

THE
Organic
Machine

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INTRODUCTION

The Columbia River has borne fewer books than barges, but its burden has been great enough so that yet another one, even one as short as this, demands justification. This is a little book with large ambitions. It is about a particular river—a stunningly beautiful river—and the people who have changed it. But it does not approach the river in the usual way. I want to examine the river as an organic machine, as an energy system which, although modified by human interventions, maintains its natural, its “unmade” qualities.

I emphasize energy because energy is such a protean and useful concept. The flow of the river is energy, so is the electricity that comes from the dams that block that flow. Human labor is energy; so are the calories stored as fat by salmon for their journey upstream. Seen one way, energy is an abstraction; seen another it is as concrete as salmon, human bodies, and the Grand Coulee Dam. I will measure the book's success by the extent to which it surprises its readers, catches them off guard, and forces them to think in new ways not merely about the Columbia but about nature and its relation to human beings and human history.

My argument in this book is that we cannot understand human history without natural history and we cannot understand natural history without human history. The two have been intertwined for millennia. As I have gotten into middle age, history has seemed less and less about things or ideas or individual persons and more and more about rela-

tionships. Nature, at once a cultural construct and a set of actual things outside of us and not fully contained by our constructions, needs to be put into human history. Nature, to paraphrase Donald Worster, is salmon swimming, the river flowing, and, I would add, humans fishing. In aiming for a relationship, I mean to do more than write a human history alongside a natural history and call it an environmental history. This would be like writing a biography of a wife, placing it alongside the biography of a husband and calling it the history of a marriage. I want the history of the relationship itself.

What I have stressed are qualities that humans and the Columbia River share: energy and work. I do not deny the huge differences between human work and the work of nature. I do not attribute either a consciousness or a purpose to nature. I do argue that it is our work that ultimately links us, for better or worse, to nature. One of the great shortcomings—intellectual and political—of modern environmentalism is its failure to grasp how human beings have historically known nature through work. Environmentalists, for all their love of nature, tend to distance humans from it. Environmentalists stress the eye over the hand, the contemplative over the active, the supposedly undisturbed over the connected. They call for human connections with nature while disparaging all those who claim to have known and appreciated nature through work and labor.

On a more mundane level, I came to this book with a dual fascination; I have long been intrigued by both salmon and dams. I first came to know salmon years ago with Indian gillnetters on the Nisqually River. The Nisqually knew salmon by catching them. They taught me, although I was too dim to recognize it then, how nature can be known through labor. My fascination with dams began the first time I saw a turbine room of a big dam. It was so obviously a human creation, and yet, paradoxically, there was virtually no visible human presence. The interior of a dam is an eerie place. The turbines turn in the unseen river; the generators produce electricity. A dam seems a piece of ghost technology. This, of course, is not true. Humans supervise the whole immense structure; without human maintenance the machinery would freeze up and cease to function. The dam would begin to self-destruct.

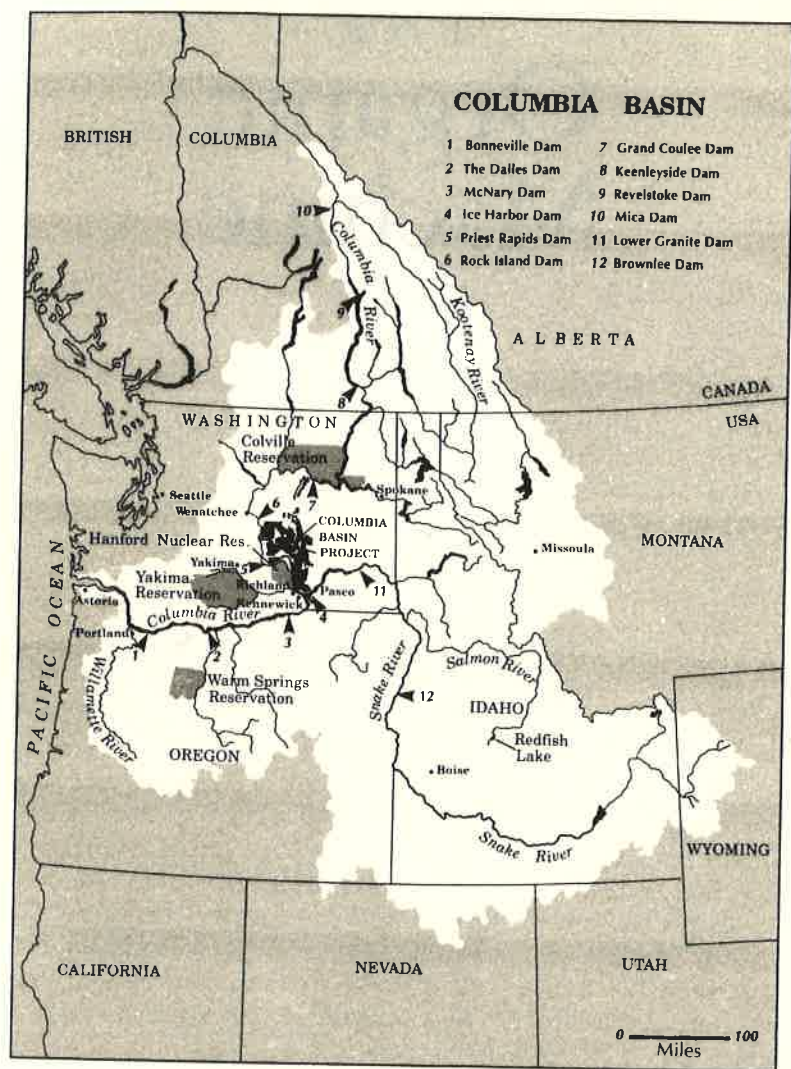
Being fascinated by both salmon and dams, and appreciative of the virtues of each, I have tried to write this book in quite conscious opposition to modern reductionisms: the reductions of the natural world

to property, the reduction of action to discourse, of life to the market, of the great changing and multifarious planet to a stable and harmonious Nature. This is a book which seeks to blur boundaries, emphasize impurity, and find, paradoxically, along those blurred and dirty boundaries ways to better live with our dilemmas. What this book suggests is that if we want to understand what we have done and how we have acted in nature, we might want to spend more time thinking about Ralph Waldo Emerson and Lewis Mumford and less about Henry David Thoreau and John Muir. We might want to look for the natural in the dams and the unnatural in the salmon. The boundaries between the human and the natural have existed only to be crossed on the river.

I want to thank Robert Self, my research assistant on this project. His aid was invaluable. Dick Lowitt saved me a great deal of effort by allowing me access to his own files gathered in his research for his book *The New Deal and the West*. James Anderson generously allowed me to attend demonstrations of CRISP, the most sophisticated computer model of the Columbia. Bill Rudolph sent me his own engaging, funny, and perceptive writings on the fishery disputes of the Columbia. John Findlay and Bruce Hevly, my colleagues at the University of Washington, allowed me to use their own work on Hanford, and Bruce perceptively read sections of the manuscript for me. Jay Taylor, who knows the fisheries far better than I do, read the manuscript for me, and Anne Spirn read the sections on New Deal planning. Both readings were immensely helpful; any misinterpretations and mistakes that remain are mine, not theirs. My wife, Beverly Purrington, put up with my fascination with dams, allowed me to turn "vacations" into hydroelectric tours, and read this manuscript with the kind of critical exasperation that I have come to depend on. Finally, I would like to thank Arthur Wang, who, for better or worse, persuaded me to write this book, patiently waited for it, and along with Eric Foner, the Consulting Editor of this series, provided both advice and judicious editing.

The format of this series does not include footnotes, but this manuscript is fully, indeed excessively, annotated. I will deposit a footnoted typescript of the unedited version of this manuscript in Special Collections of the University of Washington Library for those who are interested.

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CHAPTER 1

Knowing Nature through Labor: Energy, Salmon Society on the Columbia

I

The world is in motion. Tectonic plates drift across a spinning planet. Mountains are lifted up and eroded to the sea. Glaciers advance and retreat. All natural features move, but few natural features move so obviously as rivers. Our metaphors for rivers are all metaphors of movement: they run and roll and flow.

Like us, rivers work. They absorb and emit energy; they rearrange the world. The Columbia has been working for millennia. During the Miocene, volcanic eruptions deposited layers of basalt across the Columbia Plain. The upper Columbia cut a gutter through which it ran along the margins of the basaltic flow. At Wenatchee the rise of the Horse Heaven anticline caused the river to cut into the basalt; it drained into the Pasco basin, the lowest point on its route east of the Cascades, and emerged from the basin at the Wallula Gap. During the Pleistocene the collapse of an ice dam holding glacial Lake Missoula created the largest known freshwater flood in the earth's history. It was an afternoon's work for one of the Missoula floods to create the Grand Coulee and other rock channels of the Channeled Scablands. In those few hours it accomplished work that it would have taken the Mississippi three hundred years at full flood to duplicate. The flood rushed into the Columbia channel and finally slowed enough to create the "Portland Delta" of the Willamette lowlands. Since then ice dams have blocked the Columbia's bed, temporarily spilling the river into the Grand Cou-

lee; mountains have slid into it, and humans have dammed it. All these changes have left work for the river to do.

For much of human history, work and energy have linked humans and rivers, humans and nature. But today, except when disaster strikes, when a hurricane hits, or earthquakes topple our creations, or when a river unexpectedly rises and sweeps away the results of our effort and labor, we forget the awesome power—the energy—of nature. There is little in our day-to-day life to preserve the connection. Machines do most of our work; we disparage physical labor and laborers. The link between our work and nature's work has weakened. We no longer understand the world through labor. Once the energy of the Columbia River was felt in human bones and sinews; human beings knew the river through the work the river demanded of them.

Early-nineteenth-century accounts of the Columbia can be read in many ways, but they are certainly all accounts of work, sweat, exhaustion, and fear. The men of the early nineteenth century who wrote the Lewis and Clark journals and the accounts of the Astorian trading post, the North West Company and Hudson's Bay Company, knew the energy of the river. They had to expend their own energy to move up, down, and across it. Alexander Ross's marvelous *Adventures of the First Settlers on the Oregon or Columbia River*, a narrative of the arrival of the Astorians and the establishment of the fur-trading outpost of Astoria in 1811, can serve as a primer on the Columbia as an energy system during a time when human beings—Indian and white—had only the wind and the strength of their own muscles to match against the powerful currents of the river.

"The mouth of the Columbia River," Ross wrote, "is remarkable for its sand bars and high surf at all seasons, but more particularly in the spring and fall, during the equinoctial gales." The shoals and sandbars at the Columbia's mouth are relicts of its work and energy. In areas without strong tidal action a river deposits the load it carries to its mouth as a delta, but the Columbia emerges into the Pacific in an area of strong tides and persistent storms.

The river's current and the tides battle at the Columbia's mouth and prevent the formation of a delta. At full flood, Captain Charles Wilkes wrote in 1841, one could "scarcely have an idea of its flow how swollen it is, and to see the huge trunks of thick gigantic forests borne like chips on its bosom astonishes one." During ebb tides the river pushes its

freshwater out many miles into the sea. The tides, in turn, are felt as high as 140 miles upriver when the Columbia's water level is at its fall and winter low. This pushing and pulling produces a set of sandbars and islands at the river's mouth. Ocean currents and tides force themselves against the bars with "huge waves and foaming breakers." The result is "a white foaming sheet for many miles, both south and north of the mouth of the river, forming as it were an impracticable barrier to the entrance, and threatening with instant destruction everything that comes near it." To enter the river, ships, powered only by wind and aided by the tide, or boats and canoes powered by human muscle, had to pass through this barrier.

During the Astorians' own terrible entry into the Columbia in 1811, they sent out small boats to find a channel into the river for their ship, the *Tonquin*. In Ross's dramatic telling, the Astorians watched as the *Tonquin's* first officer, Ebenezer Fox, protested to Captain Jonathan Thorn that the seas were "too high for any boat to live in." In reply Thorn only taunted Fox: "Mr. Fox, if you are afraid of water, you should have remained at Boston." Fox's uncle had died at the mouth of the Columbia. In despair Fox announced that he was "going to lay my bones with his." He shook hands with the Astorians and, getting into the boat, shouted, "Farewell, my friends . . . we will perhaps meet again in the next world." Fox's crew was inexperienced and the sea violent. Not one hundred yards from the ship the boat became unmanageable. The waves hit the craft broadside, whirled it like a top, and "tossing on the crest of a huge wave, [it would] sink again for a time and disappear all together." Fox hoisted a flag to signal his distress, but the *Tonquin* turned about, and they "saw the ill-fated boat no more."

Ross himself took part in a second attempt, and he discovered more immediately the experience of pitting human energy against the energy focused at the mouth of the river. As they first approached the bar with its "terrific chain of breakers," the "fearful suction or current" gripped the boat before they realized what had happened. The second officer, Mr. Mumford, called for them to match their strength against that of the river and sea: "Let us turn back, and pull for your lives. Pull hard, or you are all dead men." They pulled hard and survived, but this attempt to enter the river and two more failed. The *Tonquin* eventually made the passage across the bar, but only after eight men had died.

In their ordeal at the bar the Astorians had confronted storms, sand-

bars, and currents; men had labored and died. But wave, water, and wind—and human labor—can be represented in ways beyond the immediacy of actual experience. We can abstract them to a single entity: energy. There is a physics to the *Tonquin's* drama at the river's mouth, and it leads outward beyond the earth to the sun and the moon. Lunar gravitation causes the tides, but virtually all the rest of the energy manifest at the Columbia's mouth originates in the sun. The sun, in effect, provides fuel for a giant atmospheric heat engine which evaporates water from the oceans and produces winds that move the moisture over land. As the clouds cool, the moisture falls as rain. Without solar energy to move the water inland and uphill, rivers would never begin; without gravity to propel the water downhill back toward the ocean, rivers would never flow. In a real sense the Columbia begins everywhere that the rain that eventually enters it falls. The Columbia gathers its water from an area of 258,200 square miles, but not all that water finds its way into the river as it flows 1,214 miles to the sea. Some of it is lost through transpiration and use in plant tissues; some is lost through evaporation.

Physicists define energy as the capacity to do work. Work, in turn, is the product of a force acting on a body and the distance the body is moved in the direction of the force. Push a large rock and you are expending energy and doing work; the amount of each depends on how large the rock and how far you push it. The weight and flow of water produce the energy that allows rivers to do the work of moving rock and soil: the greater the volume of water in the river and the steeper the gradient of its bed, the greater its potential energy.

In fact, however, neither the Columbia nor any other river realizes all of its potential energy as work. Indeed, only about 2 percent of the river's potential energy results in work: the erosion, transportation, and deposition of matter. About 98 percent of the river's kinetic energy is expended in friction as the moving water rubs against itself, its bed, and its bank. This energy is dissipated as heat within the river.

Engineers can measure the potential energy and the kinetic energy of the Columbia with some precision, but early voyagers like Ross recognized the power—the energy—by more immediate if cruder measures. They measured it by the damage it did as it threw ships or boats or bodies against rocks or sandbars. And they measured it by the work they had to perform to counter the river's work. They knew something

we have obscured and are only slowly recovering: labor rather than "conquering" nature involves human beings with the world so thoroughly that they can never be disentangled.

During the forty-two days of Ross's first trip upriver from Astoria, the river demonstrated its power again and again. The river upset the Astorians' boat; it dunked the men, drenched them, grounded them, and delayed them. But mostly the river made them work, sweat, and hurt. "On the twenty-third [of the month] . . . we started stemming a strong and almost irresistible current . . ." The "current assumed double force, so that our paddles proved almost ineffectual; and to get on we were obliged to drag ourselves from point to point by laying hold of bushes and the branches of overhanging trees . . ." "The burning sun of yesterday and the difficulty of stemming the rapid current had so reduced our strength that we made but little headway today." "We were again early at work, making the best of our way against a turbulent and still increasing current."

Ross had reached the Cascades, the rapids where the Columbia bursts out of the mountains. Above the Cascades were even worse rapids at the Dalles, and the Dalles commenced with Celilo Falls. Here the current was too strong and travelers had to portage.

Above Celilo Falls, Ross's litany of labor continued. "The current was strong and rapid the whole day." "[We] found the current so powerful that we had to lay our paddles aside and take to the lines." "The wind springing up, we hoisted sail, but found the experiment dangerous, owing to the rapidity of the current." And so they proceeded through Priest Rapids, where the "water rushes with great violence," and through lesser rapids where a whirlpool grabbed a boat, spun it several times, and sent it careening down a chain of cascades. Ross stopped at the Okanogan River. If he had gone farther, more rapids awaited: Kettle Falls, and farther still, the Dalles des Morts. The largest tributaries of the Columbia, the Snake and the Willamette, contributed falls and rapids of their own.

So thoroughly did Ross come to measure the river by the labor he pitted against it, by the feel of his body, by the difficulties it presented, that his return downstream with the river's energy speeding him back to Astoria from Fort Okanogan could be contained in a sentence. "On the twenty-sixth of February, we began our homeward journey, and spent just twenty-five days on our way back."

With so much energy deployed against them, it was remarkable that voyagers could proceed at all. The first white fur traders built what they called canoes out of cedar planks caulked with gum. Such boats could not stand the rapids. The Astorians longed for another Indian technology—the more familiar birchbark canoes of the eastern rivers. The Northwesters who succeeded the Astorians actually imported the birchbark necessary to make birchbark canoes.

Efficient movement on the river demanded not just muscle power but knowledge and art. The fur traders, fortunately, had examples of both before them. In the Indians' cedar canoes, efficiency and art met and became one. The Indians carved each of their canoes from a single log; Gabriel Franchère, another of the original Astorians, reported that the largest canoes were thirty feet long and five feet wide. And as Robert Stuart, also an Astorian, wrote: "If perfect symmetry, smoothness and proportion constitute beauty, they surpass anything I ever beheld." Some were as "transparent as oiled paper."

The art and knowledge embodied in the canoe demanded an equal knowledge of the river. Lewis and Clark were repeatedly amazed at the conditions Indians ventured out in, and William Clark had thought them "the best canoe navigators I ever Saw." Stuart concurred: The Indians were "the most expert paddle men any of us had ever seen." If the river overpowered their canoe, they would spring "into the water (more like amphibious animals than human beings), right and empty her, when with the greatest composure, they again get in and proceed." But the clearest mark of knowledge and skill was when nothing happened, when Indians knew which paths through the river were the most efficient and least demanding of human energy.

The river's lessons that the Astorians learned, the North West Company men would have to relearn. The poverty of the boats and the inability to maneuver them that the governor-in-chief of the Hudson's Bay Company, George Simpson, found on his first voyage of inspection to the Columbia posts in 1824 provoked a spluttering astonishment that still resonates in his journal. "There is not," he wrote, "a Boat at the Establishment [Fort George] fit to cross the River in bad Weather nor a person competent to sail one." Simpson's attempt to cross in a boat with rotten rigging had proceeded only a mile before everyone on board was bailing with hats and buckets. The boat struck a sandbar and drifted off, with the crew rowing madly against an outgoing tide until they

"exhausted their strength at the Oars." They were only saved when the tide turned and swept them back into the river, where they made shore, abandoned the boat, and walked back to the fort. Farther upriver, however, where Canadian boatmen were more in their element, the British naturalist David Douglas could in 1826 admire the "indescribable coolness" with which Canadians shot the rapids.

The Canadians showed Douglas that the knowledge of how and where to use the boats was as important as the boats themselves; the complexities of the energy system of the river could be made to work for as well as against travelers. "Our Indians," the American explorer Charles Wilkes wrote in 1841, "cunningly kept close to the shore & thus took advantage of all the eddies." Such knowledge was initially a bodily knowledge felt and mastered through experience and labor. Even when learned from others, the messages sent through nerve and muscle constantly validated or modified acquired knowledge. Knowledge of the river was in large part knowing how its velocity varied and where it was turbulent. With proper experience, traveling against the current on the Columbia demanded less expenditure of human energy than traveling overland. The hydraulics of the river sketched out a map of energy; this geography of energy was also a geography of labor.

George Simpson saw the world with the eyes of an adventurous accountant. He gauged rivers, as he judged his men and the Indians, by the work they did, the expense they required, and the profit the company might derive from them. In 1824, on first entering the Columbia near the Cedar River, he had found the current of the Columbia "so strong that at first sight one would scarcely suppose it possible to stem it even with the Towline." But "on more attentive observation it is found that in every reach there is a strong back current or eddy which renders it easy of ascent."

The Columbia, as Simpson noted, does not travel at a constant speed along its bed. Friction divides its very current against itself. It divides it horizontally. Where the water meets earth and rock along the river's bed and banks, friction slows the current. Velocity increases away from the shore. The river's current also varies vertically. The river, in effect, is composed of layers. It is the fluid equivalent of a piece of plywood, but in the river's case each layer moves at a different velocity. The layer of greatest velocity is always below the surface. With a constant depth of flow, velocity increases toward the center of the river and rises toward

the surface. Where the channel is asymmetrical, maximum velocity shifts toward the deeper side.

As Simpson noticed, the very velocity of the river created other compensatory effects that reduced human labor. Water, as a fluid, cannot resist stress. When the river's velocity reaches a certain point, the flow becomes turbulent. The layers mix; the flow at some points eddies back against the main current.

The velocity of the river changes across both space and time. When the volume of water increases in spring and summer with melting snows from the mountains, friction does not increase proportionately. The area of bank and streambed increases by a much smaller increment than does the volume of water. When deep and full, rivers run faster than when shallow. Thus the velocity of the Columbia increases in the spring and summer, and it increases the farther one goes downstream.

As every voyager on the river knew, it was not just speed that created turbulence; the flow of a river also depended on the roughness of its bed. Obstructions in its channel—rocks and boulders, trees or piers—separate its flow and create eddies. Eddies create the waves, vortices, and surges that characterize rapids. And the Columbia possessed some of the fiercest and largest rapids on the continent.

The places on the Columbia marked by the greatest turbulence and velocity formed a gauntlet through which voyagers had to pass. Roughly eight hundred years ago a three-mile chunk of Table Mountain fell into the river, blocking it entirely. Stand at Bonneville Dam and you can see the gash it left in the mountain. One hundred and fifty miles from its mouth, the river eventually cut a rocky path through the slide's outer edge, forming the Cascades. Robert Stuart described the current as that "of a Mill Sluice, and so rough that the Ocean agitated by a tempest would be but a faint comparison."

Roughly forty miles above the Cascades came the Dalles or Long Narrows, where a basalt flow constricted the Columbia. Narrowing the channel increased the velocity of the Columbia in the same way that partially blocking the outlet of a hose with your thumb increases the water's velocity. In the words of David Thompson, a North West Company man who probably knew the continent more intimately than any other human alive, the "walls of Rock contract the River from eight hundred to one thousand yards in width to sixty yards or less: imagination can hardly form an idea of the working of this immense body of water

under such compression, raging and hissing as if alive." To William Clark it was an "agitated gut Swelling, boiling and Whorling in every direction." At full flood the river rose high up the narrow gorge. David Douglas saw tree trunks "3 feet in diameter . . . on the rocks, 43 feet above the present level . . . placed there by the water." Just as compression increased speed and energy, so did gravity when the incline of the river's bed steepened. Immediately above the Dalles, at Celilo Falls, cascading water increased in velocity and thus increased the amount of kinetic energy it produced.

At these places where the river narrowed and/or fell in a short distance, the river's energy was greatest. The river became dramatic and dangerous. Falls and rapids yielded disproportionate death to those inexperienced at handling boats or cedar canoes or those who chose risk over the labor of portage. There was, however, danger no matter how great the skill of the paddlers.

The early accounts of missionaries provide a grim narrative of the dangers of rivers. "The water being very high and the current strong," was the Methodist Elijah White's prologue to an 1843 accident in which a canoe carrying four whites and four Indians was swept over Willamette Falls on the Willamette River. A hopeless effort to battle the current, a "thrilling shriek" from Mrs. Rogers, and the victims were gone. Two Indians jumped and survived. Everyone else died. Five years earlier an Indian canoe carrying missionaries attempted to run the Cascades and overturned. When it was righted and brought to shore, the Indian crew found the dead body of the drowned infant son of Mrs. Elijah White in the canoe. A short time earlier a Hudson's Bay canoe with seven men was lost at the same place.

It took only bad luck, a moment's panic, or a lapse of skill for the river to claim its toll. The Dalles des Morts of the Columbia received its name in the 1820s when the river had wrecked a Hudson's Bay Company party, killing five men and reducing one survivor to cannibalism. Near the Dalles proper, nine men drowned in 1830 on a stretch of the river not considered especially dangerous. And in 1842 Father Pierre De Smet, who described the Columbia as "but a succession of dangers," watched in horror as what appears to have been the Whirlpool Rapids near Kalichen Falls swallowed a Hudson's Bay Company bateau, drowning five bargemen.

These rapids and falls created the most revealing places on the river.

They were critical sites in a geography of energy, and they were critical places in the social, cultural, and political geography humans constructed. A scholar needs to consider them at least as carefully and from as many angles as a boatman preparing to run them.

As we now understand rivers, they seek the most efficient and uniform expenditure of energy possible. Rivers constantly adjust; they compensate for events that affect them. They are, in this sense, historical: products of their own past history. "The river channel," concluded one geomorphologist, is "a form representing the most efficient—in terms of energy utilization—geometry capable of accommodating the sum total of the means and extremes of variability of flow that have occurred in that channel throughout its history."

Where obstacles slow rivers, rivers try to restore an even velocity; where the gradient increases or the channel constricts, rivers try to widen or build up their bed. The Columbia ceaselessly worked to widen the Dalles and it responded to Celilo Falls by working to downcut the falls and erode the plunge pools until the falls themselves eventually would even out and disappear. When an obstacle such as a beaver dam or a hydraulic dam slows a river's current, for example, its speed and energy decrease. The river drops part of its load—the material it works to move. It gradually builds up its own bed and increases its gradient, thus increasing its speed and its kinetic energy. Eventually it will remove the obstacle.

In the long run the river's work of eliminating obstructions aids the human work of moving up and down rivers. But in the short run rapids and falls demand greater expenditures of human energy to counter the river's energy. This combination of energies bonded the material and social; the natural and cultural intertwined. The geography of energy intersected quite tightly with a geography of danger and a human geography of labor. Precisely where the river expended its greatest energy, humans had to expend the most labor and confront the greatest danger.

At the falls and rapids travelers had to portage. Indians living at the Cascades had canoes at either end of the portages, but travelers had to carry their cargo and either tow or carry their boats. It was hard and demanding work. Portaging the Cascades brought Lewis and Clark much "difficulty and labour," cost them a pirogue, and left their men "so much fatigued" that they granted them a respite. The missionary

Mrs. Elijah White, whose baby drowned at the Cascades, had gladly reembarked two-thirds through the portage because she and David Leslie "with wet feet and fatigue were very uncomfortable." Going upstream, everyone had to portage; going downstream, danger could be substituted for labor.

The Cascades and the Dalles were the most dangerous points on the river and the longest portages. At the Cascades—which one of the literary Astorians described as "that rocky and dangerous portage"—the "laborious task of carrying" made clear the distinction between the work of the river and the work of human beings. In one sense, the expenditure of energy by human workers was as natural as the energy of the river, but human work was socially organized and given cultural meaning. The Cascades and the Dalles, for example, bared class divisions among the Astorians and revealed their relation to work and power. Ross, "not being accustomed myself to carry," instead stood armed as a sentinel against the Indians, but with those subordinate to him "wearied to death," he took up a load. The first ascent left him breathless and able to "proceed no farther." He hired an Indian to carry the load, and the Indian proceeded "full trot" across the portage, only to pitch the pack of tobacco over a two-hundred-foot precipice at the end. He and fifty others laughed uproariously as Ross scrambled to retrieve the load. The joke was about work and power, weakness and dominance, all of which were physical and social.

The river demanded energy to match its energy, and this shaped and revealed the organization of work. The necessity of portages and the limits of human labor caused the Hudson's Bay Company to transport all its goods in ninety-pound packages. The expenditure of labor in carrying these packages involved numerous acts of calculation, conflict, abuse, and cooperation. In these acts a social order became transparent.

If all journeys were downstream, if there had been no rapids or falls, then the human relations on the early-nineteenth-century river would have been different. The labor white men expended in the ascent forced them into close contact with Indians. The knowledge that in passing upstream they had to travel close to shore to take advantage of back-currents encouraged efforts to accommodate Indians. David Thompson, the remarkable North West Company explorer who descended the Columbia just as the Astorians were arriving at its mouth, succinctly

calculated the social result of this mix of river energy and human labor when he explained why he stopped to smoke and exchange gifts with the Sanpoils as he passed downstream.

My reason for putting ashore and smoking with the Natives, is to make friends with them, against my return, for in descending the current of a large River, we might pass on without much attention to them; but in returning against the current, our progress will be slow and close along the shore, and consequently very much in their power; whereas staying a few hours, and smoking with them, while explaining to them the object of my voyage makes them friendly to us.

Passage along the river was, Thompson realized, not just physical; it was social and political. Social and political rituals were as necessary as labor to move against the current. Indians expected gifts and ritual at the portages. The failure of whites to meet such expectations brought conflict from the time of the Lewis and Clark expedition until the 1820s.

In English the words "energy" and "power" have become virtually interchangeable. Horsepower is, for example, a technical measure of energy. But we also speak metaphorically of the power of the state. Thompson spoke of being "in the power" of the Indians. The conflation is partially metaphorical, but it also arises because both meanings involve the ability to do work, to command labor. To be powerful is to be able to accomplish things, to be able to turn the energy and work of nature and humans to your own purposes.

We conflate energy and power, the natural and the cultural, in language, but they are equally mixed as social fact at the rapids and portages. The energy system of the Columbia determined where humans would portage, but human labor created the actual route of the portage, and human social relations determined its final social form and outcome. The Dalles, *per se*, did not cause Ross's dilemma. Ross's humiliation was an incident of power. Human labor would later make the Dalles and the Cascades the sites of dams that produced energy—power; they were, however, long before this, sites at which humans contested over social power—the ability to gain advantage from the labor of others.

Spatial arrangements matter a great deal in human history. They reveal the social arrangements that help produce them. The repeated conflicts at the Dalles and the Cascades revolved around a particular organization of space. Whites regarded the space at the Cascades and the Dalles as open, as culturally empty. Indians regarded it as full. In a space that brought together many different peoples, Indians expected gifts to mediate and smooth passages through this social maze. Too often whites replaced gifts with force; they resented what they perceived as theft and pillage. The space became uniquely violent.

II

Examining how humans moved on the river provides one angle of vision on the rapids and falls of the Columbia; examining how salmon moved up and down the river provides a second, equally revealing, perspective. It was, after all, the salmon that brought thousands of Indians to the Cascades, to the Dalles and Celilo Falls, to Priest Rapids and Kettle Falls.

As much as wind, wave, and current, salmon were part of the energy system of the Columbia. Salmon are anadromous fish: they live most of their adult life in the ocean but return to the stream of their birth to spawn since the Columbia does not provide sufficient food to support the salmon born in its tributaries. The precise timing of the movement of young salmon to the sea depends on the species, but eventually all except the kokanee (a form of sockeye which, although nonanadromous, retains the genetic potential to become so) make their way to the ocean. During their time at sea Columbia salmon harvest the far greater solar energy available in the Pacific's food chain and, on their return, make part of that energy available in the river. By intercepting the salmon and eating them, other species, including humans, in effect capture solar energy from the ocean. Salmon thus are a virtually free gift to the energy ledger of the Columbia. They bring energy garnered from outside the river back to the river.

For salmon the rapids and the falls represent obstacles that force them to expend energy, but to the Indians the combination of salmon and rapids and falls seemed providential. In 1811 Gabriel Franchère traveled with one of the sons of Concomly, the leading Chinook chief on the

lower Columbia. He told Franchère that in perfecting creation Ekan-unum (Coyote) had "caused rocks to fall in the river so as to obstruct it and bring the fish together in one spot in order that they might be caught in sufficient quantities." On the Columbia, where the river was the most turbulent the fishing was best. Rapids and waterfalls forced fish into narrow channels; they forced salmon toward the surface. And as the fish became concentrated and visible, they became more vulnerable to capture.

At the rapids human art and technology altered the river to increase the difficulties for fish. At low water in early May, for example, the Nespelems and Sanpoils built weirs to deflect fish toward artificial channels cleared at certain points in the rapids. The bottoms of the channels were lined with white quartz to make the fish more visible. On smaller tributaries, the Indians built weirs to block the fish until their harvest was complete. At Kettle Falls the Indians fixed timber frames in the rocks of the falls and from them they hung huge willow baskets, ten feet in diameter and twelve feet deep. Leaping salmon would strike the frames and fall into the baskets, where waiting fishermen clubbed and removed them. A single such basket could supposedly yield five thousand pounds of fish a day at the height of the runs.

Robert Stuart described how, at the Dalles, Cathlakaheckits and Cathlathalas built scaffoldings which extended out over the water. "The places chosen are always a point where the water is strongest, and if possible a mass of rock near the projection between which and the shore the Salmon are sure to pass, to avoid the greater body of the current." From the platforms fishermen extended dip nets, and during the peak of the run "the operator hardly ever dips his nett without taking one and sometimes two Salmon, so that I call it speaking within bounds when I say that an experienced hand would by assiduity catch at least 500 daily."

The human energy expended to obtain salmon did not dependably yield a proportionate return of caloric energy from the fish. Salmon do not bestow their gift of energy evenly. Salmon cease feeding when they enter freshwater and live off the fat they have formed while feeding in the ocean. Because salmon burn stored calories to progress against the current, they lose caloric value as they proceed upstream. Early travelers along the river noted the changing quality of the salmon. Descending the river, David Thompson did not find fat salmon until he was near

present-day Pasco. Thompson found the Indians taking salmon as high up as the Arrow Lakes, but "they were very poor, necessity made them eatable."

Thompson was not being an epicure. His own body, needing calories to provide energy to do the work the Columbia demanded, craved fat salmon for a reason and rightly gauged its quality. A salmon caught at the mouth had 100 percent of its original caloric value. A salmon caught by the Wishrams at the Dalles had roughly 88 percent. A salmon caught by the Nez Percés near the Snake River had 52 percent. A salmon caught by the Kutenais on the Kootenay River at Nelson or Windemere, British Columbia, had only 25 percent.

The gifts salmon gave varied temporally as well as spatially. The extraordinary yields at the fisheries Stuart mentioned were fleeting. There was a seasonality to the river flow and fish runs that neither art nor knowledge could overcome. During spring flood in late May and June, many sites at the rapids could not be fished at all. The salmon set other limits. Four species of salmon (*Oncorhynchus*), as well as the steelhead trout (*Oncorhynchus mykiss*), spawn in the Columbia and its tributaries, and there is some evidence that a fifth species, pink salmon, once did so. Before their late-nineteenth- and twentieth-century decline, they returned to the Columbia in astonishing numbers, but they did not go everywhere nor did they come evenly. All species passed through the lower river, but at each tributary some spawners separated from the main run; the size of a run decreased as it proceeded up the Columbia.

The largest salmon species was the chinook or king salmon, and it was the chinook that came up the river in the greatest numbers. They actually came in three separate runs: spring, summer, and fall. Each run differed not only in its timing but in its combination of spawning areas, size of fish, and life history. Originally, the spring chinook run was the largest and, for most Indians, the most critical. The first fish might enter the river in February, but the Chinook Indians told Lewis and Clark that they arrived in significant numbers in April. Robert Stuart said spring chinooks reached the Dalles in mid-May, with the greatest numbers coming over the next two months.

Subsequent runs shaded into each other. The spring run of chinook (*O. tshawytscha*) merged into the summer run and the summer into the fall. Sockeye or blueback (*O. nerka*), which spawn in lakes, come

in late summer and early fall, and the coho or silver (*O. kisutch*) arrive in the fall. The chum or dog salmon (*O. keta*), the least desirable species, first enters the river in October and spawns largely in the lower tributaries below the Dalles. The steelhead (*O. mykiss*), an oceangoing trout which spawns and returns to the sea, has a summer and winter run. The size of each of these runs fluctuates from year to year.

The seasonality of salmon and the geography of energy that concentrated fishing sites meant that during a relatively short span of time a single place provided a sizable portion of the total annual caloric intake of Indian peoples on the Columbia. At the Dalles the Wishrams and Wascos derived between 30 and 40 percent of their annual energy requirements from salmon; at the other extreme, farther upriver, the Kutenais, Flatheads, and Coeur d'Alenes obtained 5 percent or less.

Taking so many salmon in so short a time, however, meant that the salmon were worthless unless preserved. Preserving fish on the Columbia meant drying them, and this demanded a second convergence of labor and energy. Women's work preserved the fish men caught. On the lower river fish often had to be smoked to be dried, but at the Dalles and above Indians could rely on solar energy—the direct heat of the sun—to dry the fish they split and set out on racks.

As the salmon dwindle and environmental crises deepen, there is an understandable tendency to romanticize and even invent pasts in which the planet was nurturing and humans simply accepting and grateful. And the Columbia, with the annual passage of millions of fish, invites such images. Salmon have sustained culturally rich human communities whose way of life stretches back over five thousand years.

But the people who awaited the salmon were not simple fisherfolk gratefully taking the bounty of their mother earth. Culturally, they made no assumptions about the inevitability of the salmon's return. Their rituals, their social practices, their stories all recognized the possibility that the fish would fail to appear. They waited for salmon not with faith but with anxiety. Depending on how long Indian cultural memories extended, they had good reason to worry. When Table Mountain slid into the river eight hundred years ago and formed a huge lake, it almost certainly cut off all the people upriver from the salmon runs until the river broke through.

In the myths of the river there is a recurring motif of a time when

sisters imprisoned the salmon—sometimes within a lake or pond, sometimes behind a dam—and how they are freed by Coyote, the lecherous and often foolish culture hero. Coyote, who defecates so he can consult his feces whenever he needs advice, often uses either the wisdom of women or the tools of women—digging sticks—to take the salmon from the sisters. Indians usually put the site of this dam near the Cascades.

In these stories the women who prevent the coming of the salmon are identified with birds. They are often *wi'dwid*, a Sahaptin word usually translated as swallows, but which also can refer to water snipes or wild ducks. Sometimes it is eagle people who imprison the salmon. Sometimes it is the sandpipers. But as the Wishram story makes explicit, the connection is with a bird whose migration coincides with the spring arrival of the chinook, or as among the Sanpoils, with birds who live by the water and eat fish. In another Wishram myth Dove is Salmon's wife. "Whenever the salmon comes, they kill him at Wishram, and then the dove cries."

This connection between women, birds, salmon, and a time when the salmon did not come was ritually reenacted each year along the river. When the salmon ran and the birds returned, the activities of women became circumscribed. Space reflected and structured power as men controlled access to the fish. Among the Sanpoils and Nespelems men prohibited women not only from visiting fish traps but also from crossing or using trails that led to them. Women could not take water from a stream that contained a fish trap. They had to remain several paces away from the distributing center which contained the common catch. The taboos affected all women, but their prime object was menstruating women, whose contact with water or salmon could cause the run to cease.

The blood of menstruating women was not unique in its power to offend salmon. Any bone had the same effect. So did internal organs. So, too, did the death of a fisherman. David Thompson, watching the fishing at Kettle Falls, reported that neither the scales nor the bowels of cleaned fish were thrown back into the water. If a speared fish escaped, fishing was done for the day. When the spear of one fisherman came too close to the skull of a dead dog, it was polluted and fishing ceased until spear and spearman were ritually purified. Thompson himself was inclined to dismiss all this as superstition, but when one of Thompson's

Canadians threw the bone of a dead horse into the river, he reported that the fish vanished. An Indian had to dive down and retrieve the bone. A few hours later the salmon returned.

But the fishery in actual practice was about doing everything that the taboos prohibited: it was about shedding blood; it was about taking what was inside living things—blood, bone, and organs—and putting it outside. It was about the death necessary to sustain life. And the rituals acknowledged this and compensated for it by treating with reverence and respect, in a controlled ceremonial context, those things which, if uncontrolled, could cause the salmon to disappear.

When the salmon first appeared, Indians shed its blood ritually; they consumed it ritually; they preserved the bones. Sometimes the ritually treated blood and bones were restored to the river. To catch salmon, the Astorians had to observe ritual prohibitions. They could not cut salmon crosswise, and if cooked, the salmon had to be consumed before sundown.

The rituals along the Columbia took the biological necessity of obtaining the caloric energy needed to live and elaborated it into a web of social meaning and power that took on consequences of its own. Both men and women caught and ate salmon, but not equally. Ritual restricted the movements and actions of women far more than those of men. The rituals connected the taking of fish with the privileged position of men over women and reinforced that position. They gave men the credit for bringing salmon to the people and placed most of the burden of the failure of the salmon runs on women.

But the elaboration went further than this. In this most critical of times, many groups created a salmon chief, a man who had the power to regulate the fisheries by deciding when fishing began and ended. That the salmon chief had the power to control the timing of human work at the fishery is so clear that we tend to neglect the way in which that chief also indirectly controlled access to space at the fishery.

The acts by which salmon swim upstream, are caught by human beings, and are eaten take place in a temporal sequence, but they are also movements through space. For millennia their culminating moments tended to take place at specific sites: salmon were caught at the Dalles or the Cascades or Celilo Falls; they spawned in the specific stream of their birth.

Humans, too, lived at specific sites and moved through space in a predictable manner. The lower Columbia River valley was one of the most densely populated areas of aboriginal North America. The names of the peoples who lived there are, however, hardly familiar even to scholars who study Indian peoples. There were Chinooks and Clatsops and also Kathlamets and Wahkiakums near the mouth of the river. Katskanies and Cowlitzes a little farther upstream. Then come Skillutes, Kalamas, Quthlapottles, Clannarminnamons, Multnomahs, Tillamooks, Shotos, Clanninatas, Cathlahnaquiahs, Cathlacommahtups, and many, many more, before the last of the predominantly Chinookan speakers, the Wascos and Wishrams, yielded to Sahaptin speakers at Celilo Falls. The names, drawn largely from Lewis and Clark, the Astorians, and other early voyagers on the river, form a lexographic thicket. Sometimes they signify a town or village; sometimes a group of towns or villages; sometimes they refer to what whites regarded as a tribe, sometimes to the people living in a geographic region.

But all these towns and villages, all these "tribes" and territories, were porous. The lower Columbia was not a world of tribes. The basic social unit was the village or town organized around a core population of related males. People ebbed and flowed in and out of these settlements according to season. Summer sites attracted families related through women. Such movements seasonally fragmented winter villages as people moved toward the Columbia in summer; away from it in winter. People could not go wherever they chose. Space was not empty or free. Movements demanded connections, and the strongest connections came through the out-marriage of women. Kin connections secured usufructary rights at fishing places and at wapato grounds. This was a society of dense networks of relations, and the salmon fisheries formed a basic node where the lines of human relationships intersected. The possibility of taking salmon in large numbers drew people to the fisheries from a wider region. When the salmon ran, thousands of people flocked to the Columbia fisheries from the interior. At the Dalles the permanent population of roughly 600 swelled to as high as 3,000 during the peak of the fishery.

As nodes where the lines of human relationships clustered, the fisheries revealed a regional organization. They marked, first of all, a broad division between summer and winter towns and villages. The activities

that took place at the summer sites emphasized kinship ties through women. They were materially central, the sites of fishing and food gathering.

The internal spacing of activities at the summer fishing sites is also revealing. It is impossible now to re-create in detail the spatial organization of the Dalles or the Cascades. No one mapped them or tapped human memories to demarcate them before they vanished under the waters of the dams. But such maps of memory do remain for Celilo Falls, which was really the beginning of the Dalles. The falls was among the most densely named and intimately known places on the river. The names grew from human labor. Celilo Falls is gone now, buried since 1956 beneath the waters of the Dalles Dam, but once it was thick with specifically known and bounded human spaces. At Celilo, Sahaptin fishers named places where people cast gill nets when the river ran normally; others named places to cast nets when it ran high. At *tayxay-tapamá* there was a bed of pale flat stones under clear water which made the fish stand out for spear fishing. Where the river fell at *sapwilalatapamá*, men could dipnet leaping salmon. At *áwxanayčáš* ("standing place") seven men could stand with their dip nets on twenty-foot poles to dip into the rushing current. Nearly every rock and island in the falls suitable for fishing acquired a name.

Such spatial divisions both made visible and reproduced the social structure of the Chinookans and Sahaptins who fished the rapids. Just below Celilo Falls, at the Wishram villages on the north bank of the Dalles, such fishing stations were owned by groups of relatives who controlled access. Each group seems to have had a station for using dip nets in summer, for spearing in the fall, and for seining.

To watch such fisheries would be to watch an intricate series of convergences among the energy of the river, the work of salmon, and the labor of humans. It would be to see how humans socially and culturally organized this labor and to glimpse how people were connected and ranked. The spatial arrangements created maps of energy, maps of labor, and maps of meaning. Each of these places was unique. They were bounded spaces which, in Michel Foucault's words, were "irreducible to one another and absolutely not superimposable on one another." There was only one *Awxanaycas* at Celilo and which seven men stood there was socially determined.

In this world the human and the natural were tightly linked, but one did not determine the other. The social organization of Indians was not reducible to control of the rapids or access to salmon; there were no recorded "tribal" conflicts over resources or territory. Geography and nature influenced without determining culture.

At the rapids the intersection of labor and nature produced wealth. There is no doubt about that. The abundance was readily apparent to the first whites. Lewis and Clark saw, in Clark's fractured spelling, "emenc quantites of dried fish." They presumed the fish were for trade, but they could not figure out who bought them.

Lewis and Clark presumed a market which reduced everything in the world to an equivalence. Making things equivalent did not mean making everything equal in value, but it did mean that any good could theoretically be traded for any other good. But this was not true on the Columbia. Food normally moved only in exchange for other types of food. The caloric energy of fish was the great wealth of the fishing places, but it could not readily be translated into other forms of wealth with higher prestige value. Food had a different social meaning than did slaves, dentalium shells, or canoes.

Exchanges of food suggested an ongoing relationship rather than a single act in which a person sought advantage. And thus at the Dalles, the great mart of the Columbia, fish occupied only a limited sector of exchange. Those who flocked there to trade came for horses, buffalo robes, beads, cloth, knives, and axes. They traded and gambled while the huge yields of fish supported their numbers. Those who came for fish came because they had the kin connections that allowed them to share the fishery and take their own fish. They created the huge stocks of pounded and dried salmon that Lewis and Clark saw. This salmon would see them through the winter. And because the fish had expended some of their fat in reaching the Dalles, salmon dried there had a lower oil content and would keep better than fish caught lower down. This was prime dried salmon and would be traded, usually for other types of food, up and down the river.

At the Dalles and the Cascades ownership of a particular fishing site did not automatically translate into wealth. The fish belonged to the fishermen who caught them, but old men could freely take the fish they required for their meals. And strangers and relatives both could

claim some of the bounty of the catch. Many of the strangers who concentrated at the Dalles during the fishing season never fished, nor did they lay in a supply of fish.

And fish, in any case, had little to do with the competitive social rankings of people and villages apparent in ceremonies such as the potlatch. It was wealth in scarce and valuable goods—in slaves from more distant peoples or dentalium shells or trade goods—that buttressed such rankings. Food, usually abundant and of lesser prestige, could not normally obtain such things. The Dalles and Celilo, the great fisheries and site of this exchange of wealth, thus ranked below the winter towns and villages lower down the Columbia. The winter villages of the lower river where related males lived were the sites of riskier and higher-prestige activities: slave raids, warfare, and religious performances.

The whites partially changed these relations. They offered nonfood valuables for food. And Indians, hesitantly at first, made an exception for them. Ross and Franchère, like Lewis and Clark before them, described the initial difficulty of trading for fish or other food. Fish eventually moved in exchange for the valuables whites offered, but thirty years after the arrival of the Astorians, Charles Wilkes reported that at the Cascades the Indians "refuse to sell any Salmon until after the first run and then always without the heart they have many superstitions in relation to them . . ."

III

There was a final geography of energy on the Columbia, an interior geography of the human body itself. The human body always forms an exterior geography of signs; a map of meaning. On the lower Columbia, for example, a flattened head denoted freedom, a round head slavery. A dentalium shell in the septum told of wealth or status. But within the body, beneath such signs, we form a space in which other organisms live. Such organisms can be as lethal to us as we are to the salmon; they can mark our bodies with other signs.

A sustained note of bewilderment and subdued horror entered the journals of Lewis and Clark when they reached the Dalles. The eyes of the Indians triggered it. Many of the Indians were blind, or nearly so. Many of them, indeed, had lost one of their eyes. Clark, always

ready to venture a cause, thought it was the amount of time they spend on the water; the reflection of the sun must have destroyed their sight. But he himself was not satisfied. He returned to the subject again and again. Part of the problem could have been trachoma, but part was smallpox, which can cause scarring of the cornea and blinding. In April 1806 when Clark asked about the decline of a village, an old man exhibited a woman around thirty years of age who was scarred by smallpox as a small child. Her body served as a calendar of the disease. Clark estimated the last arrival of the smallpox as twenty-eight or thirty years earlier.

The smallpox that marked this young woman's body left even deeper cultural markings among the Chinooks. In 1811, that fateful year in which the Astorians and David Thompson established a permanent non-Indian presence on the Columbia, an odd premonitory episode occurred. Soon after the arrival of the Astorians, two Algonquian-speaking Indians from east of the Rockies arrived at the mouth of the Columbia. Theirs was an unrecorded journey certainly as epic as that of the Astorians or of David Thompson. The husband, Kocomenepeca, was "very shrewd and intelligent" and provided the Astorians with valuable information about the interior. The pair accompanied the first party of Astorians to go up the Columbia.

When David Thompson arrived at Astoria, he saw the couple, but he did not recognize them until he began his return trip in company with the Astorians. At the Cascades the young man, "well dressed in leather, carrying a Bow and Quiver of Arrows, with his Wife, a young woman in good clothing, came to my tent door and requested me to give them my protection." The man, Thompson realized, was a woman "who three years ago was the wife of Boisverd, a canadian and my servant." Thompson had requested that Boisverd dismiss her because of her loose conduct, and he had done so. She had become a prophetess, "declared her sex changed, that she was now a Man, dressed, and armed herself as such, and also took a young woman to Wife, of whom she pretended to be very jealous."

The women carried with them a letter. They told Indians of the Columbia that it came from a white chief who desired to fill their every want. But white traders, instead of bestowing presents on the Indians as the chief wished, cheated them and demanded payment for the goods. The women themselves received presents for bringing such tidings. They

possessed, Ross reported, twenty-six horses, many of them loaded with robes, leather, and dentalium shells.

But these were not the only stories the prophetess told. She had, when with the Chinooks, predicted a recurrence of epidemics "which made some of them threaten her life, and she found it necessary to return to her own country . . ." This is why she sought Thompson's protection. And she immediately had need of it, for at the Cascades the Indians told Thompson that Kocomenepeca had told them that the whites had brought the smallpox to destroy them, and "also [that] two men of enormous size . . . are on their way to us, overturning the Ground, and burying all the Villages and Lodges underneath it." Thompson reassured them, promising that the skies and ground would not change. As it was in the days of their grandfathers, it would be in the days of their grandsons.

Kocomenepeca was a better prophet than Thompson. Disease did come, and big men would eventually come and bury the villages under earth and water. By and large the people below the Dalles were reduced to remnant groups by 1834. As Lewis and Clark had discovered, the Chinooks had reason to fear. The smallpox had already struck twice, forcing the abandonment of entire towns.

But it was malaria, brought up from California by returning Hudson's Bay Company fur brigades in 1830, that catastrophically rearranged the human geography of the river. The mosquito that carried the disease (*Anopheles malculipennis*) was rare along the coast and scarce east of the Cascades, but where the mosquito thrived on the lower Columbia death rates reached 90 percent. The seasonal cycles of the lower river became a trap as the summer search for wapato led women into the wetlands where wapato and mosquitoes thrived. In September 1830, John McLoughlin noted that "the Intermittent Fever is making a dreadful havoc among the Natives." He reported that malaria had carried off 75 percent of the Indians around Fort Vancouver. The survivors congregated at the fort. They gave as a reason that they knew if they died the Hudson's Bay Company men would bury them. Reluctantly, McLoughlin had them driven away. His own people were so sick that he could barely attend to them.

After that malaria came annually. It devastated the villages along the Willamette in 1831 and left towns and villages empty and deserted and the shores of the Columbia strewn with dead from Oak Point to the

Dalles. By 1835, the American fur trader and entrepreneur Nathaniel Wyeth was writing from the once thickly settled Wapato (Sauvie) Island in the Columbia that "a mortality has carried off to a man its inhabitants and there is nothing to attest that they ever existed except their decaying houses, their graves and their unburied bones of which there are heaps." Mortality from a single epidemic was never so high above the Dalles, but following contact with whites epidemics repeatedly cut into the population. The population of the Columbian Plateau fell by nearly 50 percent between contact and 1855. By 1875 the total loss was close to two-thirds.

The whole world changed. The Columbia continued to flow and the salmon to swim; humans continued to labor—all the elements of the energy system remained intact, but their relation was altered. Below the Cascades the intricately arranged human geography of the river's borders largely vanished. The salmon encountered fewer human obstacles on their return upstream.

Fishing pressure at the Dalles and the Cascades diminished as the number of fishermen declined. Nathaniel Wyeth had cautioned that "the impression of the vast quantity of salmon in the Columbia arises from not considering the vast number of Indians employed in catching what is seen" (sic). But as disease eliminated Indians, probably more salmon spawned in the rivers and streams than ever before. White fishermen did not quickly replace Indian fishermen. Wyeth's own attempts to go into the business of salting and exporting salmon failed. The Hudson's Bay Company's harvest of the fish was only a minimal debit against the millions that Indians no longer harvested. But like Charles Wilkes, those arriving on the river could not help but think that in the future Columbia salmon would and should "afford a large source of profit to its Settlers."

Like the prophetess Kocomenepeca, Samuel Parker, a missionary sent by the American Board of Commissioners for Foreign Missions, arrived in the midst of change and envisioned a drastically altered Columbia. He prophesied matter-of-factly. He did not call upon giants to effect this transformation, but he thought in terms of energy and labor equal to that of Kocomenepeca's giants.

The power of the Columbia astonished Parker as thoroughly as it had astonished the Astorians. He marveled at the river's "boiling eddies and the varying currents." The skill of the Indians at managing the

rapids dazzled him. But this convergence of natural energy and human energy became for Parker almost a sideshow. He foresaw the possibility of new convergences of the river's energy and human labor which would transform the Columbia, its tributaries, and the lives humans lived alongside it.

The question often arose in my mind, can this section of the country ever be inhabited, unless these mountains shall be brought low, and these valleys shall be exalted? But they may be designed to perpetuate a supply of wood for the wide-spread prairies; and they may contain mines of treasures, which, when wrought, will need these forests for fuel, and these rushing streams for water power.

At Celilo Falls he saw a "situation for water power equal to any in any part of the world." At the Willamette Falls, Parker found the scenery had "much to charm and interest," but what gripped him was the opportunity to harness the Willamette's energy.

The opportunities here for water power are equal to any that can be found. There cannot be a better situation for a factory village than on the east side of the river, where a dry wide-spread level extends some distance, and the basaltic shores form natural wharves for shipping.

When Joel Palmer arrived at Oregon City at the Willamette Falls in 1845, the first marks of the new order had appeared. Dr. John McLoughlin, the pillar of the old Hudson's Bay Company, had taken a donation claim and laid out a townsite. He had also finished a mill (contemplated and begun much earlier) which would "compare well with most of the mills in the states." The Methodists had built a second mill. The water of falls "constitute[d] great water privileges for propelling machinery"; they powered the mills, each of which served as both gristmill and sawmill. It was a small beginning, but Palmer jumped quickly to a grander future, for "Nature rarely at any one point concentrates so many advantages for the erection and support of a great commercial and manufacturing city." Abundant waterpower, prime farmland, a "navigable river to bring the raw material to the manufac-

tories, and when manufactured to carry the surplus to the Pacific, whence it can easily be taken to the best markets the world affords." Palmer was wrong in the details—Oregon City would not be the center of Oregon—but he was right enough in envisioning along the Columbia and its tributaries a new energy regime, a new geography, and a new relationship between human labor and the energy of nature.