Creatures Of Habitat

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Animal life on the edge
Does it take a special breed?

Does it take a special breed to live on the edge? Or does living on the edge create a special breed? Small groups of animals who live on the outer limits of their species' range—such as Utah’s Mexican spotted owls, desert tortoises, and Gila monsters and Arizona’s peccaries—encounter a tougher environment than individuals of the same species who live in the optimal conditions of their core habitat. But far from being sideshows, these small populations that survive the challenging conditions on the fringe of their habitat make a critical contribution to the evolution and survival of their entire species, scientists say.

MEXICAN SPOTTED OWL
Utah’s Mexican spotted owls live on the edge—literally. These one-pound feathered hunting machines perch and pounce on woodrats and bats from the ledges of towering cliffs in southern Utah’s steep-walled canyons. On the edge figuratively, they live at the extreme northwestern fringe of Mexican spotted owl habitat, which stretches south from Utah’s Colorado Plateau to central Mexico.

In the sheer, narrow sandstone canyons of places such as Zion National Park and Canyonlands National Park, the Utah group of Mexican spotted owls meets especially challenging conditions. For example, they lack old-growth forests that spotted owls usually require for nesting. In addition, they must adjust to temperatures that are alternately scorching and freezing. Here
on the rugged northern border of the Colorado Plateau, Utah's isolated Mexican spotted owl population demonstrates an adaptability and hardiness that one day may prove crucial to preserving the declining spotted owl species as a whole, scientists say. Or this small population on the edge of its range may just wink out of existence.

AS A GROUP, OWLS have survived a long time, at least 38 million years. And among all birds of prey, they own the franchise on night hunting. Eagles and hawks use daylight and speed to nab prey, but owls have another strategy.

With oversized pupils in eyes that are surrounded by light-gathering feathered facial disks, an owl’s stereoscopic vision is three to four times better at night than human eyesight. But most people figure that. What’s less well known is that an owl’s facial disks also collect and direct sound into two large ear openings concealed on the disks’ periphery. This enables the owl to hear prey that’s quiet as a mouse. In addition, one of the owl’s ear openings is higher on the head than the other, allowing an owl to pinpoint the location of concealed prey by comparing the timing and intensity of faint sounds funneled into the offset ears. These facial disks allow an owl’s eyes and ears to work together. For this reason, their eyeballs don’t rotate in sockets; their entire head swivels three-quarters of a turn in either direction.

Camouflage is a tactic owls have perfected. Owls are difficult enough to spot behind chicken wire in a zoo, even when a nameplate tells you an owl’s in there. It’s no wonder that we seldom sight motionless, perched owls in the wild. An owl will roost on a tree branch near its trunk, and when it does, it blends perfectly with the tree bark and the shadows.

While eagles and hawks make a whooshing noise in flight, the owl’s ultra-soft feathers and broad, rounded wings are designed to muffle sound. Silent flight allows an owl to listen while cruising and to surprise its prey, which typically has keen hearing as well.

Spotted owls, one of 20 owl species in North America, are medium-size. A foot and a half tall, their plumage is dark brown with white spots on the

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<th>MEXICAN SPOTTED OWL</th>
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<td><strong>Status:</strong> State Threatened.</td>
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<tr>
<td><strong>Estimated Number Remaining:</strong> 2,200 throughout their range. Utah has 120 breeding sites.</td>
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<td><strong>Tips for Viewing:</strong> Dusk is the best time. Look in steep walled canyons, they may be roosting on tree branches.</td>
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head and shoulder and a lighter brown breast and belly. The facial disks are light brown and the eyes are black. Though a spotted owl has a wingspan of three-and-one-half feet, with wings folded it will fit into a shoebox.

Mexican spotted owls, like the ones living in southern Utah, are one of three subspecies of spotted owl. The California spotted owl is considered uncommon, while the northern spotted owl of Oregon and Washington is rare. The northern spotted owl got lots of ink a few years back when it was listed by the federal government as threatened. In the Northwest, spotted owls prefer to live in the multi-layered canopy of mature—old-growth—forests but will live in a younger forest if it has dense canopy and protected nest areas. Preserving these increasingly rare woodlands for spotted owls clashes with loggers’ desire to continue cutting them for timber.

A lighter color and more spotty than the other two kinds of spotted owls, Mexican spotted owls range from southern Colorado and Utah through New Mexico, west Texas, and Arizona and into central Mexico. They are the only spotted owls that live in Utah.

Here on the northwestern edge of the Colorado Plateau, Mexican spotted owls live in narrow sandstone canyons. “In Utah, Mexican spotted owls are canyon specialists,” says Frank Howe, Utah Division of Wildlife Resources (DWR) non-game avian coordinator. “In other places they are mature forest specialists.”

The caves and cavities in cliffs they inhabit keep daytime temperatures cool for the birds. Dr. David Willey, a professor of biology at the University of Alaska-Fairbanks who has studied owls on the Colorado Plateau since 1988, says he believes the “steep-walled canyons provide them with protection from heat, from predators, and act as a nursery for the young.” Woodrats, the Mexican spotted owl’s favorite meal, also live in the canyons, as do bats, which the owls snatch in midflight, according to Willey. “Bats make up about 9 percent of their diet.”

In difficult years when their prey is scarce, Mexican spotted owls can forego breeding. “They are a long-lived species,” notes Howe, “so they can afford to hold off raising young when necessary.”
Spotted owl pairs mate for life and begin to breed at two to three years old. The female incubates a clutch of two or three eggs while the male delivers food to the nest. The female is larger than the male, “maybe to keep her mate in line or to protect the nest from predators,” speculates Willey. The eggs hatch in May. Young owls can fly, weakly, at about six weeks and can capture insects at about ten weeks. Juveniles hang out with their parents until late summer or fall, then they split to find their own territories and mates.

That first year is risky for young Mexican spotted owls. “We’ve recorded 90 percent mortality in juveniles,” reports Willey. Juveniles usually die from starvation and predation, which go hand-in-hand. “Lack of food makes them weak and more susceptible to disease and predators, such as great horned owls, golden eagles, and red tail hawks.”

Utah has about 120 Mexican spotted owl breeding sites. In their entire range, the Mexican spotted owl population is estimated at approximately 2,200 and they appear to be declining at a rate of 7 percent per year. They are federally listed as a threatened species. (A threatened species is one that soon is likely to become endangered. A species listed as endangered is considered in danger of extinction in all of, or in a significant portion of, its range).

To survive over time, scientists believe an animal species like the spotted owl needs to maintain a diverse gene pool. This allows the species the potential to weather natural disasters, such as a virus that wipes out all genetically similar birds, or an unnatural disaster, such as loss of suitable nesting sites to logging in old-growth forests. Small subpopulations, like the northern Colorado Plateau’s Mexican spotted owls, that adapt and reproduce despite the intense conditions on the edge of their habitat range represent a robust genetic mix for the spotted owl species as a whole.

At the same time, these “small subpopulations on the periphery of their habitat can wink right out,” Willey says. All animal populations fluctuate in size from year to year in response to favorable or unfavorable conditions. Small groups can disappear quickly because for them, a population of zero is not far away.

“It’s this loss of genetic signal that we need to avoid,” Willey notes. “Otherwise, just by chance, as the population declines, we might end up with a group of owls that’s not very adaptable to coming changes. For example, maybe we’d end up with a variety of Mexican spotted owls that can’t handle extreme heat or cold.”
In that sense, Utah’s small group of Mexican spotted owls is not just a sideshow in a larger conservation problem, Willey says. “Given trends like global warming and the current conversion of habitat to more open, hot environments,” Utah’s Mexican spotted owl population may prove key to the long-term adaptation and survival of the spotted owl species as a whole.

**DESERT TORTOISE**

To survive in southwestern Utah’s Mojave Desert, it helps if you look like a rock, store water like a camel, and tunnel like a gopher. In addition, if your cruising speed in open country is three hours per mile, you need armor, like a knight.

The desert tortoise—Utah’s only native turtle—has all these qualities. As a reptile, it belongs to the order of backboned animals that first adapted to arid turf hundreds of millions of years ago. The turtle’s hard-shelled design is so successful that it remains nearly unchanged since the dinosaur era. Nature, however, did not prepare these armored reptiles to live in contemporary southern Utah’s golf courses, strip malls, and subdivisions—or to survive infections carried by abandoned pet turtles.

WITH SOLEMN, AMBER EYES, leathery neck, and a plodding gait, the desert tortoise is easily recognized as a member of the turtle family. An adult desert tortoise is more than a foot long and weighs in at fifteen pounds. Its oblong black-to-tan shell serves as part of its bone structure; spine and ribs are fused to it. The tortoise has four stout legs and the hind two are shaped like shovels.

It’s these built-in trowels that allow the desert tortoise to thrive despite the Mojave’s wild temperature swings. Here, the mercury soars to 115 degrees in summer, then plunges to freezing in winter. Because turtles have no internal mechanism for controlling their body temperature, you’d think they would never survive in such a place. Just a few feet underground, however, the temperature...
of the Earth remains around 55 degrees year-round, varying only by a few degrees. Desert tortoises take advantage of this and dig burrows in which to hole-up when the temperatures are extreme. In the winter they hibernate in tunnels that may be thirty feet deep, while in summer they shelter in shallower dens.

The Mojave sunlight is scorching and rain is scarce, so the desert tortoise is a water miser. Its skin and shell are waterproof and won't dry out easily. The tortoise’s bladder is a reservoir in which it can store and reclaim water for months. It depends on the grass and plants it eats for most of its water but will tank up on standing water when available, increasing its weight by 40 percent in the process. In addition, desert tortoises sometimes collect rainwater by digging shallow, pan-like depressions in the ground.

Like humans, desert tortoises have a life expectancy of about 80 years; but they don’t reach sexual maturity until their late teens. Courtship begins in spring for these reptiles. An amorous male will stick out its neck and bob his head up and down or will even bite or ram a female to get her attention.
A female, once her eggs are fertilized, digs a shallow nest and buries a clutch of about a half-dozen eggs. In the late summer or fall, tortoise hatchlings dig themselves out. About the size of a silver dollar, the hatchlings’ color and shape make them nearly invisible among the desert stones. But because it takes seven years for their shells to harden, young tortoises are nearly defenseless against ravens and other predators; only about three in a hundred make it to maturity.

If lucky enough to survive, the armored shell serves an adult desert tortoise well. When caught in the open by a predator, it will retract its head and fold in its legs, making it difficult for an animal to maim or kill it. “A mountain lion is the only predator that can crack an adult’s shell,” says Ann McLuckie, a wildlife biologist with Utah’s Division of Wildlife Resources who studies desert tortoises. A coyote can only gnaw off a tortoise’s limb if it can fasten onto it, she notes. Once in its burrow, a desert tortoise can brace itself with its legs and resist mighty attempts to remove it.

More than a match for predators, the desert tortoise has been successful in the Mojave. The first white settlers in the area estimated there were a thousand desert tortoises per square mile. Today, in many areas of their range—western Arizona, southern Nevada, southeastern California, as well as southwestern Utah—there are fewer than 25 per square mile. A century of overgrazing, road building, and water diversion projects in the Mojave have taken a toll.

Worse, a killer upper respiratory infection has spread from desert tortoises first captured as pets and then released into the wild. “When Californians have a captive tortoise that’s sick, they release it into the wild where they think it will heal itself in nature—or some such pipe-dream,” says Jerry Freilich, an ecologist who studied desert tortoises at Joshua Tree National Park for six years. “What happens is that the disease is spread into wild populations.” At remote Joshua Tree he saw only a few infected tortoises, but close to population centers sick tortoises are numerous, he points out.

The upper respiratory infection is associated with major tortoise declines in California, McLuckie reports. In Utah, the disease symptoms
have been observed in desert tortoises, but the number infected is not yet known. The main threat to Utah’s desert tortoises is that they’re sharing their home with one of the fastest growing human populations in the United States. Washington County’s golf courses, subdivisions, and strip malls are transforming the Mojave in ways to which the desert tortoise cannot adapt.

Because of alarming population declines, Utah’s desert tortoise is listed as an endangered species. A habitat conservation plan in Washington County did spare 60,000 acres for a desert tortoise refuge. However, the human population growth is unrelenting here. In 1980 there were 26,000 people in the county and by 1990 the population nearly doubled; it is expected to hit 125,000 by 2010.

We can take the health of desert tortoise populations as an indicator of the well-being of the entire Mojave Desert, Freilich says. “Desert tortoises respond badly to all those things that also decline with human impacts. They don’t like to be shot at with guns. They do poorly when run over . . .
Parking lots and city sprawl have bad effects on them . . . But they’re not so rare that they’re completely gone. Maybe we can attract human attention to their plight before it’s too late.”

**GILA MONSTER**

It has an armored hide like a dinosaur. It has venom like a rattlesnake. It has a bite like a pit bull. And it can thrive on just a few meals each year. The Gila monster is overequipped for desert survival. It’s no wonder this unique reptile—the largest lizard in the U.S.—has been flicking its forked tongue into the North American breeze since the age of dinosaurs.

Gila monsters are native to southwestern Utah and to the Arizona, southern Nevada, and northern Mexico deserts. Though well known in Western folklore, few hikers see Gila monsters in the wild today. In past decades they were overcollected for exotic pets, and now, roads, subdivisions, and strip malls are taming large parts of their harsh desert turf. Experts say Gila monsters may be the next unlucky candidate for the federal endangered species list.

“Last year we saw five Gila monsters while traveling back and forth over about 180 square miles of desert” recalls wildlife biologist McLuckie. At the time, McLuckie and her crew were traversing Washington County’s Mojave counting desert tortoises. “Some of the Gila monsters were walking in washes, a few were digging at burrows,” she says.

If you’re lucky enough to see a Gila monster, you’ll know what it is instantly. No other creature looks like a Halloween-colored sausage that’s sprouted legs. Typically one-and-a-half feet long and weighing one-and-a-half to two pounds, a Gila monster has a heavy flattened head, elongated body, and stubby legs bristling with five, clawed toes. Its normally plump tail is half as long as its body. A Gila monster’s color scheme is bright, like a highway construction warning sign—black stripes and marbling over an orange background that may sometimes appear yellow or salmon pink.
The colorful hide looks beaded, or pebbled. It’s actually armor in a form that was common on dinosaurs but which today is only found on the Gila monster and its cousin, the Mexican beaded lizard. This skin is made of tightly woven scales, each of which encloses a particle of rounded bone. The protective covering is woven so tightly that only the sharpest, strongest teeth can puncture it.

Despite this eye-catching coat of armor, Gila monsters are seldom seen. They have keen hearing and the ability to detect subtle ground vibrations, so it’s nearly impossible to sneak up on them. In addition, their lifestyle is reclusive. When scientists put radio collars on Gila monsters in the 1970s, they discovered Gila monsters spend 95 percent of their time dormant, underground.

A Gila monster may be active only two weeks in a year, coming out in the spring to eat and to mate, then emerging irregularly after that. “All of our Gila monsters sightings last year were in May and early June,” McLuckie says. It’s no coincidence that spring is when their normal prey—juvenile rodents, small birds, and eggs—are most abundant.

In spring, a Gila monster hunts for food and for a mate by working washes and rocky slopes, “tasting” the air with frequent flicks of its forked
tongue. Each fork of the tongue gathers separate chemical cues, creating a kind of stereo receiver arrangement. This helps a Gila monster lock in the location of odors. When it reaches a prey’s nest, it digs into it with powerful claws.

As a cold-blooded creature with a low metabolism, a Gila monster requires many fewer calories than a warm-blooded animal of comparable size. And when a Gila monster eats, it gorges, consuming up to half its body weight in a single feast. One expert estimates that the eggs from three Gamble’s quail nests provide all the food an adult Gila monster needs for a year. It stores extra calories as fat in its tail, so a chubby tail on a Gila monster means it is well fed, a skinny derriere means it’s starving.

A healthy booty full of fat is important to both male and female Gila monsters in spring. Females must store enough food to produce eggs. Males need the calories to tussle with other males for mating privileges. These brawls are brutal, World Wrestling Federation Smackdown-like endurance contests that include everything but hurling folding chairs at each other: lateral head shoves, head bites, body rolls, and tail thrashes. They finish with a dorsal straddle of the inferior male by the winner. But afterwards, the males are all sweetness with the females, stroking them with tongue caresses, chin rubbing, and nose nudging. Female Gila monsters deliver a clutch of five to six leathery eggs that, when hatched, look like small adults, complete with choppers and venom.

Gila monsters are not aggressive toward humans. An individual will try to retreat from an encounter, and if it can’t, it will hiss and may lunge at its tormentor. A Gila monster’s backup defensive weapon is a bite that probably won’t kill you but will make you wish you were dead. Its curved teeth are quarter-inch daggers with grooves running from base to point. The creases in each tooth help channel a toxin—which is created by modified spit glands—into puncture wounds. A Gila monster will bite and clamp down like a bulldog, grinding its powerful jaws to chew the venom into its victim.
The effect is stunning. “I worked with a herpetologist who was showing a live Gila monster’s teeth during a demonstration,” McLuckie remembers. “He was distracted and the Gila monster clamped down on his finger and held on. He said it was the worst pain he’d ever felt. In order to pry the Gila monster’s jaws loose, he kept asking for a pencil, but it took a while for the audience to understand this bite wasn’t part of the show. He said the pain was so bad that he passed out.”

A Gila monster’s venom inflicts immediate, severe pain and causes its victim’s blood pressure to drop. Still, it’s rarely fatal to anything as large as a cat, and it is considered a milder toxin than a rattlesnake’s venom, a scorpion’s sting, or a black widow spider’s bite. But venom is an unusual weapon for a lizard. Of more than 3,000 species of lizards in the world, only two are poisonous: the Gila monster and the Mexican beaded lizard. These two are the only known creatures—living or extinct—with both venom and grooved teeth as a toxin delivery system.

A powerful digger, the Gila monster excavates its own winter den site by enlarging crevices under rocks. In summer, it may use the shaded shelter of a desert tortoise burrow or a pack rat nest as a motel in which to rest and cool down. No one knows how long a typical Gila monster lives in the wild. In captivity, they have lived to be 27. Natural mortality for them may be low. Being at the top of the food chain, adult Gila monsters appear to have no primary predator. Badgers and desert tortoises have been observed driving prowling Gila monsters away from their nests, McLuckie says, but not eating them.

However, road kill and overcollecting of Gila monsters for exotic pets in the 1950s, ’60s, and ’70s reduced the population. In many places where they were regularly spotted in the 1960s, they were rarely seen by 1975. State laws were passed to protect them. In 1985, the estimated population of Gila monsters in Utah was between 450 and 800, McLuckie reports. “No current estimates of their population exist. We don’t know if their numbers have increased or decreased.”

Scientists are interested in using Gila monster venom as a new blood pressure drug or perhaps as a diabetes medication. However, the venom is so rare that one round of experiments uses up the entire U.S. supply, according to a recent New York Times article.
Habitat loss hits Gila monsters especially hard. Recent research shows that individuals need their hereditary home base and won’t survive transplant of more than a half mile. Utah’s Gila monsters benefit from the recent Desert Tortoise Habitat Conservation Plan agreed upon in Washington County. They live in the same range as Utah’s only native turtle, so by protecting tortoises, the Gila monster gets a break too.

Still, notes McLuckie, “People in our Division of Wildlife Resources office are concerned about Gila monsters. We think they may be the next endangered species listed by the federal government.”

PECCARY
She busted in like a Hell’s Angel at a Sunday picnic. I’d been wandering in the utter silence of southern Arizona’s Sonoran desert when a nearby palo verde bush erupted. With a grunt and the papery rustle of leaves, a hairy, pig-like animal the size of a pit bull stalked into my path.

I had trespassed on a javalina’s turf. And while I didn’t argue territory with her then, I can point out now that the northern Sonora desert hasn’t been home to her kind for all that long. Although there are about 50,000 javalinas—more correctly called collared peccaries—in the southwestern U.S. today, archaeologists say no peccary bones show up in digs in the area earlier than the 1700s. The first report of peccaries in what is now the southwestern United States came from trappers in the early 1800s.

Peccaries are a tropical species of animal whose core population inhabits South America and Mexico. Southern Arizona’s collared peccaries—like the one I met—arrived here after migrating north for generations along river bottoms. These individuals are pioneering life for their kind on the extreme northern fringe of their range—Arizona, New Mexico, Texas. For any creature, life on the edge of its habitat is especially challenging. A peccary for example, unlike a desert-adapted mammal, can neither store water nor recycle it; the cactus in its diet can give it kidney disease; and, because it’s tropically adapted, it has no underfur or fat.

**PECCARY**

**Status:** Abundant.

**Estimated Number:**
Approximately 50,000 in southwestern U.S.

**Tips for Viewing:** Walk up Sonoran washes any time of year.
Cabeza Prieta National Wildlife Refuge, Arizona, peccary habitat.
layer to keep it warm on frosty winter nights in a desert where dry air allows temps to drop to freezing.

ALTHOUGH PECCARIES LOOK AND ACT much like pigs, they are a distant relation. Pigs are native to Europe and Asia, brought here as domestic livestock. Peccaries are the only pig-like species naturally occurring in North or South America.

A peccary has tiny ears and weak eyes set in an oversized wedge-shaped head. Its disk-shaped snout is both strong and very sensitive—it can lift logs as well as sniff out roots several inches underground. Its mouth has two tusk-like canine teeth useful for self-defense and for cutting roots. Its rump is small and terminates in a short tail. Collared peccaries—the ones commonly called javalinas—have long bristly charcoal fur, stand over a foot and a half high, are three feet long and may weigh up to 60 pounds. The “collar” is a pale stripe of fur that rings its shoulders.

Peccaries are the only wild, hoofed mammal of the Western Hemisphere with a year-round breeding season; consequently litters—usually pairs—may be born any time of year. Pregnancy is five months long and young reach sexual maturity in less than a year. Peccaries live in parties of up to two dozen individuals with a strict pecking order, and they practice group self-defense. They don’t appear to be built for speed, but can sprint 20 miles per hour for short distances.

Though there are no documented cases of a collared peccary injuring a human, they do have a reputation for being ornery. Encounters between peccaries and untrained dogs usually end in a dead or crippled pooch; however, in fights with dogs, peccaries are not the aggressors. In the wild, peccaries are known to chase off bobcats and coyotes, their primary predators other than humans.

Peccaries aren’t adapted to endure many days without drinking water. They drink from cattle tanks and springs, but when it gets dry in the northern Sonora desert, they pass up their preferred food—acorns, palo verde beans, and roots—to eat mostly prickly pear cactus for its high water
Peccary, also known as javalina.
content. However, this prickly pear diet is low in nutrients and high in an acid that can cause them kidney disease.

Because they are tropical animals, collared peccaries have no built-in insulation to keep them warm during the chilly Sonoran winters. So, they change their behavior to adapt. Rather than nap during the day, which is their natural schedule in their core tropical habitat, collared peccaries in Arizona forage during the warmth of the day in the winter. At night, they huddle together for warmth. Still, on this northern end of their habitat, peccaries sometimes die of lung infections brought on from the stress of enduring cold temperatures.

These extreme conditions that peripheral populations of javalinas encounter—those that may cause kidney disease and lung infections in individuals—are what biologists call “intense selection pressures.” Individuals who don’t survive the challenge don’t pass on their genes as frequently as those who do. It’s evolution speeded up. “On the periphery of their habitat, individuals of a species encounter challenging conditions. Because their gene flow is often somewhat isolated (little mating with members of the core population), evolution may occur faster here,” notes Eric A. Rickart, curator of mammals for the Utah Natural History Museum. A core population of a species lives in optimal conditions, and the sheer number of individuals dilutes their genetic differences, Rickart says. A group on the edge that has a different gene pool may evolve over time into a whole new species if it becomes completely isolated. But the evidence is theoretical, he adds.

As the only individuals left alive when a massive epidemic occurs in the main population, groups on the edge are vital to the survival of a species, points out Bob Walters, Watchable Wildlife coordinator for the Utah Division of Wildlife Resources. This recently happened when tens of thousands of eared grebes died of cholera on the Great Salt Lake. The surviving fringe populations of eared grebes “now become especially important for repopulating after this die-off,” he observes.

Global warming, which promises to shift the habitat range of all plants and animals, may make the diverse gene pools that edge populations contribute even more important to the long-term survival of each species. Unless we preserve the diversity that these groups living on the edge of their habitat bring to their own species, we may cause, if not the end of that species, perhaps a major limitation on the way it can evolve and survive.
Burrowing owl.