Monitoring species: Are we looking long enough?

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The conservation of animals relies heavily on estimates of their numbers. Without knowing how many individuals there are, it is impossible to know whether a population is thriving or dying out—and whether conservation efforts are getting the job done. But making those estimates is no mean feat, reports Easton R. White of the Center for Population Biology at the University of California, Davis, writing in *BioScience*. Unfortunately, he says, many monitoring periods of threatened species are short, a result of "short funding cycles and typical experimental time frames."

Perhaps more problematic, monitoring periods used by the International Union for Conservation of Nature and other organizations charged with evaluating population health are crudely determined: "For many populations, the IUCN criteria suggest that more years than necessary are required to assess a population as vulnerable. Conversely, for other populations, the IUCN criteria suggest sampling times that are less than the minimum time required for statistical power."

Statistical power, explains White, is the probability of detecting a trend if it actually exists, and using appropriately powered protocols will offer a truer representation of population health. With poorly powered monitoring, conservationists might not know, for instance, whether an effort to restore a threatened species was succeeding or leaving it in peril.

But what sampling period, precisely, is required for monitoring

populations over time? White argues that according to his data, "72% of time series required at least 10 years of continuous monitoring in order to achieve a high level of statistical power."

Efforts to quantify necessary sampling periods are not unheard of, but this one, says White, constitutes the "first attempt to document the minimum sampling requirements for such a wide diversity and number of species." Indeed, White's analysis comprises 822 species in total and stands to upend traditional measurement protocols, which typically rely on "rules of thumb" rather than statistical power. "These results are evidence against overly simplified measures of minimum sampling time based on generation length or other life-history traits, such as those of the IUCN criteria." White argues that considering statistical power in sampling is essential to understanding population trends—but are conservation organizations ready to follow suit? Only time will tell.

More information: Easton R White, Minimum Time Required to Detect Population Trends: The Need for Long-Term Monitoring Programs, *BioScience* (2018). DOI: 10.1093/biosci/biy144

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