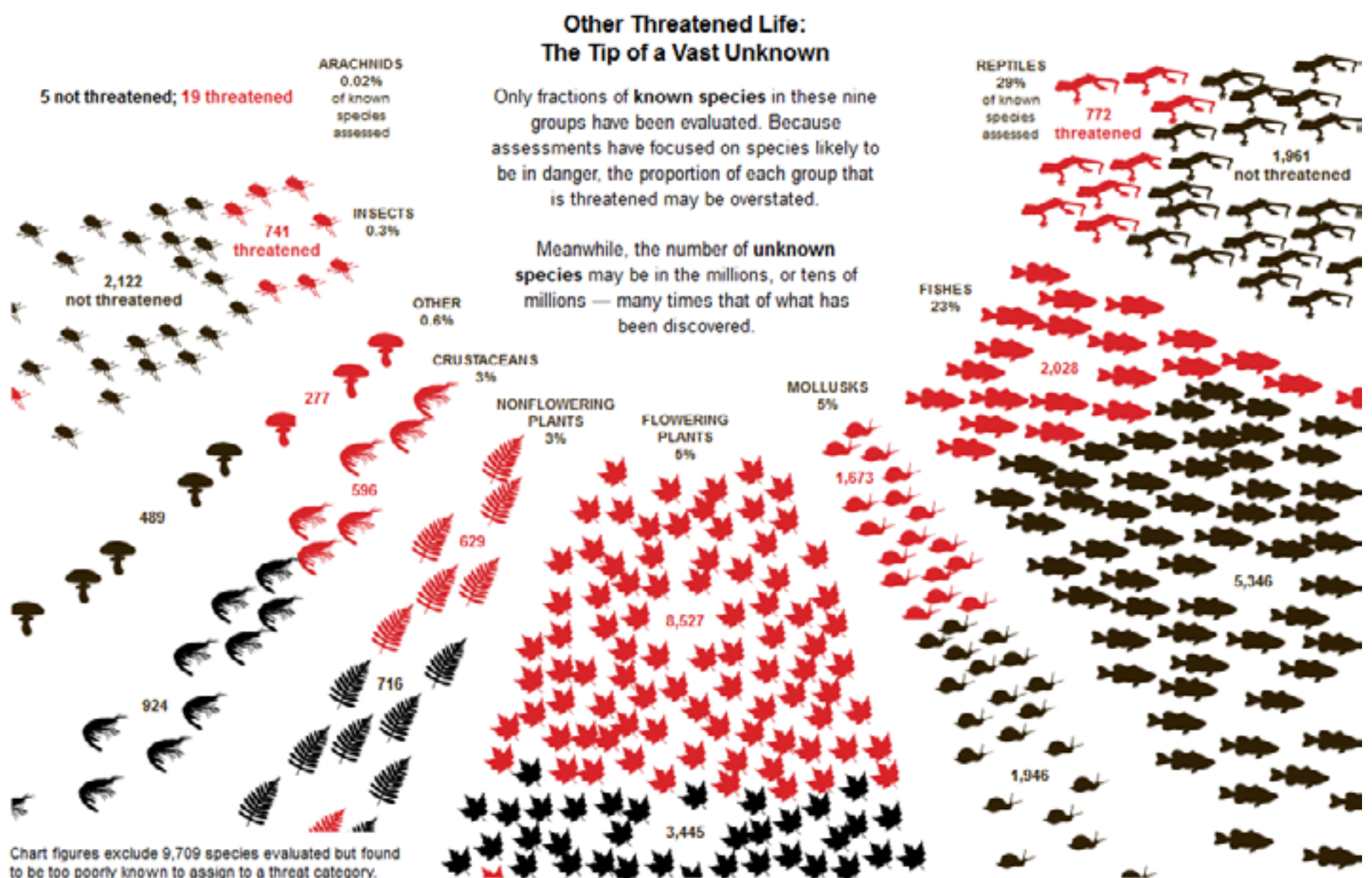
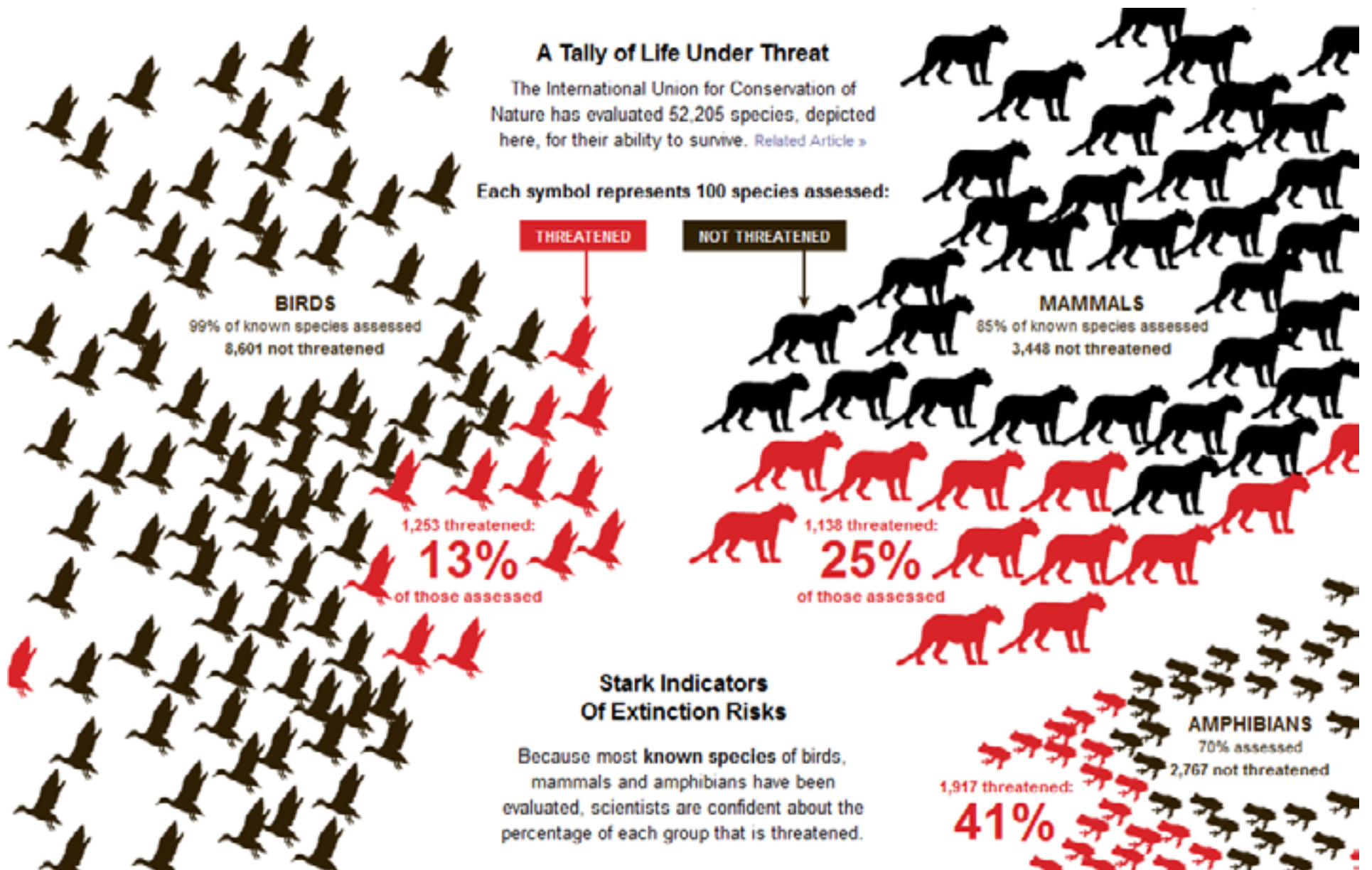


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Are We in the Midst Of a Sixth Mass Extinction?

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NEARLY 20,000 species of animals and plants around the globe are considered high risks for extinction in the wild. That's according to the most authoritative compilation of living things at risk — the so-called Red List maintained by the International Union for Conservation of Nature.

This should keep us awake at night.

By generalizing from the few groups that we know fairly well — amphibians, birds and mammals — a study in the journal *Nature* last year concluded that if all species listed as threatened on the Red List were lost over the coming century, and that rate of extinction continued, we would be on track to lose three-quarters or more of all species within a few centuries.

We know from the fossil record that such rapid loss of so many species has previously occurred only five times in the past 540 million years. The last mass extinction, around 65 million years ago, wiped out the dinosaurs.

The Red List provides just a tiny insight into the true number of species in trouble. The vast majority of living things that share our planet remain undiscovered or have been so poorly studied that we have no idea whether their populations are healthy, or approaching their demise. Less than 4 percent of the roughly 1.7 million species known to exist have been evaluated. And for every known species, there are most likely at least two others — possibly many more — that have not yet been discovered, classified and given a formal name by scientists. Just recently, for instance, a new species of leopard frog was found in ponds and marshes in New York City. So we have no idea how many undiscovered species are poised on the precipice or were already lost.

It is often forgotten how dependent we are on other species. Ecosystems of multiple species that interact with one another and their physical environments are essential for human societies.

These systems provide food, fresh water and the raw materials for construction and fuel; they regulate climate and air quality; buffer against natural hazards like floods and storms; maintain soil fertility; and pollinate crops. The genetic diversity of the planet's myriad different life-forms provides the raw ingredients for new medicines and new commercial crops and livestock, including those that are better suited to conditions under a changed climate.

This is why a proposed effort by the I.U.C.N. to compile a Red List of endangered ecosystems is so important. The list will comprise communities of species that occur at a particular place — say, Long Island's Pine Barrens or the Cape Flats Sand Fynbos in South Africa. This new Red List for ecosystems will be crucial not only for protecting particular species but also for safeguarding the enormous benefits we receive from whole ecosystems.

Another important step was the recent creation of a new Intergovernmental Platform on Biodiversity and Ecosystem Services. The organization, created under the auspices of the United Nations, will provide the scientific background for international policy negotiations affecting biodiversity.

Do we need to protect so many species? Or can we rely on ecosystems with a depleted number of parts? Recent results from a study of grassland ecosystems shed important new light on these questions. Seventeen grasslands with different numbers of species were created and then studied over many years. The analysis, published in *Nature* last fall, showed that more than 80 percent of the plant species contributed to the effective functioning of the ecosystems, causing, for instance, a greater buildup of nutrients in soils.

Another study, published in *Science* in January, showed that more species allow for better functioning in arid ecosystems, which support nearly 40 percent of the world's human population. The bottom line is that many species are needed to maintain healthy ecosystems, and this is especially the case in a rapidly changing world, because species take on new roles as conditions change.

Benefits provided by ecosystems are vastly undervalued. Take pollination of crops as an example: according to a major United Nations report on the Economics of Ecosystems and Biodiversity, the total economic value of pollination by insects worldwide was in the ballpark of \$200 billion in 2005. More generally, efforts to tally the global monetary worth of the many different benefits provided by ecosystems come up with astronomically high numbers, measured in tens of trillions of dollars.

These ecosystem services are commonly considered “public goods” — available to everyone for free. But this is a fundamental failure of economics because neither the fragility nor the finiteness of natural systems is recognized. We need markets that put a realistic value on nature, and we need effective environmental legislation that protects entire ecosystems.

Richard Pearson is a scientist at the American Museum of Natural History and the author of “Driven to Extinction: The Impact of Climate Change on Biodiversity.”