

**Cheilinus
undulatus**

Humphead Wrasse

Cheilinus undulatus • Endangered

Humphead wrasse are big, colorful fish that inhabit the warm shallow waters of the coral reefs of the Indian and Pacific Ocean. They can live for 30 years, grow to 2 meters in length, and weigh as much as a motorcycle. The showiest individuals are painted in luxurious hues of blue, green, and purple. Mature males have the hump. This emblem of sexual provocation extends above the eyes of the fish, like the Phrygian cap that symbolized the revolutionary spirit in France. Female fish can transform themselves into males, making the switch after a decade of laying eggs. Humphead wrasse swim alone or in small groups and congregate for spawning. They feed on clams and sea urchins, exposing their brainless and backboneless prey from the soft sand by spitting jets of water from their big, supermodel lips, and crunching the shells with special teeth in their throats. They swallow crustaceans too and small fish, enjoying the rich sushi bar presented by a productive reef. Wrasse lose their lives, in turn, to spear-fishers and people so desperate for food and cash that they spoil their local waters with explosives and cyanide. Protections are widespread.

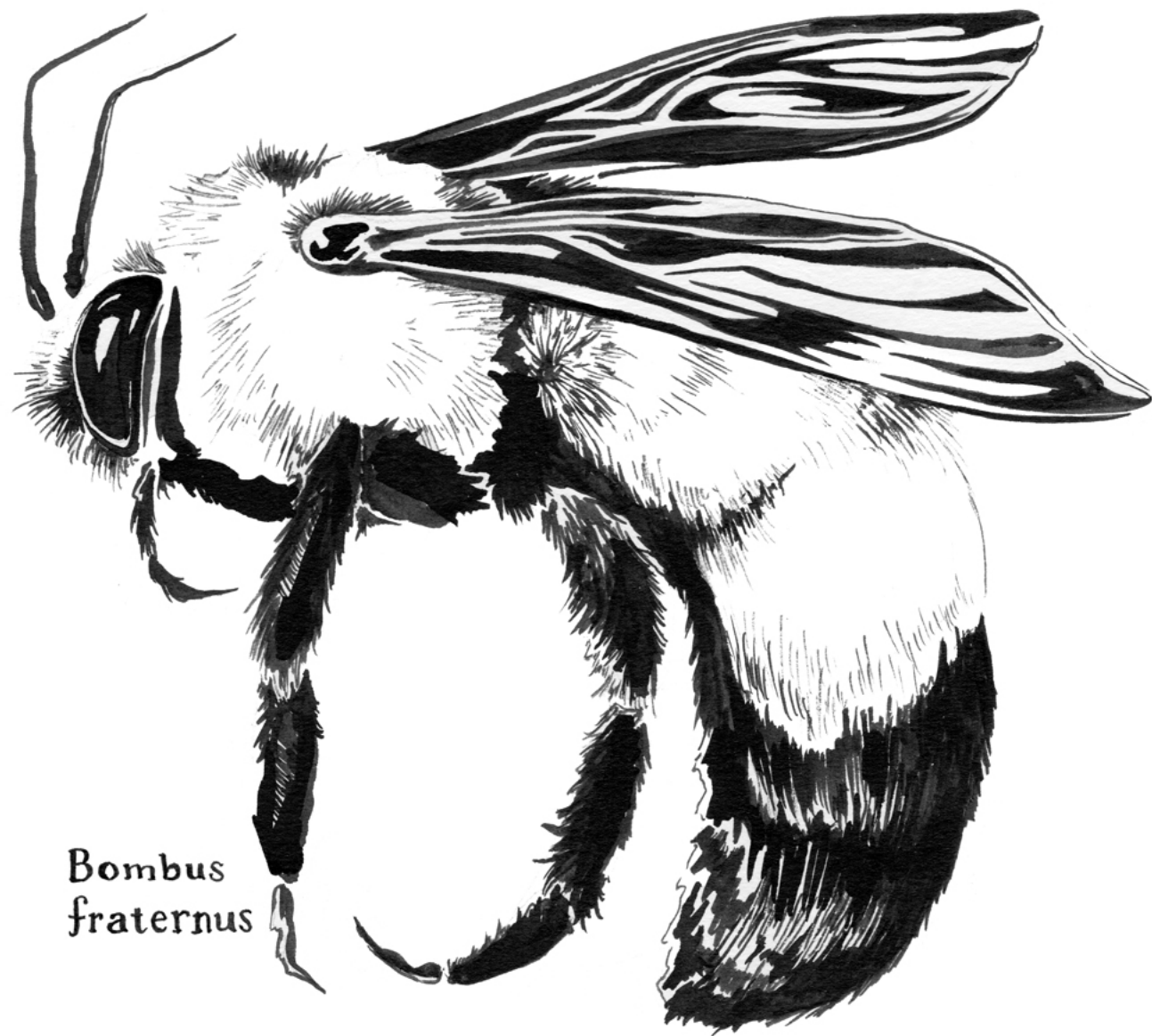


**Encephalartos
woodii**

Wood's Cycad

Encephalartos woodii • Extinct in the Wild

When this South African native was discovered in the 1890s it was so close to extinction that its disappearance from the wild was inevitable. Collecting plants in the Ngoya Forest, botanist John Medley Wood found a single plant with four roughened stems. This was the sole representation of the species. Cycads look a bit like palm trees, but belong to an ancient group of plants that served as food for dinosaurs long before there were any flowers. Palms have bunches of flowers that cascade from their crowns and produce coconuts and dates; cycads have enormous cones that shed their naked seeds like pine trees. *Encephalartos woodii* is a big cycad with a stem that can grow 6 meters in height. Before its decline and fall, the cycad grew as separate male and female plants. Other cycads do too. The clump of stems in the Ngoya Forest sprouted from an individual male plant. No female of this species has ever been found. Without the opposite sex, no cycad babies can be born. Cuttings from the relic in South Africa are grown in botanical gardens, but Wood's cycad is extinct in the wild. The males produce masses of pollen. When the grains used to reach female cones they would germinate to form pollen tubes and release the most astonishing sperm cells. Cycad sperm are decorated with belts of thousands of beating cilia that power the cells like outboard motors. Sperm of Wood's cycad has no place to swim now. The reason for the extinction of this species is not known. The discovery of the last wild plant was the botanical equivalent of finding a lonely pterodactyl, chattering on a tree limb, spreading its leathery wings in the sun. It was, at once, astonishingly unlikely, exciting, and tragic. Relatives of Wood's cycad are threatened by illegal poaching supported by wealthy patrons obsessed with rare plants, who collect them like baseball cards.

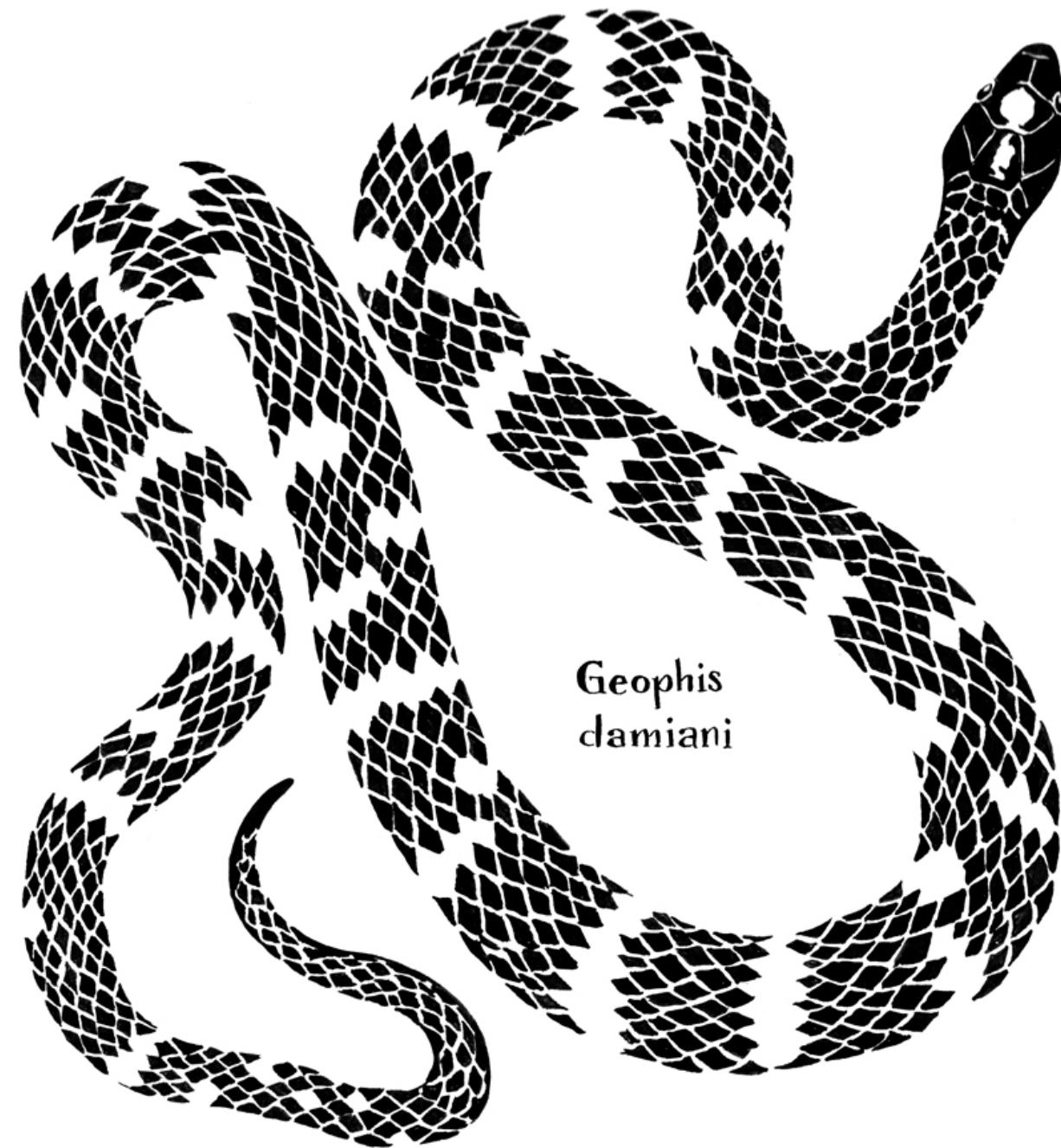


**Bombus
fraternus**

Southern Plains Bumblebee

Bombus fraternus • Endangered

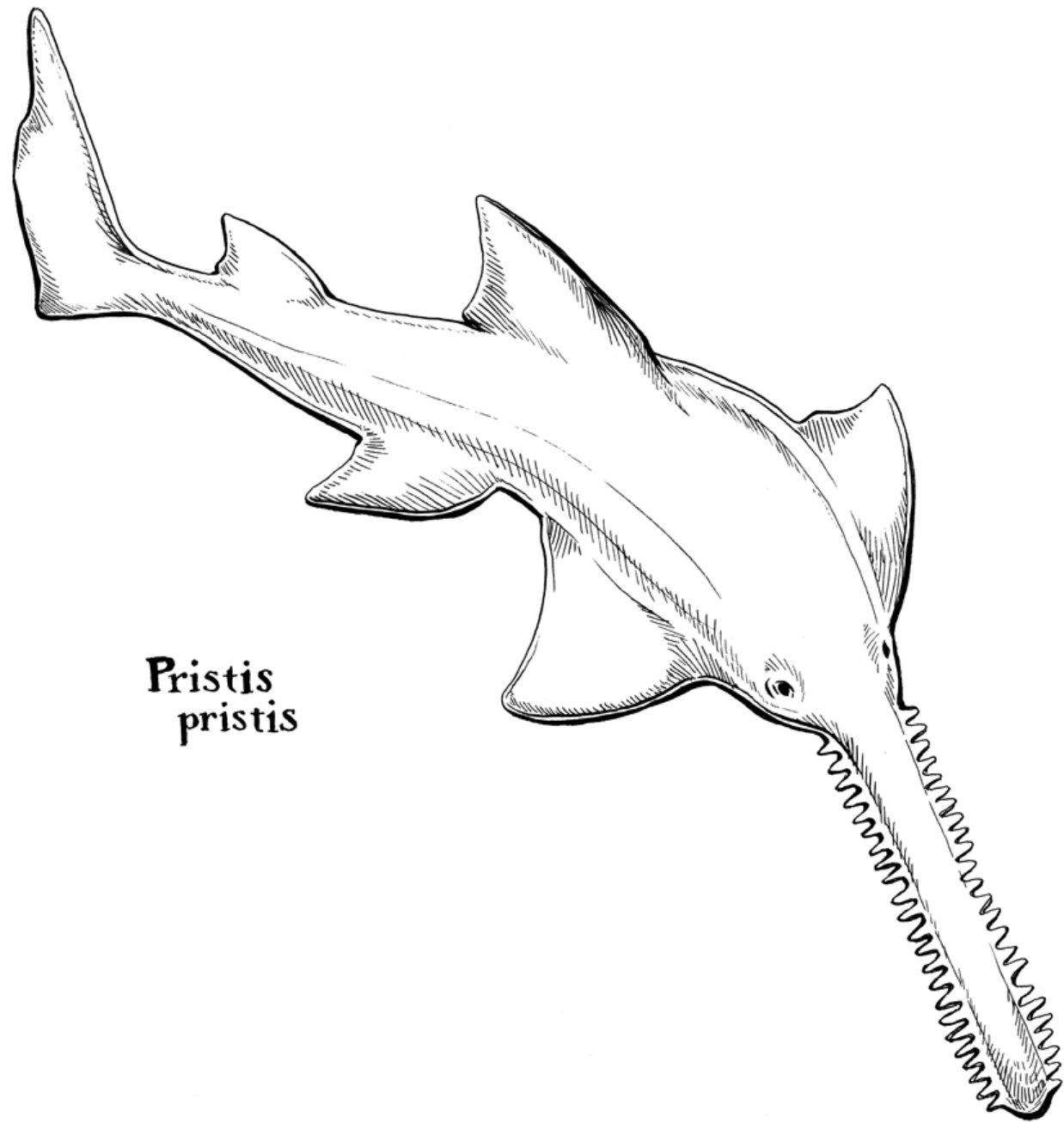
This millennium is a poor one in which to be born a bumblebee. Bumblebees have thrived as pollinators for tens of millions of years, but are confronted by the Grim Reaper in the form of modern agriculture. The punishing effects of farming range from the wholesale clearance of grasslands for cereal cultivation, poisoning by insecticides, and infection with diseases spread by commercial bees imported by fruit growers. The threat posed by commercial bees is ironic because these alien insects are recruited to fill the gap left by the disappearance of wild pollinators. The Southern Plains bumblebee is in a great deal of trouble, declining across its vast range in North America. Related bees with more restricted territories are in even greater jeopardy, crossing from endangered into the last-hope category of the critically endangered. Bumblebees are magnificent fliers, beating their wings 200 times per second and maintaining steady speed in turbulent air by going with the flow, rolling in the breeze rather than fighting it. An apocryphal story about bumblebees suggested that scientists had judged their flight an aerodynamic impossibility. This is not true. Bumblebees do not create lift like airplane wings, but sweep their wings backwards and forwards, twisting them at the completion of each cycle, creating eddies that reduce air pressure like miniature hurricanes to lift their fat bodies into the air. Bumblebees use their flight muscles in a different way when they visit flowers, producing vibrations to shake the pollen-bearing anthers that empty like pepperpots. *Bombus fraternus* is an unusual bumblebee because its hairs lie flat rather than fuzzily.



Texíguat Earth Snake

Geophis damiani • Critically Endangered

Described as a cryptozoic or hidden animal, because it conceals itself under leaves or fallen tree trunks, this earth snake is known from a single place in Honduras. Its home is the Texíguat Wildlife Refuge, a scrap of cloud forest attracting so little protection that the herpetologists who discovered the snake in 1998 anticipated, “that habitat destruction . . . will continue until it is complete.” Only four specimens of the snake have been found: two males, one female, and one embryo in an egg. The adult animals were killed by the investigators to facilitate the customary description and Latin naming of the species, and their deposition in the National Museum of Natural History in Washington, DC. No live snakes are in captivity, which means that the reptile will disappear with its refuge. Assuming that a few of these snakes continue to slither beneath logs in Honduras, they do so with heartbreaking beauty. This earth snake is thin as a pencil and twice as long, decorated with flame scarlet bands and splotches on a background of lustrous dark grey scales. It would feel silky in your hands and look prettier than any piece of jewelry. A new species of venomous pit viper was also discovered in the Texíguat Wildlife Refuge in 2010. It was named *Bothreichis guifarroi*, after an environmental activist, Don Mario Guifarro, who was assassinated during an expedition to document illegal logging. There are 8 million people in Honduras today, four times as many as there were in 1960.

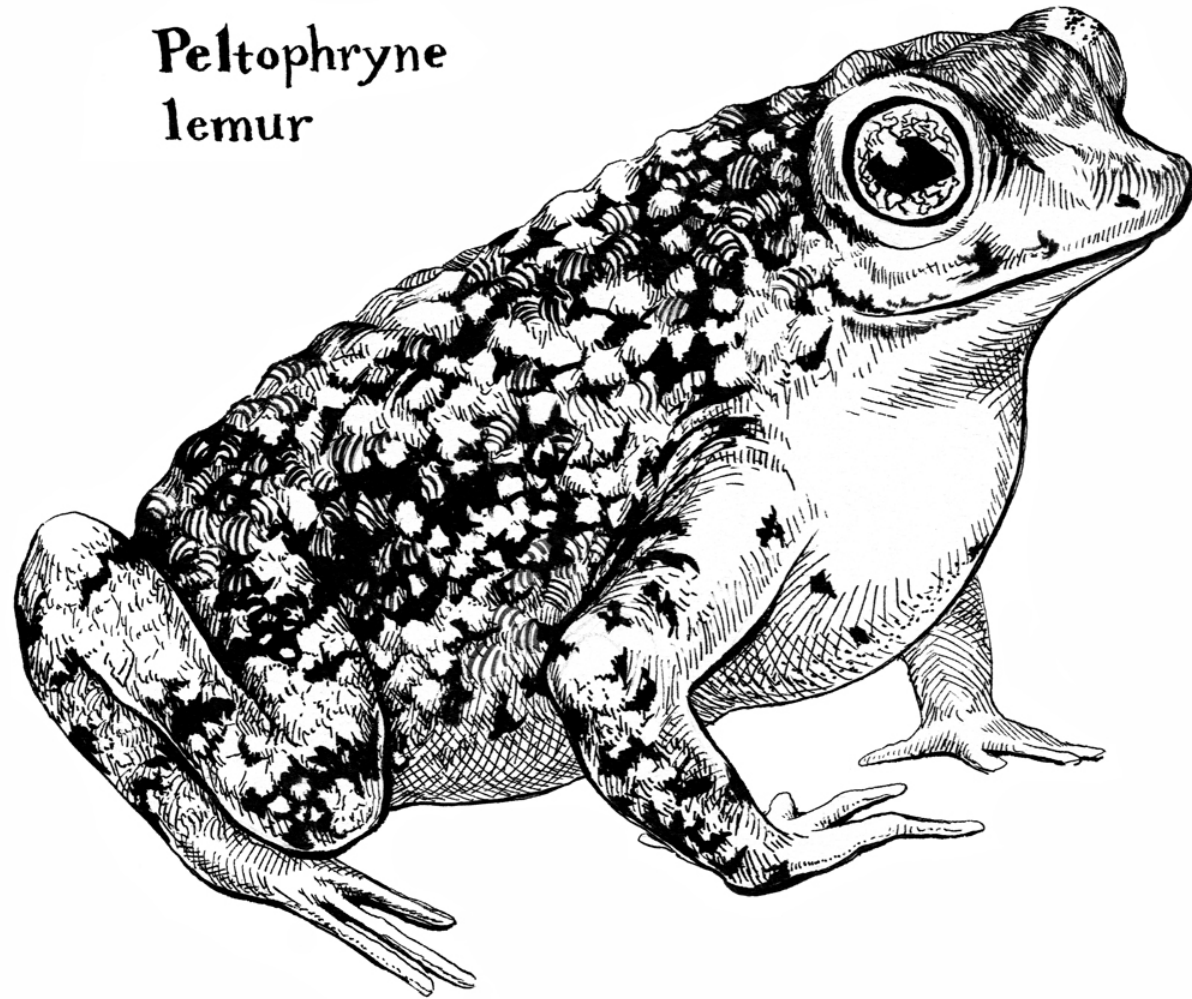


Common Sawfish

Pristis pristis • Critically Endangered

The English name of this cartilaginous fish is an anachronism that reflects its worldwide distribution before the era of global vandalism, also known, in a more soothing tone, as the Anthropocene. It would be more apt to refer to the once common sawfish. *Pristis pristis* loves the shallow water around mangroves at the mouths of rivers, and migrates inland in search of food. The once common sawfish is one of the few relatives of sharks that can thrive in freshwater. With damage to rivers from hydroelectric dams, pollution, and overfishing, this species has lost a lot of its territory and is extinct across much of its historical range. Fishermen have added to the problems for this big fish, whose toothed snout or rostrum gets entangled in nets too easily. Adversent fishing is fostered by the Asian market for shark fin soup and traditional medicines. Trophy collectors who prize the rostrum as a dried fetish make things worse for the species. What evolved 70 million years ago as a hunting tool, has become the downfall for this fish. The saw is packed with sensors that detect electrical fields, allowing the animal to detect its prey in murky water. Sawfish can cut smaller fish in two with a sideslash of their weapons. The largest specimens grow to 6 meters and weigh 600 kilograms. (This mass was matched by the world's largest living man, a citizen of Saudi Arabia, who was airlifted to hospital in 2013 before he lost 150 kilograms.) Once common sawfish are ovoviviparous, which means that their eggs hatch inside the mother. They give birth to seven or more pups, perfect baby sawfish whose teeth have not emerged from their snouts, which protects the mother from being ripped apart as she gives birth. Sawfish belong to the group of fish called batoids, or rays, and have the same flat underside perforated with nostrils, mouth, and gill slits. They can live for 80 years. Despite protections, few do.

Peltophryne lemur



Puerto Rican Crested Toad

Peltophryne lemur • Critically Endangered

Toads related to this species are spread across the Caribbean islands of Cuba, Hispaniola, and Puerto Rico. The complex geological history of this region involved the separation of these islands of the Greater Antilles 14-16 million years ago. With island formation came the classic opportunity for the evolution of distinctive species from a common ancestor. Twelve kinds of *Peltophryne* toads have been described since the 1830s. Ten of these appear on the IUCN Red List, with classifications ranging from vulnerable to critically endangered. The only wild population of the Puerto Rican crested toad is crammed into an area of 10 square kilometers of rocky ground in a dry forest reserve on the south coast. *Peltophryne lemur* hides from the sun in limestone crevices, venturing from its sanctuaries after sunset. The Latin name *lemur* means ghost, describing the nocturnal behavior of this amphibian. One is more likely to see a ghost than this fist-sized warty animal with bony ridges on the top of its skull and an upturned snout like Walt Disney's Tinkerbell. Humans have worked very hard to make this species disappear, by clearing forest and draining the seasonal pools where it breeds. None of this has been driven by malevolence toward toads. The unconscious extirpation of other species is the price of doing business, of being human. There is some good news in the story of the crested toad. A captive breeding program has allowed Puerto Ricans to reintroduce this species in a few locations and adult frogs have been returning to the pools where they swam as tadpoles.

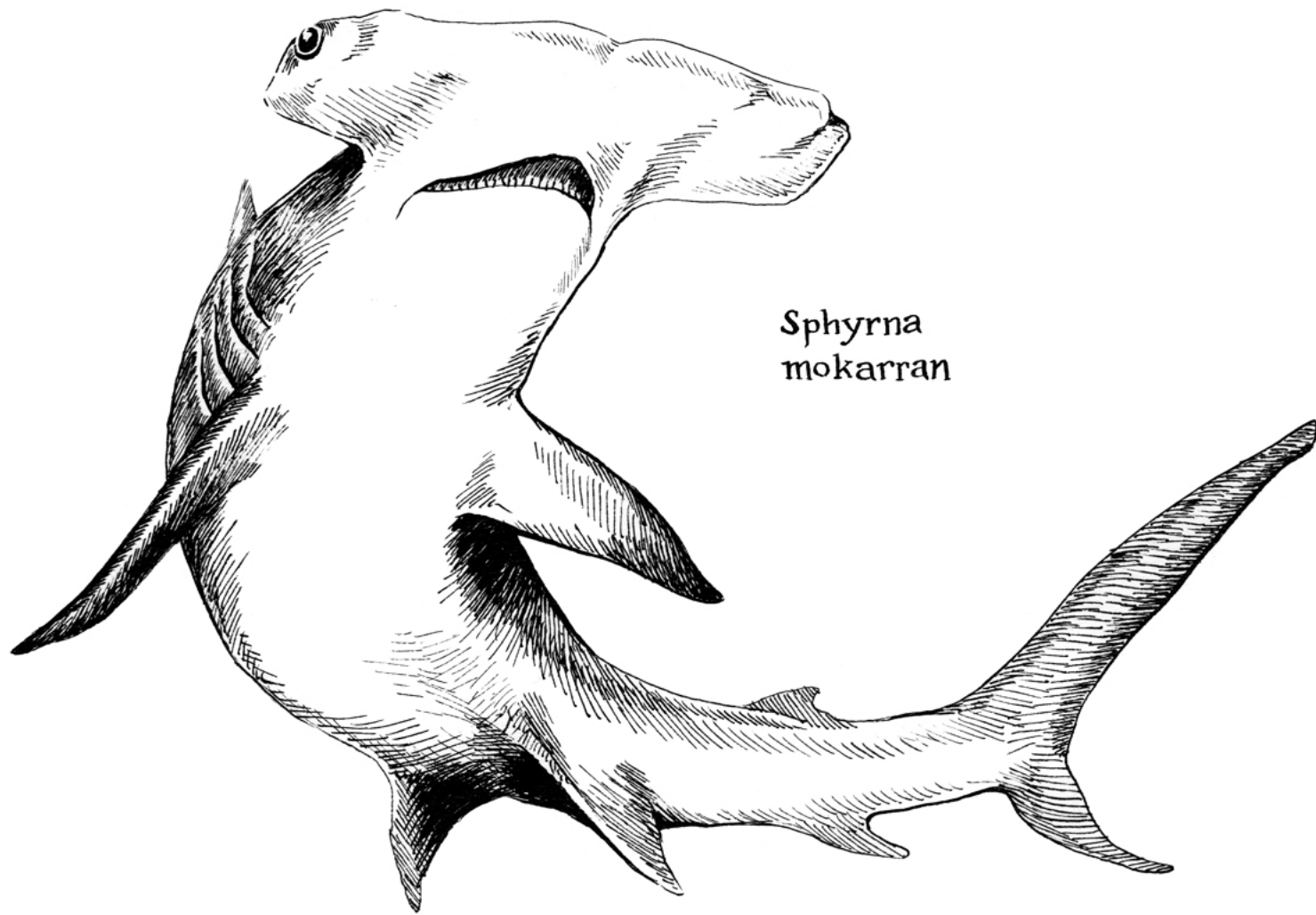
**Zaglossus
bartoni**



Eastern Long-beaked Echidna

Zaglossus bartoni • Critically Endangered

Four species of echidna, or spiny anteater, and a single species of platypus are the only mammals that lay eggs. The eastern long-beaked echidna is a native of New Guinea, where it survives on a forested peninsula in the eastern half of the island, which is the Independent State of Papua New Guinea. A second, smaller population may remain on the other side of the island, which is the Indonesian territory of Western New Guinea. Adult echidnas are the size of large house cats. They live in underground dens and stay hidden during the day. Earthworms are their favorite food, sucked-up like fat noodles after pushing their snouts into soil and probing the darkness with their long red tongues. Echidna sex is a remarkable business. Females are followed by trains of males that muster during the mating season with the youngest animals joining the rear of the group. The large red penis of the echidna—whose appearance has been likened to the foot of a baby rhinoceros—is clothed with spines and has four flat tips. The tips are inserted, two at a time, into the paired canals of the female reproductive tract. Three weeks after congress, the female lays a single egg with a leathery shell, and transfers this to her brood pouch. The infants, called puggles, begin life as mobile jelly beans that break from their eggs and suckle from mammary glands within their mother's pouch. Deforestation and forest disturbance heightened by mining activity have fragmented the populations of this rare animal and driven it to extinction across most of its range. Two other species of echidna live in New Guinea. Both are critically endangered. One is named *Zaglossus attenboroughi*, Sir David's long-beaked echidna, after the pioneering television naturalist David Attenborough. This animal has not been seen by scientists since 1961, but its persistence is suggested by the discovery of burrows.



*Sphyrna
mokarran*

Great Hammerhead

Sphyrna mokarran • Endangered

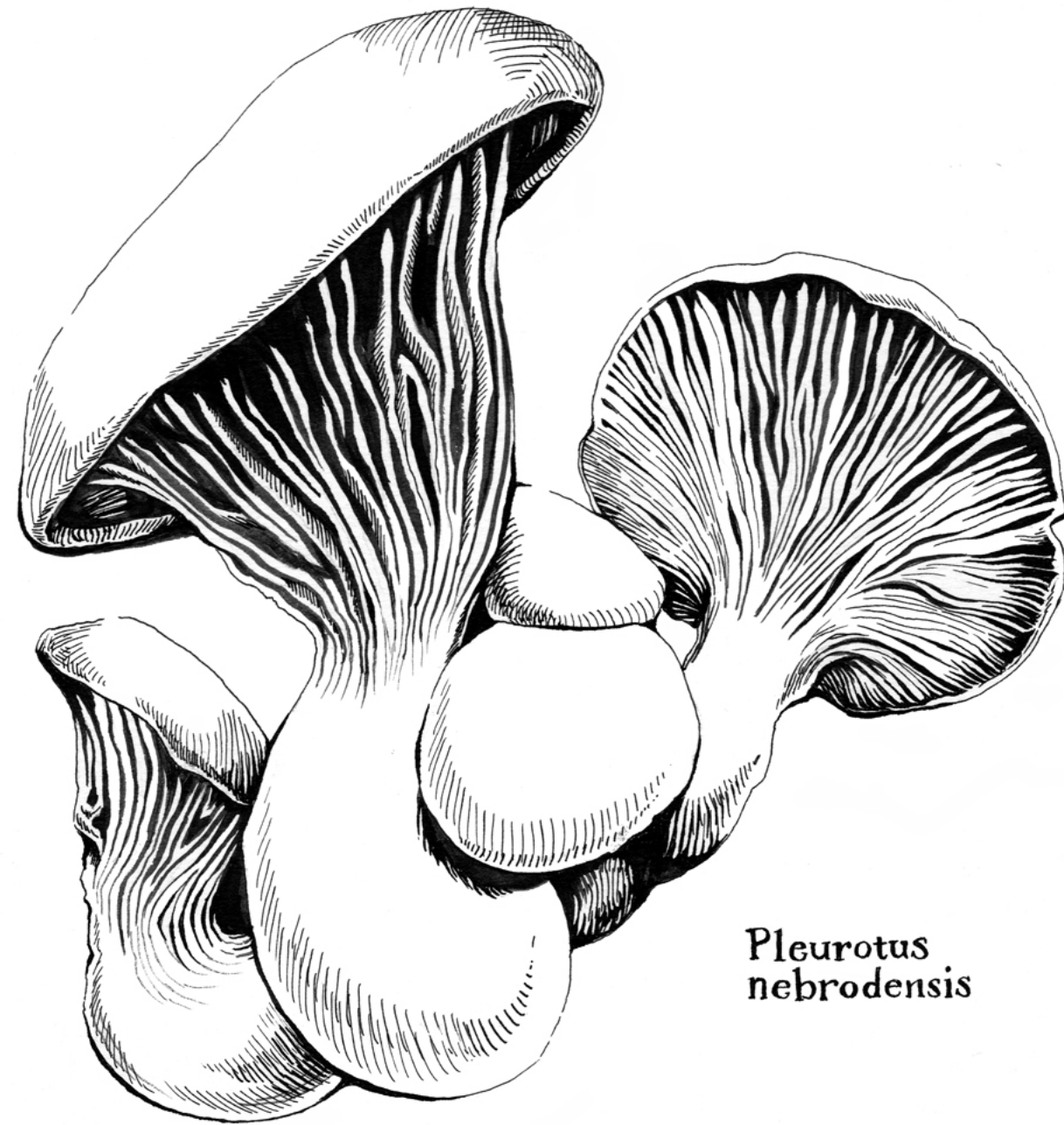
Shark finning is among mankind's more blatant sins against marine animals. Fishermen that live by the practice, reel the fish on board their boats, slice off their fins with a knife, and drop the mutilated and helpless animals back into the sea. A shark without fins is as disabled as an aircraft without wings. They sink and die by asphyxiation, because they cannot force water over their gills without swimming, or are killed by predators. As objectionable as this is for the individual victims, shark finning did not endanger species like the great hammerhead until quite recently. The crisis is rooted in the growing popularity of shark fin soup in China and today's shark fin market is supported by the annual harvest of an estimated 73 million animals. *Sphyrna mokarran* is among the losers. Most of these sharks are around 3.5 meters long, but the largest on record measured 6 meters from hammerhead, or cephalofoil, to sickle-shaped tail. The underside of the cephalofoil is perforated with the gel-filled openings of organs called ampullae of Lorenzini, after the seventeenth century ichthyologist who discovered them. The great hammerhead uses these extraordinarily sensitive organs to detect the faint electrical fields produced by stingrays that bury themselves in sand. Besides stingrays, which are cartilaginous fish, *Sphyrna mokarran* likes to eat smaller sharks, bony fish, cephalopods, and crustaceans. It is an apex predator, meaning that it is not the natural prey of any other animals in the sea. Humans have a way of changing everything. Does anyone need to eat a bowl of shark fin soup this badly?



Bermuda Shield Fern

Thelypteris bermudiana • Endangered

In 1872 a Royal Navy corvette, HMS Challenger, left Portsmouth for a four-year voyage to the study of the world's oceans. The ship covered almost 130,000 kilometers, equal to three times around Earth, and established oceanography as a new scientific field. Naturalists on the mission also studied animals and plants whenever the ship made landfall. A fern discovered in limestone caves in Bermuda was a new species with big fronds that was named *Thelypteris bermudiana*. It grows in rock clefts and at the mouths of caves, but has been reduced to less than 200 mature plants by a combination of habitat destruction, uninspiring protection efforts, and overgrowth by invasive plants that shade it to starvation. Like other ferns, the Bermudan species releases spores from minuscule sporangia that resemble maracas. Sporangia develop in clusters called sori on the underside of the leaf. The head of each sporangium contains spores, which are launched using an intricate mechanism that functions in the same fashion as a rock-flinging Medieval catapult. As the sporangium ripens it loses water by evaporation, causing one side of its bulbous head to shrink. This produces tension around the casing of the sporangium, which is relieved by the formation of a crack in the other side of the head. The resulting tear in the casing widens into a gaping mouth as the drying side of the sporangium continues to curl back on itself, forming an open cup that holds the spores. The sporangium wall is very elastic, and when it has curled as far as it can go it snaps back to toward its original position, closing the sporangium and catapulting the spores into the air. As thousands of sporangia curl and snap on a warm afternoon, the air beneath the fronds sparkles with spores glinting in the sunbeams. This fern is of no commercial value. It is a part of nature that we have endangered just by being here.

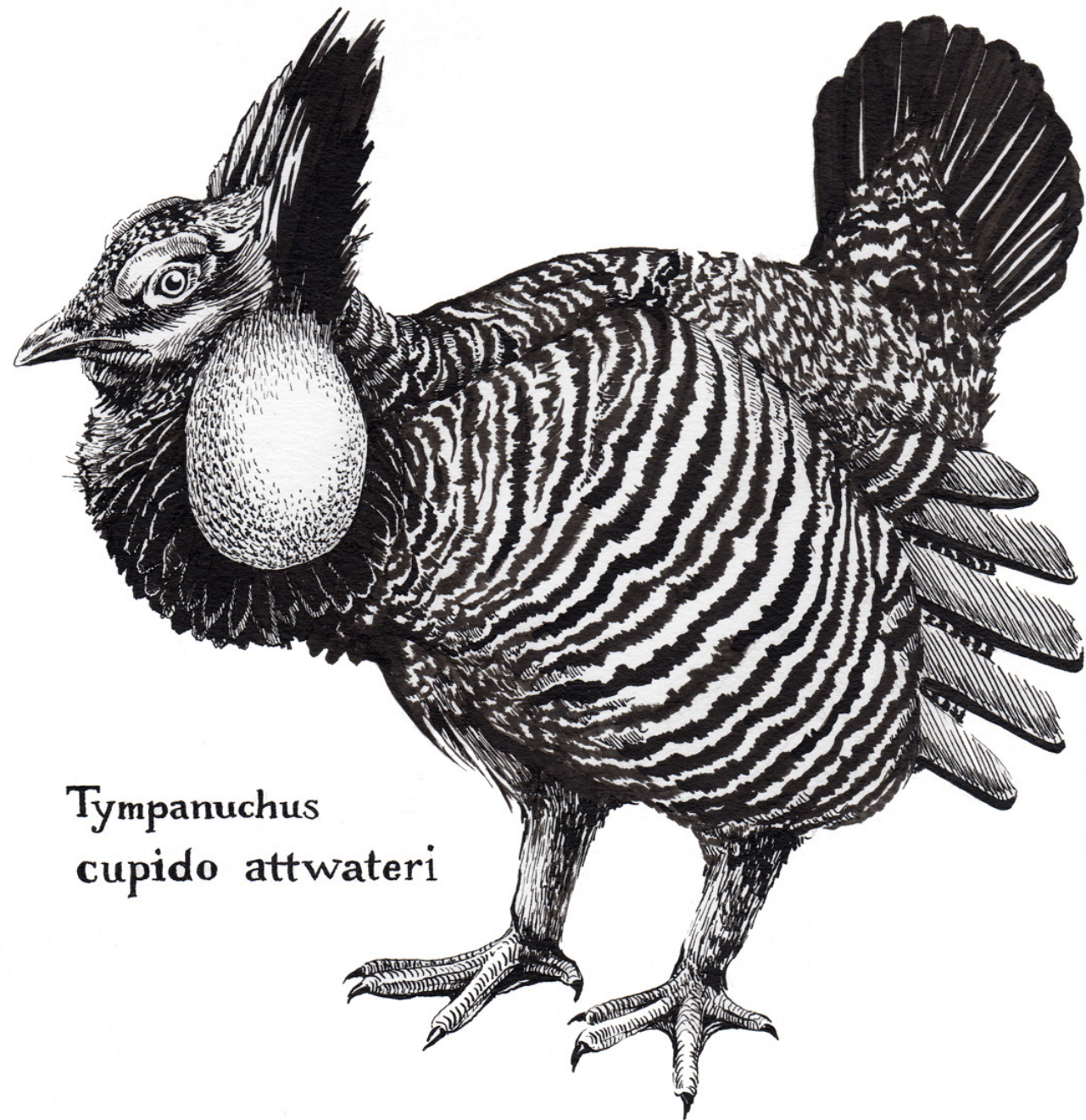


**Pleurotus
nebrodensis**

White Ferula Mushroom

Pleurotus nebrodensis • Critically Endangered

More than 70,000 species of fungi have been described by fungal biologists, or mycologists, and given Latin names. The pace of new descriptions and the discovery of the genetic signatures of unknown species of fungi in soil and in insect guts, suggest that the real number of species may run above one million. Zoologists have recorded around 70,000 vertebrates and half of these are fish. The IUCN lists 1,601 of these animals as critically endangered, but just two fungi. Many of the fungi studied by mycologists are very widespread, which means that they are unlikely to face extinction any time soon. Other fungi are so poorly studied that we have no way to judge their vulnerability. The white ferula mushroom, *Pleurotus nebrodensis*, is the only mushroom on the critical list; the other fungus is a lichen. White ferula mushrooms grow in an area of 100 square kilometers in the northern part of Sicily and nowhere else. This prized edible fungus has been picked for centuries and alarmingly few fruit bodies reach maturity before they are gathered today. The IUCN listing of *Pleurotus* has helped activists to introduce regulations against picking the mushroom in Sicily. The white ferula mushroom gets its common name from its association with the roots of a plant in the celery family called *Cachrys ferulacea*. This symbiotic relationship, called a mycorrhiza, supports the fungus and the plant. Sicilian biologists are inoculating *Cachrys* roots with the fungus to establish more of the fruiting colonies. Conservation by farming the endangered mushroom is comparable to breeding rhinos and tigers in zoos.



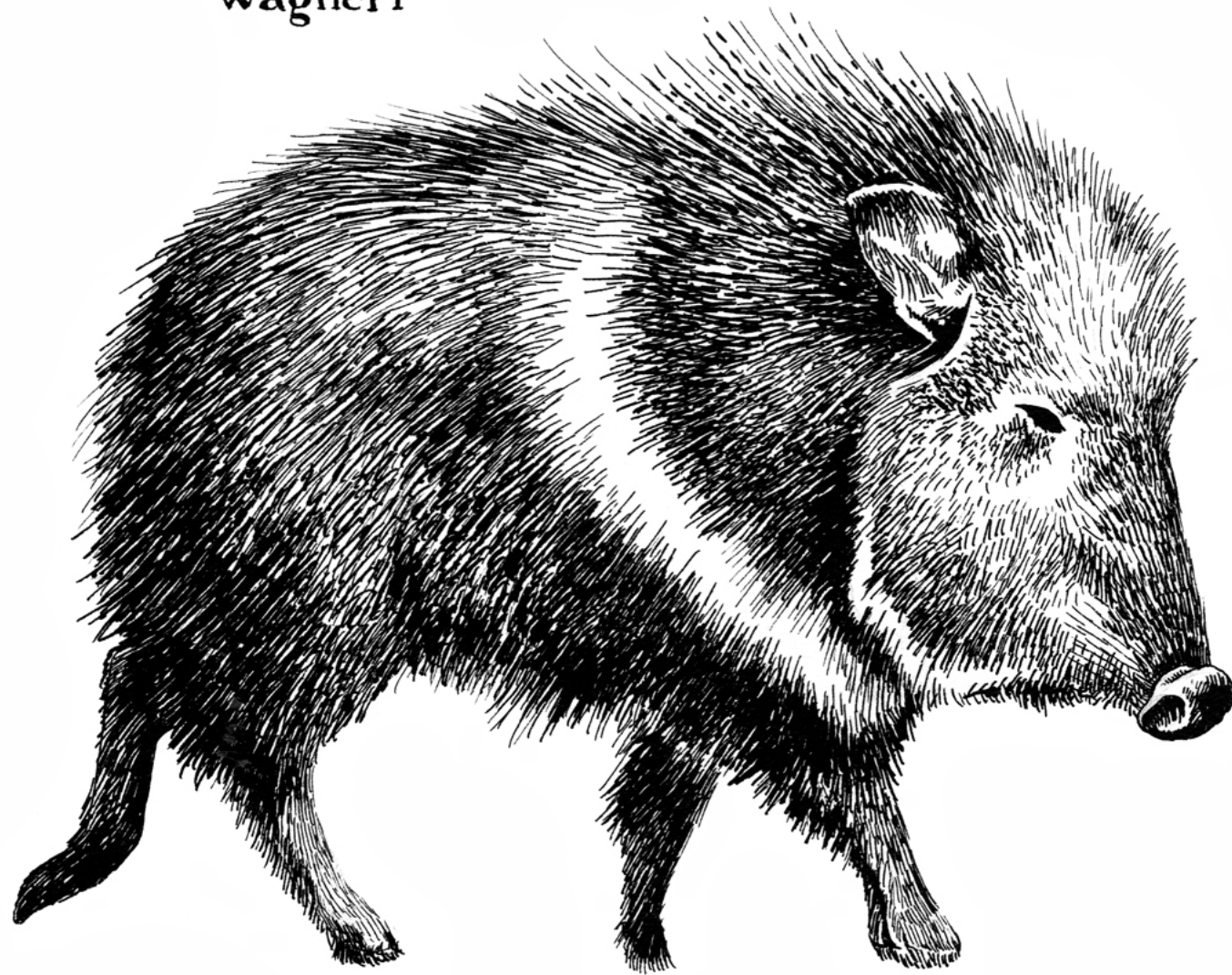
*Tympanuchus
cupido attwateri*

Attwater's Prairie Chicken

Tympanuchus cupido attwateri • Endangered

Each April, the U.S. Fish and Wildlife Service holds the Attwater's Prairie Chicken Festival in Eagle Lake, Texas. Visitors see the endangered bird honored at the event at the peak of its mating season. The gorgeous roosters have orange air sacs on both sides of their neck, orange eyebrows, and feathers that stand up on the crown of their head looking like ears. Groups of the birds gather to pick mates in their leks or booming grounds where the roosters stamp their feet in frenzied displays, inflate their air sacs, and make woo-woo calls that carry across the swaying grasses. One hundred birds remain in the wild, the remnant of the nineteenth century population of one million that occupied the Western Gulf coastal grasslands, a region of tallgrass prairie that stretched from the Mexican state of Tamaulipas northeast to Louisiana. Attwater's prairie chicken is a subspecies of the greater prairie chicken, a nuance of classification that recognizes distinctive versions of the same species in different parts of North America. Prairie chickens were common in the middle of the continent before the ocean of grass vanished under the plough. The birds are gone from Canada and legislation to protect them in the United States is subject to continuous lawsuits from the oil and gas industry. Like the buffalo, they are embedded in the native culture of the United States and Canada. The Blackfeet and Cree perform a dance in which the warriors adorned with feathers strut, stomp, and bow their heads in enchanting mimicry of the prairie chicken.

**Catagonus
wagneri**



Chacoan Peccary

Catagonus wagneri • Endangered

This South American mammal with incongruously small feet is a Lazarus taxon—a species known from the fossil record, believed to have suffered extinction, and then found enjoying life in our time. The lobe-finned fish called the coelacanth is the most famous Lazarus taxon. Peccaries constitute a New World family of hoofed mammals whose closest relations are the suids—pigs, hogs, and boars—of the Old World. Fossils of peccaries with strikingly similar anatomy to the Chacoan species had been found in Argentina, but the descendants were presumed extinct until they were discovered in Paraguay in 1972, hoofing around in the dry thorn forest called the Gran Chaco. The investigators were so enthralled by the sight of these seemingly magical animals that they shot 29 specimens and hauled their bristled corpses back to museums in Connecticut and California to confirm their identity. Local people were already familiar with the animals and called them tagua, pagua, or curé-buro, meaning donkey-pig. A few thousand specimens remain in the wild. They negotiate the thorny shrubs in this harsh ecosystem with their dainty hooves, using their snouts to roll cacti on the ground to rub off the spines before digesting the squishy flesh in their double-chambered peccary stomachs. Like the other pair of non-endangered peccary species, the endangered Chacoan peccary has a single musk gland above its tail that it uses to mark territory. The cheesy perfume squirted from this gland advertises the animals before they are seen and explains the common name of skunk pig. Ranching is the biggest threat to the survival of *Catagonus*, because clearance of the thorn forest for cattle grazing fragments their habitat, and the Trans-Chaco Highway that slices through their territory guarantees relentless development.



Grey Crowned Crane

Balearica regulorum • Endangered

The grey crowned crane resides in eastern and southern Africa. It is the national bird of Uganda, featured as the central icon on the Ugandan flag, where fewer than 20,000—some experts say *far* fewer—of the birds remain. The birds stand one meter from black feet to grey beak, have a wingspan of 2 meters, and have astonishing faces, adorned with a spray of golden feathers that creates a spectacular headdress. Dressed in her jewels, Cleopatra could not have come close to the natural beauty of this beast. The yellow eyes on either side of the bill are accented by white chin patches, and a red throat sac dangles beneath the chin, primed for inflation when the breeding cranes bob their heads, spread their wings, jump around their mates and make loud honking calls. Unlike other cranes, the grey crowned ones, and the related black crowned species, roost in trees, a balancing act facilitated by their prehensile hind toes that allow them to grip branches. The grey crowned crane has suffered from comprehensive loss of its wetland habitat, it is sickened by pesticides, poisoned by farmers, electrocuted on overhead power lines, hunted and egg-collected, and trapped for foreign buyers who want to keep them as live ornaments in their private gardens. Recognition of the scale of the threats to this lovely bird led the IUCN to upgrade the grey crowned crane from the least concern category in 2008, to vulnerable in 2009, and endangered in 2012. Uganda is a demographic accident in progress. Its population is projected to grow from 40 million people at the time of writing to more than 100 million by 2050. Access to contraception is limited. The country should consider redesigning its flag.



**Trachypithecus
francoisi**

François' Langur

Trachypithecus francoisi • Endangered

Langurs, or leaf monkeys, are slender animals with long tails. François' langur is evocative of a Victorian British gentleman, a character in a Dickens novel perhaps, a man who settles in a leather armchair in his club with a large glass of brandy and surveys newcomers with unreasonable hostility. This imaginative sketch is encouraged by the long white sideburns of this animal that sweep down from their ears, prominent brow ridges, and a permanent inquisitive gaze that could be mistaken for pique. These endangered primates have good reason to be angered by the treatment they receive from their human relations. Around 2,000 François' langurs live in Asian forests, eating leaves, mostly, and varying their diet with fruits and seeds. Digestion is accomplished with the aid of big salivary glands and a two-chambered stomach that is home for bacteria that break down the fibrous tissue. François' langurs form matriarchal groups in which females share the responsibilities of child rearing. Babies are born with red-orange hair that turns silky black after the first year. Males within the group are no longer welcome when they reach sexual maturity. These surplus males form bands of bachelor monkeys and wait for opportunities to challenge dominant males for control of their harems. Deforestation and mining have pushed this monkey into smaller and smaller areas of Vietnam and southwestern China. Prospects for François' langur are worsened by a gruesome market for a traditional medicine called black ape wine, made from its bones.



*Sarracenia
oreophila*

Green Pitcherplant

Sarracenia oreophila • Critically Endangered

The insect-eating function of the flute-shaped leaves of pitcherplants was a mystery to botanists until it was properly documented in 1904. Finding insects in the pitchers, some investigators had thought that insects used the leaves as hiding places. Pitcherplants, like the critically endangered green pitcherplant, attract insects by secreting nectar from the rim of their pitfall traps. Flies lose their footing on the waxy coating and drop into a pool of liquid in the bottom. Escape is prevented by an unscalable obstacle course of fine, downward pointing hairs in the throat of the pitcher. Bacteria that grow in the liquid and digestive enzymes secreted by the plant dissolve the drowned insects, providing the immobile carnivore with a vital source of nitrogen and phosphorus that are scarce in the acidic water of their boggy habitats. The upper part of the modified leaf that forms the trap is extended into a hood that prevents rain from diluting the enzymes in the bath. It is as if the plant had thought of everything, which led botanists before Darwin to reach the wrong conclusion about design. The truth of life, as illustrated by pitcherplants, is that natural selection is an unparalleled artist and an awesome engineer. *Sarracenia oreophila* is found in 30 or so locations in the southeastern United States. Most of the original habitat for the green pitcherplant has disappeared and the remaining patches of its wetland home are threatened by housing construction. Illegal plant collectors who prize this species are also responsible for driving it toward extinction in the wild, which seems ironic. Seed conservation programs have been implemented as an insurance policy that may allow reintroduction of the plant in the future.



Homo sapiens

Human

Homo sapiens • Least Concern

Considered with the kind of objective methods employed by biologists to describe other animals, humans emerge as a most peculiar kind of primate. Although we share numerous characteristics with the handful of living great apes, including chimpanzees and bonobos, we have much larger brains, less hair, smaller canine teeth, and are mistresses and masters of bipedal locomotion—walking upright on two legs. Our forelimbs are worth celebrating too. Look at your hands. They are marvels of evolutionary engineering. Typical primates have small thumbs and long curved fingers. Human thumbs are larger and our fingers straight. This anatomy allows you to touch the tips of your thumbs with each finger in turn, index to pinky, pinky to index, in a display of manual dexterity unparalleled in the 3.5 billion years of biological history. Key features of our reproductive cycle also help place us. Females show no obvious signs of ovulation, which contrasts with the swelling and reddening of the buttocks of fertile baboons and other primates. Following nine months of gestation, which is two weeks longer than it takes to prepare a gorilla, humans are birthed in a state of profound irresponsibility that requires years of adult care. Human babies seem no smarter than other apes, but by the time we are toddlers the differences are profound. The descended position of the larynx along with other anatomical and neurological adaptations have allowed us to develop sophisticated communication methods ranging from our original African languages of clicking sounds to the extended vocal range required for “Muzetta’s Waltz” from *La Boheme*. Besides these biomechanical characteristics, attempts at an holistic description of *Homo sapiens* embrace our recurring cultural habits of agriculture, politics, trade, materialism, warfare, art, science, and religion. The IUCN Red List places *Homo sapiens* in the conservation category of “Least Concern,” and offers the following justification: *Listed as Least Concern as the species is very widely distributed, adaptable, currently increasing, and there are no major threats resulting in an overall population decline.* The durability of this assessment should be considered along with this excerpt from a Latin description of our species that may be adopted by extraterrestrial taxonomists that visit earth in the twenty-second century: *Homo sapiens: illa simiae species Africana ab origine quae adeo orbem pervastavit terrarum ut ipsa extincta fiat.* (Homo sapiens: species of ape of African origin that devastated the biosphere and thereby drove its own extinction.)