.

Dr. Julio Betancourt, a USGS Senior Scientist, gave an overview presentation that pretty much shocked us all. Although we had been generally aware of the invasive species issue, the full consequences and extent and implications of a buffelgrass spread were a surprise to us. This particular invasion has the potential to undermine our quality of life and the basis of our economy. It hardly seems like it could be true. It almost seems like a plot of a science fiction horror film, but the scientists and land managers in the region are in agreement with their concerns, and none feel adequately equipped to address what needs to be done.

There has been a strategic plan developed, and one of the principal recommendations was the formation of a nonprofit entity that could provide coordination among jurisdictions and help focus resources.

It's not exactly a czar, but the Southern Arizona buffelgrass Coordination Center was formed. It's now the hub of the buffelgrass-related activities in the community. It's diverse, it's inclusive and it's the body through which choices are assessed and the inevitable trade-offs are evaluated. We have many of the people here that you've heard today involved, and I think we've made great progress in the short amount of time.

I'm the current chairperson of that organization, and our family foundation helped provide early funding to get it going. I spend about a quarter of my time on the buffelgrass issue, and I do it because developing the capability to manage buffelgrass is not only important, but it's really urgent. And the outcome, one way or another, will have a huge impact on this community and more broadly. We can't be complacent or wishful. We have to act intelligently.

There are only two basic choices right now. We can focus and invest substantial amounts upfront now to try to contain this destructive grass, and some of it can be easily managed with local resources going forward indefinitely, into the future, through adjusting the agency budgets of the people we've talked to and measured, such as that, or we can concede that we waited too long to address

the problem and start preparing for a grass fire dominated environment, which also will take investment.

Substantial investment in equipment and personnel to fight fires will have to be put in place to protect life and property if we let the buffelgrass take over.

In many ways, the situation is kind of like the dikes in New Orleans prior to Katrina. We could fix the dikes. Yes, it would have cost a lot of money, but the eventual cost of not doing so far exceeded the cost of preventative actions, and it would have saved a lot of human suffering.

Our choices are do we mitigate the spread of buffelgrass or delay and face more costly adaptation to a hostile, fire-prone environment later.

I have become convinced, by the experts, that wholesale conversion of our landscape will, in fact, be inevitable without intervention. The point of no return is on the horizon, and there's a very real possibility of losing our magnificent and diverse desert and saddling ourselves with ugly landscapes and dangerous fires forever.

Our tourism industry can easily dry up. People, like my parents, would choose other places to start a business, and companies considering relocation or expansion could easily choose to go elsewhere.

And it's not just a local matter. The Sonoran Desert is unique to the Southwest, and there seems to be pretty widespread scientific consensus that the Sonoran Desert in Mexico is pretty much doomed. The Sonoran Desert of Arizona is the last place where saguaros have a chance. Our cacti are symbols of the wild west and embody the enchantment of the American frontier and are recognized throughout the world.

If the ugly future is to be avoided, procrastination is not an option. The situation is changing fast. Buffelgrass spreads and doubles every year. To get a feel for that, if you double a penny every day for a month, you're a multimillionaire by the end of the month.

So we desperately need some help. State and local resources have been pushed to the brink. We cannot do this on our own right now.

The Buffelgrass Coordination Center submitted an appropriations request earlier this year to give Federal land managers more to work with. We need your understanding and support for this.

People here have mobilized very quickly once they understood the true ramifications of buffelgrass and its spread. We have formed unprecedented alliances and collaborations that could never have been imagined before. We even have the Porsche Club of Southern Arizona involved. So with this broad spirit of cooperation and volunteerism, we are still not keeping up with it.

The Sonoran Desert in Mexico is gone for good with no chance of recovering as we know it. It seems unbelievable but the same could happen here. Please intervene and direct resources our way so we can keep this from happening. We're prepared to do our part. Please help us by doing your part.

Mr. GRIJALVA. Thank you very much.

[The prepared statement of Ms. Smallhouse follows:]

**Statement of Sarah Brown Smallhouse, Chair,
Southern Arizona Buffelgrass Coordination Center**

Thank you for this opportunity to give testimony on the buffelgrass issue in Arizona. This is a matter of pivotal importance to southern Arizona now, and the threat is expanding. For an easy-to-digest overview please watch the 10-minute video on the home page of www.buffelgrass.org.

I am a native Tucsonan. My parents moved to Tucson from the East because they were attracted to the community and the Sonoran Desert setting. They were entrepreneurial and started a company, Burr Brown Research Corporation, that manufactured high precision electronic equipment and became world renowned. The University of Arizona and Pima Community College educated and trained most of the employees that worked at Burr Brown and who created its capacity for great success in the world market place. When the company was sold to Texas Instruments in 2000 it constituted the largest corporate sale ever in the State of Arizona. My sister and I now carry the legacy of our parents and we are deeply committed to this community and its ability to prosper long into the future.

The Brown Family Foundations have given many gifts over the years: Tucson Medical Center, the Arizona Cancer Center, the Tucson-Pima County Library, the University of Arizona, Pima Community College, San Miguel High School, the Wildcat School, the Sunnyside School District, and to key strategic initiatives benefiting the region. We were major supporters of the Southern Arizona Regional Town Hall. Our contributions of start up funding for the Critical Path Institute and Science Foundation Arizona significantly helped those organizations launch. We have endowed professorships at the University of Arizona, including that of Peter Smith, the first civilian scientist to ever lead a NASA mission. The Phoenix Mars landing was another historic moment for Arizona and we were very proud to have played a part. Many students at the University of Arizona benefit from scholarship programs we have funded; most recently we gave \$2 million to the Arizona Assurance Program designed to help the most financially challenged—but talented and motivated—kids who apply to the University of Arizona. Pima Community College significantly updated their health sciences teaching facilities and upgraded technology needed to train respiratory therapists, radiological technicians and nurses with our help. We offer programs for public school teachers for professional development. We have substantially contributed to the public dialog through research, symposiums and forums in the areas of energy, infrastructure, immigration, and growth. We feel gratitude for our good fortune in Tucson and give back to the community in a myriad of ways.

I participate in civic affairs in other capacities too. I serve on the Board of Directors of Tucson Regional Economic Opportunities (TREO), our local economic development agency, and participated in creating its strategic roadmap for investment and direction. I am also an active member of the Southern Arizona Leadership Council (SALC), a CEO group aimed at facilitating long term planning and leadership in Southern Arizona. These entities are the two most influential business organizations in the community and are where we put our collective stock in preparing for a productive future and continued high quality of life. They are both aware and deeply concerned about the potential impact the expanding base of buffelgrass threatens.

I became aware of the buffelgrass issue at a meeting of the SALC Strategic Initiatives Committee of which I am a member. Dr. Julio Betancourt, a Senior Scientist with the U.S. Geological Survey, gave an overview presentation that shocked all who were in the room. I think it is fair to say many of us had been aware of invasive species issues in general, and may have even known buffelgrass was of particular concern, but the picture Dr. Betancourt painted took us all back. The potential consequences of this particular invasion have the potential to undermine the very foundation(s) of our community; our quality of life and the basis of our economy are threatened by buffelgrass. It hardly seems like it could be true—it is almost like the plot of a science fiction horror film—but the scientists and land managers in the region are all in agreement, are all deeply concerned, and none of them feel adequately equipped to address what needs to be done.

Land managers organized themselves and wrote a strategic plan for how to most efficiently attempt to bring the invasion under control. There was recognition that many governmental jurisdictions and private property owners would have to coordinate their efforts to be successful. After all, if one property owner lets buffelgrass spread unchecked, regardless of how diligent his neighbor might be, the neighbor will never be able to keep their land clear as the buffelgrass will just keep reseeding itself. One of the principal recommendations of the strategic plan was to form a neutral non-profit entity that could provide such coordination and help focus resources.

This is how the Southern Arizona Buffelgrass Coordination Center (SABCC) came into being. It is now the hub of all buffelgrass related activity in the community and is diverse and inclusive with participation from all sectors of the community. This is the body through which community choices are discussed, where all ideas have a forum and all sectors of the community come together to evaluate inevitable trade-offs. SABCC facilitates community-wide decisions and then organizes the teamwork necessary for progress.

The Brown Family Foundation made an enabling gift to SABCC in 2009 and I personally contribute about a quarter of my time to this issue. I choose to do so because it is important, it is urgent, and the outcome—one way or another—will have a huge impact of this community. I am committed to seeing this through. There is too much at stake to be complacent or wishful. We must act intelligently, and fast.

I have come to appreciate the hard facts facing us: either we focus, invest substantial amounts up front now and try to contain the spread of this grass at some level that can be feasibly managed on local resources indefinitely into the future, or we concede we have waited too long to address the problem and start preparing for a grass fire-dominated environment. Neither of these paths will be costless; the fire regimes we can expect will be very expensive indeed and we certainly do not have the equipment or personnel to fight them now. In many ways this is a situation analogous to the dikes in New Orleans prior to Hurricane Katrina. We could have fixed the dikes—and yes it would have cost a bundle—but the eventual cost of not doing so far exceeded what preventative action would have cost, and it would have saved the terrible human suffering that came about from the extensive flooding. I believe we are facing a comparable problem here, but it has to do with the Sonoran Desert, grass and fire. Our choice is this: Do we mitigate the spread of buffelgrass, or delay and face forced (and more costly) adaptation to a hostile fire-prone environment?

There is no doubt among those who understand this desert ecosystem that wholesale conversion of our landscape will be inevitable without intervention, and it won't take that long either. Not only will we lose the magnificent desert that creates enormous quality of life for the people who live here, but we will have saddled ourselves with ugly, expensive, and dangerous fires forever. The tourism industry, which now contributes billions annually and employs close to 50,000 people here, would surely disappear. People like my parents would choose other communities to start a business. Companies considering relocation or expansion might easily choose more friendly environs for their new operations and a higher quality lifestyle for their employees. Things could get pretty bad here.

If this ugly future is to be avoided, procrastination is not an option. The situation is changing too fast. Estimates are the buffelgrass doubles annually; a large effort is needed upfront to contain the invasion to a smaller land area that can reasonably be managed with much smaller budgets going forward. This is why we have brought this matter to your attention. Right now we need your help. State and local resources have been pushed to the brink and we simply cannot manage this effort on our own right now. The appropriations request SABCC submitted earlier this year is for funds to begin on federal lands in southern and central Arizona. This is a responsible and meaningful first step.

We believe this is more than a local matter of concern as well; the Sonoran Desert ecosystem is unique to the southwest and is already doomed in the northern states of Mexico due to widespread established buffelgrass. The Sonoran Desert of Arizona is the last place saguaros have a chance. Our giant cacti are symbols of the Wild West and embody the enchantment of the American frontier. They are recognized throughout the world. To lose the Sonoran Desert and all the biodiversity it holds would be more than just a local travesty.

The broader Tucson community mobilized quickly once the true ramifications of buffelgrass spread were realized. All jurisdictions, area Tribes, parks, transportation departments, conservation and environmental groups, the business community, the utility companies, the University, the tourism industry, home builders, contractors, realtors, public safety officials and fire fighters, neighborhoods and homeowners, hikers, bikers and nature lovers, school kids, boy scouts—even the Porsche Club of Arizona—all these groups have come together to do what they can. This community has united in a totally unprecedented way to prevent a terrible future from unfolding. We are all very appreciative of Congressman Grijalva for responding quickly to the threat we see and bringing this matter to the fore.

Our community has fully engaged and formed alliances and collaborations that never would have been imagined before so we can be as effective as possible. But for all this good work, valiant effort, and broad spirit of cooperation and volunteerism, the buffelgrass is still spreading faster than we can keep up. We need help, and it is not within the capacity of our local or state governments to provide

it. Right now we need help from Washington. The goal is to contain the buffelgrass spread, reduce the acreage infested, and then keep it under control through ongoing diligence. But for this plan to work there needs to be significant resources now to bring the problem under control.

I lived for awhile in Southern Sonora, the Mexican state just south of Arizona. I often drove the road between Alamos and Tucson. Over the years I watched buffelgrass take over the Mexican landscape. The scientists I have spoken with are unanimous: the Sonoran Desert of Mexico is gone for good. No chance of it ever recovering at this point. It seems unbelievable that the same could happen here, but it is true. And it might not take that long either—a few decades. Please intervene and direct resources our way so we can keep this from happening.

Mr. GRIJALVA. I was glad that you brought up the five-year strategic plan in the role of coordination. Anything additional you'd like to add to that strategic issue? I want you to define czar.

There's an urgency for coordination and an urgency for logistical strategic planning, as we make trade-offs that inevitably happen in this process, but there's a blueprint where it's going and who is in charge of making sure that blueprint is carried out periodically. Is that what you see as the nonprofit or is that part of the five-year strategic plan that you're looking at?

Ms. SMALLHOUSE. Well, it is part of the five-year strategic plan and it's really substantially developed by the buffelgrass working group, which is the people who are charged with land management and who are out there trying to control the problem.

What they're looking to the Southern buffelgrass Coordination Center to do is to raise awareness, focus resources, and where there are jurisdictional changes or different ownership patterns, that we can help negotiate what the most effective, least-cost way is to proceed in those boundaries.

Essentially we have to reduce the scale of the problem to make it manageable going forward. Eradication is probably not a reasonable goal. What can we do to enable our future capacity to keep this in check, and we've had all levels of help, the City of Tucson, all those towns, Pima County volunteer group, school groups, the utilities, the resorts, all manner of collaboration. Everybody is very interested. They just need to know what their role is. That's something that the coordination center can provide.

Mr. GRIJALVA. I thought the plan—the alliance you drew up was very impressive and you identified that you prioritized twelve hot spots where initial work has to be done. Those are the priority areas.

What do you see as proposals for addressing the infestation that occurs in other areas, not just the twelve hot spots, be they public or private?

Ms. SMALLHOUSE. We've evolved and we're refining that. And right now actually we're taking a look at the whole basin right now and evaluating where the most sensitive places are, where is the most value at risk, from a fire management point of view. With buffelgrass moving up into the Foothills, there's a possibility of forest fires catching on valley fires and vice-versa.

So there are some strategic places where we really need to focus, and from the very get-go, the problem was we couldn't give a firm figure, how much is it going to cost to do this, exactly where are we going to tackle first.

So one of the very first priority projects of the coordination center has been to initiate a mapping project where those questions can be specifically addressed so that we put our early resources to their highest and best use. Does that answer your question?

Mr. GRIJALVA. Yes, thank you. And so if you need to go, you can go or you can stay.

Ms. SMALLHOUSE. I appreciate your flexibility. But I actually would like to stay and hear the other panelists. I'm deeply invested.

Mr. GRIJALVA. Burr-Brown and the Duval Mine are responsible for me being here. When I graduated from Sunnyside, I applied at both places and I didn't get a job. So I went to the University of Arizona and I went a whole different direction. But they're the best employers Southern Arizona has ever had.

Ms. SMALLHOUSE. Thank you.

Mr. GRIJALVA. Let me now turn to Dr. Richard Mack. Thank you for coming this way, from the School of Biological Sciences, Washington State University, Pullman. Thank you very much, sir.

STATEMENT OF RICHARD MACK, SCHOOL OF BIOLOGICAL SCIENCES, WASHINGTON STATE UNIVERSITY, PULLMAN, WASHINGTON

Dr. MACK. Thank you, Mr. Chairman, and I appreciate very much having the opportunity to speak on this issue.

As in my written testimony, as background, I spent most of my research career dealing with invasive grasses in arid systems, cheatgrass, buffelgrass and similar epidemiologies.

I want to comment, based on my perspective from my research career, on the question you proposed earlier to several of the panelists in group one, which is, is this a capacity issue or resource issue, and I think we can always say that we can add more resources. We can add more capacity. I'll go a step further and say you can hire several czars.

But I would take a different tack on this and agree with that, which is I think we, as a society, need to have a change in our attitude about how we deal with invasive species like buffelgrass.

Frankly whether or not we want to express it this way, I think we deal with invasive species far too often as similar to earthquakes or hurricanes or tornadoes. In other words, we clean up the mess after they roar through, and we restore the site and then we sort of hunker down and wait for the next wave or the next hot spot to pop up or whatever.

That frankly isn't going to get us that far in the long run. That deals with the short-term issues. The mechanical removal, herbicides, all have their proper place on a local scale, but as you already heard this morning, we're dealing with a regional phenomenon. In fact, it's likely to get bigger than a regional phenomenon in the case of buffelgrass. That calls for a landscape scale treatment. And quite honestly, in my experience, the only tool left in the toolbox of more invasive species treatment and one that hasn't been dealt with is biological control.

Now, as you know, Mr. Chairman, biological control is the identification, selection, rearing and release of agents which attack spe-

cifically the target species, which, in this case, would be buffelgrass.

That kind of research has two prime goals, one of which is to release an agent which is effective. Best of all, it kills it. But at least, it debilitates it.

But at even a higher priority is that it must be extraordinarily specific. It will only attack the target species and no other species. That's extremely important when we're talking about grasses, for the obvious reasons of typical host extension on to very radical grasses, native and introduced into this country.

So we certainly would have to be extremely careful in that, but the classical biological control is as close to the proverbial silver bullet as ecologists can ever produce.

It will attack the beast, and if not destroy it outright, will greatly reduce its role because frankly I'm not here to talk about controlling buffelgrass. I'm here to at least offering the option of us to consider eradicating it or reducing its central role so it's really a minor species in the landscape, not what we have today.

Now, of course, that's going to take a lot of research and a lot of sustained research, I might add, that we aren't investigating yet, but I advocate it is done, it can be done and it is feasible.

And there are parallels, not just in this country, but elsewhere in the world, in which this kind of work has been undertaken, not yet for buffelgrass, but it can be and most specifically dealing with microorganisms that can be used for this approach.

This requires considerable care, and getting back to this issue of extreme specificity to make sure that we select microorganisms down to the genotype level that attack specific genotypes of buffelgrass.

We have done some work in this, but we have to characterize the genetics of buffelgrass far better than it has been so far. Moreover we've got a big job ahead of us in characterizing the microorganisms that can attack it.

Now ten years ago, if I proposed that—well, I never would have because it would have been totally impractical from the standpoint of logistics and the costs of it, but the good news that I can tell you is that the costs of this kind of examination have collapsed and fallen greatly in the last ten years, and I detail, in my written testimony, how the human genome project costs the Federal government three billion dollars in costs over ten years. That has dropped in considerable magnitude since then.

We can now do that same project in less than two months. In fact, there's evidence that backs that up. So the cost of this is coming down to a scale where we can consider these species, and we can potentially select for them.

There's no guarantee with biological control that it works, but what I can say, and I think we all agree on this, if we don't deal with this at that kind of scale, that landscape scale climate control can deal with, this problem is only going to get worse.

I think we need a difference in our attitude about new tools and new tactics in strategy, in addition to the issue you asked, the rhetorical question about coordination of resources.

[The prepared statement of Dr. Mack follows:]

**Statement of Dr. Richard N. Mack, Professor, School of Biological Sciences,
Washington State University, Pullman, Washington**

Good morning and thank you for the opportunity to provide testimony here today. I am Richard N. Mack. I am a Professor of Biological Sciences at Washington State University. I am an ecologist, and for the past 35 years my research has dealt with invasive plant species and more specifically with invasive grasses in the Far West. Much of my research on invasive grasses has concentrated on the century long invasion of cheatgrass (*Bromus tectorum*), a native of arid Eurasia and northern Africa, in its vast new range in the Intermountain West.

I. Plant Invasions in Arid Regions: A Recurring Phenomenology and Learning from One Invasion as Preparation for Combating the Next Invasion

A point that I hope to demonstrate today is that lessons we have learned from investigating the spread, population biology and consequences of the invasion of cheatgrass, an invasion that was underway a century ago, provides valuable lessons in determining the future for other invasive species in arid ecosystems in the U.S., in particular buffelgrass (*Pennisetum ciliare*). The phenomenology of all terrestrial plant invasions shares many characteristics (Rejmanek et al. 2005), although admittedly each invasion has some unique features. As a result of shared characteristics and features, many of the lessons and consequences we see in the long term invasion by cheatgrass have reliable carry-over for our understanding of the still developing invasion by buffelgrass in much of the U.S. Southwest.

As has been true for almost all plant invasions, the invasion by cheatgrass began slowly with its introduction into isolated areas. Populations of this non-native grass grew readily and small pockets of its occupation, perhaps just a few acres, developed at a handful of sites on the Columbia Plateau and in northern Utah in the late 19th century. Unlike buffelgrass, the entry of cheatgrass was almost entirely accidental (Mack 1981). Although the mode of introduction (accidental or deliberate) can affect the number of entry sites, all plant invasions are dependent on a large measure of pre-adaptation of the non-native species to the physical and biotic components of environment in the new range. For both cheatgrass and buffelgrass, a major pre-adaptation has been to an arid environment through a varying array of physiological mechanisms (Smith et al. 1997). Equally important for both these grasses has been a tolerance to grazing by large mammals. Such tolerance is exceptionally important for two reasons in the context of the arid American West: many native species cannot tolerate routine (or even seasonally restricted) removal of plant material by grazing because the plant's ability to replace biomass ultimately requires water, and water is almost always limiting in the American arid grasslands and deserts. Furthermore, to a degree not widely appreciated by the public, our arid treeless regions in the Far West did not support large herds of native ungulates (bison, elk, antelope, deer) before the extensive arrival of settlers in the 19th century (Mack & Thompson 1982). Consequently, our native plant species in this huge region are at a competitive disadvantage with non-natives, such as cheatgrass and buffelgrass, in the greatly altered environment brought about with the introduction of livestock.

The rise of the public's alarm to the spread of cheatgrass also deserves comparison to the events still unfolding with buffelgrass. Although cheatgrass was recognized early on by farmers as a troublesome weed, the whole scope of the damage that it would cause was not recognized until after it was too late to curb the invasion, much less eradicate it, with the tools available in the early 20th century (laborious mechanical removal). Within less than 20 years (1915-1935), cheatgrass went from a problem in croplands on the Columbia Plateau and northern Utah to a regional invader in croplands and the much more extensive rangelands in a five-state area (Mack 1981). The damage this small (usually less than 18 in. tall) grass now wreaks is massive in terms of its contribution of fuel for wildfires on a scale that the native plants never contribute. Proliferation of cheatgrass and the recurring fires its fuel produced has caused almost total replacement of palatable native grasses for livestock with a low value, temporary forage. In addition, cheatgrass remains a persistent weed in crops (mainly wheat, barley and oats) on the Columbia and Snake River Plateaus.

The Worst Damage by Invasive, Combustible Grasses is not Immediately Seen

The worst damage caused by cheatgrass however (and ominously similar to the growing role of buffelgrass) has been the aftereffects of huge (as much as 500,000 acres) fires that almost yearly ravage its new range here in the West. In addition to the immediate loss of property and even human life caused by cheatgrass-fueled fires is the loss of soil from this region. These fires consume all vegetation in their path and the result is a lifeless, blackened landscape with no vegetation left that

could check sheet-wash and erosion. This soil, which is an irreplaceable natural resource for the Nation, is destined to wash into the region's waterways. The Snake and then the Columbia River are the eventual resting places for this new sediment. Sediment clogging these rivers threatens the efficacy, and even outright sustainability of the hydroelectric dams along these waterways, including Grand Coulee Dam in Washington and the Bonneville Dam on the Columbia River at the Oregon-Washington border. So severe is erosion from the Snake-Columbia watershed that the U.S. Army Corps of Engineers must routinely dredge these waterways of sediment to maintain the rivers as navigable waterways and to minimize sediment that would interfere with turbine performance in these dams (<http://www.nww.usace.army.mil/dmmp/default.htm>). Much of this cost (and the attendant concerns about environmental damage caused by annual dredging [<http://findarticles.com/p/news-articles/columbian-vancouver-wash/mi-8100/is-20050619/corps-seeks-input-dredging-snake/ai-n51309342/>]) can be blamed on cheatgrass and the fires it fuels in the region.

Here again, the invasion of cheatgrass and its consequences in the Intermountain West presage events and circumstances that are unfolding with the buffelgrass invasion in the Southwest. As a non-native grass deliberately chosen for forage, buffelgrass was introduced initially into more locales than was the accidentally-introduced cheatgrass decades earlier. But much of the subsequent spread of buffelgrass has occurred through its own seed dispersal, rather than direct introduction by humans. Similar to the unfolding invasion of cheatgrass, the early small infestations of buffelgrass were worrisome to some, but ignored by many others—until the new range occupation became only too apparent.

Invasions of Invasive Species take on an Accelerating Pace

The rate of new range occupation and increase in abundance of invasive species forcefully illustrates one of the most powerful aspects of the performance of an invasive species under conditions it finds ideal (and simultaneously illustrates an important difference between the need for swift reaction to combat its spread, compared with a pollutant, such as a heavy metal contaminant in soil). Species have various modes of persistence, including the production of seeds. Under conditions a species finds ideal (as defined by the species), its vegetative growth and its seed production may be prolific and form a performance trajectory that grows with compound interest. The accrued interest for a species, such as buffelgrass, is the rapid increase in seeds and in-turn new parent plants. This growth in numbers adds individuals to the population at an exponential rate, so that the doubling time for the population becomes increasingly short, e.g. from decades to just a few years. Consequently, the immigrant population grows and expands its range: a few individuals in a small locale increase to many individuals occupying a much larger area (Mack 1981; Williamson 1996). When viewed in a map, the initially occupied areas grow, and eventually coalesce at an accelerating rate (Elton 1958; Mack 1981). The alarm that is being legitimately sounded now about the spread and prominence of buffelgrass is a recurring public reaction to the development of a biological invasion.

II. The Need for a New Course of Action in Combating Buffelgrass

Given the size of areas occupied by invasive grasses such as buffelgrass, one might readily conclude that these species and the harm they cause are with us for good, and that at best all we can do as a Nation is pay for site restoration after an invasive grass burns over a huge area. (This approach is roughly analogous to cleanup after a hurricane or an earthquake, i.e., cleanup is our only option; prevention of the next calamity is not possible.) Although site restoration through re-seeding and careful conservation of areas once occupied by an invasive species is always required, we need to take a much broader, science-based, view of not only restoring areas damaged by buffelgrass but also actively implementing a sustained program to roll-back the invasion.

What Is Being Done (and What Can also be Done) Now

The current control of buffelgrass locally has often produced positive results, such as the laudable campaign to limit its spread in the Saguaro National Park and Organ Pipe Cactus National Monument. Using dedicated volunteers, U.S. National Park personnel have removed buffelgrass from many areas within both sites, perhaps most important has been its removal along roads, which serve as excellent corridors for the grass's spread (<http://www.nps.gov/orpi/naturescience/invasive-plant-species.htm>). Other groups within the Tucson area have also banded together to remove local grass infestations. These efforts pay immediate dividends by protecting sites of high cultural and conservation value and should be encouraged, expanded and sustained.

Another, non-mutually exclusive approach that can be done now (short term) is admittedly more controversial. Although buffelgrass has been banned for planting and transporting in Arizona since 2005 (Schiermeier 2005), the grass is available for sale elsewhere in the U.S. and even overseas. Furthermore, an active research program has been pursued elsewhere in the U.S. to breed cold tolerance into buffelgrass so as to expand its geographic range as a forage grass (Hanselka 1988; Hussey & Bashaw 1996; Hussey and Burson 2005). This line of investigation has led to the release for sale of a cold tolerant strain “Pecos Buffelgrass” (http://www.pogueagri.com/Buffelgrass_Pecos_Brand.aspx). I am unaware of any evidence that this variety has become invasive. But developing new varieties of this grass that would extend its geographic range seems problematic, particularly in any cases in which the new variety is derived from the same basic genotypes as those that are now invasive in the Southwest. Policy-makers could consider strengthening the prohibition of this grass’s sale and transport as well as evaluate whether developing new buffelgrass varieties is in the overall public interest.

What can be done in the Long Term—Exploring Biological Control

I contend that while a variety of tools have been used to control invasive grasses, such as buffelgrass, including herbicide application, mechanical removal, and controlled burns of accumulating fuel, we need to investigate additional approaches to this problem that are more effective at all landscape scales. The cumulative areas already occupied by buffelgrass defy effective control, much less permanent removal, by any of the tools that have been employed so far. Herbicides are rarely practical over large areas, and often incur public comment on the potential for collateral damage to waterways, livestock, native species and humans; mechanical removal is impractical for an invader that now occupies so large an area. (Although it can be effective in protecting small areas of special interest or sensitivity.) Controlled burns are a highly contentious issue in the West—certainly appropriate in some circumstances in forested sites but is problematic or even counter-productive in habitats that buffelgrass occupies. (And of course, it is not feasible near buildings, highways or anywhere near where humans reside.)

Biological Control—the last big (untried) tool in the toolkit for combating invasive grasses

The biggest single tool left remaining in the invasive plant toolkit for combating buffelgrass (and other invasive grasses in the West) is biological control. Biological control refers to the release of organisms, usually native to the native range of the invader, which readily attack the invasive species—and only that species. The USDA has a long, successful history of having discovered, developed and released effective biological control agents in the U.S. Invasive plant species that have been effectively curbed in this manner over large areas include St. Johns Wort and Dalmatian toadflax (Coombs et al. 2004). The biological control agents released in these cases have been insects, but it is unlikely that any insect can be found that attacks only buffelgrass. (Grass species rarely have specific insect predators or grazers.)

The search for biological control agents for buffelgrass will instead need to be for microorganisms (e.g. bacteria, fungi) that have the requisite lethality and specificity for this invader (e.g., Auld and Morin 1995; Hintz 2007). Specificity in attack of buffelgrass or any invasive grass is of paramount importance, given the need to prevent introduction of any microbial agent that inadvertently also attacks a native or valued introduced grass. (Admittedly the most severe concern would deal with commercial grasses employed in food production, such as corn, wheat, oats and rice.). Neither the invasive grass nor the microbial species to be evaluated as control agents are genetically uniform, although most buffelgrass in the U.S. was produced through asexual seed production, i.e., the seed develops without require pollination (Gutierrez-Ozuna et al. 2009). Whatever the extent of the grass’s genetic variation, whether termed subspecies, races, varieties or most specifically, genotypes, it will nevertheless need to be characterized. The same characterization will be necessary for any microbial taxa that may show promise of buffelgrass control under laboratory conditions.

Key to finding Effective Microbial Control Agents will be characterizing their specificity

To develop an effective bio-control program against buffelgrass (as well as other invasive grasses in the West) will require commitment to a research program by USDA (in association, for example, with researchers at land grant universities and others) to identify microbial agents that meet a high standard for efficacy in control of the invader and strict specificity. Such research will likely involve a long term financial commitment by state and federal governments to ensure that the project is given the opportunity to succeed. (Development of biological control agents from

initial collections through evaluation to release on the target species often involve a work that spans as much as 10 years or more). Research for biological control agents does not guarantee a successful outcome: some searches for effective agents against other plant invaders have yet to identify an effective agent (Coombs et al. 2004). And as pointed out above, great care will be needed to ensure that no introduced agent can attack any non-target grass, especially a crop species. Unintended target species often include close taxonomic relatives of an invasive species. Although no *Pennisetum* species are native to the U.S., pearl millet (*Pennisetum glaucum*), a commercial crop, is a relative. Consequently, care certainly would need to be directed at insuring the release of an agent that does not attack pearl millet.

As illustrated with the presence of a valued relative of buffelgrass in the U.S., the scientific hurdles in such a research program are admittedly sobering. But I certainly do not mean to paint a pessimistic picture. The opportunity for success in this research has never been better: recent advances in the molecular technology needed to screen and characterize the genetics of large number of microorganisms has taken quantum leaps, even the last half dozen years. Analyses that once took years, can now be completed in a few months and at a small fraction of the cost 10 years ago. For example, the federally funded Human Genome Project, a massive research program to map all the genes that we humans possess, took more than a decade and cost 3 billion dollars (<http://www.technologyreview.com/Biotech/18809/?a=f>). In sharp contrast, 80% of the Paleo-Eskimo genome, i.e., duplicating the original Human Genome Project but for a specific group of humans, was completed recently in 2 months for \$500,000 (Rasmussen et al. 2010). These costs and the length of the analyses will undoubtedly drop further with rapidly improving technology in the next few years. Nevertheless, federal commitment to this program through the USDA and its research partners will involve multi-year careful laboratory evaluation of potential bio-control agents.

Although I am optimistic about the ability to rapidly screen potentially hundreds of microbial taxa for efficacy and specificity, I deliberately avoid painting an overly optimistic picture of the ability to find effective agents for buffelgrass. There are no assurances of success in the search for biological control agents. I emphasize nonetheless that the search for these agents, given the growing scale of the damage attributable to this invader, is worth the endeavor. Without it, buffelgrass will continue to expand its range, and this range expansion will occur even without our factoring in the potential for this grass to expand its range under future global warming.

Postscript: What Can be Done Now and in the Future

Buffelgrass was deliberately introduced in an era in which the ability to evaluate the potential detrimental features of a non-native grass were rudimentary (e.g. prohibition of parasitic plants and species known to harbor pathogens that could attack crops). In retrospect, the introduction of buffelgrass and other species should have been blocked, and these lessons are reflected in current quarantine laws and Weed Risk Assessments (WRA), illustrated by the Plant Protection Act of 2000. (http://www.aphis.usda.gov/lpa/pubs/fsheet_faqs_notice/fs_phproact.html). USDA APHIS diligently carries out enforcement of this and other regulations. Needed however is a strengthening of our ability to detect and prohibit the entry of problematic species that may pass or at least not fail current screening procedures. Although some invasive or otherwise noxious species would likely arrive under any evaluation protocol short of a total (an economically untenable) ban on plant imports, post-immigration (but pre-release) experimental field testing and evaluation of these species would likely pay important dividends. For example, had buffelgrass been evaluated in field trials in its intended range in the Southwest before its widespread introduction, its invasive properties would likely have been detected. Much cheaper to the Nation than the high cost of a potential "Product recall" for buffelgrass and other deliberate plant introductions that have become invasive would be an effective, transparent, science-based procedure for their detection and removal. Steps are underway to develop such a system for the future (Mack 2005; Davis et al., in press).

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Mr. GRIJALVA. The Tamarisk and other exotic plants, the biological efforts have taken on in the desert to try to control those species, you mentioned the word research line. I agree with you. I think this is a many-fronts war, and unfortunately—and we've had many hearings over a variety of invasive species and the effects they are having generally over the environment, now in our public lands.

The research development, the biological control aspects of it have always been the last tier of discussion in those efforts. It's about control. It's about targeting and hoping they don't come back. I think your point is well taken. This is a many-fronts war.

Can you elaborate a little more on the research line, how do you see that as an important part?

Dr. MACK. Well, the traditional steps—and, of course, they'd have to be modified for these issues—would involve wide-scale screening of all microorganisms that can attack buffelgrass, and most of all literally fieldwork, not just in this country but overseas, and then the genetic characterization of those organisms under controlled laboratory conditions far removed from the potential release of them, so they can be evaluated so they are indeed specific to buffelgrass and its various genotypes itself.

It's a long-term program or protocol. It's well worked out with insects as well as microorganisms. Folks that do this type of work are conservative to the extreme in terms of making sure that they don't

release something that undergoes an unintended attack on a non-target species.

So the bad news about it, in that sense, is it's a long-term research program. This is not a quick term fix, but I think we're agreeing that the tools that are already on the table that are being used locally, however you define locally, need to be continued, but this program I think needs and should run in tandem.

Mr. GRIJALVA. The research and development component is not at the expense of the current control component?

Dr. MACK. I don't think it should be done at the expense of. I think it should be done as a parallel line of pursuit.

Mr. GRIJALVA. You talked about changing attitudes when it comes to biological eradication or control?

Dr. MACK. Yes.

Mr. GRIJALVA. Is it an education issue? Is that how we get to that point?

Dr. MACK. It very much is. In fact, we have a precedent in this country for doing that. It's always remarkable to me that the Federal Government, and specifically the USDA, has let this fine record, in this very area, slip into institutional memory or lack of memory because 80 years ago this country faced an enormous problem, frankly, which I think is more devastating than buffelgrass—with European Barberry, which is the alternative host for stem rust on wheat.

It was devastating the wheat crop, the crops grown in a 13-tier, 17-state tier. They used the tools they had at the time, which involved largely mechanical removal and very primitive types of herbicide treatment, and they destroyed the European Barberry, essentially brought down the damage to wheat at a time that it was critically important. It took 30 years. It took hundreds of thousands of people.

So I'm not advocating that as particular tools and tactics to use, but nevertheless, we do have a precedent for that wide scale public acceptance of a sustained program that has, as its goal, eradication.

Mr. GRIJALVA. Without the Pandora's box?

Dr. MACK. Yes, without the Pandora's box. We've learned a lot in 80 years. So the science today, all I can say is it's better than the science then. So when we consider all these other tools, they weren't even on the horizon then.

Mr. GRIJALVA. With a century of research on grass with no biological control mechanism, what leads you to believe that the biological control mechanism, with regard to buffelgrass, is valid?

Dr. MACK. Because it hasn't been explored. It's the last tool we have left. We know this tool works with other species. In fact, with cheatgrass, we've had more experience with it. Doug Coomer asked me—he's currently exploring my core band for cheatgrass.

It's a case where we're going to consider what we thought we couldn't do before and investigate it. We don't know that we're going to have a guaranteed agent coming out at the end of the tunnel, but we do know we'll never find it if we don't look for it.

Mr. GRIJALVA. Thank you very much. I appreciate it. Looking by way of acknowledgment and introductions, first I'll acknowledge

Dr. Betancourt for all his work and his persistence with our office. We appreciate it very much.

Also welcome my former colleague on the Board of Supervisors, Supervisor Elias. Thank for you being here today.

Mr. GRIJALVA. Let me now turn to someone I used to work for, my good friend, Mr. Chuck Huckelberry, who is the Administrator for Pima County. One time I went to talk to him about the Sonoran Conservation Plan, and I was introduced by the then supervisor from Maricopa, as Chairman Raúl Grijalva from the People's Republic of Pima.

Mr. HUCKELBERRY. We've been called worse.

Mr. GRIJALVA. Right in this chamber too. I want to thank you, Chuck, because with the process of getting the planning and discussion and the research for the Sonoran Conservation Plan, one of the things that Mr. Huckelberry educated many of us on was the whole issue of invasive species, both in the Sonoran Desert and in general, and for many of us, that was a shocking realization that we'd like to go about our days not knowing, that all around us the ecology that we're trying to save is being threatened, not just by homebuilders but by invasive species coming into the region. So I appreciate that.

Mr. Huckelberry, comments.

**STATEMENT OF CHUCK HUCKELBERRY, COUNTY
ADMINISTRATOR, PIMA COUNTY, TUCSON, ARIZONA**

Mr. HUCKELBERRY. Yes. Thank you, Mr. Chairman. It's good to see you in Pima County again, even if it is in the Council's chambers.

I'd like to offer our comments and concerns with regard to the issue of buffelgrass. And frankly I think I've seen buffelgrass transition, in Pima County at least, from a potential ecological disaster to one now that frankly can be a public safety disaster.

We've already seen, in this community, one death from an uncontrolled buffelgrass fire. We have today hundreds of homes on the front faces of the Catalina Highway that are all subject to buffelgrass wildfire and that could, in fact, cause public safety chaos within this community. It needs action. It needs to be controlled.

We need to understand that it is not only the threat that it is to the ecological soundness to the Sonoran Desert, in maintaining our cultural diversity, but it is a true public service threat.

As you know, we've worked together to try to develop and implement a Sonoran Desert Conservation Plan, a far-reaching plan trying to really retain the species diversity of the Sonoran Desert and to tackle the tough issues associated with conservation and growth and to meet Federal regulatory requirements.

That plan is being well advanced. It's being implemented. It's being implemented with the cooperation and the funding from taxpayers in Pima County.

If we look back at the last 20, 25 years, the people of Pima County, through bond issues, have voted to approve spending \$300 million to acquire sensitive land in the Sonoran Desert. They have done that, and in doing so, they have made Pima County the six largest land manager in the region.

We have purchased and control today over 85,000 acres of fee land and 160,000 acres of either State trust grazing land or Federal grazing land for purposes of the conservation plan.

The buffelgrass threat is something that, in that invasion, puts our investment in jeopardy. We may lose the fundamental purpose of those investments in preserving and protection of the Sonoran Desert.

The board of supervisors, when you were a member and today, continues to be very concerned about buffelgrass. We have adopted ordinances. We have prohibited it and have caused it to be deemed a noxious weed.

We now have the ability to regulate it on private properties. We have done all those things, but we're still losing ground at a very rapid rate.

Because of our proximity in this valley and the relationship of other Federal land managers, we share boundaries with Federal land management agencies that are extensive and often very adjacent to our urban footprint today. Those agencies include the Bureau of Land Management, the Forest Service, the National Park Service, the United States Fish and Wildlife Service and our State trust land. They're all very important partners with dealing with this issue.

It's very critical that the county and we all continue to work more closely in the future, on our buffelgrass control efforts.

Because of the aggressive nature of buffelgrass, this is not a simple we can go pull it out and we're done. It takes successive periods of time to be able to eradicate it, probably in a period of five to ten years.

I'd like to conclude my statement by giving a few points that we think are important. It's important that Federal agencies, within the county, have adequate and sustained funding with which to systematically control buffelgrass infestation on their lands and so they can be controlled and they don't spread to other lands within Pima County.

We would suggest that the Federal Government do the same that the local government has done. What the State government has done is to classify buffelgrass, as a Federal action, as an invasive species, and that any further research, with regard to its use, be ceased and not funded by the Federal Government.

We would like to think it's important to direct all Federal land management agencies to be active participants. I think they are voluntarily today, but it would be appropriate to ensure that they intend to be very active in the Southern Arizona Buffelgrass Coordination Center, and it's important that funding be provided, funding to both the Federal Government and local jurisdictions, to address the infestation and to begin actions to reverse it.

We also believe that the Federal Government needs adequate flexibility and authority necessary, under planning documents, to deal with these issues, as opposed to being delayed for months and for years in updating their planning documents to allow them to take control of the situation.

We also think that we should fund and direct certain research efforts for controlling buffelgrass, and that we study and know fully

the social and other impacts of buffelgrass, if the infestation continues uncontrolled.

We believe that it is, in fact, an issue that has been largely overlooked and is also one that could cause huge impacts almost instantaneously because of the public safety threat today.

I'd like to thank you for holding this hearing and allowing everyone to express our concerns and to better understand the threat of this invasive species.

[The prepared statement of Mr. Huckelberry follows:]

**Statement of C.H. Huckelberry, County Administrator,
Pima County, Arizona**

I. Introduction

Chairman Grijalva and subcommittee members, I would like to thank you for holding this hearing on the ecological and social challenges of controlling the buffelgrass (*Pennisetum ciliare*) invasion in the southwest and for inviting Pima County to testify. The impact of the buffelgrass invasion on federal lands, and consequently on the adjacent County lands, is of great importance to the residents and visitors to southern Arizona. Therefore, I greatly appreciate this opportunity to formally convey concerns on behalf of Pima County.

Unfortunately, Pima County seems to be ground zero in the buffelgrass invasion in Arizona, and the presence of this invasive exotic grass threatens the very existence of the Sonoran Desert in our region. Only through the coordinated partnership efforts of local jurisdictions, NGOs, state agencies and the federal government can we systematically and aggressively address this threat on the many fronts necessary. To do otherwise could seal the fate of the demise of the Sonoran Desert as we know it today, and the accompanying ecological and economic disaster is unacceptable.

There is little question within the scientific community about the potential impacts and alteration of the fundamental workings of the Sonoran Desert ecosystem that the buffelgrass invasion can bring. One only needs to look south to Mexico to see the catastrophic changes to native plant communities where buffelgrass has been introduced and not controlled to gain a strong sense of urgency. We do not want to see our region follow the same destructive pathway and a similar ecological fate.

II. The Risks of the Buffelgrass Invasion to Pima County

The current buffelgrass invasion's roots can be traced back to the well meaning, but now clearly understood as ill advised, introduction of the grass for erosion control and livestock forage in the 1930s by federal land managers. For over 60 years, the grass was spread around the region by agencies and individuals; yet the distribution and density of the introductions were generally contained. In the last decade, however, a rapid and dramatic expansion of the grass distribution, as well as the size and density of existing patches, has dramatically increased, leading to the current crisis conditions.

Pima County has experienced tremendous population growth and is dealing with the challenges of accommodating continued growth while conserving the watersheds and unique natural areas that are a vital part of the quality of life in our communities and that bring new residents and visitors to our area. Pima County has been implementing a regional plan, the Sonoran Desert Conservation Plan, which balances these growth issues and minimizes the need for federal regulatory actions that can be divisive. Public support for the Sonoran Desert Conservation Plan has been very high, as demonstrated by voter approval of \$174 million in bond funds to purchase lands for conservation.

The County's current network of biologically important lands includes more than 85,000 acres of fee title lands and another 100,000 acres of state and federal grazing leases held for conservation uses by Pima County. Added to that is over 1.5 million acres of federally owned conservation lands within the over all Sonoran Desert Conservation Plan identified planning boundaries. Many of these lands are in direct jeopardy of losing their fundamental conservation and natural habitat values due to the buffelgrass invasion. The risk to the key conservation lands in Pima County like Saguaro National Park, Organ Pipe Cactus National Monument, Cienega Creek Natural Preserve, Las Cienegas National Conservation Area, Ironwood Forest National Monument, Catalina Ranger District of the Coronado National Forest and the 85,000 acres acquired by Pima County is real and inevitable without strong action

and leadership by both local jurisdictions and the federal government. The visionary outcomes of the Sonoran Desert Conservation Plan will be increasingly difficult, if not impossible, to achieve if the buffelgrass invasion is not controlled. The investment and commitment by Pima County of millions of dollars and tens of thousands of hours of community planning efforts will have been in vain.

Like many areas with unique natural resources and important National Parks and Monuments, tourism is an important component of the local economy. Imagine the impact on the local economy if the iconic Sonoran Desert is significantly altered or lost. The saguaro cactus is extremely susceptible to the increased fire regimes brought to the historically fire resistant desert ecosystem with the buffelgrass invasion and could be lost. Lose the natural systems that have attracted residents and visitors from around the world and the impacts will unquestionably ripple through the local economy. Tourism and bed tax revenues will decline, property values will be reduced, infrastructure will have to be modified to be protected from annual buffelgrass fires, and fire suppression time commitments and costs will increase thus reducing the ability of fire agencies to also respond to routine medical calls. At this time, the full impact of the current buffelgrass invasion on the local economy is not entirely understood. However, even the more conservative projections place the impacts at hundreds of millions of dollars over time. An emerging environmental issue of this magnitude cannot be ignored.

III. Pima County's Current Investment in Buffelgrass Control

Pima County has been developing responses to the buffelgrass invasion since the late 1990s. In October 2005, the Pima County Board of Supervisors passed a resolution establishing an Invasive Species Working Group to coordinate actions and activities within the County structure. This working group identified buffelgrass as a priority species and has worked to integrate buffelgrass control activities across the various Public Works agencies with land management responsibilities. The policy guidance from the Board also directed County staff to play a visible and supportive role in coordinating buffelgrass planning and control efforts. The County investment in those programs is thousands of staff hours and hundreds of thousands of dollars annually and would be more if overall budgetary resources were not currently so constrained. The County's commitment to this issue has been clear, visible and supported with on-the-ground funding.

In February 2007, the Board of Supervisors again passed a resolution targeting policy efforts to control buffelgrass as part of the lead up to the first Buffelgrass Summit held in Pima County. In that resolution, the Board of Supervisors stated "...the Pima County Board of Supervisors strongly supports the 2007 Pima County Buffelgrass Summit and its stated outcomes, and encourages in the strongest terms that local, state and national agencies, jurisdictions and organizations allocate human and financial resources to assist in coordinated buffelgrass control efforts in their areas of responsibility as well as the County as a whole, until control efforts have been determined effective." Unfortunately, that call to action did not result in the desired visible support. Responses from key partners have ranged from a lack of available funds, questions regarding the actual severity of the issue, lack of information on buffelgrass distribution, no staff resources to take on additional projects, and a general lack of pressure from the public to take action.

In 2000, a volunteer group was formed by the County called the Sonoran Desert Weedwackers, to combat buffelgrass in Tucson Mountain Park. This group of community volunteers has invested over 30,000 hours over the past decade at a value to the County conservation efforts of over \$450,000. We have conservation education staff that conduct community programs on buffelgrass awareness and how to take action at the local community level and how to conduct volunteer control projects and events. The County utilizes Summer Youth work crews to conduct buffelgrass control projects on County lands and roadways each summer.

Adult probationers are also used to conduct buffelgrass control programs along roadways and in neighborhoods as part of their community restitution program. County staff assists with the annual Beat Back Buffelgrass Day activities across the Tucson basin and provides significant amounts of information to the public on the buffelgrass issue and ways for people to take positive action and be part of the solution. Community awareness of the dangers of buffelgrass invasion is at an all-time high. There can no longer be a question of public interest and demand for government, at both the local and national levels, to take action.

In 2009, the County adopted a modification of the current Weed Ordinance in the unincorporated portions of the County that allows the County to require removal of buffelgrass infestations on private lands where they are determined to be a public health and safety risk. Our major utility companies have agreed to voluntarily control buffelgrass and other invasive plants on County rights of way where they dis-

turb the ground as part of their development and maintenance activities, since these pathways have been found to be major vectors for the movement of buffelgrass within the urban areas.

One of the more significant efforts the County has made is to support the Southern Arizona Buffelgrass Coordination Center (SABCC). The County took a leadership role in the formation of the group and is one of its major financial sponsors at this time. SABCC is an important link in actually bringing the major land management agencies to the table to begin coordination efforts on the scale necessary to actually tip the buffelgrass war back in our favor. This nonprofit organization needs broad based support and a commitment of resources to meet its potential. Unfortunately, once again, the financial resources necessary to move our collaborative efforts forward are slow in coming. Participation of some federal agencies could be improved and financial support more forthcoming. This is one area that the federal government could be of specific assistance. All opportunities need to be explored and supported to get the SABCC a steady flow of the resources it needs to be an effective facilitator for research, control projects and public outreach. This role could not be played as well by any other local organization, institution or jurisdiction.

IV. Interrelationships with Federal Lands and Future Scenarios

Pima County enjoys hundreds of miles of shared boundary with federal land management agencies. At some points, the County urban footprint directly adjoins the federal lands. The National Park Service, Bureau of Land Management and the U.S. Forest Service manage the largest units of those federal lands. The County has maintained a strong working partnership for many years with the various agencies and under the Sonoran Desert Conservation Plan, the health of those federal lands within Pima County will play important roles in the future growth and conservation priorities of our County.

The current lack of a systematic effort to control buffelgrass is a clear and multi-jurisdictional concern. The potential for fire to move back and forth across the land boundaries is a real threat and currently without any comprehensive strategies to combat such occurrences. Current efforts by the Forest Service in their Coronado National Forest Firescape planning process shows promise, but it will take time to mature and be implemented. Buffelgrass control needs to be integrated into all local fire plans, and we would hope to explore in the near future the development of a County level Community Action Fire Plan to focus on the needs and strategies required to address the new fire regimes the buffelgrass invasion has created. Because of the many, expanding interface zones of buffelgrass infestations and urban growth, the potential for loss of life and property from a catastrophic fire is a real possibility if strategic control actions are not taken immediately. New fire models on public lands show a bleak future and fire behavior previously unknown to our desert ecosystem. The front face of the Catalina Mountains appears to be an especially vulnerable area at this time. Federal agency participation and support is critical to a successful outcome to establishing comprehensive fire management strategies and defensible spaces. The emerging buffelgrass fire concerns in southern Arizona rival those in the pine type of northern Arizona and warrant the same types of resource allocations in the future.

At the present time, while federal agencies in Arizona expend limited resources to combat the buffelgrass invasion, the U.S. Department of Agriculture is working to hybridize this exotic invasive grass to make it more cold tolerant. Because of the proven serious invasive nature of buffelgrass in the desert ecosystem, the federal government should be restricting all activity in use or development of hybrids of this invader. It seems counter to good environmental policy to have some federal agencies fighting buffelgrass and others trying to make the species more adaptable. How can this expenditure of federal funds be justified when we at the local level are paying the price? Why is buffelgrass not being recognized as the invasive species it is by the federal government and its use and distribution by all agencies, both inside and outside the United States, prohibited? Arizona has taken action within our borders; we need the federal government to recognize that need and mirror local actions.

It is critical that the County and federal land management agencies work closely on future buffelgrass control efforts. Joint multi-year projects will be necessary to ensure that resources are being targeted on the priority areas and that adequate project boundaries are treated to ensure that seed banks of the grass are not maintained on adjoining lands. Based on the most recent discussions, it appears that most of the local federal agencies do not have adequate resources available to address the buffelgrass invasion with a systemic approach. Funding commitments from the federal government must be adequate for the task and sustained over the necessary life of control efforts. Because of the aggressive nature of buffelgrass and

long-lived seed banks, control efforts must be considered in terms of three to five repeat year treatments and not single year efforts in any given area.

In the past, Saguaro National Park implemented comprehensive control programs only to see funding cut and much of their positive effort lost due to the inability to apply the necessary continued control effort. Ultimately, they experienced a reestablishment of buffelgrass in specific areas previously treated for several years within the park. This is a disappointing waste of manpower, funding and control effort impact.

Pima County is facing a rapidly diminishing timeline for effective action. Action response needs to be intensified and measured in years, not decades. The County and federal lands infested with buffelgrass need aggressive treatments now. If we wait a decade, it may well be too late, and the costs of required routine control efforts to contain the inevitable fires will be far greater than potential control efforts today. Buffelgrass knows no boundaries; therefore, the County and adjacent federal lands must be viewed as a holistic ecological system. The County cannot continue to focus resources on lands adjacent to public lands without assurance of support from federal agencies to address the buffelgrass problem cooperatively, collaboratively and effectively.

V. Summary and Recommendations

We have an ecological and economic disaster looming on the horizon, and parties are working diligently to avert that impending disaster. However, the commitments and resources necessary to address the issue are not available or coordinated at a level necessary to move concern to true action. Because buffelgrass knows no boundaries and much of the current infestation is on federal lands, the problem is one of local, state and federal significance. All of the land management agencies must be active and committed participants in control efforts and public outreach. We cannot adequately address this issue from just the local level. The federal government needs to provide its local units with the funding and tools necessary to address the buffelgrass invasion responsibly.

I would like to conclude this testimony by listing the following recommendations that the federal government could take that I believe will make a measurable difference in the fight to control buffelgrass now and into the future:

- Ensure that federal agencies in Pima County have adequate and sustained funding to systematically control buffelgrass infestations on their lands with special emphasis on those shared boundaries with Pima County and the urban lands interface.
- Cease any further work on hybridization of buffelgrass and distribution of this invasive exotic grass outside of its native habitats.
- Direct all of the federal land management agencies in Pima County to be active participants and funding support partners with the Southern Arizona Buffelgrass Coordination Center.
- Provide local jurisdictions and organizations in Pima County with emergency funding support to address buffelgrass infestation control efforts on lands that border federal public lands.
- Ensure that the federal land management agencies have adequate authority and planning documents in place to take aggressive action with all the control tools available when implementing buffelgrass control programs.
- Direct and fund the federal agencies to increase research efforts into the ecology, control methodology and social implications of the current buffelgrass infestation.

I hope I have communicated to you a sense of urgency in the need to address the buffelgrass issue head on and allocate the resources at the federal level necessary to make a difference in the open space lands we cherish. The areas of interface between Pima County and federal lands are too important for watershed protection, habitats for special status species of plants and animals and our local tax base to not step forward and address the buffelgrass invasion now. If we do not address this invasion by an exotic, human introduced species cooperatively, aggressively and financially we will share the disastrous environmental and economic consequences of inaction.

Again, thank you for inviting Pima County to provide testimony on this most critical and time sensitive environmental issue.

Mr. GRIJALVA. Thank you, Mr. Huckelberry, and your point about public safety, I appreciate that a lot. I think that needs to be integrated fully into the overall discussion, even with the

invasive species, that it threatens biological diversity, but it threatens life and limb.

And I think people will understand, one, in one sense the urgency of that, like many of us in this room. The other one has an urgency to it, and I, for one, think we should integrate that as part of the discussions on this. So I appreciate that.

I couldn't agree with you more about the classification. That's something we're going to pursue to add it to the list and to attach to that the fact that we, the Federal Government, should not be funding efforts to promulgate buffelgrass, whether it's through research or through demands from certain industries that that is part of the feeding cycle for livestock.

And it's going to be a little bit of a fight, but I think the science is there. The threat is evident, and I think we can justify pushing for that legislative classification. Thank you for that.

We heard today about agencies working together, state, local, private entities, Federal agencies, to coordinate its efforts to combat buffelgrass. In your written testimony, you state some concerns about maybe some of the efforts of the Forest Service have been counterproductive in that effort. Can you elaborate on those, or did I misread your testimony?

Mr. HUCKELBERRY. I think it's fragmented. What occurs one year, doesn't occur the next year and there's inconsistent application. It's a whole issue of whether it becomes a statement and a guiding principle, and why it's adopted and why it's in the document. Those things need to be addressed so there's consistency, because if you take some actions and they're funded for a short period of time to eradicate buffelgrass, and then you're not—then you don't, it doesn't work.

So there has to be an understanding. There needs to be a continued effort and indeed basically carried forward from one land manager to another. And that then is institutionalized to the long range plan, management planning documents.

Mr. GRIJALVA. And that was your point?

Mr. HUCKELBERRY. Yes, sir.

Mr. GRIJALVA. I think Ms. Krueger made that point about not putting limitations of three years, five years, that this be an ongoing and consistent effort.

The Federal Government is a nexus both for our needs, classification, flexibility on the planning documents so land managers can react and also the nexus for funding.

Given all the constraints that are going on budgetarily in this state and across the Nation, I see local jurisdictions and state government being less able to respond with funding for this, and that kind of begs the question about where that funding nexus is going to come from. I think it needs to be the Federal Government. Your response to that?

Mr. HUCKELBERRY. Mr. Chairman, as you know, states are fiscally stressed. They pass that fiscal stress back down to the local government, but they have other resources that, if properly managed and directed, can, in fact, become a component of fighting the buffelgrass these days, and I'll give you another example.

In Pima County, we have adult corrections. They can actually be directed to these efforts from a manual eradication perspective, but they require equipment, supervision, control, and it costs money.

And so I see those kinds of grants that could come from the Federal Government and then actually take programs that are under stress today and make them more effective.

Mr. GRIJALVA. Thank you, Mr. Huckelberry.

We will now hear from Dr. John Brock, Brock Habitat Restoration and Invasive Plant Management. Welcome, Doctor. We'd like to hear your testimony.

**STATEMENT OF JOHN BROCK, BROCK HABITAT RESTORATION
AND INVASIVE PLANT MANAGEMENT, TEMPE, ARIZONA**

Dr. BROCK. Thank you, Congressman Grijalva, for asking me here. Part of my other background, my other life, I was for 31 years at ASU, Arizona State University, as a professor on the faculty there. So that explains a little bit of my—

Mr. GRIJALVA. We all have our cross to bear.

Dr. BROCK. It was a tough life but someone had to do it. One of the nice things about being the last person in a testimonial line like this is that all the good things have been said, and I could just quietly walk off.

But buffelgrass, I think, was introduced in the United States in the early 1930s, and it actually didn't take the first time. In the early 1940s it was reintroduced, and obviously it made it.

Buffelgrass, as an invasive species, is fairly unique. It's one of those invasive species, kind of like Russian Olive, that was introduced and almost immediately people recognized the thing was invasive and it was spreading beyond the limits.

Specifically, invasive plants have a lag time, from the time they're introduced, until they start really spreading. Buffelgrass is one of those that didn't act that way. It started spreading almost immediately after it was introduced.

Buffelgrass is—when we talk about it being an international problem, it truly is a global problem because buffelgrass is on the top 20 unwanted plants in Australia, and they have literally millions of acres of buffelgrass in Australia as well.

My first experience with buffelgrass was actually when I worked at Texas Agricultural Experiment Station in Texas in the early 1970s. I was on a ranch down in Southern Texas when they were root-plowing and digging brush and seeding buffelgrass on that land.

That landowner later became one of the Governors of Texas, but it was quite awhile ago. It wasn't the one that was just Governor and then President awhile ago. It was a different one.

Mr. GRIJALVA. I was going to add another blamegate here.

Dr. BROCK. Also when I was working at the experiment station in Texas, I worked out of Lubbock. And one day I got a telephone call from the main campus, from the plant breeders, asking me if I'd be willing to work with them on a project evaluating cold tolerant buffelgrass strains that they had been working on, the forage plant breeders had been working with.

And I had eight strains of buffelgrass shipped to me up to Lubbock. The first winter some of the buffelgrass actually survived.

The second winter, temperatures got down to about 5 degrees, and they died. So that was that at that point.

But even in the 1970s, people were working to try to get cold tolerant buffelgrass, and what they were doing was crossing it with other species in the *Cenchrus* genus. A real common one of those is the common sand burr. But anyway that was my experience.

When I came to Arizona, in '77, buffelgrass was not much of a deal at all. I remember seeing it being planted down on the Santa Rita Experimental Range at that particular time, and so it was just something that, well, people are planting it and the invasive nature of it wasn't being recognized by very many people, but it was being planted.

And then about 1985, at ASU, I was given a new teaching assignment that included buffelgrass on that list. And I used to have to go to one specific spot in Phoenix, on I-17, to find buffelgrass to bring a specimen to class. Fifteen years later, I could pick it up on my bicycle going to campus.

And so it spread fairly rapidly. So it's still spreading. So it's spreading along the transportation corridors around Phoenix, and it's continuing to spread. It's going to find new microsites, particularly when we have—the full effects of global warming are coming on.

It's a difficult case for vegetation managers. And in my testimony, I list actually seven things we could do to control—try to control buffelgrass. The first one is prevention, and like Dr. Mack talked about with biological control.

But there are seven things we could do. We talked about those this morning. I've been pretty active in looking for herbicide screening for buffelgrass. Of course, Round-Up, glyphosate herbicide works quite well for it, if the plant is green and we can get the coverage on the plants.

I've been looking at broadcast sprays with several different herbicide with minimal successes, but I'm continuing that. I started some studies in 2008, 2009. Both of those are still active.

What I'm going to do next is try to eliminate a bunch of things that didn't work and try to focus more on—there have been some other studies. But my recommendations this morning is that a concerted effort be put together taking the best knowledge of the people in the State or everywhere, getting all that knowledge together, getting research and demonstration teams going, much like were laid forth in the presentations earlier, and by particularly Southern Arizona Buffelgrass Group. We can do that. We've got plenty of expertise in the State installed to interpret and evaluation those kind of results.

And the second recommendation is that really immediate effort be made by APHIS, the U.S. Department of Agriculture. They're the ones that do the biological and control-type work. Get an immediate project going on that.

There's a spill-wet that controls buffelgrass—that can control buffelgrass. It attacks buffelgrass. The current technique, to get rid of buffelgrass stands, is for the ranchers or the farmers to burn those fields to get rid of that pest, and it will kill buffelgrass plants.

There is also a disease—there's plant disease, but also a fungi, I believe, that will get on buffelgrass. And it's another way they control that, and again actually burn the pastures to get rid of it.

I believe there are some things that could be done with biological control, but much more the emphasis has to be put on really trying to treat it as a forage material and much less on bio control. That's my comment. Thank you very much.

[The prepared statement of Dr. Brock follows:]

Statement of Dr. John Brock, Brock Habitat Restoration and Invasive Plant Management, and Professor Emeritus, Arizona State University Polytechnic, Tempe, Arizona

Buffelgrass is native to the veld of central Africa. Its taxonomic classification is as follows: Family: Poaceae, Grass Tribe: Paniceae, Genus and species : *Pennisetum ciliare* (L.) Link (syn) *Cenchrus ciliaris* L. Buffelgrass is a perennial bunchgrass that is adapted to sub tropical habitats around the world. While being a native to sub tropical climate grasslands, buffelgrass is well adapted to dry periods and can withstand prolonged drought conditions. Buffelgrass was introduced the United States in the 1930's and that introduction failed. In the early 1940's a successful introduction was made. Buffelgrass was first introduced in Texas, New Mexico and Arizona, and fairly soon thereafter to neighboring states in Mexico. Buffelgrass began to show its invasive nature fairly early after introduction. Often perennial plants show a lag time of decades from the time of introduction to invasion, this was not quite the case for buffelgrass. According to the USDA's Plant Data base, buffelgrass is now found in 10 states, and is in Puerto Rico. Buffelgrass is widely found in Hawaii, along with fountain grass, *Pennisetum setaceum*, which has escaped urban landscapes and is invading the Sonoran Desert at well. Buffelgrass is one Australia's most unwanted plants and has invade vast areas of that country's deserts.

My first experience with buffelgrass was in about 1972 while doing rangeland improvement projects in south Texas. In that case, mixed brush was being removed from rangeland and this introduced African grass was being planted to increase forage production for livestock grazing. Buffelgrass showed advantages over the native grasses in that it was easy to establish from seed, reached maturity rapidly, and provided palatable forage to domestic livestock, especially cattle. Forage yield measurements showed that buffelgrass pastures could produce in excess of 4,000 pounds per acre, in years of favorable rainfall. In the mid 1970's I planted accessions of buffelgrass at the Texas Agricultural Experiment Stations at Lubbock and Spur, Texas to test them for winter hardiness. At that time forage plant breeders were attempting to increase cold tolerance in buffelgrass by crossing it with other species in the *Cenchrus* genus. The first winter was mild and some of the buffelgrass plants survived at both locations. However in the second winter low temperatures approached zero degrees and all of the plants were winter killed.

When I arrived in Arizona in 1977, buffelgrass was not very common, especially in the Phoenix area. However it was being planted in southern Arizona, including trial plantings on the Santa Rita Experimental Range. At Arizona State University, in about 1985 I began teaching the course "Range Plant Identification". To instruct this class, we used, as part of the material, a plant list of 200 rangeland plant species utilized in the Society of Range Management annual meeting plant ID contest for undergraduate students. Buffelgrass was on this list. I liked to use fresh specimens if possible for laboratory instruction and ID tests. At this time, I could only find buffelgrass near the interchange at 7th Ave and I-10 in the Phoenix area. For several years, I would go to that site to collect buffelgrass. Later, about 1990, I was able to find it growing at industrial type areas in north Tempe. Before moving to ASU Polytechnic in 1999, I would collect buffelgrass on my bike ride to the ASU Tempe campus. It was also about this time when buffelgrass became established on "A" mountain in Tempe, since that was a site I would take students on fieldtrips for plant identification. At the present time, buffelgrass can be easily found along roadsides and other disturbed sites in what is known as the East Valley.

Buffelgrass is spreading along transportation corridors and is firmly established to the east of Fountain Hills. To the north of Phoenix, along I-17, it is found as far north as Black Canyon City. I believe it will continue to spread northward and find microclimate sites for establishment and with the advent of climate change, will continue to advance into the upper Sonoran Desert characteristic of the landscapes north of the Phoenix area. Buffelgrass impacts the Sonoran Desert in two ways. One the presence of this plant can provide strong competition to native plants and result

in a monotypic vegetation stand. This obviously decreases plant biodiversity, but also can change animal populations because of the limited food source and decrease overall biodiversity. Secondly, buffelgrass presents a perennial fine fuel that can promote wildfires. Sonoran Desert vegetation is not adapted to fire and many of the signature plants of the Sonoran Desert are killed in wild fires.

Buffelgrass is presenting a difficult case for vegetation managers. Vegetation managers have seven categories of management to direct toward a plant species. These include: (1). Prevention of introduction, (2). Manual, which can be labor intensive (3) Cultural practices which includes things like crop rotation and directed livestock grazing, (4). Mechanical treatments involve equipment like plows and mowing, however, on most Sonoran Desert sites, these actions would have little value, (5). Chemical treatments most commonly focus on herbicides, (6). Fire, and (7) Biological control agents.

There are reports of insect and plant disease damage to buffelgrass. A spittle bug can attack buffelgrass causing plant death, however, the common response by land managers who want buffelgrass is to burn the pasture to control the spittle bug. Buffelgrass developed under a natural fire regime in Africa and is tolerant to fire, although prescribed fire during summer dormancy can cause mortality to the population, but the losses are quickly replaced by seedling recruitment. Directed grazing as a form of biological control has been considered for buffelgrass, but buffelgrass is well adapted to grazing pressures. If "overgrazed" it can develop a decumbent growth form which helps it escape some of the grazing pressure. Manual removal of buffelgrass can be very effective. Manual control works best when the soil is moist and persons doing this practice return to the site for several years to find any new invading buffelgrass plants.

Herbicides can control buffelgrass. The most common herbicide applied for buffelgrass control is Roundup (glyphosate) or the generic equivalents of this herbicide. Roundup works best when buffelgrass is in a full green state. Glyphosate based herbicides are not selective herbicide hence, care during application is needed not to harm non-target plant species. In recent tests, Arsenal or Habitat herbicides (imazapyr) has been found to be effective against buffelgrass. Imazapyr also is not a selective herbicide, so collateral damage to non-target plants would be expected if this herbicide was applied as a broadcast spray. Buffelgrass can be controlled, based on research in Texas, with applications of Spike or Graslan (tebuthiuron). To get effective control tebuthiuron was applied at high rates, about 2 lbs ai/ac, and tebuthiuron is a persistent herbicide that ties readily to soil organic matter and plant tissues. Research for buffelgrass control with herbicides with more selectivity have shown that buffelgrass is not very susceptible to those compounds. For example Oust herbicide (sulfometuron) is selective but has intermediate control effects on buffelgrass, as does Accent herbicide (nicosulfuron). These preliminary observations are from treatments made to buffelgrass in September of 2009. As with most perennial invasive species, conclusive statements as to vegetation management treatments should be made after 1 or 2 complete growing seasons. Herbicides more specifically developed for grasses (gramicides) have shown little effectiveness to buffelgrass control. What is needed at this time are controlled herbicide tests made to buffelgrass growing among native Sonoran Desert vegetation, using the best herbicide management practices.

My recommendation would to be actively begin research/demonstration tests for buffelgrass control in the Sonoran desert using the best information available. I believe this will involve a team approach and team members are present within Arizona to design, install, evaluate and interpret such tests. A second recommendation is that an immediate effort be put forth by the Animal and Plant Health Inspection Service (APHIS), an agency within the U.S. Department of Agriculture, charged with assisting in biological control strategies for management of invasive species, to find biological control agents targeted to buffelgrass.

Mr. GRIJALVA. Two questions in one, having to deal with a comment you made about climate change. Is part of the migration up north due to cooling of temperatures, and on that same issue, how is that worsening buffelgrass infestation in the Sonoran Desert?

Dr. BROCK. Climate change, from my observations, is moving north. I make that road trip from Phoenix to Flagstaff once in a while but much more commonly to Payson. I've seen it going up the mile markers to Payson. Fountain grass or *Pennisetum setaceum* is a close relative and is even farther north than buffelgrass. But the

other part of that was—gosh, now my senior moment came. What was the second part of that?

Mr. GRIJALVA. Is it worsening?

Dr. BROCK. Oh, yeah, yeah. Yes, I believe it is. Buffelgrass is a subtropical grass, and I believe that the changing environment—there are things, too—global climate change has a bunch of components.

One is temperature, carbon dioxide in the atmosphere and then the other thing is that people don't seem to think too much about either is hydrogen deposition in terms of all the air pollutants. So I believe all three of those are working together to allow buffelgrass stands to expand and become a little more vigorous.

Mr. GRIJALVA. Thank you, sir. I appreciate it. I want to thank all the panelists for the hearing today. The information today plus, for all the panelists, the questions that I want to submit and for the sake of time and other reasons I didn't ask today, but if you could get that back to us as soon as possible for a couple of reasons: One, to have a strong record of this hearing, number one, and the recommendations that we heard; Number two, back to the point that Ms. Smallhouse made, that we are going to continue our efforts to secure some early demonstration money for the region, and like the last time, we hope that the appropriators will, based on today and the body of evidence that is available now, be more responsive to the requests.

So we'll make that effort, and we thank the alliance for their help in pushing some of our appropriators that that's a good thing to fund down here. That's truly a funding request, implications all over.

And the legislative work, I think it's important to raise this to an imminent threat status to where it should be, and I think it will help us most on the funding side.

I think the point that Chuck made, and in other parts of the testimony, about creating management and planned flexibility for plant managers so they have the ability to move and rapidly respond to situations.

And I think part of the hearing has to be about the cost benefits. If we would have spent the money that we should have 20 years ago, we wouldn't be talking to the grave situation that we find ourselves in now.

And rather than be foolish about that, I think this is—we have to look at the cost, but we also have to look at the benefit of making the investment now as opposed to waiting another ten years when the crisis perhaps is to the point that we can't tip it over in the other direction.

And so on the scale of how it's spreading, this is something everyone should be terribly, terribly concerned about, and I think that helps us with our argument about cost benefit, that it's not just Southern Arizona. It's going to affect the State. And thank you for that, Doctor.

It's going to affect other parts of the country, and there are multiple responses we need to take, and all of them are codependent on our ability to have that sustained funding, so that land managers in local community can begin the control process, and that

we have the flexibility, once classification is done, for some real R&D work down the road.

The tri-national point about this, this invasion has no boundaries between jurisdictions and between nations, so the coordination has to be some effort and some resources dedicated both to helping tribes and to enhancing the bi-national cooperation with our neighbors to the South. It is essential.

And the educational component is going to be critical. We are going to continue to work now on the—I don't want to call it demonstration funding anymore. I think we're past the demonstration point.

We're going to attach the urgency that this hearing has produced, to our request, and push it. Beyond that, there's the legislative initiative, and a coordinated, comprehensive campaign to eradicate buffelgrass has to be the overarching goal that we have here.

So we're real grateful for your testimony today. The staff has much good information and we're going to follow-up with some of you for additional information and additional help in helping us craft some of the initiatives that we're going to put together.

Thank you so much. More than anything, not only was it informative, but I appreciate all of the people here, the panelists and the alliance, for the fact that you have done so well in taking this issue and not letting it settle under the radar, and hopefully this hearing will continue to profile the fact that there's a clear, imminent threat to the biological diversity of the region and to the health and safety of the people of the region.

With that, I want to thank you again and I appreciate very much your attendance and fine work. Thank you. The meeting is adjourned.

[Whereupon, at 11:40 a.m., the Subcommittee was adjourned.]

[NOTE: The individuals listed below have submitted documents for the record, which have been retained in the Committee's official files.]

- Bean, Travis M., Principal Research Specialist, University of Arizona
- Bloom, Claudia, Founder of the Phoenix Weedwackers
- Brigham, Linda A., Executive Director, Southern Arizona Buffelgrass Coordination Center
- Brown, Lasha, Executive Director, Friends of Ironwood Forest
- Brusca, Richard, Senior Director, Research & Conservation, Arizona-Sonora Desert Museum
- Dahl, Kevin, Arizona Program Manager, National Parks Conservation Association
- Graumlich, Lisa J., Professor, University of Arizona
- Green, Paul, Executive Director, Tucson Audubon Society
- Lovallo, Lisa, Vice President, Cox Communications
- McVie, Christina, Secretary, Board of Directors, Friends of Ironwood Forest and Conservation Committee Chair, Tucson Audubon Society
- Olsson, Aaryn, PhD Candidate, Arid Lands Resource Sciences, University of Arizona
- Remington, Richard, Senior Biologist, Logan Simpson Design, Inc.
- Skelton, Lynne, Mayro, Town of Sahuarita
- Whittle, Richard K., LTC (ret.), PhD, Wildlife Biologist, Barry M. Goldwater Range-East