Population Trends Among Globally Threatened Species: An Analysis of the IUCN Red List

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In May 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released a landmark report on the state of global biodiversity and the services that ecosystems provide to humanity (IPBES 2019). That report, which estimates that as many as one million species are facing extinction over the next few decades, garnered widespread attention and helped to raise awareness of the ongoing global extinction crisis. For the one-year anniversary of that report, National Wildlife Federation (NWF) looked at the prospect for future biodiversity loss by analyzing available population trend data for globally threatened species included on the International Union for the Conservation of Nature's (IUCN) Red List of Threatened Species. **NWF found that of the 15,649 globally threatened species for which the IUCN Red List tracks population trend data, 90% of species are declining, while only 9% are stable and just 1% are increasing.**

IPBES Estimate of Globally Threatened Species

Estimating current levels of extinction risk worldwide are challenging given the large gaps in scientific understanding about the diversity of life on Earth. The IPBES assessment that one million species are threatened with extinction was an extrapolation of extinction risk based on available IUCN Red List assessments combined with an estimation of the total number of species on Earth. Dr. Andy Purvis, a coordinating lead author of the IPBES report, provides a useful explanatory note describing the process used in generating the IPBES extinction risk estimate. Averaging across taxonomic groups of animals and plants with IUCN Red List assessments, about 25% of species are categorized as threatened. Because of sparse Red List data for insects, the IPBES assessment assumed an average extinction risk for insects of 10%, which in light of recent reports of widespread insect declines (e.g., Sánchez-Bayo and Wyckhuys 2019) may be conservative. Because most species on Earth have yet to be scientifically described, there are widely varying projections of the total number of species on Earth. The IPBES analysis relied on an estimate by Mora et al. (2011) of 8.1 million species, which includes both known and unknown species. Insects are thought to represent about three-quarters of all animal and plant species: applying the 10% risk factor to an estimated 5.5 million insect species therefore results in a figure of more than a half-million threatened insect species. Applying a 25% risk factor to the remaining 2.6 million species of plants and animals results in more than a half-million

threatened species of "non-insects." Combining these two figures results in the IPBES estimate of more than one-million species threatened with extinction in the coming decades.

IUCN Red List of Threatened Species

Established in 1964, the IUCN Red List of Threatened Species is the world's most comprehensive information source on the global extinction risk status of plant and animal species. Red List assessments are carried out by a global network of scientists organized under the IUCN Species Survival Commission, and adhere to a set of rigorous criteria and guidelines (IUCN 2012). Based on these assessments, species are categorized into different risk categories: extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened, lower risk – conservation dependent, least concern. Additionally, species can be categorized as "data deficient," which precludes assignment to a particular risk category. In the IUCN Red List, the term "threatened" refers collectively to species in the critically endangered, endangered and vulnerable categories. Species status assessments and reassessments are ongoing, with the IUCN Red List Program making current data available through a searchable online database. As of May 1, 2020, the IUCN Red List database included 116,177 species (plants, animals, fungi, and chromists), of which **31,030 species are categorized as threatened**. Another 875 species are listed as "extinct" and 75 as "extinct in the wild."

Extinction Risk Levels by Taxonomic Group

A key metric for tracking the condition of biodiversity is to look at the relative extinction risk levels for different groups of organisms. Doing so requires that a group of plants and animals be comprehensively assessed or subjected to a statistical sample from across the broader group. The following chart, from a forthcoming article in the June/July 2020 issue of *National Wildlife* magazine, displays the relative extinction risk for selected groups of organisms based on IUCN Red List assessments.

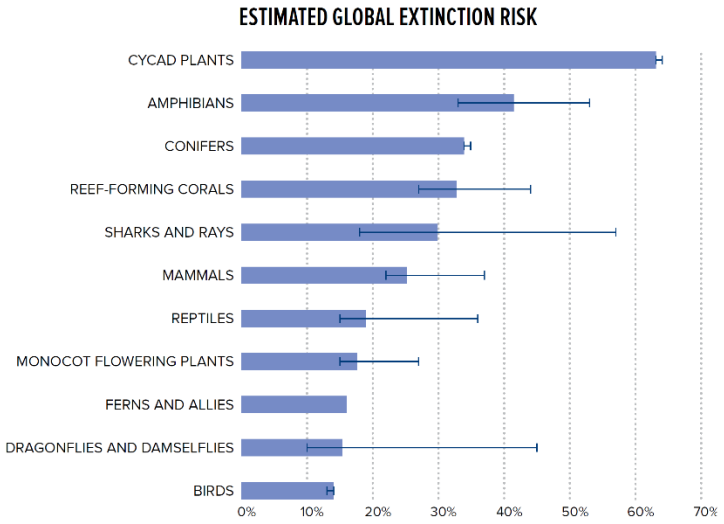

Figure 1. Estimated Global Extinction Risk. Based on assessments by the IUCN Red List of Threatened Species, a substantial proportion of species in key plant and animal groups (right) are now at risk of extinction. Because many species are still poorly known, "whisker bars" indicate the possible range in risk levels. Source: From Stein (2020), based on data from IUCN 2020 and IPBES 2019.

Population Trends of Threatened Species

Although the number of species already extinct, or at risk of extinction are key measures of the status of biodiversity globally, population trend data provides a useful perspective on the direction and future condition of biodiversity. Trend in species populations, whether increasing, stable, or declining, is an important factor in assessing extinction risk, and population trend data, where available, is a key input into Red List assessments. Indeed, extinction can be understood as the ultimate decline in a population, and occurs when a species' entire global population reaches zero.

"Direction of current population trend" is a component of the IUCN Red List assessment guidelines, and assessors are asked to note whether, based on best available data, that trend is stable, increasing, decreasing, or unknown. Although population trend is now designated as a "required" information element, for historical reasons not all Red List assessments include documentation of this element.

We analyzed the current version of the IUCN Red List to determine the relative proportion of threatened species that fall into the different population trend categories. Of the 31,030 threatened species in the IUCN Red List database as of May 1, 2020, only 23,791 (76%) had population trend data. Of those, 8,142 species were flagged as having an "unknown" population trend. As a result, just 15,649 globally threatened species have specific population trend data recorded, representing only half (50%) of total threatened species.

Of the 15,649 globally threatened species for which the IUCN Red List tracks population trend data, 14,037 are recorded as declining (90%), 1,453 as stable (9%), and just 159 (1%) as increasing. Given the huge disparity between the relative proportion of threatened species with declining versus stable or increasing population trends, it is fair to assume that similar patterns probably hold for the half of globally threatened species lacking specific population trend data.

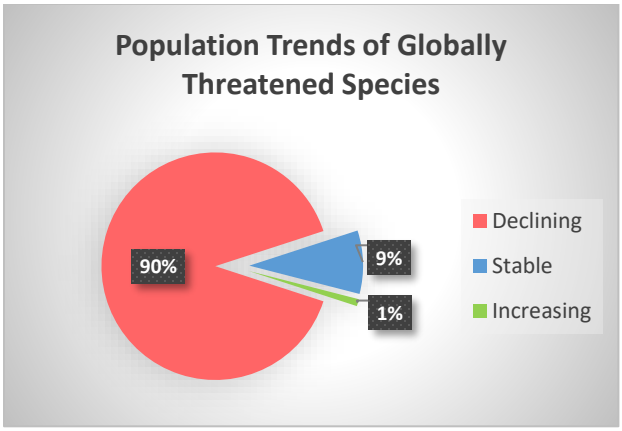

Figure 2. Population Trends of Globally Threatened Species. Of the 15,649 globally threatened species for which the IUCN Red List tracks population trend data, 90% are recorded as declining, 9% as stable, and just 1% as increasing. Source: IUCN Red List of Threatened Species (website accessed May 1, 2020).

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