

## We Can't Bring Back the Passenger Pigeon: The Ethics of Deception Around De-extinction

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### ABSTRACT

There is much hype around the idea of bringing the Passenger Pigeon back from extinction. However, 'de-extinction' is a fantasy that is not grounded in science. The proposed plans for 'de-extinction' would create a new organism that is not likely to be viable in the wild. Thus, 'de-extinction' as proposed is unethical both because it could lead into the release in nature of a new genetically created organism and because it is not honest to claim that it would reverse the extinction of the Passenger Pigeon.

Scientists and ethicists see the world in very different ways. The goal of science is to identify the truth about how the natural world and its component parts and processes work. Ethics explores human values.

Ethicists such as Kasperbauer (2017) worry about suffering of individual animals. Ecologists and conservation biologists worry (and act) about the extermination of species and promote the health and resilience of ecological systems and of human–nature relationships.

Science helps us to understand how the world works (and how we humans affect it), but science cannot tell us what to do with that knowledge. Ethics helps us to decide how to apply that knowledge. Ethicists can help society to consider questions brought on by scientific discoveries and technological advances. Ethics and science intersect, or and sometimes, collide when it comes to questions such as scientific methods and practices and questions of science and society.

The issue of so-called 'de-extinction' brings the collision between scientists and ethicists to the fore. Is it socially acceptable, ethical or moral to use certain scientific technologies such as 'synthetic biology' without considering the consequences for society or on ecosystems? Is it acceptable, ethical or moral to create new life forms, or to re-create past life forms? What about introducing such life forms into the environment?

In order for such dialogues to be productive, they must be based on factual knowledge. There is an obligation on both sides. For ethicists to comment usefully regarding science, they must have a certain understanding of science and the ecosystems under consideration. Kasperbauer (2017) makes some important errors ('In the late 19th century, when the population of passenger pigeons reached a few thousand individuals, they simply ceased

reproducing') and misinterpretations of science such as thinking that Passenger Pigeons could be introduced into the Pacific Northwest. But there is an obligation among scientists to communicate clearly about the facts of science and not to over promise about what scientists and science can and can't do.

In the view of this scientist, one of the ethical violations of the proponents of 'de-extinction' is to lure and seduce the public with false promises and fantastical visions of bringing extinct species back from the grave.

I am an ornithologist and conservation biologist who specializes in the family Columbidae (doves and pigeons). I have conducted research on endangered doves and pigeons. I have also conducted library and museum research on the extinct Passenger Pigeon (*Ectopistes migratorius*) and have published scientific papers on the ecology and extinction of this amazing species (including the definitive life history account in the Birds of North America series (Blockstein, 2002).

The story of the Passenger Pigeon is one of the most remarkable of any species of the modern era. Living only in North America and breeding only in the eastern deciduous forest, this nomadic colonial species, reached numbers vastly exceeding any other land bird. Retrospective analyses of the population put its numbers at 3–5 billion (Schorger, 1955), nearly 25% of all birds in colonial North America. The flocks of Passenger Pigeons were legendary, so thick and plentiful that they blocked the sunlight for hours on end as they passed in search of unpredictable bumper crops of acorns, beech nuts, berries, and grain. Their demise was also legendary. Victims of unregulated killing for commerce in meat, feathers and capture of birds for sport, and devastation of their nesting colonies, the population crashed in the mid-nineteenth century from billions to none in 40 short years (Blockstein & Tordoff, 1985).

The legendary status of the Passenger Pigeon makes it an obvious subject for the hopes and dreams of technologists and their promoters who wish to bring back the spectacle of the prodigious flocks. Their fantastic vision and dependence on synthetic biology, under the rubric of 'de-extinction' creates a minefield of ethical issues that are considered by Kasperbauer and the other respondents of this journal issue.

I am very familiar with the proponents of 'de-extinction'. I attended the first meeting of Project Revive and Restore (The Long Now Foundation, 2016) in February 2012 where we toured the Harvard lab of biotechnologist George Church and viewed the pioneering genomic editing technology that supposedly will be used to recreate the Passenger Pigeon. I was at the TEDX conference on 'de-extinction' hosted by the National Geographic Society in February 2013.

The problem is that all of the gene editing in the world will not bring back the Passenger Pigeon or any other extinct species. The gene editors are practitioners of synthetic biology, which is a tool to create new organisms, not to restore extinct organisms. But, as noted by Meine (in press) 'reconstituting a genome and putting the resulting organism outside is not the same as conserving a species or a place'.

Scientists associated with the project are intending to sequence the genome of the Passenger Pigeon using DNA extracted from specimens in museums and private collections. This in itself is a legitimate exercise in basic science. They plan to compare the genome of the Passenger Pigeon with that of its nearest living relative, the Band-tailed Pigeon (*Columba fasciata*) of the American West, identify differences in the two genomes and conclude that the differences are what distinguish the two species. This also is legitimate science.

The problem comes when the proponents move from description to manipulation. They plan to insert pieces of DNA from extinct Passenger Pigeons into DNA from Band-tailed Pigeons with the goal of manipulating the genome to make it more and more like the Passenger Pigeon genome (The Long Now Foundation, 2016). Even if they are successful at introducing some Passenger Pigeon-like characteristics such as a longer tail, into Band-tailed Pigeons, they are not making a Passenger Pigeon.

They would be creating a new biological entity—a chimera that is not a Passenger Pigeon but would be an altered Band-tailed Pigeon with some Passenger Pigeon genes and features (Temple & Blockstein, 2014).

A species is more than an accumulation of its genes. The epigenetic interactions between genes and environment are responsible for the phenotype of the organism (its physical appearance). The connections between genes and behavior are not well understood, but there are significant contributions of evolutionary history and family upbringing that affect behavior. Even if biotechnologists could create a creature that looks like a Passenger Pigeon, the chances that it would behave like a Passenger Pigeon are essentially zero. This loss of behavioral traits necessary for survival in the wild is a significant problem even for animals that have been kept in captivity and then are reintroduced into the wild (McPhee, 2003).

Thus, there are two essential ethical problems with the ‘de-extinction’ scheme.

- (1) It is not ethical for humans to be creating a new organism and introducing it into the environment.
- (2) **It is not ethical for the proponents of ‘de-extinction’ to claim that they are bringing back an extinct organism when they are not.** It is not ethical to be purporting science fiction under the guise of science.

I will leave it to others to discuss the ethics of diverting scarce scientific and conservation funds and other resources to ‘de-extinction’ when the world is in the midst of an unprecedented crisis of extinction and loss of biological diversity.

Even for those who wish to give the synthetic biologists a pass and say, ‘even if it is not exactly a Passenger Pigeon, it will be the next best thing’, there is a major problem. Even if one were somehow miraculously able to create a Passenger Pigeon it would be doomed.

The first problem is that the environment in which the Passenger Pigeon thrived is gone forever. Passenger Pigeons existed in a largely forested landscape where the human footprint was minimal. Now pigeons are gone, people and our technology are everywhere and the eastern deciduous forest has been chopped into bits surrounded by a biological wasteland of development.

Individuals and species can’t and don’t live apart from their environment. The Passenger Pigeon was dependent upon a massive, dynamic, contiguous area of forest where there was always enough food within a day’s flight to support a horde of millions of birds. Passenger Pigeons did not live in isolation, they lived within an ecosystem.

But, if one started with just a few Passenger Pigeons, or even pseudo-Passenger Pigeons wouldn’t there be enough habitat for them? This brings up the second problem. Passenger Pigeons did not live in isolation. They lived in enormous flocks of hundreds of thousands and more birds. Everything about the Passenger Pigeon evolved for living in enormous flocks.

The flocks provided eyes to find food and to detect predators. They provided safety in numbers for an individual bird which had a one in a billion chance of being the bird that

was caught by the hawk that dove into the flock. The safety in numbers was especially important in the nesting colonies, known as cities, where upwards of 50 nests in a tree for over 100 square kilometers made the odds of losing an egg or young to predators very, very small. The colonial habit enabled the Passenger Pigeon to reach enormous numbers even though they produced only a single egg each year.

The demise of the species was inevitable once the numbers dropped below a critical mass. Although Halliday (1980), cited by Kasperbauer, erroneously concluded that Passenger Pigeons would not attempt to breed without the stimulation of a colony, Passenger Pigeons did breed in small groups and even lone pairs. But without the massive colonies to buffer from predators, breeding success must have been abysmal and the species continued its death spiral to extinction.

Maybe the greatest ethical failure of the entire 'de-extinction' charade to create a new life form is that the closer it resembles the original life form, the more likely it will be doomed due to the factors that led the species to go extinct originally. Even a genetically reconstructed 'Proxy Passenger Pigeons' would have no chance of leading to a viable population in nature.

This is the ethical third strike against so-called 'de-extinction'. Not only is it impossible to re-engineer an extinct organism and unethical to claim otherwise, but the re-engineered new organism would not be able to survive in the wild.

Aldo Leopold (1947), in dedicating a monument to the Passenger Pigeon wrote and spoke eloquently 'The Passenger Pigeon was no mere bird, he was a biological storm. He was the lightning that played between two biotic poles of intolerable intensity: the fat of the land and his own zest for living. Yearly the feathered tempest roared up, down, and across the continent, sucking up the laden fruits of forest and prairie, burning them in a traveling blast of life. Like any other chain reaction, the pigeon could survive no diminution of his own furious intensity. Once the pigeoners had subtracted from his numbers, and once the settlers had chopped gaps in the continuity of his fuel, his flame guttered out with hardly a sputter or even a wisp of smoke.'

To believe that the biological phenomenon that was the Passenger Pigeon can be recreated is at best an exercise in wishful thinking and at worst a cruel deception. There is no plausible way to go from a few 'Proxy Passenger Pigeons' to a viable population. De-extinction is simply not possible. No advances of synthetic biology will change that. As William Beebe (1906) commented '... when the last individual of a race of living beings breathes no more, another heaven and another earth must pass before such a one can be again.'

## Disclosure statement

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