
# Buffelgrass: Southern Arizona Fights Back

*The ecological and economic threat that buffelgrass poses to the community of Tucson and the surrounding area has sparked an unprecedented level of cooperation among land managers, nonprofits, government at all levels, and representatives from the business community. The Southern Arizona Buffelgrass Coordination Center represents a model of cross-jurisdiction cooperation and community engagement in response to an environmental threat.*

The Tucson Mountains ring the western side of the Tucson Basin. Most prominent among the saguaro-studded peaks is "A" Mountain, named for the large white A that has been placed on one side in honor of the hometown University of Arizona. Dana Backer, a restoration ecologist with Saguaro National Park, picks her way across a steep, rocky slope to the south of the "A." The slope is covered in what could almost be termed a forest of saguaro cactus. Cholla, palo verde, and prickly pear also line the hillside. However, Backer is most concerned with a dry, yellow bunchgrass that has filled in the spaces among the cacti and other desert flora. The telltale yellow patches of buffelgrass can be seen all over the hillside. "This isn't a bad infestation," says Backer. "There are other places where it is so thick you can't see the ground."

Unlike other invasives in the Southwest, such as cheatgrass or tamarisk, that have been studied, pulled, sprayed, hacked, and mowed for decades, the ecological dynamics of buffelgrass are just now beginning to be understood. However, what we have learned is frightening.

Once buffelgrass becomes established in an area, fire soon follows. While fires are not unknown in the Sonoran desert, they are usually isolated occurrences from

**Buffelgrass History**

Buffelgrass (*Pennisetum ciliare*) is native to arid and semiarid areas of Africa (the name comes from the Afrikaans word for buffalo), the Middle East, and Asia. It was introduced in the United States in the 1930s for cattle forage and soil erosion control. It is found in southern portions of the country from California to Florida. Recently, it has become common in southern Arizona where it has established in the Sonoran Desert. The plant was relatively rare in botanical surveys of natural areas until the 1980s when it began to expand rapidly, a process that many scientists attribute to the warming climate. In the Tucson area, buffelgrass was planted experimentally in several areas beginning in the 1940s. Buffelgrass was first observed in Saguaro National Park in 1989 and a control program started in 1993. Studies have shown that within the park it is expanding at a rate of 35% per year.

**Reference: SABCC -** http://www.buffelgrass.org/content/history-distribution

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**Saguaro National Park Treatment Prioritization**

Because of the difficulty and cost of treating buffelgrass, the Park has now implemented a triage system for buffelgrass treatment. First, only areas that have been previously treated are currently targeted for additional treatment (infested areas have to be treated at least two years in a row and possibly longer to ensure that buffelgrass has been completely removed from the seed bank). Next, sensitive wildlife habitat for desert tortoise and the lesser long-nosed bat is treated. The third prioritization criterion is purely logistical – only targeting areas that crews can reach safely. Buffelgrass thrives on rocky hillsides and some areas are difficult for crews to reach carrying backpack sprayers for herbicide application and wearing the required protective clothing. In fact, buffelgrass treatment in the backcountry is so difficult that the National Park and other land management agencies have been experimenting with helicopter spraying as an alternative. The Park acknowledges that portions of the Sonoran Desert ecosystem are going to be lost to buffelgrass, so the fourth criteria for treatment is aimed at reducing the impact on the visitor experience by targeting areas in visitor viewsheds. The final criterion involves treating roadways that are pathways and vectors for spread.

lightning strikes that do not spread beyond a few trees or plants due to the lack of fuel on the ground. Buffelgrass, however, fills in those spaces and provides the fuel for very hot fires that completely kill the native vegetation. Buffelgrass rapidly recovers from fire, quickly transforming large expanses of deserts into grasslands. It is estimated that 3 million acres of the Sonoran Desert in Mexico have already been transformed into buffelgrass pasture. While levels of infestation in southern Arizona vary considerably depending on location, everyone agrees that the plant is spreading rapidly.

"The Sonoran Desert could be converted to a completely different ecosystem because of buffelgrass," says Backer.

Within Saguaro National Park, buffelgrass now covers about 2,000 acres; however, the Park has instituted relatively aggressive treatment and control program and is beginning to see progress in certain areas.

All of the effort in Saguaro National Park will be for naught if the problem is not also controlled outside of the Park. On "A" Mountain, Backer points out the yellow patches that extend down the hillside along the highway and into the neighborhoods beyond.

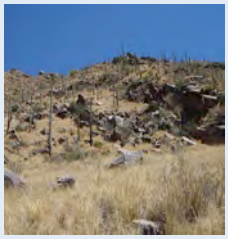
While Saguaro National Park covers much of the Tucson Mountains, other portions are under the jurisdiction of the City of Tucson and Pima County. It is the multi-jurisdictional nature of the buffelgrass invasion that is the crux of the challenge in mitigation and control.

The county has also stepped up efforts to control buffelgrass on county lands, including some of the slopes of the Tucson Mountains on which we stand. Doug Siegel, a natural resource specialist with the county, has been active in efforts control buffelgrass since 2000. He says that buffelgrass treatment is no longer a question of eradication like he and many others naively believed in the beginning, it is now a question of control and mitigation. And, for control and mitigation to be successful, it has to be done strategically.

"We started out with small patches that have now coalesced into whole fronts of mountain ranges. That is not something you can address on a small scale, you have to bring in large-scale treatment plans if

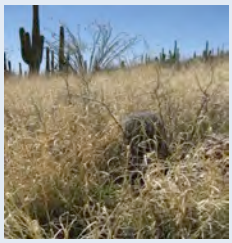
**Buffelgrass Facts**

***Description:*** Buffelgrass is a drought-tolerant, perennial bunchgrass. It has a bushy stem that can grow up to 4 ft long, and has roots that can grow to 8 ft in depth. Seeds are viable in the soil for up to 4 yrs. Growing season occurs during the summer monsoon season when precipitation increases.



***Habitat:*** Buffelgrass is most successful in areas with precipitation of 13–22 in (330-550 mm) and the minimum winter temperature does not fall below $41^0$ F ($5^0$ C). The plant prefers rocky hillsides and desert washes.

***Threat to Native Species/Ecosystems:*** Buffelgrass grows densely and crowds out native plants, rapidly converting rich biological communities into monocultural grasslands. Competition for water can weaken and kill larger desert plants. Dense roots and ground shading prevent seed germination. The grass can outcompete most native plants by these means alone. Buffelgrass is fire-tolerant, and the bushy, almost woody stems can create fuel loads of 1-4 tons per acre, much more than the usual Sonoran Desert fuel load. Most plants in the Sonoran Desert evolved without fire and cannot tolerate it. A single buffelgrass fire kills nearly all native plants.



**References:**
**Sonoran Desert Museum -**
http://www.desertmuseum.org/invaders/invaders_buffelgrass.php

you want to successfully knock it back and control it," says Siegel. "It also means you have to coordinate across boundaries. It doesn't make sense for us to treat on our side of the fence, if others are not treating on their side."

In 2008, that realization led Tucson conservationists, scientists, and civic leaders to form the Southern Arizona Buffelgrass Coordination Center, or SABCC (pronounced Sab-See). SABCC has given the buffelgrass control effort an extra spark by creating a nexus for synchronizing treatment and outreach efforts. While SABCC only has one full-time employee, executive director Lindy Brigham, the organization has strategically brought in a diverse array of partners for the effort, including land managers such as Backer and Siegel but also leaders in the business community and local government. For example, Cox Communications is represented on the SABCC Board of Directors and the company has assisted with developing high-profile public service announcements that have increased awareness across the region of the threat posed by buffelgrass.

"Invasives can be shrugged off by a lot of people," says Brigham. "But we have been able to call attention to it by maintaining a consistent and focused message."

SABCC has proved adept at bringing in funding as well. In the spring of 2012, working with the Tucson Airport Authority and Pima County, SABCC received a $3.4 million pre-disaster mitigation grant to control buffelgrass at the airport and a county prison complex.

Despite the organization's relatively short history, it has already been hailed as a model for creating partnerships that work across agency jurisdictions and coordinating among private and public institutions. In 2011, SABCC was honored as one of 17 organizations nationwide to win the U.S. Department of Interior's coveted "2011 Partners in Conservation Award."

"Prior to the development of SABCC, everyone working on buffelgrass was operating pretty much independently. There was some cross-pollination, but it wasn't until SABCC was established that we had a common group that could come together and work towards mutual goals," says Backer. "SABCC represents all of our efforts - what we do on the ground in our multiple jurisdictions."

"The scientific community can stand up to bring education to an issue, but they don't always get the attention. But when you bring local leaders to the table, you can make change," says Siegel.

**Engaging the Entire Community**

The Catalina Foothills is an affluent community situated at the base of the Santa Catalina Mountains just north of the city of Tucson. Multimillion-dollar homes and golf and spa resorts sit nestled within gated communities among the saguaros on the rocky hillsides.

In 2008, Julio Betancourt, a research ecologist with the United States Geological Survey, was leading a bus tour of community leaders from the City of Tucson with the aim of educating some of the city's decision-makers on the invasion of buffelgrass that was sweeping through the Sonoran Desert of southern Arizona and into the city itself. After making stops at various locations around town that were quickly succumbing to the wave of buffelgrass, the tour headed up to the Catalina Foothills, through a gated community, right up to the border of the Coronado National Forest. All along the mountainside there were large yellow patches of buffelgrass that had begun to fill in the spaces between the saguaros and palo verde. The patches also were filling in the spaces between houses, creating a flammable carpet of grasslands. The group stopped and heard talks from different experts on buffelgrass and the threat it posed in terms of replacing the native ecosystem, and even more importantly, fire.

"The Superintendent of Coronado National Forest had just finished giving her talk and I was standing right next to the President of the Tucson Association of Realtors. A few feet away was the President of the gated community. The president of the gated community pointed up the hillside and said 'That house is for sale for $22 million.' I elbowed the Tucson Association of Realtors President and said, "I'll give you $11 million.' He turned and said, "I'll take it.' I think at that moment

**Treatment Effectiveness**

There are essentially two ways to treat buffelgrass: pull it up manually using shovels and pry bars, and spraying it with glyphosate herbicide. Manual pulling can be done year-round but herbicides can only be applied during green-up, which corresponds to time of the year when daytime temperatures regularly exceed $100^0$ F.

A recently completed study of buffelgrass treatment effectiveness at Saguaro National Park is beginning to shed light on the pathways to success in treating buffelgrass. The study had a number of key findings:

- Treatments were less effective on south-facing aspects and on steep slopes;
- Treatments were more effective in seasons with higher rainfall;
- Buffelgrass was effectively controlled when multiple treatments occurred in consecutive seasons and when both manual and chemical treatments were used.

**Reference:** Hunter, M. 2012. Assessment and Guidelines for Determining Effectiveness and Longevity of Buffelgrass Treatments in Southern Arizona: Final Report. NPS.

every person that was on that bus tour realized that this was a problem that could end up impacting property values and public safety."

Betancourt has become the face and voice of SABCC and the effort to control buffelgrass. His intelligence and depth of knowledge is matched by a quick sense of humor and a natural storyteller's flair. You cannot help being drawn into his passionate dissection of the buffelgrass threat. Betancourt is a paleoecologist, and not an invasives species biologist. His research focuses primarily on how climate variability has led to changes in plant distribution across the Southwest. He has focused his work largely on ecological changes occurring on time scales covering millennia rather than the very short periods in which invasions like that of buffelgrass can be measured.

As a respected and well-established researcher, Betancourt decided that he had reached the point in his career that he could afford to drop some of the normal detached scientific objectivity and enter the realm of advocacy.

"Scientists are too accustomed to filling the reservoir full of science with the assumption that the public is going to happen by and basically fish out what they need to solve problems. I think that is an unrealistic assumption on the part of scientists. We are going to have to lead on the solutions to environmental problems," says Betancourt.

Betancourt realized early on that the buffelgrass community needed to engage a broader slice of the Tucson community. He has shown a keen sense in recruiting influential community leaders to the buffelgrass cause.

"You have to recruit within the brain trust – the people that actually make decisions in a community, people capable of making a big difference quickly," says Betancourt. From the Mayor's office to the County Commission, SABCC has developed a powerful group of local allies. However, Betancourt has been most successful in bringing representatives from the Arizona business community into the cause.

In 2008, Betancourt gave a presentation to the Southern Arizona Leadership Council, a group of business leaders working to improve the economic foundation and quality of life in the Tucson area. Sarah Smallhouse, President of the Thomas R. Brown Foundation, one of the largest philanthropic organizations in Arizona, was in attendance. She was completely floored by what she heard Betancourt describe.

Researchers have recorded buffelgrass fires at 1,300 to 1,600$^0$ F, almost three times hotter than fires fueled by native vegetation, with flame heights of 12 to 18 feet high. Credit: Randy Metcalf

**Decision Support System**

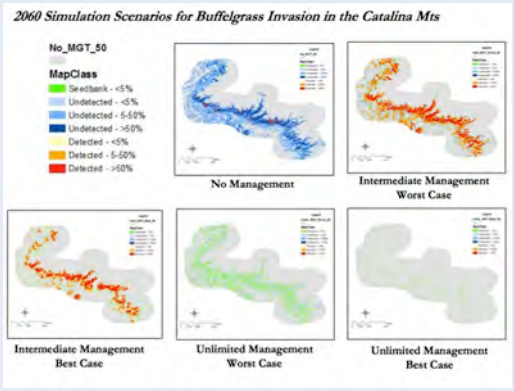
In addition to its success in outreach and coordination, SABCC provides basic support for land managers charged with controlling buffelgrass on their lands. In that realm, it has proved adept at supporting and directing scientific data collection, mapping, and the development of a decision support system.

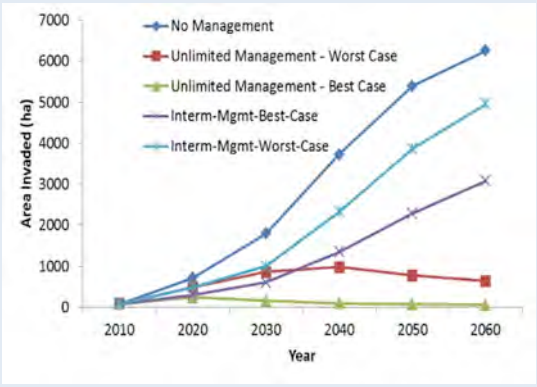
With limited resources available, land managers need tools to evaluate the effectiveness of available mitigation strategies. SABCC worked with the USGS and ESSA Technologies to develop a decision support system to evaluate potential strategies using buffelgrass infestations in the Santa Catalina Mountains as a test case.

The model developers ran a formal decision support/adaptive management simulation model asking the following questions:

- What level of resources is required to prevent buffelgrass spread?
- How should these resources be allocated among inventory, treatment, and maintenance?

They found that without treatment, areas affected by buffelgrass will increase substantially over the next 50 years, but with early and effective treatment this area could be dramatically reduced. A large up-front investment in inventory and treatment could reduce overall management costs.




"I couldn't believe my ears," says Smallhouse. "I am a native of Tucson. I grew up playing in these canyons. I immediately raised my hand and asked how I could get involved."

Betancourt describes Smallhouse as a force of nature. She quickly educated herself on the issue and dove into the legal work involved in setting up the nonprofit that became SABCC. She now chairs the Board of Directors for SABCC and works tirelessly to get the organization's message out to influential people across the State, from the Governor to CEOs of major companies.

"We have been successful by tying buffelgrass to the overall health of the economy. The Sonoran Desert is a big part of what makes Tucson attractive to business and workers," says Smallhouse. "If we let that asset go, it will have dire consequences for economy, community, and quality of life. We just keep repeating that message persistently."

Persistence is a big part of the SABCC story and that is perhaps best exemplified by the dedication of the Weedwackers.

**The Sonoran Desert Weedwackers**

Coffee cups in hand, a group of 25 volunteers gathered at 7 AM in a Tucson grocery store parking lot. They donned reflective safety vests, passed out tools, and planned the day's task of removing the invasive buffelgrass from the sides of a major highway that led directly into

Saguaro National Park. It was only late March, but the days were already heating up and this group wanted to get an early start. After receiving directions from the group leaders, Caroline Patrick and Marilyn Hanson, the volunteers fanned out along a stretch of highway and began the difficult task of uprooting buffelgrass from the roadside. The group was a mix of college students, retirees, and just plain dedicated citizens. Using picks, shovels, and pry bars, the group wrestled waist high plants out of the ground and into plastic garbage bags. By 11 AM, they had cleared about a half a mile of roadway. Marilyn Hanson, director of the Sonoran Desert Weedwackers, was very satisfied as she looked over the stacks of plastic bags that would be picked up by the County later that afternoon.

"Previously, I had this area marked as red, meaning buffelgrass is present. Now, I will change this area to yellow, meaning that buffelgrass has been removed. That gives me a great feeling," says Hanson. She pauses and looks down the road "I ask myself, why do I keep doing this? That's easy - I can't give it up. I have seen what can be done. When people can dedicate just a few hours a month, invasive species can be pushed back," says Hanson.

Buffelgrass "pulls" are common in Tucson. Neighborhood associations and non-profit organizations such as Tucson Clean and Beautiful have begun sponsoring buffelgrass removal and monitoring programs. Saguaro National Park has regular volunteer pulls in the Park and also in the surrounding neighborhoods. And most notably, the Sonoran Desert Weedwackers, a hardy group of volunteers led by Hanson, have weekly pulls at different sites around the Tucson basin.

"The hardcore Weedwackers, for the most part, are older than 55. Some are going out 3-4 times per month somewhere in Tucson, says Hanson. "They are literally working all over the city and surrounding area. We probably have 100 people per month going out weedwacking every month."

Top picture was taken of a buffelgrass infestation in February, 2006 on Brown Mountain, Tucson Mountain Park. The bottom picture was taken in February, 2012 after repeated visits by a Sonoran Desert Weedwackers crew. Credit: Marilyn Hanson

As the group took a break and drank water I asked one of the volunteers, a college-aged student standing with a group of friends why she decided to come out for the pull.

"I heard about it on TV and decided I wanted to do something to help the environment," she replied.

Mark one down for the power of outreach and education.

SABCC has used a highly effective education campaign using printed

materials, signs, posters, neighborhood workshops, and radio and television public service announcements to educate the Tucson community as a whole on the buffelgrass problem. The result has been an outpouring of volunteer commitment on a level that most environmental organizations can only dream about.

"There is an army of volunteers working on this. All over the Tucson basin, on any given weekend you can go out and see people working with pry bars and picks, people bagging buffelgrass up and carrying it away. It is an impressive level of volunteerism today for the United States." Betancourt.

The importance of volunteerism in the SABCC effort is best represented by the annual Beat Back Buffelgrass Day in which over a thousand volunteers converge on sites across the Tucson basin to remove buffelgrass. The partner organizations in SABCC pitch in to promote and organize the event, and it is has been wildly successful in raising community awareness.

**Lessons Learned**

The SABCC story holds important lessons for other communities and groups responding to environmental problems in their own communities. First, learning to work across jurisdictions is essential. Julio Betancourt says that working on issues that are "spatially-extensive" and "contagious," meaning they are found across the landscape and can easily spread from one jurisdiction to another, is the essence of most contemporary environmental problems.

"How you coordinate across jurisdictions is absolutely critical to the success of projects like SABCC. And, I would say it is critical in the response to most environmental problems whether we are talking about invasions, fire, or even the ecological impacts of climate change," says Betancourt.

Additionally, those involved with the SABCC effort emphasized that land managers and scientists need to engage the community beyond their normal comfort zone. They have to become more comfortable working with the decision makers in communities if they want to see progress. Darla Sidles, the Superintendent for Saguaro National Park, is a member of the Board of Directors for SABCC. She has also been active in reaching out and establishing partnerships with local and state officials in the Tucson basin.

"The Sonoran Desert doesn't start and stop at the Saguaro National Park boundary. It goes well out into the community, well out into all of southern Arizona. Land Managers need to get out and work with community partners if they expect to see any progress–learn who the county commissioners are, talk to city, state, and local officials. It is important to develop relationships that include not just Saguaro National Park and other federal agencies, but the entire community of Tucson," says Sidles.

Battling invasive species is a task that requires persistence and determination. SABCC, its partner organizations, and the individuals that volunteer countless hours to the cause have provided a model of community response to a serious environmental problem.

*Written by Josh McDaniel, June 2012.*

## Resources

**Southern Arizona Buffelgrass Coordination Center** - www.buffelgrass.org

**Sonoran Desert Weedwackers** - http://www.aznps.com/invasives/documents/ww.2008.pdf

**Arizona-Sonora Desert Museum** - http://www.desertmuseum.org/invaders/invaders_buffelgrass.htm

**Saguaro National Park** - http://www.nps.gov/sagu/naturescience/invasive-plants.htm

The Southwest Fire Science Consortium is a way for managers, scientists, and policymakers to interact and share science in ways that can effectively move new fire science information to management practices.

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