# Biologists bring water to species hurt by drought

## Forage enhancement may aid endangered Sonoran Pronghorn

by Susan Simpson

Sonoran pronghorn, had they been grazing as our caravan of pickup trucks raised a land-locked contrail of desert dust, would not have guessed that the disturbance was entirely for their benefit. We—a group of about 15 wildlife biologists and University of Arizona students—had packed ourselves and dozens of coils of plastic water tubing into truck beds and headed into the Cabeza Prieta Wildlife Refuge, about 30 miles north of the U.S.-Mexico border near Ajo, Arizona. By stretching this plastic tubing from an already-laid, mile-long PVC pipe connected to a well, we hoped to pump water far into the Wildlife Refuge along known pronghorn migration routes.

There was no trail to follow, but the pickup trucks in which we rode made their own, bouncing and lurching across dry washes and zigzagging to spare chain-fruit cholla in our path. At every joint in the main pipe, the drivers stopped to let the dust settle, and the students released white-knuckle grips on the truck and joined in a dash to unroll eight more lines of tubing. Like snakes crouching in the scant shade of creosote, the tubes stretched uncooperatively where we had pulled them from one plant to another. After securing the base of each water tube, the wildlife biologists drilled holes in the tubes to let water trickle toward the plants.

As we hopped back into the truck beds, the lines of tubing we left laying in the desert seemed almost too simple to help an endangered species flourish in a harsh desert environment. Yet the wildlife biologists hoped that the forage enhancement plots, established in small areas experimentally now for a couple of years, will provide adult pronghorn with the extra resources they need in severe droughts, and fawns with the critical nutrients they often lack in the long, dry, desert summers.

**Declining Populations**

Sonoran pronghorn (*Antilocapra americana sonoriensis*) have been on the Fish and Wildlife Service's list of species in danger of extinction since 1967, even before the federal Endangered Species Act was passed in 1973. A subspecies of the American pronghorn (*Antilocapra americana*) that lives throughout the Rocky Mountain region, the Sonoran pronghorn lived throughout southern Arizona and northern Mexico (Sonora) prior to extensive human development of the area. Since pronghorn will not cross most barriers, including roads, railroad tracks, or fences, many small populations have been isolated from one another. Isolation reduces the genetic diversity in each of these groups, prohibits movement into new habitat, eliminates forage and water supplies that pronghorn used to visit, and makes them more vulnerable to extinction during severe droughts.

"The basic cause of population loss is lack of rain," John Hervert, wildlife biologist for the Arizona Game and Fish Department explained in an early January interview. "Much of what we're trying to do [in conservation projects] is focused on climate, change in rainfall, seasonal rainfall, and availability of forage."

When monitoring of the Sonoran pronghorn began in the 1970s, Hervert said that it was easy to take what they found as the "normal" condition of the animals, and assume that this population and this habitat were representative of long-term conditions.

"Yet in the past," he explained, "the pronghorn had access to unaltered riparian zones, and they had a much larger habitat."

Even now, Hervert said, the 1.5 million acre wildlife refuge can create a false sense of security, because in reality the timing and availability of rain are so important.

"It's easy to become complacent, saying there always have been pronghorn here, and there always will be," Hervert said.

**Sonoran Pronghorn and Drought**

The vegetation enhancement project is part of the Arizona Game and Fish Department's efforts to ensure that, in fact, the pronghorn will be here for the foreseeable future. The population has fluctuated, often in relation to the amount and timing of seasonal precipitation. When winter precipitation rose in 2001, so did fawn recruitment (survival to the end of the year). About 50 of the approximately 120 pronghorn fawns born that year survived to adulthood, which is a high rate. Unfortunately, most of these survivors died during the prolonged drought of 2002, when the entire

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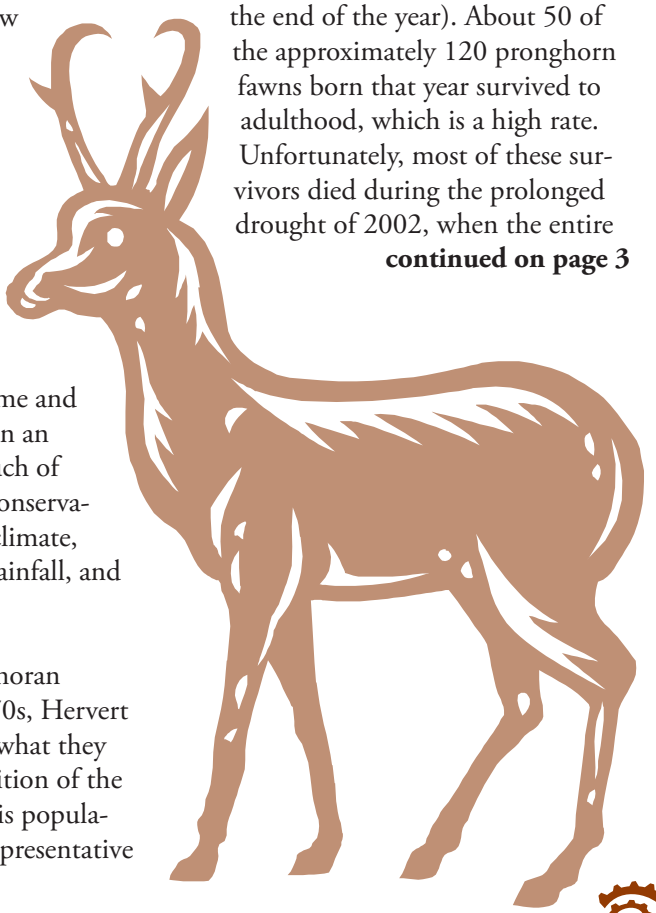

# Pronghorn, continued

Arizona population plummeted from 99 to only 21 pronghorn.

Ongoing forage enhancement programs will mitigate for the drought, Hervert said, and alleviate some of the stresses the pronghorn undergo by having forage and water available during dry spells.

The prosperity of pronghorn, like many other desert animals, is closely tied to the condition of the habitat, and in turn, to adequate levels of precipitation. Although drought can be considered a normal part of Arizona's long-term climate, it also can have devastating effects on individuals, populations in a certain region, or an entire species.

Dry plants lack the nutrients and moisture that grazing animals such as the Sonoran pronghorn expect to find along regular migratory routes through the desert. During severe droughts, plants make more severe adaptations, shrinking the size of their leaves, refusing to flower, or sometimes disappearing altogether. For a grazing Sonoran pronghorn, this means that each surviving plant is smaller, offers fewer nutrients, and requires the pronghorn to find additional sources of water in order to digest the plant's desiccated cellulose.

Hervert reported that population studies support this conclusion. "All the signs pointed to the same thing: if you have good habitat conditions, pronghorn increase," he said. "If you have poor habitat conditions, they decrease in number. If you have really poor habitat conditions, you can lose them all."

While adult pronghorn can survive on vegetation that is lower in nutrients and moisture than normal, pronghorn fawns cannot. In average years adult pronghorn populations may decrease 10–20 percent and much more during of severe drought, Hervert noted. Without new fawn recruitment, herd population would go steadily downhill.

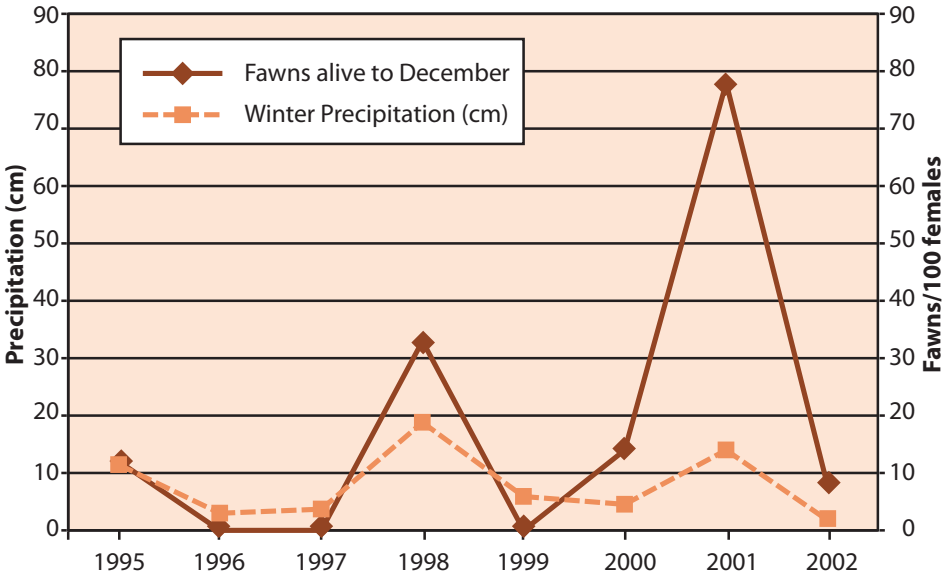


**Figure 1.** Endangered Sonoran pronghorn fawn survival (shown here as fawns alive at the end of December per 100 adult females in southwestern Arizona) is linked to winter precipitation. Many fawns, as seen in the graph, survived during years of higher winter precipitation (when there was sufficient forage to last until the next rains), while fawn mortality was greatest during very dry years. This demonstrates how crucial it is for fawns and lactating females to have nutritious, plentiful forage through the winter. Summer monsoon rains must follow good winter and spring conditions for fawns to survive until adulthood. Data from Bright and Hervert, in press.

The timing of the precipitation has to be right to meet various life stages for the pronghorn. The times of year when plants are dry are also the time when females are lactating, notes Ryan Wilson, a graduate student at the University of Arizona. Wilson is monitoring pronghorn as part of his master's work in the School of Natural Resources.

"If there is not adequate forage, [a mother] doesn't produce the adequate quantity or quality of milk," Wilson said. "The fawn has to start relying on forage earlier than usual."

But of course, Wilson notes, if there is not enough forage for the mother to produce milk, there will not be enough to sustain a growing fawn.

In a forthcoming article on pronghorn mortality in *Wildlife Society Bulletin*, Hervert and lead author Jill Bright illustrate the relationship between precipitation and fawn survival. The amount of winter precipitation appears to impact fawn recruitment (Figure 1), as does the dry spell that often comes in the spring.

"The timing between the last winter rain and the first summer rain is crucial," Hervert said.

Bright and Hervert found that the longer the gap between winter and summer rains the less fawns survived. Fawns at this time are no longer nursing, and must find nutrient-rich grasses and forbs to grow steadily.

"If there are abundant winter rains, fawns will be born and be healthy until they're at least three months old," Hervert explained. "Then they're susceptible to the spring drought."

In 1997, for example, the range had sufficient winter rains according to Hervert, but summer rains didn't arrive until September—after a gap of 108 dry days. The dry spell wasn't severe enough to deplete the adult pronghorns, but it devastated the fawn population.

"Basically all the fawns died because the summer rains just didn't come soon enough," Hervert said.

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# Pronghorn, continued

In contrast the dry gap before summer rains was only 61 days in 2001. Fawn survival vastly improved that year (as shown in Figure 1).

**Building a safety net**

Hervert hopes to provide a safety net to keep pronghorn from declining as drastically as they did dry years such as 2002. Forage enhancement will help populations migrating through the irrigated areas find abundant, nutrient-rich forage when other areas are drying up, and will act as insurance against future threats of extinction.

The project, so far, seems to be working. While both Hervert and Wilson admitted that there is no objective way to measure the impacts forage enhancement projects have on pronghorn fawn survival, Wilson added that it makes sense to put the water out there just because it may be beneficial to them.

"You see green there where there's water, and you see brown where there's not," Wilson said.

The population is currently too small to do rigorous scientific monitoring of the effects of irrigation, which would require tracking a large, radio-collared sample of the population with access to vegetation plots and comparing their reproductive success to an equally-sized population of those without access. But, the proof of the irrigation seems to come through commonsense observation.

"If anyone had any doubt about whether watering forage to feed pronghorn is working, they only needed to come out and see the animals grazing there during the drought," Hervert stated. "I think the important question is not if they work, but how large they have to be, and how many we need to have."

Results of watering come almost immediately. "Once we put water on, the plants respond," Hervert explained. "They're lying dormant, waiting for rain. They start putting out leaves within a week of watering. The pronghorn find it by smell, and they will forage in these areas before moving on."

Although the forage enhancement plots are probably not numerous or extensive enough to have impacted the population size yet, the pronghorn are multiplying due to other factors. Wildlife biologists recently completed the 2004 population survey for both the Arizona and Mexican populations, and have optimistic results: 58 pronghorn in Arizona, and 624 in the core habitat, east of Rocky Point, in Mexico.

"That's more than double what we saw two years ago," Hervert said, referring to the Mexican population.

Pronghorn are capable of producing twin fawns each year, which means that if habitats are in good condition, they can increase steadily.

Other projects will augment the forage enhancement. Part of Wilson's research will be documenting pronghorn use of an existing enclosure, the success of a captive breeding program, and differences in seasonal and daily behavior according to sex of the animals. Some of the pronghorn are already radio-collared, and just last month four new females were captured and moved to the enclosure, where, following an exam, researchers discovered that all four were pregnant, hopefully with twins.

A current priority for wildlife managers is increasing genetic diversity. "We're moving forward with captive breeding," Hervert said. "The next phase in recovery is establishing herds in other locations."

Crucial to consider is the role of the unpredictable climate in the future of the pronghorn and their management. "It's not a stable habitat," Hervert said. "It's a big area, but it's totally at risk. That's the lesson that's hard to grasp."

Plastic tubing such as that pictured here serves as conduits for pronghorn habitat irrigation. Water will flow seasonally from a well to vegetation along known pronghorn migratory routes, in hopes that the enhanced forage will increase pronghorn fawn survival and mitigate population losses during extreme or prolonged drought.

He went on to add that it is the same lesson that people in Arizona will have to learn. "We're really at the whim of nature," Hervert said. "We'll suffer if there's a drought."

Risk did seem inherent in the desert, as the thin irrigation lines faded behind a billowing cloud of turmeric-colored dust, hiding any sign of human presence. Our work that warm fall day was only a small part of the Sonoran pronghorn conservation project, in a small part of the refuge. Many of the areas pronghorn visit—in the mountains rimming the horizon of our worksite—were too remote, or too dry, to be optimal locations for water lines. The future of the Sonoran pronghorn right now looks good, but even with irrigation, the population will follow the ebb and flow of the desert rains.

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