Recreating the wild: De-extinction, technology, and the ethics of conservation

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Is extinction forever? Efforts are under way to use gene editing and other tools of biotechnology to "recreate" extinct species such as the woolly mammoth and the passenger pigeon. Could such "de-extinction" initiatives aid conservation by reviving species lost to habitat destruction and climate change? Or are they more likely to hinder conservation? What should the guiding ideals of conservation be in a new age of biotechnology? These are some of the questions addressed in Recreating the Wild: De-extinction, Technology, and the Ethics of Conservation, a new special report of the *Hastings Center Report*.

The report was edited by Gregory Kaebnick, a Hastings Center research scholar and editor of the Hastings Center Report, and Bruce Jennings, a senior advisor at the Center. The report grew out of a research project on de-extinction, led by Kaebnick and Jennings, that was part of a two-year collaboration of The Hastings Center and the Center for Humans and Nature, where Jennings is a senior scholar.

In their introduction, Kaebnick and Jennings observe that "we are living in what is widely considered the sixth major extinction," caused mainly by human activity. New biotechnology appears to offer the promise that "human ingenuity, a contributing factor in the extinction crisis, might achieve ... 'de-extinction'—in at least some cases, and with sometimes significant qualifications about whether the original species had been 'recreated' and whether it could resume its original place in the environment."

Major questions addressed in the special report include the following:

Is true de-extinction possible?

Advances in biology have revealed the ways the environment influences species' genomes. Even if scientists could produce creatures with DNA identical to that of extinct species, different environmental pressures would alter their genomes in novel ways, raising the possibility that those creatures would differ from the extinct species. "Species are entangled with other species, the land, and ecological events and processes," writes Ronald Sandler, director of the Ethics Institute at Northwestern University. "If scientists merely create organisms genetically similar to previously existing species, neither the species nor its relationships are regenerated." Still, some experts think that creating organisms that are similar to extinct species might have ecological benefits.

Does de-extinction support or undermine the goals of conservation?

Many scientists believe that although the maintenance of biodiversity benefits ecosystems, changes to the environment could make the reintroduction of extinct species difficult—possibly even ecologically disruptive. Curt Meine, a senior fellow with the Center for Humans and Nature and the Aldo Leopold Foundation, writes that species reintroduction does not take place in a "social or ecological vacuum" and that the interactions of a species with its physical and social environment are critical for its success.

Several commentators in the report raise the concern that the notion that extinct species might be "brought back" could weaken efforts to prevent extinctions. "By proposing that we can revive species through modern technology, we give the impression that species are 'throwaway' items,"

write Robert DeSalle, a curator at the American Museum of Natural History's Sackler Institute for Comparative Genomics, and George Amato, director of the conservation genomics program at the institute. And Phil Seddon, chair of a recent International Union for Conservation of Nature task force that issued guidelines for attempting de-extinction, argues that, although conservationists need to be willing to use new biotechnologies for conservation goals, de-extinction may not be the best place to start.

What ideals should guide conservation as de-extinction and other biotechnological strategies become available?

Several essayists ask whether de-extinction goes too far in advancing human activity in the natural world. Christopher Preston, an ethicist at the University of Montana, argues that de-extinction is different from many other kinds of human activities because it tries to alter the deep structure of nature. Gregory Kaebnick asks whether de-extinction challenges the "gardening ethic" that some environmentalists have recently called for. He argues that the technologies show the need to think more carefully about what "good gardening" really means for a conservationist. In the version of gardening he defends, we should "think of nature as a place, a community—a threatened homeland," Kaebnick advises. "We live in it and dominate it, but we depend on it and cherish it. We should safeguard it."

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