1 Nature in the Making

IN THE SUMMER OF 1993, the movie *Jurassic Park* took hold of American culture. Even those who dislike pulp fiction or pop movies could not miss the endless monologues on late night television, lengthy magazine articles, and cocktail party discourses about dinosaurs brought back to life by ingenious and thrilling—or were they despicable and criminal?—manipulations of DNA extracted from the bodies of prehistoric mosquitoes trapped in amber. Aside from the film version's unsuitability for younger viewers, the biggest controversy surrounding *Jurassic Park* was the scientific validity of its premise: namely, that intact dinosaur DNA 100 million years old could indeed be found and used to clone dinosaurs—bring them back to life.

Yet that was only the scientific premise of *Jurassic Park*. Author and screenwriter Michael Crichton had a more provocative *social* ax to grind. Late in the book version of the story, Crichton's skeptical mathematician said, "Science has attained so much power that its practical limits begin to be apparent. Largely through science, billions of us live in one small world, densely packed and intercommunicating. But science cannot help us decide what to do with that world, or how to live. . . . Ever since Newton and Descartes, science has explicitly offered us the vision of total control. Science has claimed the power to eventually control everything, through its understanding of natural laws. But in the twentieth century, that claim has been shattered beyond repair."[1] Entertaining though *Jurassic Park* was, in these words Crichton challenged us to consider how we humans exert control over this thing we call "nature," specifically through our clumsy use of science and technology. For all of science's ostensible objectivity and exactness, it can yield terrifying results when control is lost—and even when it is successfully applied and maintained. Most important, science cannot aid society in establishing norms—socially expected and accepted attitudes and behaviors—or in making

value-based decisions about nature. Science rests upon a foundation that identifies it alone as the privileged instrument for knowledge creation about nature, but there is no allowance in scientific objectivity for evaluating the ethical questions that arise out of science.

Moreover, *Jurassic Park* calls into question what nature is in the first place. Are cloned beings natural? Is it natural to bring plants and animals extinct for millions of years into the present? That is the departure point of this book: What, indeed, is *nature?* Such a question is actually one of meaning and even reality. How is nature defined socially, and how has it come to exist at all? Is nature the same to everyone? And, if it is not eternal or consistent in its meaning, whose nature is the dominant one and what are the processes by which nature's meaning changes? Even before we can ask the ethical and normative questions about nature posed in *Jurassic Park,* we need to come to terms with what nature is in a social sense by asking questions like these.

NATURE'S BEGINNINGS

Ultimately, these questions compel us to answer which nature it is that society actually is creating and which one it should be creating. This search for the social meaning—*meanings,* really—of nature is far more complex than looking up the word in a dictionary, as we shall see. To begin this discussion, I offer the following observation: nature is four thousand years old. Historians and etymologists tell us that nature as an identifiable concept has existed in the Western tradition since the Greeks created the term *phuysis,* which initially meant "everything." This meaning was "passed to *natura,*" the Latin root of our word "nature," and nature's denotation further evolved through the centuries.[2]

As a concept, then, nature has not always been there. Nor is it found in all cultures. Some students and I once were discussing the nature concept. We had gotten about as far along in the story as I have here—the seed of skepticism regarding nature had been planted and brows were deeply furrowed in a combination of curiosity and confusion—when one student spoke what the others must have been thinking. "I don't believe you," she said. "Of course every culture has a concept like nature. Nature obviously is everywhere around us and around every other society." Later that day I asked colleagues who speak Crow and Cheyenne

about "nature" in their languages and cultures. Both said there is no term that translates even roughly into our "nature." Nor are those cultures alone, as geographer Ian Simmons has noted.[3] Nature is not always and everywhere present, but exists only when societies conceptually distinguish themselves from their surroundings.

At some level nature must be a social creation. Today, *Nature*—this connotative, meaning-filled, and socially created nature that I have in mind when I speak of it as "socially constructed"—is constantly being remade by us, sometimes through intense conflict, such as seen in efforts to "save the whales," "save the rain forests," and even "save native peoples," and sometimes in more subtle ways, such as alterations in laws allowing or prohibiting pollution and timber cutting. Even the North American Free Trade Agreement was the topic of intense debate over what it would mean for "the environment," a synonym for Nature that I will also capitalize to highlight its contingent character. In all of these debates, science has a prominent place in the changing meanings of Nature and the Environment.[4] Politicians, corporations, and even the most radical, antitechnological environmental groups invoke science to support their unique conceptualizations of Nature.[5]

SCIENTISTS, RIVERS, AND SALMON

This study stands at the crossroads of Nature and society's primary tool for investigating Nature, namely, science. It explores how one part of Nature, Pacific salmon, is socially constructed by one group of scientists, salmon biologists. Social constructions are the meanings of things that result from interactive social processes, and our interest here is the interactions between salmon biologists, various social institutions, and the salmon. Salmon biologists pursue their work in many ways, and they do so in a host of venues. Some study "life history" processes, such as juvenile salmon incubation, fresh and salt water migration, the survival of fish in different locations, and salmons' relationships to predators. Others emphasize genetics, and still others "stock recruitment"—increasing the numbers of fish available to be caught by humans. A small fraction of salmon biologists are consultants or work for corporations; most are employed by governments or Indian tribes, or they are affiliated with universities. Many of these biologists focus their attention on salmon liv-

ing in rivers and the Pacific Ocean, although some spend virtually all of their careers in laboratories or in front of computer screens creating mathematical models from the data that their colleagues have gathered.

The rivers of most concern here are the Columbia and the Snake in the United States, although on occasion I will mention the Fraser River in southern British Columbia as well. Limnologists see the Columbia and the Snake as a single river system. The Snake rises in Wyoming and drains portions of Montana, Idaho, Utah, Nevada, and Oregon before it reaches the Columbia in Washington State. In his book *The Snake River*, river advocate Tim Palmer neatly presents the vital statistics: "The Snake is the tenth longest river in the United States. Carrying 37 million acre feet a year, it exceeds by two and a half times the volume of the Colorado River (1 acre foot covers an acre with 1 foot of water). The Snake receives 30 percent of the runoff from the eight mountain states and drains much of the northwestern Rockies, or 109,000 square miles, an area larger than Colorado. The basin is roughly 450 miles in length and width."[6] The Snake's canyons are spectacular, its roaring waterfalls are magnificent, and its salmon are all but gone, thanks to dams, irrigation, habitat destruction of many kinds, the impacts of hatchery-raised and non-native fish, and overfishing.

The Columbia shares many similarities with the Snake. In addition to their stunning scenery and the human-caused blows to the rivers and the salmon living there, both flow through high desert, almost all of which receives less than two feet of precipitation annually. For the most part human population is sparse; when compared to the Hudson, Connecticut, or Mississippi drainages, the human presence in terms of raw numbers borders on the insignificant, though the human impacts are as great as those on any eastern river. Near its lower reaches the Columbia rolls past Portland, the only large city along its entire 1,270-mile length, though it or its tributaries pass through Oregon's lush Willamette Valley and Washington cities including Richland, Kennewick, Pasco, Yakima, and Spokane.

Anthony Netboy began a book on the river's salmon by writing, "The Columbia River rises in Columbia Lake, some 80 miles north of the United States border in British Columbia at an elevation of 2,650 feet above sea level. . . . [It] enters the United States below Trail, in the northeast corner of the state of Washington, thus completing a journey of about 460 miles and dropping 1,360 feet in elevation."[7] The Snake is so large that when

combined with the Columbia it makes a monstrously large river draining 259,000 square miles, and its mouth at the Pacific Ocean is five miles wide.

The Columbia-Snake and the salmon inhabiting it evolved together, and there were perhaps 16 million adult salmon spawning in the river and its tributaries annually when Lewis and Clark visited in the first decade of the nineteenth century. The seven species of Pacific salmon found in North America are known by evocative names like sockeye, king, chum, silver, pink, steelhead, and cutthroat; two other species live only in Asia. The genus name for all nine is *Oncorhynchus*, Latin for "hook-nosed" from the curvature that male salmons' jaws take on at spawning time.

In a thumbnail sketch, this is the life course of salmon "in the wild" as scientists understand it: Born in gravelly streams carved by glaciers, after emerging from their stony nursery the fry may spend virtually no time at all in their natal waters or they may remain there for up to two years. Eventually, they swim toward the ocean as "smolts," undergoing extensive transformations that alter their body chemistry and enable them to live in salt water. After one to five years of maturing in the ocean, where their weight increases a hundredfold, their body chemistry again changes, this time reversing itself so that the salmon are adapted to living in fresh water. They swim inland to the same stream where they were born, in some instances traveling nine hundred miles to reach spawning grounds seven thousand feet above sea level. There they mate and, with the exception of some steelhead and cutthroat trout, the adults die shortly thereafter (the trout were only recently reclassified as salmon; even among biologists the trout label persists).

Historically, human-salmon interactions have been crucial to every society living within the salmons' range. For example, salmon played a central role in pre-Columbian cultures. Rituals developed around the fish, and they were worshiped as gods. And for good reason: economically the salmon were a product for trade, and these key religious icons provided the source of much of the sustenance for numerous tribes. Moreover, for many of these societies Nature as such did not exist. The absence of such a word in numerous native North American languages, like the Crow and Cheyenne mentioned earlier, reflects the fact that those cultures did not distinguish between themselves and other beings. Salmon and people were one.

The Europeans who successfully pursued the conquest of the land and the aboriginal inhabitants of northwest North America brought

with them ways of thinking, speaking, and behaving that treated the salmon not as equal actor but as *resource*. The dominant attitude was that the fish were exclusively economic goods available for sale, trade, and manipulation. Offshore fishing, riverwide nets, fish wheels, dams, pollution, and other technologies and technological byproducts simultaneously created and reflected a new form of interaction with salmon. Corresponding with the rise in industrial production was a sharp reduction of the number of salmon in the region. Today, fewer than 10 percent of adult salmon that return to the Columbia and Snake river system to spawn are progeny of wild fish. Most are born and reared in fish hatcheries, highly industrialized production facilities created to grow fish quickly and economically. Wild salmon are so rare that there are dozens of "runs"—or distinct populations—of salmon listed as endangered or threatened under the U.S. Endangered Species Act, and many more are in such trouble that they have been proposed for listing. Canada is rapidly catching up with the United States as its once thriving salmon runs suffer under that nation's lax environmental laws.

WHY SALMON?

Strange as it may sound, I did not select salmon as the subject of this study because they were endangered or because they were prominently in the news. Indeed, I wanted to avoid focusing on salmon as particularly special and merely explore the varying meanings of the fish absent any controversy surrounding them (though when I began this work I had no idea whether biologists would actually attribute more than one meaning to salmon). I suppose earthworms might have been a better choice, since their existence is void of the anxiety we feel about the future of salmon. But there were few earthworm biologists around. Besides, salmon have fascinated me since I was a child; their tragic and monumental journey home from years at sea to spawn and inevitably to die often reminds me of the film *Das Boot*, in which German submariners limp back to port after a harrowing voyage only to be killed by a bombing raid before they set foot on shore.

As my research proceeded, however, I found that there is much more to the salmon-human story than mere pathos. Salmon embody a unique nexus of social value and scientific curiosity. Their cultural importance