



Black Bears and the Wallow Fire

By Kirby Bristow and Michelle Crabb



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Do you ever wonder what bears do in the woods? How about in the blackened, scorched woods? During the past few years, biologists from the Arizona Game and Fish Department learned firsthand what happened when black bears were faced with the largest wildfire in Arizona history.

It all began after the severe fire season of 2002, when the Apache-Sitgreaves National Forests began implementing forest thinning treatments along the wildland-urban interface (or WUI, pronounced “WOO-ee”) in the White Mountains. The goal of forest thinning is to reduce the risk that intense wildfires such as the Rodeo-Chediski Fire might spread into urban areas and destroy homes and property. These treatments were designed to reduce tree-stand densities and mid-level vegetation that can act as “lad-

Researchers were in the field studying black bears when the Wallow Fire, the largest in Arizona's history, roared to life. How the black bears (here, captured on trail cameras) responded to the conflagration became the subject of intense fascination — and new studies.



ders” for low-severity ground fires to climb into the forest canopy and become devastating crown fires.

In 2006, Arizona Game and Fish started a research project to investigate the influence of forest thinning efforts on black bears along WUIs near the Arizona towns of Greer, Nutrioso and Alpine. This research was initiated because black bears often prefer habitat with higher tree-stand density and mid-level cover, and therefore may be negatively influenced by forest

structure changes.

That year, we began trapping black bears near the WUIs and fitting them with Global Positioning System radio telemetry collars to track their movements and investigate habitat selection in relation to treated areas. Our efforts were designed to determine if black bears avoided treated areas, and what aspect of the habitat alteration influenced the bears most.

This project is the reason we had researchers and collared bears on the

ground in May 2011. We were starting what was planned to be our final year of bear trapping, just as Arizona's largest wildfire roared to life.

A Cloud of Smoke

We had been baiting and setting traps all morning when we noticed a cloud of smoke building over the area south and west of Alpine. The cloud seemed to get larger and darker as the day wore on, and the intense dry winds increased our concerns about



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the spread of what appeared to be a large wildfire.

That afternoon, we headed into Springerville. Watching the growing, ominous smoke plume to the south, we joined many concerned local residents at a community meeting at the local high school auditorium to get the latest information from the U.S. Forest Service about the growing Wallow Fire. The fire had started just a few days before (on May 29, 2011), but it was still quite a way from our bear traps. Firefighting officials hoped to stop it well to the south.

Overnight, the menacing plume dissipated, and we headed out the next morning hopeful that fire crews had prevailed. Setting some traps, we kept our ears on the radio, but as the morning progressed, things started sounding dire. Finally, we got the order to evacuate the area (Could the fire really be moving that fast?). We scrambled to shut down all of our traps, leaving them in place because we couldn't imagine the fire would grow

into the monster it became.

We headed down out of the White Mountains that day, glancing over our shoulders at the intensifying smoke plume that looked like a giant thunderhead rising up from 100 miles away. Our concerns mounted for the safety of the bears and other wildlife, the local residents and the mountainous habitats that contained them all.

Burn-up to Green-up

We spent the next few weeks glued to our computers, trying to get information on the fire's progress and anxiously monitoring our bears. Five of the 17 collared bears were fitted with satellite GPS collars we could monitor online. We nervously watched the fire line approach — and then overtake — each bear. Some bears appeared to “hole up,” reducing movements as the fire approached them and eventually passed them by. We anxiously wondered if they had found a safe place to wait it out, or if their decreased move-

ments meant they were injured and unable to move around.

Although our collars are programmed to record a location three times per day, they don't always take a location when scheduled, potentially from poor satellite reception. Whenever this happened, we would wonder if the collar simply hadn't taken a location when it should have, or if the bear (and the collar) had succumbed to the fire. Meanwhile, there were 12 collared bears we couldn't monitor online.

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of their time in areas with a burn classification of low to very low or unburned. During that time, the Forest Service straw-mulched 36,062 acres to reduce erosion, concentrating on areas that were steep and severely burned. In that same time, they also aerially spread 4 million pounds of seed onto 81,124 acres.

By September, results of these treatments and summer precipitation were evident. Although some areas were still barren, many were lush with the "green-up" of barley and other seeded grasses. During the fall, following the green-up, the bears shifted their use from the low-severity burned areas to the high-severity burned areas where the majority of seed and mulch had been dropped. For example, one male bear spent 87 percent of his time and one female spent 90 percent of her time in the more highly burned areas.

Bears using these highly burned areas were eating vegetation that sprouted from the aerial seeding (mainly barley), which grew in a knee-high carpet in some places. Bears capitalizing on those greened-up, high-severity burned areas moved less each day than they had before the green-up, suggesting that the availability of the lush grasses may have influenced their movements. We observed this behavior pattern in bears

After the fire, researchers began an air and ground search for collared bears, listening from the sky for VHF signals and even crawling into ash-blackened dens to look for signs of activity.

by each collar, allowing us to locate and check the bears' status. Thankfully, on that flight we were able to find most of the bears, alive. It later turned out that one uncollared bear was found badly burned, but all the bears we monitored survived the fire. In fact, the collared bears did not seem to abandon burned areas and generally stayed within their usual home ranges.

After the fire was contained, we were allowed to resume field work and were stunned by the devastation in some areas. The human-caused Wallow Fire burned more than 538,000 acres, making it the largest in Arizona history. Within the burn perimeter, 17 percent of the area

burned at a high severity, 18 percent at moderate severity, 45 percent at low severity and 20 percent of the area experienced little to no burn. Several of our collared bears had reduced movements during and immediately after the fire, and we had speculated that perhaps they'd found elk or deer carcasses to feed on over several days. Yet when we investigated some of these sites, we found ... nothing.

We captured six additional bears after the fire; five were in good body condition, and none showed any signs of injury from the wildfire. In the month and a half following full containment of the fire on July 8, 2011, the collared bears spent most



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we collared before the fire as well as in those caught and collared after the fire.

Road to Recovery

This is not the first time the effects of wild-fire on black bears have been investigated in Arizona. In 1996, the Lone Fire burned more than 61,000 acres of chaparral and ponderosa pine habitat on the Tonto National Forest. At the time, it was the largest wildfire in Arizona history. Game and Fish biologist Stan Cunningham was tasked with determining the influence of the fire on black bears in the area.

The area supported a relatively high density of bears, and the Lone Fire forced them primarily into unburned islands of scrub oak and manzanita. Although these areas contained adequate forage that allowed females to gain enough weight to produce cubs, none of the cubs survived their first year.

One cause of cub mortality during the first post-fire year may have been an increased encounter rate with other adult bears. Male bears kill cubs when

they can, causing their mother to become reproductively receptive more rapidly and allowing the male a breeding opportunity. Adult females have also been reported to kill and eat unrelated cubs. As the Lone Fire likely forced bears into rather close proximity in unburned habitat islands, cubs may have been easy targets for mature bears.

Because we knew the Wallow Fire might impact cub production and survival, over the winter we placed cameras at the dens of collared females to document cub production. Unfortunately, none of those females had offspring (new cubs or yearlings) with them when they emerged from their dens. After females left their dens, we moved the cameras to areas with likely bear activity and, although we got many photographs of bears, we were able to document only two females with cubs. Forest Service biologists monitoring spotted owls also observed one female with a cub, so while cub production appeared to be very low, bear reproduction did not fail completely immediately after the fire.

The low cub production may have been a result of reduced forage available after the fire. Although some collared females likely ate their weight in fall green-up vegetation, a diet of grasses may have been insufficient for pregnancy and reproduction. To gain weight so they can make it through the winter, black bears typically rely heavily on autumn-masting species

such as pinyon pine and oak for nuts with high fat content. Even though black bears breed in May and June, implantation of one or more fertilized eggs is delayed until the female has gained sufficient weight to support her own survival and produce offspring. When female bears cannot build an ample fat reserve for both survival and reproduction, the eggs are reabsorbed, and females save their energy for a better year.

Although reproduction appeared to be low following the Wallow Fire, the outlook is not all gloom and doom; nature is resilient and has a remarkable capacity to recover from seeming devastation. While some areas of the forest may never be the same, this summer, after very favorable precipitation, the forest vegetation began to recover. Ash deposited after the fire can improve soil conditions, and more sunlight reaches the forest floor, allowing a proliferation of grass, forbs, shrubs and trees to sprout, many of which provide food and cover for black bears.

This year, the bears that remained within the burn perimeter have shifted back to using less intensely burned areas that offer more substantial forage and cover than the higher-intensity burned areas. However, a number of bears have left the Wallow Fire burn perimeter, and two males have been found as far as 160 miles from where they were captured. Such extensive moves are not that uncommon, particularly for young dispersing male bears striking out on



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Researchers including co-authors Kirby Bristow (left) and Michelle Crabb (above and far left) continue to study how bears and their habitats are responding to the Wallow Fire. With post-fire vegetation recovering well, they hope normal cub production will resume in the next few years.

their own. Bears frequently move great distances in response to environmental conditions (other than fire) in search of resources such as food or mates.

With post-fire vegetation recovering, we are hopeful that black bears within the Wallow Fire perimeter will resume normal cub production in the coming years. We have captured evidence of one summer romance (i.e., bears breeding) at one

of our remote camera locations, so we are optimistic about the outcome this winter.

Full recovery of the forest will take many years, and as the vegetation changes, black bears will probably respond differently to each stage. We can be confident that black bears will continue to look for the best available forage, and sows will seek out those habitats where they can safely raise cubs. In the

end, although the short-term impacts of the fire seemed devastating, the bears were able to adapt and survive, and with the forest's continued recovery, their future looks good. 🐾

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