A Feathered Tempest:

The Improbable Life Sudden Death of the Passenger Pigeon

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"The pigeon was a biological storm. He was the lightning that played between two opposing potentials of intolerable intensity: the fat of the land and the oxygen of the air. 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 diminuition of his own furious intensity. When the pigeoners subtracted from his numbers, and the pioneers chopped gaps in the continuity of his fuel, his flame guttered out with hardly a sputter or even a wisp of smoke."

-Aldo Leopold, 1947

Introduction

"Slowly the passenger pigeons increased, then suddenly their numbers
Became enormous, they would flatten ten miles of forest
When they flew down to roost, and the cloud of their rising
Eclipsed the dawn. They became too many, they are all dead.
Not one remains."

Robinson Jeffers

The passenger pigeon was not just a bird. Calling it a "biological storm," as Aldo Leopold did, was an understatement; it was more like a series of simultaneous biological hurricanes, blowing all the time. At its population's peak, four to five billion pigeons roared over the forests and prairies of the east and midwest, a number equal to the entire population of overwintering birds in the U.S.. A single flock in motion could darken the sky over 180 square miles. One recorded breeding colony in Wisconsin in 1871 was 125 miles long and between six and eight miles wide. Such a flock could consume two and ten million liters of food a day.

The passenger pigeon is an icon, a symbol of the fertility of the pre-Columbian world and our ruining of Eden. We Europeans came to a world of abundance, cut down the trees, shot the pigeons, and hauled out barrels of salted pigeons in railroad cars to the markets of the east. By the 1870's the birds were in retreat; in 1914, the last, cutely named "Martha" after George Washington's wife, died in a zoo in Cincinnati. The pigeon's extinction symbolizes the heedless exploitation of a continent's riches at the hands of our culture.

All this is true, as far as it goes. But if you begin to consider the conventional narrative, to look at the tale through contemporary scientific eyes, it begins to look curiously thin.

Such a biological phenomenon could not have acted in a void. Modern ecological thinking shows us that if you subtract a species that once consisted of 40% of all the birds in North America, you lose or change more than just a bird. Passenger pigeons fed on enormous amounts of "mast," the nuts produced by the dominant species of the eastern hardwood forest: white oak, beech, and chestnut. Of these, two are at least mildly in retreat today relative to other species, one seems to have fewer "crops," and one is ecologically if not genetically extinct. Other species of plants also seem to be affected. Berries from no fewer than eleven families were dispersed by passenger pigeons, and some now rarely fall at any distance from their parent plant.

The pure physical effect of the flocks would have been like nothing that exists on the planet today. The weight of the pigeons and their nests damaged the forest like a hurricane, breaking limbs and even toppling trees. But no hurricane would also leave inches of nitrogen-rich droppings on the forest floor. Contemporary observers said the ground looked "snow-covered" after the pigeons passed. The droppings first killed grasses and understory vegetation, then promoted riotous growth a year or two down the line.

Other species could not help but be affected. The recently-rediscovered ivory-billed woodpecker prefers to feed in dead trees; could the loss of such abundant provisions have contributed to its near extinction? The pigeon's demise may also have had an impact on such creatures as the Bachman's, blue-winged, and golden-winged

warbler, the Carolina parakeet, the eastern box turtle, and the American burying beetle. The term “keystone species” has become a part of our common understanding: a species so important that knocking it from its place in the ecological arch causes a tumbling cascade of change and destruction. The more one looks at the passenger pigeon, the more it looks like the “mother of all keystone species”.

I first began looking into the importance of this bird during an internet discussion among some friends, mostly naturalists and biologists, on rare and extinct birds. Someone asked a question about the pigeon. I had been reading about the Pleistocene extinctions, the coming of humans to the continent, and about the effect of fire on landscapes. Suddenly, all of these phenomena looked to be related. Some of the “facts” about the pigeon and about pre-Columbian America in general began to appear very strange. Things contrary to our simple myths began to emerge from the mist.

During the last glaciation, cold steppes existed as far south as the latitude of modern Delaware. South of this ecosystem was an extensive band of boreal forest, which also covered the Rockies, and much of the plains south of glacial-edge steppes were forested as well. Piñon-juniper savannah, better-watered than today, covered much of the southwest. Tropical ecosystems in Mexico may have been drier than today, but were in much the same place. Deciduous forest occupied only a fraction of its later space on the continent.

So, *where were the pigeons?*

They were always inhabitants of the deciduous forest, eating nuts and berries. It seems impossible for the pigeon to have existed in anything like the numbers it

eventually attained. And a passenger pigeon without its niche and numbers is nothing more than a big, nut-eating mourning dove.

As the glaciers receded, radical changes began. Humans invaded. Whether small bands who hunted and gathered in the sea's edge on the Pacific coast came earlier, or whether, even more controversially, some ice-edge hunters hopped over the margins of the retreating sea-ice from Europe, the general consensus is that most of the new Americans came from Asia over the Bering Land Bridge.

Recent investigations suggest that the people who became Clovis Man may have come down the ice-free corridor that opened along the flank of the Rockies on dogsleds, taking only a few months. And, whether or not you accept the so-called Pleistocene overkill scenario, most of the big native mammals, a charismatic megafauna that rivaled or surpassed that of the Serengeti, were gone in less than a thousand years. Today's so-called megafauna – the modern bison, elk, moose, grizzlies, and wolves – are all from the Old World, just like humans.

A few of the new creatures had disproportionate impacts on the ecosystem. Bison of sorts had already existed in the west, but the new species, perhaps less constrained by competition or encouraged by a warmer climate, helped create a plains ecosystem that lasted until the buffalo hunters and the sodbusters destroyed it.

Meanwhile, east of the plains, the clever new immigrant from Asia began burning the forest. Most modern ecologists, following the lead of "fire historians" like Stephen Pyne, now believe that the environment first seen by Europeans was largely shaped by humans, using fire as a tool. The plains advanced in runners that would eventually reach to the east coast, carrying with it the open- country species like bison, elk, and prairie

grouse. They all ranged as far as Massachusetts in the northeast, where the last pinnated grouse, a subspecies known as the heath hen, would perish in the1920's.

How much the two species, human and pigeon, modified the landscape is hard to imagine. Human burning encouraged white oak, and pigeon feeding suppressed red oak, making white oak a dominant plant that sometimes made up nine-tenths of the forest. The same fires created "edge effects," mixed belts of prairie and forest, rich in species and food for pigeons. Pigeons broke down the forest and renewed it, resurrected other plants from beneath snowdrifts of droppings, picked up seeds and spread them in a rain of creative destruction. Aerial predators feasted on the hordes; the large eastern peregrine was finished off by DDT, but its first and larger decline has been attributed to the loss of the pigeon. Even the burying beetle, a striking red and black creature, has become one of the rarest large species of insect in North America. It buries carcasses up to passenger pigeon size, and lays its eggs on them.

When A.W. Schorger wrote the last scientific book on the passenger pigeon, in 1955, no one knew much of the background material on is environment and history that is now slowly coming to light. He lamented:

"The life history of the passenger pigeon, including its extermination, contained many lacunae and contradictions…It is unfortunate and most regrettable that no competent ornithologist attempted to make a comprehensive study of the nesting and other phases of the life history of the passenger pigeon when it existed in large numbers."

Now, with new tools, we can see not just a tragedy but a window into the complexity of life and systems in general. Australian mammalogist and ecologist Tom Flannery said that the ecology of North America has *never* been stable, at least since the

glaciers. The passenger pigeon's tale illuminates and is illuminated by the modern science of complexity, chaos, catastrophe theory, and self-organized criticality. It warns us that small incidents may trigger sudden catastrophes, an ominous lesson in a time of global warming. It may give us insights into how suddenly species can emerge, or even to the nature of species. After all, the passenger pigeon without its habits is biologically unremarkable. In the words of Jeffrey Lockwood, entomologist and ecologist: "Ecology is beginning to slowly shift focus with tentative explorations of what the world would look like if process, rather than matter, were the basis for reality. What if we defined a species in terms of its life processes?"

This book will be a kind of forensic ecology of the passenger pigeon, an inquiry into its life and life processes as well as its death. We already know who killed it, though we may not know exactly how. But what kind of an organism was it? What kind of a hole did its passing leave in the world? What can learning more about these questions and their answers teach us?

We can't ever bring it back the "life processes" of the passenger pigeon, but we may be able to, in part, restore some of the things we have lost, using lessons we learn from the pigeon and other extinctions. Above all, in contemplating the life of this unique bird, we realize not only what we have lost. We are reminded again of the strangeness and complexity of he universe that surrounds us, and of how much more there is to know.

Possible Chapters

This is a tentative outline only; it would be adjusted "upward" (in numbers of chapters) rather than down as I learn more. I envision the chapters as they are presently described as rather long.

The Storm

I'll begin with a vivid evocation of a flock approaching, landing, feeding, flying to a nearby roost. I'll follow with some historical accounts, including famous ones (Audubon,Wilson). I'll point out common points, as well as some odd discrepancies.

I have access to accounts from Mormon pioneers, through a Utah biologist friend, never before published.

The point of this chapter is to establish the enormous impact of the passenger pigeon in unfamiliar eyes, as well as on the ecosystem; those feelings of dread and awe evoked by overwhelming natural phenomena.

After the Ice

Next, I will draw on contemporary scholarship from Pielou to Paul Martin to paint a picture of the late glacial world – one with little place for the passenger pigeon as a major ecological actor. One keystone will be Australian ecologist Tim Flannery's (*The Eternal Frontier*) hypothesis that the North American continent, by virtue of its shape, weather, and geology, has never had a stable environment, especially since the last glaciation.

Other key ideas will be Stuart Fiedel's recent paper of the rapidity of Clovis Man's dog-aided 'invasion," Paul Martin's "Pleistocene Overkill," and above all, Stephen Pyne's ideas about anthropogenic burning and its effect on forests and prairies. I have on tap many papers backing my idea that human burning, quite possibly in feedback with an expanding passenger pigeon population, may have "made" the landscape east of the Great Plains (which themselves may have been "bison-genic" – a corollary that I will describe.) I will need to pick the brains of several scholars.

The idea in a nutshell; before humans and after the glaciers, the passenger pigeon was probably like the bandtail pigeon of the western mountains – sometimes gathering in huge flocks (I have a nice modern account of those) but not a major player, a maker of systems. It took the retreat of the ice and human burning to break that phenomenon – and the pigeon as we knew it.

Forests and Fire

This chapter is rooted in Pyne's work and several recent papers – I am sure I can find more (I have a geochronologist and climatologist, Jake Sewell, "on tap.") Basically, Pyne thinks all the plant and animal associations discovered by the colonists were created by Native burning. (What is "natural"?) Apparently both burning by the Indians and feeding by the passenger pigeon suppressed red oak and encouraged white oak, which became the dominant tree of the northeast (and is now in retreat contra other species.)

The other dominant trees of he northeast and Midwest were hickory (in retreat) and chestnut (effectively extinct – from blight , but was it weakened by other factors?) Many complex interactions have been observed by ecologists I have been reading, from

the effect of light in canopies of different species (also seen in the rain forest) to the open prairies, full of bison and elk, made and maintained by burning.

I will present plenty of material, again some historical on burning, and quote (probably interview) Pyne.

So: the greatest ecological influence east of the Mississippi was the Indian. But what about his collaborators?

A Force of Nature

What would be the effect of the passenger pigeon, by itself and in collaboration with the fires set by the tribes?

NUMBERS. Quite incredible. 210 *million* liters of food a day eaten by a flock. Volume of nitrogen in the droppings. Areas of trees crushed.

Contemporary accounts – more quantitative than my first impressionistic ones. Statistics. I have many scientific papers to draw from on the subject. This is not a dull subject—the numbers are mind- boggling!

Supporting Players

Many of the species that shared the environment with the passenger pigeon are extinct, reduced, or changed in habitat. I would like to cover them in detail. The ivory-bill – recently rediscovered (in part by a friend, Tim Gallagher, who has written a book on the subject and is enthusiastic about this project) has already been mentioned. Two other extinct birds, the Bachman's warbler (probably dependent on the passenger pigeon, according to artist-naturalist John Schmitt) and the Carolina parakeet, which at least

interacted with it, should have “bios” here. Two other warblers, the blue and golden-winged, have been affected. I will do more here about berry distribution, peregrines and other raptors, turtles, beetles, and trees. Another theme might be passenger pigeon interaction with the vanished “canebrakes,” huge (corresponding to pigeon roost size) swaths of twenty-foot tall bamboos that harbored their own unique fauna, including the Bachman’s warbler. These may well have originated in old passenger pigeon roosts in the south, and are as extinct as the pigeon.

Collapse

Narrate the fall, first. Contemporary accounts again. 19th Century theories – they all flew out to sea and drowned; they flew to the moon; they are just someplace else, easy to believe in a time of slow communication. Go to the well-meaning but clumsy attempts at breeding (and such oddities as free-flying small flocks in Germany) all the way to the pathetic end of “Martha.”

Then: what caused the crash? Obviously, industrial-level hunting contributed, but probably the cutting of the forest was even worse. Newer theories include Frank Beebe’s idea of its decline being aided byepidemics caught from colonist’s domestic pigeons, such as “canker” (*Trichamonas gallinae.)*

Then: probably, our civilization could not have co-existed with such numbers..?? (Get some good ecologists to comment.) But what about the other species above? Which leads to “restoration ecology” and …

Wilder Dreams

First, some definitions and examples of restoration, from salt marshes in the east to the work done by such organizations as the Quivira Coalition restoring streams in the southwest (I can report on this personally.) Bringing back wolves in the west; the idea of restoring predators in the east to knock back the ridiculous, tick-bearing, understory-destroying, species-suppressing whitetail deer herd in the east. Necessity of education, contra animal-rights platitudes.

Then: crazier stuff. Paul Martin and company and their not-quite-tongue-in-cheek plans to "Bring 'em back!" Restoring *real* megafauna to the southwest – elephants, camels, and more…even lions. (Think of the furor that would create!) Why this might restore the range, even make possible a strange but productive ranching. Zimov and his actual "Pleistocene Park," with University of Alaska assistance, n Siberia. Cloning and DNA.

Then, return to more modest proposals. Habitat for ivorybills and what else might still be there. "Fixing" the eastern forest, more than a bit, and making it better habitat for birds is already within our grasp

End with an expanded version of intro's last paragraph, loss, hope, dreams.