KNOWLEDGE, NATURE, AND REPRESENTATION: CLEARINGS FOR CONSERVATION IN THE MAINE WOODS

by

DAVID DEMERITT

B.A., The University of Maine, 1988
M.Sc., The University of Maine, 1990

A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

(Department of Geography)

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA
November 1996

© David B. Demeritt, 1996

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Geography

The University of British Columbia
Vancouver, Canada

Date 26 November 1996

Abstract

This thesis concerns the cultural and scientific practices involved with turn-of-the-century struggles to conserve the Maine Woods. Conservation was underwritten by the powerful and productive fiction that an essential nature exists as something completely apart from the elaborately organized exhibitions by which it has been staged for our benefit. The absolute distinction between nature and culture is profoundly problematic but tremendously productive as well. Drawing on a variety of historical and theoretical sources, this thesis describes the various ways in which the essential nature of the Maine Woods was set up and represented as something demanding protection and conservation.

The thesis is divided into three parts. Part I sets the stage for the historical discussions that follow by assessing debates in geography and environmental history about the social construction of knowledge and nature. Recent scholarship has been caught on the horns of a theoretical dilemma: while understanding of the present environmental crisis and its historical roots seems to demand recognition of the independent agency of nature, social theory suggests the impossibility of stepping outside the bounds of culture to represent an independent nature as it really is. Different responses to this dilemma are discussed. It is argued that environmental critique demands a more humble approach to truth, one sensitive to the meanings of its metaphors and the politics of its practices.

Part II assesses the forest conservation movement. The objects of scientific forestry depended fundamentally upon the ways in which the forest was framed as an object of knowledge. Very different programs of action flowed from competing metaphorical definitions of the Maine Woods as a crop, a mine, or a kind of capital. The ascendency of technical and quantitative knowledge of the forest and its displacement of local understandings are described as are public policy disputes in Maine about the regulation of private property, the institution of publicly owned forest reserves, and the role of the state in forestry.

Part III deals with the conservation of wildlife for sport. Flocking to the forest to hunt, wealthy sportsmen articulated a variety of sexual, class, and racial anxieties about the debilitating embrace of modern life. The transfomation of the Maine Woods into a vacationland for their manly recreation demanded the institution of game laws and the criminalization of traditional lifeways to save the game for sport. In these struggles, conservationists had to contend not only with local residents, who resisted this construction of the Maine Woods, but also with a variety of non-human actors, such as deer, predators, and pathogens, whose presence, though difficult to deny outright, was culturally framed and mediated in materially significant ways.

Table of Contents

Abstract	ii
Table of Contents	iii
List of Figures	v
Acknowledgements	vi
Preface	1
PART I. HISTORY, SCIENCE, AND SOCIAL THEORY	10
Chapter 1: Science, Representation, and Reality	11
representing science in geography	16
sociology of science	26
climatic change and the sociology of scientific knowledge	34
reflexivity and SSK	38
articulating practices of science	41
Chapter 2: Ecology, Objectivity, and Environmental History	50
revision in ecological science	52
social constructivism	60
linguistic turns	65
beyond foundationalism	72
Chapter 3: The Nature of Metaphor	76
cross-sections and vertical themes in the history of landscape	80
metaphors of cultural production in cultural geography	83
environmental history and the agency of nature	95
metaphors of nature	107
PART II. THE OBJECTS OF FORESTRY	114
Chapter 4: Picturing the Forest	124
forest for the trees	126
truth in numbers	147
Chapter 5: Forest Knowledges and the Famine	167
local knowledge	169
the authority of science	177
Chapter 6: Properties of the Forest	193
crops, mines, and capital	194
forestry and the state	219
PART III. THE WILDLIFE AND THE RE-CREATION OF MAN	250
Chapter 7: Call of the Wild	261
masculine anxieties	263
primitive resorts	277
class and sexual tensions	287

Chapter 8: Rules of the Game 297
moral economies 298
code of the sportsmen 301
law and the game wars 317
the values of wild life 328

Postscript 348

Bibliography 352

List of Figures

Figure 1.1 Symmetrical Explanation of Science 27

Figure 1.2 Room for Doubt: Volcanic Eruptions and Averaged Annual Temperatures in the Northeastern United States 35

Figure 1.3 Converting the Doubtful: Superposed Epoch Analysis of Annual Temperature (C°) Anomalies Before and After Volcanic Eruptions 36

Figure 4.1 Greeley's Picture of Diminishing Forest Supplies 125

Figure 4.2 "Forest and prairie lands of the United States" by Joseph Henry, 1858 132

Figure 4.3 "Map of Maine Showing the Distribution of Pine and Spruce" by C.S. Sargent, 1883 142

Figure 4.4 "Density of Forests" by C.S. Sargent, 1883 144

Figure 6.1 Optimum Rotation Age for Various Interest Rates 208

Figure 6.2 Great Northern Paper Co. View of Forest Conservation 242

Figure 7.1. Residence of Visitors to Parmanchenee Club, Parmanchenee Lake, Maine, 1896-1905 276

Figure 7.2 Promoting the Backwoods Experience 284

Figure 8.1 Moose and Deer Shipped by Bangor & Aroostook Railroad, 1895-1910 338

Figure 8.2 Effect of Removal of Predators on Deer Populations on Kaibab Plateau, Arizona 341

Acknowledgements

In the six years I have been working on this project I have come to rely on the advice, support, and assistance of a large number of people. My supervisor, Graeme Wynn, was a keen editor and, perhaps equally important for a supervisor, provided me with some funding to bridge me after the end of my fellowship. The members of my committee, Trevor Barnes, Derek Gregory, and Cole Harris, were always accessible for a chat or word of advice. From the University of Washington, Richard White was also able to chip in with a word of advice whenever I needed to call upon him. Perhaps because my tenure here at UBC has been so long, there is a long list of people who helped me along the way, either by reading something of mine, suggesting a reference, or chipping in with a helpful idea: Allison Blunt, Kate Boyer, Noel Castree, Brett Christophers, Dan Clayton, Robyn Dowling, Averill Groeneveld-Meijer, David Ley, Maureen Reed, Matt Sparke, Lynn Stewart, and Bruce Willems-Braun. It's fair to say, however, that I would never have completed a Ph.D thesis without the encouragement, to say nothing of the impatience, of Loretta Lees who kept telling me to hurry up and finish so we could go hiking.

In Orono, I relied (and still rely) on the support and company of Kathleen Hornsby, Stephen Hornsby, and Dave Smith. At the University of Maine Library, Muriel Sanford and the other people in Special Collections (especially Mary Ellen and Betsy) always made working there a pleasure.

Through it all, I have been sustained by family: my father and my late mother who encouraged and supported me in my work. Thank you all.

Preface

> That which is can only be, as a being, if it stands within this clearing. Only this clearing grants and guarantees to us humans a passage to those beings that we ourselves are not, and access to the being that we ourselves are. Thanks to this clearing, beings are unconcealed in certain changing degrees.
>
> --- Martin Heidegger[1]

On 5 November 1996, the people of Maine will go to the polls to decide, in a state-wide referendum, whether to "ban clear-cutting and set other new logging standards." Alarmed by the environmental impacts of industrial forestry and frustrated by the refusal of the legislature to do anything about it, the Maine Green Party, with the support of other environmental activists in the state, has gathered the 53,000 signatures necessary to put the question directly to the voters. The actual bill does much more than just ban clear-cut logging. It mandates that no more than one-third of the standing volume of wood per acre may be removed in any fifteen year period. Mathematical formulae establish the maximum size of allowable canopy openings and the required basal area of residual standing timber for various stand types.

As the most far-reaching government intervention in the Maine Woods since the 1930's, the referendum campaign has focused unprecedented public attention on the forest and on the sciences of forestry and ecology underwriting its conservation. Highly critical of applied forest science, supporters of the referendum believe that it will "[e]liminate practices that remove Maine's forests and replace them with herbicide- and insecticide-dependent monoculture tree plantations with no genetic diversity and little biodiversity." This critique of industrial forestry has a powerful aesthetic appeal, to be sure, but its

---

[1] Martin Heidegger, "The Origin of the Work of Art," in M. Heidegger, Poetry, Language, Thought, trans. A. Hofstadter (New York: Harper & Row, 1971), 53.

principal authority is scientific. Environmentalists insist that "clearcutting is harmful to the forest ecosystem."[2]

Referendum opponents disagree, and they also appeal to science to support their claims. In addition to arguing that the referendum will create "more government bureaucracy and red tape" and "damage our state's entire economy," they insist the ban will actually "[d]amage the health of our forests and wildlife habitats," by "prohibit[ing] many sound, scientific forest management practices that are needed to... encourage the growth of healthy, commercially valuable trees ... and to maintain the diversity of wildlife habitats."[3] In defense of its forest stewardship, the Great Northern Paper Company cites "a growing body of scientific knowledge about the very important role that clearcutting plays in the management of many wildlife species, including several threatened migratory songbirds, ruffled grouse (partridge), moose and white-tailed deer." GNP's manager of forest policy, Dan Corcoran asserts that the clear-cutting ban will "replace scientific forestry with political forestry" appealing to "public emotions" rather than rational consideration of the scientific facts.[4]

Knowledge, even scientific knowledge, is not easily divorced from its social context. Scientific representation of the forest as an integrated and autonomous *eco*-system, subject to external disturbance by human action, both plays on and reinforces popular understandings of the Maine Woods as a sort of wilderness, relatively untouched by human hands. Former Green Party gubernatorial candidate and Ban ClearCuts spokesperson, Jonathan Carter argues that restrictions on the volume and intensity of logging are necessary to put "the forest in balance as a natural system" so that we "will be living off the growth, not undermining the capital."[5] The metaphor of natural capital may

---

[2] Maine Greens, 1996 Clearcutting Referendum (n.p., Sept. 1995).
[3] Citizens for a Healthy Forest and Economy, Information About The Green Party's Drastic Forestry Ban (n.p., 1996).
[4] "Green Party Referendum Would Do a Lot More Than Just Regulate Clearcutting" GNP News (January 1996), n.p, photocopy circulated to me by Dennis W. Tompkins, communications co-ordinator, Maine Forest Products Council, 20 February 1996.
[5] Quoted in Andrew Kekacs, "Vote to Ban Clear-Cutting Sought" Bangor Daily News 16 November 1995.

seem an ironic choice for a group committed to biocentric thinking and opposed to the narrow-minded instrumentalism of the paper companies, and it is. But more generally, it suggests the way in which the metaphorical is necessarily (and consequentially) mixed up with the production and representation of nature. The significance of such widely accepted scientific concepts as habitat and ecological community depends on their cultural and figurative dimensions as well as their natural and scientific ones. Making any absolute distinction between the social and the natural or the scientific and the metaphorical is highly problematic.

Although some of the practices at stake in the 1996 referendum are new-- clear-cut logging, for example, has only been common in Maine for thirty years or so-- public anxiety over the future of the forest and its conservation is not. Indeed, the Maine legislature debated very similar regulations on forest practice in 1896 and again in the years immediately thereafter. In fact, the very idea of conservation itself came into focus over a century ago, when the rapid pace of exploitation and the closing of the frontier raised the dual specter of a national timber famine and a landscape devoid of any wildlife. Concerns about the depletion of the Maine Woods and the wildlife in it were underwritten by and advanced a new, technical vocabulary of natural limits, sustainability, and carrying capacity. These scientific concepts framed the forest and its natural resources as finite quantities that might be used up or dissipated if not conserved. They led to the passage of new laws and the development of new conservation practices, the creation of parks, and the institution of government forestry and wildlife protection bureaucracies to regulate individual behavior so as to protect the environment. In short, the conservation movement established a new and far-reaching regime of knowledge and power to protect and conserve the Maine Woods and its essential properties. Yet, the turn-of-the-century crusade to conserve the forest was as heralded in Maine as it was hated. Then as now, many people bitterly resented and resisted interference from government and from conservation activists, many of whom hailed from away.

This dissertation considers these earlier struggles, but with the present scene very much in mind. Far from being anachronistic, the story of past efforts to protect the Maine Woods provides an opportunity to pose some important questions about the practice and meaning of environmental conservation. Who, for instance, constitutes the public in whose interest the forest is to be conserved? The outcome of the 1996 clear-cutting referendum will be decided in the suburban wards of southern Maine, far from the northern forest and the communities most directly dependent upon it. Is this metropolitan public the appropriate public to decide the fate of the forest? Or should it be determined more locally? In Maine, the late nineteenth century controversy over game laws and wildlife conservation turned on this very question of scale. It pit the interests of local residents in hunting against those of the vacation industry and big city sportsmen, whose culturally specific (and sexually charged) experience of the hunt was institutionalized by the new game laws. Proponents of these measures argued that strict new game laws were necessary to protect the wildlife from extinction at the hands of rapacious poachers and pot hunters. They succeeded to the degree that they were able to identify the game laws with a universal public interest and to cast local opposition as opposing, special interests, inimical to the wildlife and the public interest in their conservation.

Similarly, much of the debate in Maine about forest conservation turned on identifying and speaking for the public interest in the forest. Turn-of-the-century forestry advocates, like present-day supporters of the clear-cut referendum, held that private property owners, interested chiefly in short-term and immediate profits, could not be trusted to protect and conserve the diffuse and often unpriced public benefits derived from the forest. Public policy debates about the regulation of private property, the institution of publicly-owned forest reserves, and the role of government in forestry were about re-distributing the costs and benefits of environmental conservation among competing actors, and it is important to recognize that they were uneven contests, with real winners and losers.

But the forest conservation movement, like the furor over game laws and wildlife protection, was also a contest between different ways of knowing and representing the forest. Proponents of scientific forestry, concerned about the depletion of the Maine Woods and the forest supplies in it, contrasted their conservative approach to the forest, which treated the forest as a crop or a kind of capital to be conserved, with wasteful and short-sighted lumbering that exploited the forest as if it were a mine, a non-renewable resource with no future beyond its immediate stumpage value. The ascendancy of their scientific view of the forest paved the way for scientific forest management, but it also displaced local understandings of the woods embedded in personal experience and local practice.

Much of the current agitation over industrial forestry stems from the very particular ways in which the science of forestry was established in Maine and the forest framed as an object of its knowledge. There is a contemporary ring to the 1911 lament about the displacement of the "Primeval type of forest" by the normalized forest of applied forestry:

> Time, unaided, makes the forest. *Man* makes a very different thing, the 'forested' forest, or tree garden. In the forest, nature's whole symbolic process of vegetation stands before our eyes, integral as the whole circle of the planet's orbit. Its arc is the entire sequence of tree-life, from the tiny seedling up to the zenith of growth, and down, first through the early stages of decay of the grand old *standing* giant, long serving as a home for birds and quadrupeds, then through the slow and beautiful process of the *fallen* trunk, moss- and fern-covered, back to earth again. In this pageant, in these quiet shades, one has the whole of life before one. Man's culling-out of mature trees, proper and needful as it is in practical forestry, destroys the completeness of this pageant, doing away with those lofty sentry-posts of birds, and those solemn prostate forms crumbling away to fertile mould beneath.[6]

Such sentiments provided an important source of support for conservation and for the institution of scientific forestry at the turn-of-century, but they were systematically

---

[6] Abbott H. Thayer, "The Worth of the Primeval Type of Forest" in Society for the Protection of New Hampshire Forests, Report (1911): 28-29.

marginalized by foresters who successfully promoted their science as both useful and objective.

Perhaps the greatest difference between contemporary struggles over conservation in Maine and those of a century ago is that the authority of forestry and of science more generally, once the unquestioned foundation of all discussion about conservation, has worn thin. A dizzying array of postmodern and post-structural theories challenge, in one way or another, the idea of science as a mirror to nature. Instead, they suggest a variety of ways in which science and the world it studies and represents are socially constructed. If the nature of the forest and our knowledge of it are, in some sense, the products of active and interested representation rather than reflections of an independent and objective reality, what does this mean for efforts to conserve them?

As a product of this skepticism, I have had to work through these questions for myself in trying to understand and to narrate the story of conservation in the Maine Woods. Paradoxically, it would seem, conserving the forest has also involved what the philosopher Martin Heidegger calls making a clearing or a *lichtung*-- literally a clearing or glade in the forest, but with the sense also of brightening and lighting. For Heidegger, the term suggests an open space in which one can encounter other beings-in-the-world in the light of a particular understanding. And yet, Heidegger insists, this process of making a clearing, what we might more conventionally understand as representation, is also necessarily and simultaneously a process of misrepresentation. He writes, "The clearing in which beings stand is in itself at the same time concealment."[7] The act of illuminating the world and making it clear and visible inevitably casts shadows, such that representation delimits as it discloses.

Heidegger's account of the dual character of representation is a complex and difficult one, but his ideas underwrite much of the recent critical thinking, both within the

---

[7] Heidegger, "Origin of the Work of Art," in Heidegger, Poetry, Language, Thought, 53. For an explication of his notion of the *lichtung*, see Hubert L. Dreyfuss, Being-in-the-World: A Commentary on Heidegger's *Being and Time*, Division I (Cambridge: MIT Press, 1991), 163-66.

discipline of geography and without, about the politics of representation and the social construction of knowledge and truth. Derrida and Foucault, for instance, are both heavily indebted to Heidegger for their critiques of the disembodied gaze and grids of intelligibility, as, indirectly, are many feminist and post-colonial critics. Within science studies, Heidegger's critique of representation resonates most clearly in the writings of Donna Haraway. Important as these various ideas about the relations between knowledge, power, and representation are to this thesis, it is not my intention to gloss or summarize them here. Rather, I want to work with them productively to consider the meaning and practice of environmental conservation. The thesis triangulates between theory, historical evidence, and contemporary concerns to provide a history of the present. It explores critically both the seams connecting and the ruptures separating current debate about environmental conservation in Maine from its particular historical geography.

The thesis itself is divided into three parts. The three chapters in Part I, which have been published previously in slightly different form, set the stage for the historical narrative that follows by assessing debates in geography and environmental history about the social construction of scientific knowledge and nature.[8] These theoretical discussions highlight the necessarily partial and contextual character of knowledge. They emphasize the political and theoretical significance of paying careful attention to the particular practices of representation in science and conservation as well as in critical and historical accounts of them.

Part II assesses the turn-of-the-century forest conservation movement in relation to this broader set of ideas about the connections between knowledge, power, and representation. The aims and objects of scientific forestry depended fundamentally upon the ways in which the forest was framed as an object of knowledge. Debate about the depletion

---

[8] Chapter 1 was previously published as "Social Theory and the Reconstruction of Science and Geography" Transactions of the Institute of British Geographers 21 (1996): 484-503. Chapter 2 was published as "Ecology, Objectivity, and Critique in Writings on Nature and Human Societies" Journal of Historical Geography 20 (1994): 22-37. Chapter 3 was published as "The Nature of Metaphors in Cultural Geography and Environmental History" Progress in Human Geography 18 (1994): 163-85.

of the forest and prospects of a timber famine was predicated upon new technologies and practices of representation that set up the nation's forests as an interrelated and interchangeable, quantitative whole. Pictures of the forest as a rapidly depleting natural resource imparted both an urgency and a certainty to calls to conserve it. This mathematized view of the forest won widespread acceptance for the idea of conservation, but as practice it was not entirely clear what forest conservation actually meant. Scientific forestry was founded on the metaphorical transformation of the forest from a mine into a renewable resource, but very different programs of action flowed from competing visions of the forest as a crop or as a kind of capital providing a regular and renewable dividend of arboreal growth. In Maine, debate about the regulation of private property, the institution of publicly owned forest reserves, and the role of the state in forestry-- public policy questions at the heart of the present clear-cutting referendum campaign-- turned on these competing representations of the Maine Woods.

Part III deals with the conservation of wildlife for sport and the cultural conflicts attendant upon the development of the Maine Woods as a vacationland. Starting in the late nineteenth century, large numbers of wealthy, urban sportsmen flocked to the forests to hunt big game. These tourists imagined the Maine Woods as a primeval wilderness where they could escape the deadening routines of everyday life and re-create the essential primitive manliness threatened by the debilitating embrace of modernity. Their experience of the forest articulated a variety of sexual, class, and racial anxieties about the rapid transformation of American cities, and as such it was very different from that of most rural Mainers, who looked to the forest as a place of work and a source of essential resources to sustain everyday life. The transformation of the Maine Woods into a vacationland for the manly recreation of urban sportsmen demanded the institution of game laws and the criminalization of traditional lifeways to save the game for sport. In these struggles, conservationists had to contend not only with local residents, who resisted this construction of the Maine Woods, but also with a variety of non-human actors, such as deer, predators,

and pathogens, whose presence, though difficult to deny outright, was culturally framed and mediated in materially significant ways.

Whether saving wildlife or forest growth, the objects of conservation depended in large part upon the ways in which the forest was framed as an object of knowledge. This thesis explores these various representations of the Maine Woods and the stakes in their construction.

I. HISTORY, SCIENCE, AND SOCIAL THEORY

1. Science, Representation, and Reality

We live in a momentous age. In an era of AIDS and greenhouse warming, genetic engineering and microchips, it is harder than ever to be agnostic about the doings of tiny molecules-- or the sciences by which they are constructed and brought into view. In this brave new world of ours, science is serious business. It has helped make possible unprecedented levels of affluence, but it has also helped fabricate many of the environmental specters that make the future of that way of life seem so insecure. Perhaps, then, it should come as no surprise that nature and the sciences are looked upon so ambivalently. Nature, we are told, is threatened with extinction, yet uncontrolled climate change threatens our lives. Science is celebrated as our guiding light in the wilderness and exorcised as the cause of our expulsion from the garden. Such old fashioned rhetoric about the path to Enlightenment and the fall from Grace should signal that these concerns about knowledge, nature, and the human condition have a long ancestry. Despite millennial declarations about being "post" this and "post" that, unease about the nature of knowledge and the knowledge of nature is nothing particularly new.

Yet, with the rise of those various modes of thought and intellectual practice so often dubbed "postmodernism," such concerns about science are now enunciated with new found fervor. In the face of global environmental changes that would seem to make science more vital than ever, many people dismiss scientific knowledge as pure fiction. Science, it is said, is merely a social construction, and the nature it studies an artifact of the way that it is represented to be. No different than other kinds of knowledge, scientific knowledge is made up, just like fairy tales and nursery rhymes.

Such social constructivism is big business in the humanities these days. It undermines the authority given to science by those philosophers of science who defined the

scientific method as the pinnacle of rationality. Social constructivists maintain that the facts do not speak for themselves; that scientific observations are not independent from social influences and pre-conceptions; that the truth value of scientific statements is not determined by the degree to which they correspond to a world external to them. Different social constructivists, of course, explain the social construction of scientific knowledge differently, but they share these essentially negative reactions to the traditional stories told about science by realists, empiricists, and logical positivists.

With our own rich traditions of debate about positivism and spatial science, geographers have greeted the new social constructivisms with a decidedly mixed reaction. Some human geographers dismiss these epistemological criticisms of scientific objectivity as naive relativism while others celebrate the play of difference made possible by the passing of any faith in true, objective knowledge. Physical geographers meanwhile seem to carry on more or less as always, largely oblivious to the arcane debates of their colleagues in human geography.[1] Those geographers who have taken up social constructivism, particularly in its "postmodern" and "deconstructive" modes, have cast their claims in such sweeping and yet such opaque terms that they are easily dismissed as simply "anti-science."[2] There is some truth to this accusation, since critiques of science and objectivity in human geography, as elsewhere, have been energized by reactions against modern technology and western rationality, but such instant dismissals are unfortunate.

Claims to knowledge are claims to power. This is especially so of scientific knowledge. Since the Enlightenment, science has been synonymous with the revelation of truth about the world. Debates about science, objectivity, and scientific fact are debates about what will count for real knowledge and whose voices will be heard in struggles to

---

[1] But see Bruce L. Rhoads and Colin E. Thorne, "Geomorphology as Science: The Role of Theory" Geomorphology 6 (1993): 287-307 and Bruce L. Rhoads and Colin E. Thorne, "Contemporary Philosophical Perspectives on Physcial Geography with Emphasis on Geomorphology" Geographical Review 84 (1994): 90-101.

[2] The most prominent example of this would be Paul R. Gross and Norman Levitt, Higher Superstition: The Academic Left and Its Quarrels with Science (Baltimore: Johns Hopkins Univ. Press, 1994).

define it. These are vital questions-- matters of life and death. By claiming to speak scientifically and thus to know nature objectively as it really is, scientists have silenced other voices interested in environmental matters. This great social power is what made the sciences such an attractive target for social constructivists. While it is certainly true that the effect of social constructivism has been to level the playing field between the sciences and the humanities in the academy, social constructivism cannot be written off as green-eyed physics envy, however much those like Michael Dear may promote it as a way to claim for themselves some of the cultural authority accorded to science.[3] The critique of epistemology is about power, to be sure, but it can hardly be reduced (and thereby dismissed) to a power play.

In this chapter I articulate some important theoretical questions about science and the social construction of knowledge underwriting my discussion of conservation in the Maine Woods. I begin with the critical reassessments of the epistemological foundations of scientific objectivity offered by human geographers. These critiques provide a potentially valuable corrective to the self-image of science, but sadly, the tone of debate in the discipline has not been conducive to much serious discussion across the human/physical divide, a necessary though by no means sufficient step in the radical reform of environmental science. Ironically, bold pronouncements by postmodernists of the death of Enlightenment meta-narratives have been written in such a way that the next of kin-- empiricist and positivist physical geographers-- missed the funeral. If we geographers are really serious about changing the way that science is socially constructed, then we must find some way to address practicing scientists.

To this end I find the social constructivist arguments advanced in the sociology of scientific knowledge (SSK) to be invaluable. The name of this merry band is somewhat misleading (and partisan), given the work by scholars in so many other disciplines, but it

---

[3] Michael Dear, "The Post-Modern Challenge: Reconstructing Human Geography" Transactions of the Institute of British Geographers 13 (1988): 262-74.

offers a convenient shorthand to describe a heterogeneous body of scholarship underwritten by the premise that science studies are cultural studies. Like contemporary critiques of science in geography, SSK enthusiasts are aggressively anti-realist about scientific representations. That is, they dispute the traditional stories told about scientific knowledge as an objective reflection of the natural world as it really is. However, unlike the discussions in geography, which tend to refer in grand terms to Science with a capital "S", as if it were a monolithic enterprise speaking with one voice, the proponents of SSK advance their epistemological arguments about the social construction of scientific knowledge in more specific and empirically substantiated terms.[4] Scrupulous attention to the messy details of scientific practice makes for a compelling social constructivism much more difficult to dismiss out of hand. A brief, SSK-inspired analysis of my own research on the climatic impact of stratospheric volcanic aerosols demonstrates both the power and the potential problems of an SSK critique of the normative accounts of scientific epistemology offered by empiricist, realist, and positivist philosophers of science.

Troubling ambiguities beset the notion of social construction in SSK. In the rush to debunk the epistemological claims of science to represent the world "as it really is," social constructivists have not distinguished sufficiently between epistemological anti-realism about scientific theories and ontological anti-realism about scientific entities. These distinctions are slippery, but essential. It is one thing to say that scientific knowledge of the world is socially constructed, but it is quite another to say that the world itself is fabricated as well. To do so, suggests that the world is entirely of our own making and plays into the sense that social constructivism leads to a stark choice between, on the one hand, some kind of objectivism grounded in the rational evaluation of a subject's representations in terms of their correspondence to a real, objective world, and on the other, some sort of

---

[4] For recent reviews, see Joseph Rouse, "What Are Cultural Studies of Scientific Knowledge?" Configurations 1 (1992): 1-22; Sharon Traweek, "An Introduction to Cultural and Social Studies of Sciences and Technologies" Culture, Medicine, and Psychiatry 17 (1993): 3-25; Emily Martin, "Citadels, Rhizomes, and String Figures" in S. Aronowitz, B. Martinsons, and M. Menser, eds., Technoscience and Cyberculture (New York: Routledge, 1996), 97-109.

anything-goes-relativism about a world absolutely of our own making. Despite their careful empirical accounts of scientific practices, proponents of SSK have become mired in the same unhelpful and polemical discussions of scientific representation, truth, and epistemology that have distracted geographers trying to come to grips with the postmodern challenge. Perhaps as a result, they have been unable or unwilling to make political interventions in support of or against particular scientific practices. For the most part it would seem, SSK enthusiasts are more interested in telling stories about how science works than in trying to change the content of the scientific practices they describe with detached and indifferent eyes.

Social constructivism is important because it is political, but the discussions in human geography and SSK have not made the most of this potential. The epistemological guarantees of objectivity are without question a major source of power for modern science, but so too is scientific practice, and here, social constructivists have not made the necessary political interventions. Tilting at the windmill of epistemology, science critics in human geography have been little concerned with scientific practice. But even their counterparts in SSK who study scientific practice do so in order to make anti-epistemological arguments. This is a mistake. Such a narrow focus on epistemological questions simply feeds the unfortunate sense that social constructivism presents an exclusive choice between objectivity and anything-goes relativism. I neither accept this formulation, nor believe that recognizing the social construction of scientific knowledge makes it impossible to evaluate different scientific claims rationally. And yet framed as it has been in geography and SSK, social constructivism leads almost inevitably to endless school-boy philosophy squabbles about the truth of scientific representations. Ultimately, such metaphysical debates are unresolvable. They serve merely to distract attention from more immediately practical and explicitly political considerations of the scientific practices by which the facts of science are actually produced. As a result, discussions in the humanities about the social construction of scientific knowledge have not contributed significantly to the radical reform of science.

In the final part of this chapter, I will try to suggest how changing the terms of the conversation about social construction so as to pay more attention to the politics of particular scientific practices might go some ways towards fulfilling this political potential and adding a badly needed moral and proscriptive dimension to social studies of science and scientific knowledge.

representing science in geography

Geographers have long entertained their own discussions about science and the nature of scientific knowledge. Far from being a fixed identity, the word scientific has been ascribed over the centuries to a wide variety of practices and beliefs, many of which we would characterize today as magical and fantastic, the very antithesis of science itself.[5] The status accorded to a "science" proved to be an invaluable commodity for professional geographers trying to institutionalize the discipline in universities, just as the epitaph unscientific provided a powerful weapon for those hostile to qualitative methods.[6] Rather than trying to review the entire history of these debates, I will restrict my discussion to the criticisms directed over the last twenty-five years at the self-image of geography as an objective science. While these debates have a long ancestry, much of the recent ferment in the discipline has proceeded as if the noble dream of geography as a positive science had been invented in the 1950's and 1960's. Indeed as David Livingstone describes it, this has been just as true of those appropriating the label positivist to describe long standing positions within an empirical tradition of geography, as it has been of those reacting against such epistemological proscriptions. While actual practice diverged considerably from the

---

[5] Steven Shapin, A Social History of Truth: Civility and Science in Seventeenth Century England Chicago: Univ. Chicago Press, 1994).

[6] David Livingstone, The Geographical Tradition: Episodes in the History of a Contested Enterprise Cambridge: Blackwell, 1991); Trevor Barnes, Logics of Dislocation: Fragmented Stories for Economic Geographers (New York: Guilford, 1995).

normative description provided by positivism, most of the controversy about science in geography has swirled around this particular theory of knowledge.[7]

Critiques of scientific geography coming in the wake of the positivist revolution have been aimed most vigorously at the idea of geography as a *social* science. Humanistic and marxist geographers insisted that positivism was inappropriate to human geography, albeit for rather different reasons. Geographers have had much less to say about the philosophies of science underwriting physical geography and the natural sciences. Humanistic geographers, of course, were largely uninterested in the world of natural facts or in the ways they might be understood. They took for granted the distinction between objective knowledge about the natural world-- the realm of science and physical geography-- and subjective knowledges about the meanings of social worlds-- the domain of human geographers. Marxism was also built around the fundamental distinction between scientific truth and socially relative belief. Because of the particular history of the discipline, marxist geographers have not had much to say about what Margaret Fitzsimmons (1989) calls "the matter of nature" or the particular ways it has come to be understood.[8] Marxist scholarship in geography has been more focused on urban and economic questions than on environmental, scientific, or epistemological ones.

There are exceptions, however. In an early paper, David Harvey argued that geographic discussions of natural hazards were distorted by the fiction that environmental phenomena and thus environmental problems are pristinely natural.[9] Environmental problems, Harvey contended, are really social ones. They can only be understood by coming to grips with the capitalist relations of production that not only produce so called "natural hazards" like the CFC's responsible for ozone depletion, but also the social relations by which their "impact" is felt (unequally). This line of critique by no means

---

[7] Livingstone, Geographical Tradition, 322.
[8] Margaret Fitzsimmons, "The Matter of Nature" Antipode 21 (1989): 106-20.
[9] David Harvey, "Population, Resources, and the Ideology of Science" Economic Geography 50 (1974): 256-77.

precludes the possibility of objective knowledge; it suggests, rather, that only perspectives cognizant of certain social relations can hope to represent the world as it really is.[10] Marxist geographers concerned with development and environmental problems in the "Third World" have produced compelling accounts of the social nature of natural hazards and disasters. Although they insist that the object of their study-- nature-- is socially constructed, they have said relatively little about the social construction of their own knowledge of this object.[11]

With the rise in geography of critical realism and the various epistemic projects associated with post-marxism, this has begun to change.[12] Nevertheless marxist analysis of scientific knowledge remains much better developed outside the discipline of geography. Much of this early radical criticism of science came from actual scientists, as physicists, for example, opposed the militarization of scientific research through the Bulletin of Atomic Scientists. Critical of what might be called the economics of untruth, marxists revealed how scientific practice has been corrupted by ideologies and structured by interests whose lingering hold produced false knowledge.[13] In his book First the Seed, Jack Kloppenberg describes how the division of scientific labor between "basic" and "applied" research in agronomy and genetics has functioned to the tremendous profit of agri-business.[14] Others

---

[10] Though feminist standpoint epistemologies ground their objectivity claims in the structures of patriarchy rather than in capitalist relations of production, feminist standpoint theories, as Donna Haraway notes, depend upon the same Hegellian problematic in which objective knowledge is only possible from particular positions within structures of oppression. Haraway, Primate Visions: Gender, Race, and Nature in the World of Modern Science (New York: Routledge, 1989), 6.

[11] See, for example, Andrew Sayer, "Epistemology and Conceptions of People and Nature in Geography" Geoforum 10 (1979): 19-43; Michael Watts, "On the Poverty of Theory: Natural Hazards Research in Context" in K. Hewitt, editor, Interpretations of Calamity (Boston: Allen & Unwin, 1983), 231-62; Michael Watts and Richard Peet, "Development Theory and Environment in an Age of Market Triumphalism" Economic Geography 69 (1993): 227-53.

[12] See, for example, Lakshman, Yapa, "What Are Improved Seeds? An Epistemology of the Green Revolution" Economic Geography 69 (1993): 254-73; Andrew Sayer, "Postmodernist Thought in Geography: A Realist View" Antipode 25 (1993): 320-44; Noel Castree, "The Nature of Produced Nature: Materiality and Knowledge Construction in Marxism" Antipode 27 (1995): 12-48

[13] See, for example, Jerome Ravetz, Scientific Knowledge and Its Social Problems (New York: Oxford Univ. Press, 1971); Richard Lewontin, Steven P. R. Rose, and Leon J. Kamin, Not in Our Genes: Biology, Ideology and Human Nature New York: Pantheon, 1984); Richard Levins and Richard Lewontin, The Dialectical Biologist (Cambridge: Harvard Univ. Press, 1985).

[14] Jack R. Kloppenberg Jr., First the Seed: The Political Economy of Plant Biotechnology, 1492-2000 (New York: Cambridge Univ. Press 1988).

have criticized the military-industrial imperatives directing scientific research since the Cold War.[15] This line of critique should be familiar to geographers who have begun to explore the complex lineaments connecting the rise of their discipline with European colonialism.[16] Recent geographical scholarship on knowledge has followed the course charted by radical science critics in other ways as well. By scrutinizing all science as a labor process structuring continued class domination, radical critics like Robert Young seemed to erase the precious distinction between science and ideology, sparking a fierce controversy on the Left reminiscent in some ways of contemporary debates in human geography and SSK about reflexivity.[17]

In a similar vein, feminist geographers have criticized the sexist biases distorting geographic knowledge. Science, it is said, has not lived up to its own high standards guaranteeing objective, value-free representation of the world. Feminists have exposed discrimination in the sciences hindering the promotion and advancement of women. Despite some progress, the sciences, and in particular the physical sciences and engineering, remain bastions of white males.[18] Physical geography is no exception. Even when they have been able to attain graduate degrees and research positions, women in science have often been passed over and their achievements ignored. The crystallographer Rosalind Franklin made the crucial observations behind the discovery of DNA, but Watson and Crick won the Nobel Prize.[19] In geography, Mona Domosh has called for a new historiography of the discipline that would recognize the achievements of female travel

---

[15] Hilary Rose, Love, Power, and Knowledge: Towards a Feminist Transformation of the Sciences (Bloomington: Indiana Univ. Press, 1994), 4-10.

[16] See, for example, Livingstone, Geographical Tradition; Felix Driver, "Geography's Empire: Histories of Geographical Knowledge" Environment and Planning D: Society and Space 10 (1992): 23-40; Derek Gregory, Geographical Imaginations (Cambridge, MA: Blackwell, 1994).

[17] Robert Young, "Science Is Social Relations Radical Science Journal 5 (1977): 65-129; Hilary Rose and Steven Rose, "Radical Science and Its Enemies" The Socialist Register (1979): 317-35. For retrospective accounts of this debate, see Rose, Love, Power, and Knowledge, 260; Robert Young, "Science, Ideology, and Donna Haraway" Science as Culture 15 (1992): 165-207.

[18] National Science Foundation, Characteristics of Recent Science and Engineering Graduates: 1990 (Washington, DC: NSF 92-316, Detailed Statistical Tables, 1994).

[19] The story of Franklin, Watson and Crick, and the Nobel Prize is retold in Anne Sayre, Rosalind Franklin and DNA (New York: Norton, 1975).

writers and naturalists passed over by traditional histories of geography.[20] This liberal critique of scientific bias implies that if only the black marks of sexism and society could be more completely bleached out of science then somehow science and scientific representations could be made truly objective.

Other feminist geographers have called for a much more thorough-going deconstruction of the entire architecture of objectivity claims in science. This line of feminist critique, which Sandra Harding dubs "feminist postmodernism," deploys post-structuralist theory to insist that all knowledge, even feminist knowledge, is necessarily partial and relentlessly social.[21] It is skeptical of what Nancy Harstock calls "the totalizing and universalistic theories ... of the Enlightenment," because what counts for scientific objectivity has been defined in terms of the disembodied mind abstracted from social prejudice and position.[22] These standards are neither fair, nor universal, because universalism has almost always been a code word for certain unmarked social norms: masculine, white, western heterosexual. Reason and theory, according to feminist geographers like Louise Johnson, are gendered.[23] Cartesian dualisms like mind/body, reason/emotion, and nature/ culture enthrone an abstract masculinity. They repeat the kinds of stories that men, at least men in the West, tell about themselves to identify real men as distinct from women said to be more emotional, more subjective, more attached to nature and to Mother and consequently less rational, less intellectual, less individuated, and less objective.[24] By appealing to these powerful social constructs, Robert Park and the Chicago School of urban sociology were able to declare unscientific, and thus illegitimate,

---

[20] Mona Domosh, "Toward a Feminist Historiography of Geography" Transactions of the Institute of British Geographers 16 (1991): 95-104.

[21] Sandra Harding, The Science Question in Feminism (Ithaca: Cornell Univ. Press, 1986); Harding, Whose Science? Whose Knowledge? (Ithaca: Cornell Univ. Press, 1991).

[22] Nancy Harstock, "Rethinking Modernism: Minority Versus Majority Theories" Cultural Critique 7 (1987): 190-91.

[23] Louise Johnson, "(Un)Realist Perspectives: Patriarchy and Feminist Challenges in Geography" Antipode 19 (1987): 210-15.

[24] Genevieve Lloyd, The Man of Reason: 'Male' and 'Female' in Western Philosophy (London: Methuen, 1984).

the work of female social workers whose gender and radical politics they found suspicious.[25]

The ideal of the detached, impartial observer is a peculiarly masculinist one, because vision, say many feminists, is a masculinist epistemic system. The objective gaze of the scientist is eroticized. It objectifies the feminized body of nature. Feminists like Carolyn Merchant, Evelyn Fox Keller, and Annette Kolodny have advanced this line of critique by examining the erotic (and heterosexual) language that saturated the scientific revolution.[26] Francis Bacon, "father" of the experimental sciences, compared experimentation to seduction and rape. In planning experiments on the body of nature, Bacon counseled that the scientist should "make no scruple of entering and penetrating into these holes and corners, when the inquisition of truth is his whole object" because, as he put it, "nature betrays her secrets more fully [when subdued]... than when in enjoyment of her natural liberty."[27]

Feminist critiques of scientific rationality have also originated from psychoanalytic theory. Gillian Rose contends that the scientific desire for objectivity is driven by a psychological crisis of individuation. The scientist's masculine gaze individuates *HIS* self as distinct from the (m)Other and establishes his rationality in the contrast with the seen object. Physical geographers, she writes, relish their field work because research allows them to "assert and establish their manliness in the face of Nature."[28] Objectivity, by her psycho-analytic account, is the dream of masculinist subjectivity.

To some, this kind of psychoanalytic critique of science may perhaps seem all a bit much. When I first encountered it, I had just completed a climatological study of volcanic

---

[25] David Sibley, "Gender, Science, Politics, and Geographies of the City" Gender, Place, and Culture 2 (1995): 37-49.

[26] Carolyn Merchant, The Death of Nature: Women, Ecology, and the Scientific Revolution (San Francisco: Harper & Row, 1980); Evelyn Fox Keller, Reflections on Gender and Science (New Haven: Yale Univ. Press, 1985); Annette Kolodny, The Lay of the Land: Metaphor as Experience and History in American Life and Letters (Chapel Hill: Univ. North Carolina Press, 1975).

[27] Quoted in Merchant, Death of Nature, 168, 172.

[28] Gillian Rose, Feminism and Geography: The Limits of Geographical Knowledge (Minneapolis: Univ. Minnesota Press, 1993), 108.

stratospheric aerosols (more about which below).[29] Unwilling to write off my struggles with heterogeneous data series, instrument problems, and programming glitches as some vestigial separation anxiety lingering from days on baby formula and strained prunes, I dismissed this important psychoanalytic critique of objectivity as wild, impractical, and soft-minded. My feelings of pride and satisfaction at having conquered these difficulties and completed my first independent scientific research seemed beside the point. Yet even as I discounted this feminist critique for introducing subjective psychological factors into the objective consideration of the facts of nature, I was constructing a thoroughly social and intensely gendered hierarchy of knowledge to distinguish my own objective scientific knowledge from silly and subjective social theory. I imagined my own critical assessment as reasoned, realistic, and practical. I might as well have said masculine, for I now realize that this is usually the next couplet in the long chain of mutually reinforcing dualisms by which the rigorous and rational hard sciences are differentiated from soft and sentimental forms of feminine thought. Sadly, my initial knee-jerk reaction to this feminist critique seems to be all too typical.

It would be much more difficult to dismiss the post-structural critiques of feminist geographers if they took on more of the technical details of scientific practice, rather than, as has been more typically the case, seizing a few sexist metaphors as the basis on which to indict "Science" as the very embodiment of sexism and patriarchy. Metaphors and discourse are, of course, a vital part of scientific practice, and it would be easy to make too much of the distinction between them. Still, feminist geographers have tended to pick on more incidental uses of sexist language rather than those that are fundamental to some particular scientific practice. The recent exchange between Peter Gould and Linda Peake is a case in point. In a most unfortunate turn of phrase, Peter Gould referred to himself as "one of Geographia's many lovers," an expression that deeply offended Peake (and many others) who seized upon this flight of rhetorical fancy to condemn sexism in geography.

[29] David Demeritt, "The Effects of Volcanic Eruptions on Surface Temperatures in Northeastern North America, 1800-1978" (unpubl. M.Sc. thesis, Institute for Quaternary Studies, Univ. Maine, 1990).

Gould, in turn, discounted Peake's feminist critique as a tempest in a teapot that said nothing about the substantive core of his research on AIDS.[30] I don't happen to agree with Gould; I found his expression ill-considered and certainly unnecessary, but I wonder if the energy spent on this debate would have been better spent elsewhere. To critique the violence committed in the name of scientific objectivity it is far better to aim for the technical details from which both the great power and objectivity of science are said to derive. Here, Gillian Rose's criticisms of the masculinism implicit in Hagerstrand's time geography, or Michael Brown's critiques of medical geography's stigmatism of gay men with AIDS, are both much harder to dismiss out of hand as mere rhetoric, and, more importantly, likely to be more effective in changing actual scientific practices.[31] For the most part, however, feminist geographers have been more concerned with the language of scientific representations than with the details of scientific practice. With a few notable exceptions, it has been left to feminists from outside the discipline to pursue the critique of masculinist practice in science.[32]

Other geographers have also been inspired by postmodern and poststructural critiques of scientific objectivity and representation. Michael Dear proclaimed that the "postmodern challenge is to face up to the fact of relativism in human knowledge."[33] Dear helped inaugurate a vigorous discussion in human geography about the foundations of knowledge and representation. Readings in post-structural and psychoanalytical theory made many other human geographers feel that their representations of the world did not reflect the world as it really was; rather their knowledge was necessarily structured, mediated, interpreted, and constructed in language. Geographers have fiercely debated the

---

[30] Peter Gould, "Sharing a Tradition: Geographies from the Englightenment" Canadian Geographer 38 (1994): 196, 194-202; Linda Peake, "'Proper Words in Proper Places ...' Or, of Young Turks and Old Turkeys" Canadian Geographer 38 (1994): 204-206.

[31] Rose, Feminism and Geography, 17-40; Michael Brown, "Ironies of Distance: An ongoing Critique of the Geographies of AIDS" Environment & Planning D: Society and Space 13 (1995): 159-83.

[32] Geographical fieldwork is just beginning to recieve the critical scrutiny it deserves. See Anna Skeels, "A Passage to Premodernity: Carl Sauer Repositioned in the Field" (unpubl. M.A. thesis, Univ. British Columbia, 1993). Robyn Longhurst, "Reflections on and a Vision for Feminist Geography" New Zealand Geographer 50 (1994): 14-19.

[33] Dear, "Post-Modern Challenge," 271.

implications of this linguistic turn and the crisis of representation it ushered in. Many insist that empiricism, positivism, realism, hermeneutics, pragmatism, or some other theory of knowledge present viable alternatives to the epistemic uncertainty brought on by post-structural and postmodern social theory. Others maintain that old foundations of scientific objectivity still hold and that the fascination with continental philosophers is a fad that will soon pass.

I cannot pretend to resolve this discussion, but by way of gloss I would like to make three points about the debate on postmodernism and scientific objectivity in geography. First, this conversation was focused almost exclusively on epistemological questions about how (or whether) representations reflect the truth about the world. Michael Dear claimed the postmodern challenge meant that knowledge "claims are ultimately undecidable."[34] Likewise, Strohmayer and Hannah declared, "The truth of any statement, scientific or otherwise, which ultimately must rely on some anchoring in order to avoid being completely arbitrary, is *undecidable.*"[35] Marxist geographers, such as David Harvey, dispute this dim assessment of the possibility for true representations of the world. They characterize postmodernism as a conservative movement debilitating any critique of the objective conditions of capitalist oppression.[36] Other human geographers suggest that the resolution to the objectivist/ relativist debate involves re-imagining geography as an interpretive discipline concerned with understanding social meanings of a social world. By this account, human geography would forgo its long ambition to the objectivity and authority accorded a *social* science and instead be content with a place in the humanities.[37] Despite their differences, these various takes on the postmodern challenge all consider the

---

[34] Dear, "Post-Modern Challenge," 265-66.
[35] Ulf Strohmayer and Matt Hannah, "Domesticating Postmodernism" Antipode 24 (1992): 36.
[36] David Harvey, The Condition of Postmodernity (Cambridge, MA: Blackwell, 1989); Harvey, "Postmodern Morality Plays" Antipode 24 (1992): 300-26.
[37] See, for example, James S. Duncan, and David Ley, "Introduction: Representing the Place of Culture" in, J.S. Duncan and D. Ley, eds., Place/culture/representation (London: Routledge, 1993) 1-21.

important questions to be epistemological ones about knowing the truth of geographic representations of the world.

Second, this largely epistemological debate about representation and its relationship to the world has been conducted, at least in geography, at a high level of theoretical abstraction. Marcus Doel's aping of Derrida's playful style is perhaps typical: "modern human geography has become a MEANINGLESS MOMENT: a succession of a-signifying events... modern human geography was never able to accept that there is no separation, real or imagined, between existence (things) and writing (words) (or, more formally, between ontology and epistemology)."[38] Derrida's account of the impossibility of grounding of grounds for representation is a complex and sophisticated one that might easily be dismissed by the uninitiated as empty rhetoric or simply as bizarre. Skeptics quite reasonably ask, what, if anything, this sort of talk has to do with them and the very serious business of making sense of the world. For the most part, those pursuing the critique of representation in geography have not been interested or concerned with reaching out to those not already "in the know." Doel's essay displays a considerable familiarity with the style and substance of Derrida's critique of metaphysics, but it does little to suggest to those not already familiar with Derrida why they should pay any attention to it or him.

Finally, the very rarefied tone of the debate about representation in geography has served to exclude physical geographers and other natural scientists, arguably the people who need to consider the critique of objective representation most urgently. In part this is by design. Michael Dear explicitly exempted physical geography and the natural sciences from his postmodern challenge. Derek Gregory chose not to consider physical geography in his sweeping account of Geographical Imaginations. Such a project, he said, would be a different book.[39] True enough, but the collective effect of these silences has allowed

---

[38] Marcus Doel, "Proverbs for Paranoids: Writing Geography on Hollowed Ground" Transactions of the Institute of British Geographers 18 (1993): 378.

[39] Dear, "Post-Modern Challenge," 262; Gregory, Geographical Imaginations; Gregory, "Response" Annals of the Association of American Geographers 85 (1995): 175-86.

physical geographers to ignore the critiques of scientific objectivity and representation. If human geographers are serious about convincing their colleagues in physical geography to own up to the social construction of scientific knowledge, they will have to frame this discussion differently.

sociology of scientific knowledge

Geographers might learn some different, and, I believe, more useful ways to speak about the social construction of scientific knowledge by eavesdropping on conversations in the sociology of scientific knowledge (SSK). Although I will use the singular to describe SSK, this is a purely artificial designation. Historians, philosophers, sociologists, anthropologists, and literary critics, but sadly few geographers, have been active in the study of science as a socially and culturally constructed activity.[40] Their different approaches to science, knowledge, and their social construction are heterogeneous and their merits hotly contested. In general, however, conversations in SSK have paid close attention to the details of scientific practice. As a result they can provide a much more compelling way to frame the social construction of scientific knowledge than the rather abstract debates about postmodernism and representation ongoing in human geography.

The SSK movement is founded on the methodological relativism of what David Bloor dubbed the symmetry principle: scientific beliefs held to be true should be analyzed in the very same, socially constructivist terms as those held to be false (FIGURE 1.1).[41] In contrast to asymmetrical explanations of scientific belief, such as those offered by marxism or by Manheim's classical sociology of knowledge in which a firm distinction was drawn between the true beliefs of science that were explained by nature and the false beliefs of

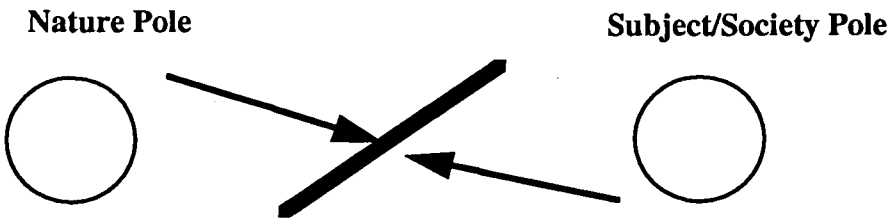
---

[40] But see Trevor Barnes, "Whatever Happened to the Philosophy of Science?" Environment and Planning A 25 (1993): 301-304; Keith Bassett, "Whatever Happened to the Philosophy of Science?: Some Comments on Barnes" Environment and Planning A 26 (1994): 337-42; Trevor Barnes, "Five Ways to Leave Your Critic: A Sociological Scientific Experiment in Replying" Environment and Planning A 26 (1994): 1653-58.

[41] David Bloor, Knowledge and Social Imagery (London: Routledge and Kegan Paul, 1976), 4-5.

Figure 1.1 Symmetrical Explanation of Science

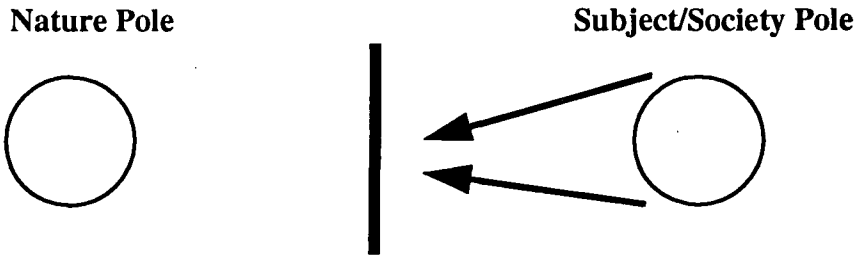
ASYMMETRICAL EXPLANATION OF SCIENCE



Truth is explained by Nature

Falsehood is explained by Society

SYMMETRICAL EXPLANATION OF SCIENCE



Nature explains neither truth nor falsehood

Truth and falsehood are explained by Society

After Bruno Latour, We Have Never Been Modern, 95.

ideology that were explained by bias, interests, or some other social influence, the symmetry principle demands epistemic agnosticism about the truth of all knowledge and belief. As Harry M. Collins explained, the symmetry principle led proponents of SSK to ask skeptically about "what comes to count as scientific knowledge and ... how it comes so to count."[42] It treats scientific knowledge as socially constructed and amenable to sociological analysis and explanation all the way down to its most technical details.

That said, SSK has advanced a number of distinct programs for understanding how scientific knowledge is socially constructed. Much of the earliest work in SSK was done out of the University of Edinburgh, where members of what became known as the Edinburgh school challenged conventional accounts of science and scientific objectivity on several fronts. First, they insisted that scientific knowledge is a local construction dependent upon local practices that cannot be generalized into theories and laws as the hypothetico-deductive model of science suggests. As David Bloor explained "meaning is created by acts of use. Like a town, it is constructed as we go along. Use determines meaning; meaning does not determine use."[43] By this account, scientific knowledge is literally a social construction since its meaning is represented and brought into view through various practices from which knowledge *itself* cannot be abstracted, as realist accounts of scientific representation imply. Scientific understandings grow through what Barry Barnes called "bootstrap induction" whereby self-referentially explanatory metaphors construct the nature of the world: "Trees are nothing more nor nothing less than what are called trees, electrons are what are called electrons."[44] His polemical conflation of epistemological anti-realism about theories (our ideas about electrons are made up) and ontological anti-realism about objects (electrons *themselves* are socially constructed objects) is perhaps typical of much of the work in SSK, which has been involved in an

---

[42] Harry M. Collins, "The Sociology of Scientific Knowledge: Studies of Contemporary Science" Annual Review of Sociology 9 (1983): 267.
[43] David Bloor, Wittgenstein: A Social Theory of Knowledge (New York: Columbia University Press, 1983), 25, quoted in Barnes, Logics of Dislocation, 119.
[44] Barry Barnes, "Social Life as Bootstrapped Induction" Sociology 17 (1983): 540.

epistemological dispute with philosophers of science.[45] By conflating these two senses of social construction, proponents of SSK offer the strongest possible critiques of correspondence theories of truth, but they expose themselves to fierce debates about reflexivity and the self-referentiality of their own representations of science.[46]

Second, members of the Edinburgh school insist that the verification and falsification of scientific theories are social processes in which social interests are hopelessly intertwined, for as Barry Barnes puts it "any 'context of justification' must always rest upon negotiated conventions and shared exemplars."[47] They represent scientific facts as the socially constructed outcome of contingent social relations between scientific actors with different and conflicting interests in the construction of what will pass for scientific fact. These "interests" are not so much the external economic interests of marxism but the local interests of practicing scientists themselves. The Edinburgh school dissolved the old divide between internal and external explanations of science by insisting that social interests are internal to the practice of science. Interests are the social force that determines *at the end of the day* how scientific "conventions are maintained, applied, and developed."[48] Empirical case studies of statistics, phrenology, particle physics, and early experimental science demonstrate that scientific controversies were resolved through power plays and local negotiations between competing scientists struggling to extend particular models, metaphors, and practices by which the world can be known and represented-- not by reference to the data alone, as normative accounts of science by realist and positivist philosophers suggest.[49] The geographer Trevor Barnes has followed the Edinburgh school

---

[45] I should say though that Barnes (1983: 541) advanced this claim only to step back from what he termed the reflexive "epistemological left" which denies any grounds for representation: "I do not accept the assertion that reference reduces to self-reference, but treat it on a par with the alternative scientistic claim which wrongly discounts self-reference altogether." Barnes, "Social Life as Bootstrapped Induction," 541.

[46] For an insighful analysis of the various senses of social construction current in SSK, see Sergio Sismondo, "Some Social Constructions" Social Studies of Science 23 (1993): 515-53.

[47] Barry Barnes, Scientific Knowledge and Sociological Theory (London: Routledge and Kegan Paul, 1974), 154.

[48] Barry Barnes, T.S. Kuhn and Social Science (London: Macmillan, 1982), 101.

[49] Donald MacKenzie, "Statistical Theory and Social Interests: A Case Study" Social Studies of Science 8 (1978): 35-83; Steven Shapin, "The Politics of Observation: Cerebral Anatomy and Social Interests in the Edinburgh Phrenology Disputes" in H.M. Collins, ed., Sociology of Scientific Knowledge: A Source Book

model to explain the ascendance of quantitative methods and theory in economic geography as the outcome of a struggle between a rising generation of new scholars eager to make their mark in the discipline and an old guard resistant to these new methods and theories. Unlike Peter J. Taylor's Mertonian explanation of the quantitative revolution, Barnes emphasizes that these negotiations and social struggles shaped the very core of economic geographers' beliefs in quantitative theories and methods: "we might best view their work as the consequence of a set of locally-derived metaphors and social interests."[50]

In contrast to the Edinburgh studies of social interests, proponents of SSK based at the University of Bath in England prefer micro-studies of scientific controversy as the best way to expose the social construction of scientific knowledge. Following Pierre Duhem's contentions about the theory-ladenness of observation and thus of the difficulty of empirical falsification, they describe how scientific controversies cannot be resolved by reference to the data alone. Harry Collins calls this problem the experimenter's regress:

> since experimentation is a matter of skillful practice, it can never be clear whether a second experiment has been done sufficiently well to count as a check on the results of a first. Some further test is needed to test the quality of the experiment-- and so forth.[51]

In the debate over the existence of the gravity waves predicted by relativity theory, negative experimental results were not decisive, because physicists could not decide if they were the correct result or if the methods were flawed.[52] Experiments, claims Collins, "tell you nothing unless they are competently done, but in controversial science no one can agree on a criterion of competence. Thus in controversies ... scientists disagree not only about

---

(Bath: Bath Univ. Press, 1982), 103-50; Andrew Pickering, "The Role of Interests in High-Energy Physics: The Choice Between Charm and Colour" in K. Knorr, R. Krohn, and R. Whitley, eds., The Social Process of Scientific Investigation (Dordecht: Reidel, Sociology of the Sciences Yearbook, vol. 4, 1981), 107-38; Steven Shapin and Simon Schaffer, Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life (Princeton: Princeton Univ. Press, 1985).

[50] Barnes, Logics of Dislocation, 122; Peter J. Taylor, "An Interpretation of the Quantitative Debate in British Geography" Transactions of the Institute of British Geographers n.s. 1 (1976): 129-42.

[51] Harry M. Collins, Changing Order: Replication and Induction in Scientific Practice (London: Sage Publications, 1985), 2; Pierre Duhem, The Aim and Structure of Physical Theory, trans. P.P. Wiener (1906. Princeton: Princeton Univ. Press, 1954).

[52] Collins, Changing Order, 79-107.

results, but also about the quality of each other's work."[53] Bath school studies of experimenter's regress provide empirical confirmation of David Bloor's more abstract and theoretical arguments, based on the later Wittgenstein, about the circularity of rule following and thus of the social construction of scientific knowledge and scientific facts.[54]

In a recent exchange, Collins and Steven Yearley make explicit the strong sense in which they mean the social construction of scientific facts as well as scientific knowledge. At least for the purposes of sociological explanation, they insist that SSK must remain steadfast in recognizing human action as the only cause of and acceptable explanation for scientific objects and scientific representations of them. Their sense of a socially constructed nature then, is a methodological principle of epistemic explanation more than it is an ontological claim or an object of much critical inquiry. As a result, their discussions of socially constructed nature do not engage much with the wider political implications of particular productions of nature, in the way that, for instance, a long established tradition of marxist scholarship did.[55]

Other proponents of SSK prefer ethnographic study as the best way to understand the social construction of scientific knowledge. Ethnomethodologists proceed from the assumption that scientific "outcomes are the results of participants' interactive and interpretive work."[56] In her ethnography of a plant protein research laboratory, Karin Knorr-Cetina looked at how the relationship between the world and scientific representations of it is socially constructed and transformed within "a highly preconstructed artificial reality"-- the laboratory.[57] Her use of "social construction" runs together three

---

[53] Harry M. Collins and Trevor Pinch, The Golem: What Everybody Should Know About Science (Cambridge: Cambridge Univ. Press, 1993), 3.
[54] Bloor, Wittgenstein: A Social Theory of Knowledge.
[55] Harry M. Collins and Steven Yearley, "Epistemological Chicken" and "Journey into Space," both in A. Pickering A., ed., Science as Culture and Practice (Chicago: Univ. Chicago Press, 1992), 301-26, 369-89.
[56] Karin Knorr-Cetina and Michael Mulkay, "Introduction: Emerging Principles in Social Studies of Science" in K. Knorr-Cetina and M. Mulkay, editors, Science Observed: Perspectives on the Social Study of Science (Beverly Hill: Sage Publications, 1983), 8.
[57] Karin Knorr-Cetina, "Towards a Constructivist Interpretation of Science" in Knorr-Cetina and Mulkay, eds., Science Observed, 119. Also, Karin Knorr-Cetina, The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science (Oxford: Pergamon Press, 1981).

distinct senses of social construction: the social construction of scientific theories (representations), the social construction of what passes for (beliefs about) reality, and the social construction of the artefactual objects of science. In response to criticisms, she explained that her constructivism dissolves distinctions between representation and reality, natural and social objects: "science secretes an unending stream of entities and relations that make up the 'world.'"[58] But her insistence that the practice of science involves the "enculturation of natural objects" leaves open the sense that there is some realm of the natural that escapes social construction, even if it can never be known as it really is.[59]

Other ethnomethodologists have focused their attention on modes of scientific discourse and communication. Ethnography reveals how scientific facts about such matters as brain proteins are made up in what Michael Lynch calls the shop work and shop talk of a research laboratory.[60] Lynch and other proponents of what has come to be known in SSK as discourse analysis use social construction in the strong sense that representation creates its own objects, but their focus on scientific discourse tends to eclipse the laboratory and other scientific practices by which these representations are produced. In their book about the biochemical study of oxidative phosphorylation, Nigel Gilbert and Michael Mulkay devote almost all their attention to an analysis of scientists' descriptions of the field. Thus, they have relatively little to say about the practices that constitute it or how these scientific constructions feed into other social practices.[61]

Of the various studies of scientific discourse, Bruno Latour and Steve Woolgar's Laboratory Life has been the most widely read and cited. They represent scientific practice

---

[58] Knorr-Cetina, "Strong Constructivism-- From a Sociologist's Point of View: A Personal Addendum to Sismondo's Paper" Social Studies of Science 23 (1993): 557. See Sismondo, "Some Social Constructions."

[59] Knorr-Cetina, "The Couch, the Cathedral, and the Laboratory: On the Relationship between Experiment and Laboratory in Science" in Pickering, ed., Science as Culture and Practice, 118.

[60] Michael E. Lynch, Art and Artifact in Laborator Science: A Study of Shop Work and Shop Talk in a Research Laboratory (London: Routledge and Kegan Paul, 1985).

[61] G. Nigel Gilbert and Michael Mulkay, Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse (Cambridge: Cambridge Univ. Press, 1984). For other examples of discourse analysis, see Michael E. Lynch, Eric Livingston, and Harold Garfinkel, "Temporal Order in Laboratory Work" in Knorr-Cetina and Mulkay, eds., Science Observed, 205-38; Eric Livingston, The Ethnomethodological Foundations of Mathematics (Boston: Routledge and Kegan Paul, 1986).

as primarily a literary practice in which scientific facts are constructed by the double structure of scientific representation. First, scientists deploy various "inscription devices"-- technical apparatus that can "transform pieces of matter into written documents"-- to make statements in scientific texts. Then, through a variety of rhetorical techniques and substitutions, these scientific statements can become "split entit[ies]": both statements and the objects-in-themselves represented by these statements. Reality appears as such by virtue of the operations of representation where the relationship between statements and objects can be inverted and then concealed. So, as Latour and Woolgar describe the scientific construction of the brain peptide TRF, this scientific fact was only transformed from a statement into a scientific fact when enough statements from still other texts were enrolled to win over all doubters and allow scientists both to invert the relationship between representation and reality, claiming thereby that the existence of TRF was the cause of its representation, *and* to erase all traces of this inversion such that the facts could be taken for granted. Latour and Woolgar conclude:

> "Reality" cannot be used to explain why a statement becomes a fact, since it is only after it has become a fact that the effect of reality is obtained... It is *because* the controversy settles, that a statement splits into an entity and a statement about that entity; such a split never proceeds the resolution of controversy.[62]

Their account of the grounding of grounds for representation owes much to Derrida, but in sharp contrast to the way that notions of deconstruction and the supplementarity of meaning have been taken on board in geography, Latour and Woolgar offer an accessible and empirically substantiated deconstruction of scientific claims to represent reality as it really is.

---

[62] Bruno Latour and Steve Woolgar, Laboratory Life: The Social Construction of Scientific Facts (London: Sage Publications, 1979), 59, 180.

climatic change and the sociology of scientific knowledge

I find these various SSK arguments about the social construction of scientific facts to be a very seductive and compelling way to describe my own modest climatic change research.[63] Hoping in some measure to justify to the National Science Foundation their heavy investment in the reconstruction of historical climate databases, I became interested in the possible regional climatic effects of volcanic eruptions. Certainly my supervisor (the principle investigator) was excited by the prospect of adding another tangible research application to his next grant proposal. These interests dictated the direction of my research, but not its content; that was the result of negotiations between me, my instruments, and other scientists propounding various other constructions of the facts about the world.

Unambiguous traces from earth orbiting satellites, solar radiation meters, and other inscription devices made the impact of volcanic ejecta upon solar insolation an indisputable fact.[64] These instruments and inscription devices incorporate and literally embody various statements made by scientists about something called climate, but an SSK analysis would never allow such a natural object to play any active part in explaining scientific knowledge. The symmetry principle demands that the only reality that can count in an SSK narrative such as this is a social one of human actors and the technologies they construct; nature can have nothing to do with it.[65] Thus, climate, once an aggregate statistical phenomenon described by readings from thermometers and rain gauges, can now be said to be the socially constructed product of three-dimensional mathematical models, run on multi-million dollar supercomputers.[66]

---

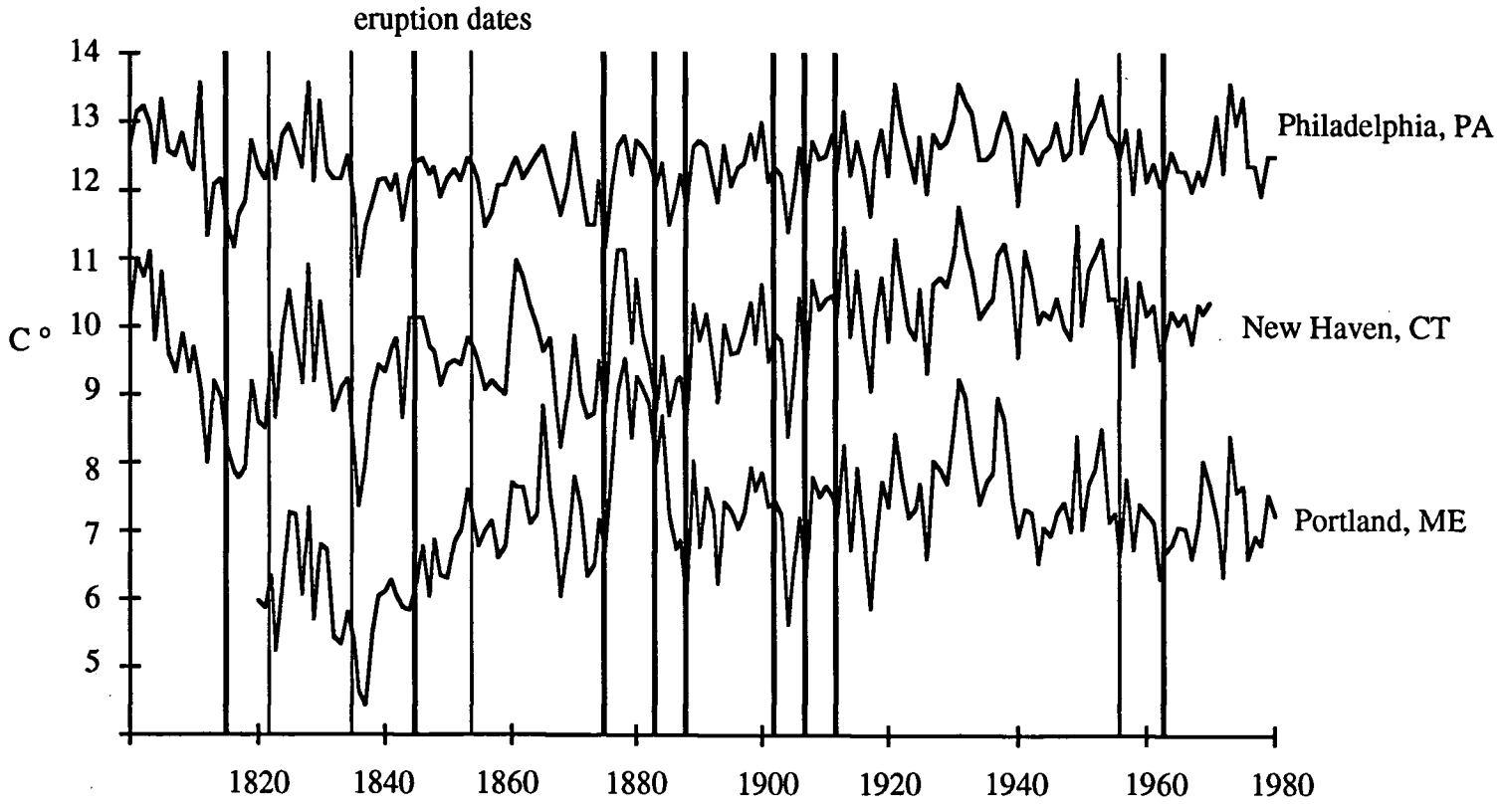
[63] Demeritt, "Effects of Volcanic Eruptions on Surface Temperatures."

[64] R. P. Turco, R.C. Whitten, and O.B. Toon, "Stratospheric Aerosols: Observation and Theory" Review of Geophysics and Space Physics 20 (1982): 233-79; M.R. Rampino and S. Self, "Sulfur-Rich Volcanic Eruptions and Stratospheric Aerosols" Nature 310 (1984): 677-79.

[65] This point is emphasized by Collins and Yearley, "Epistemological Chicken."

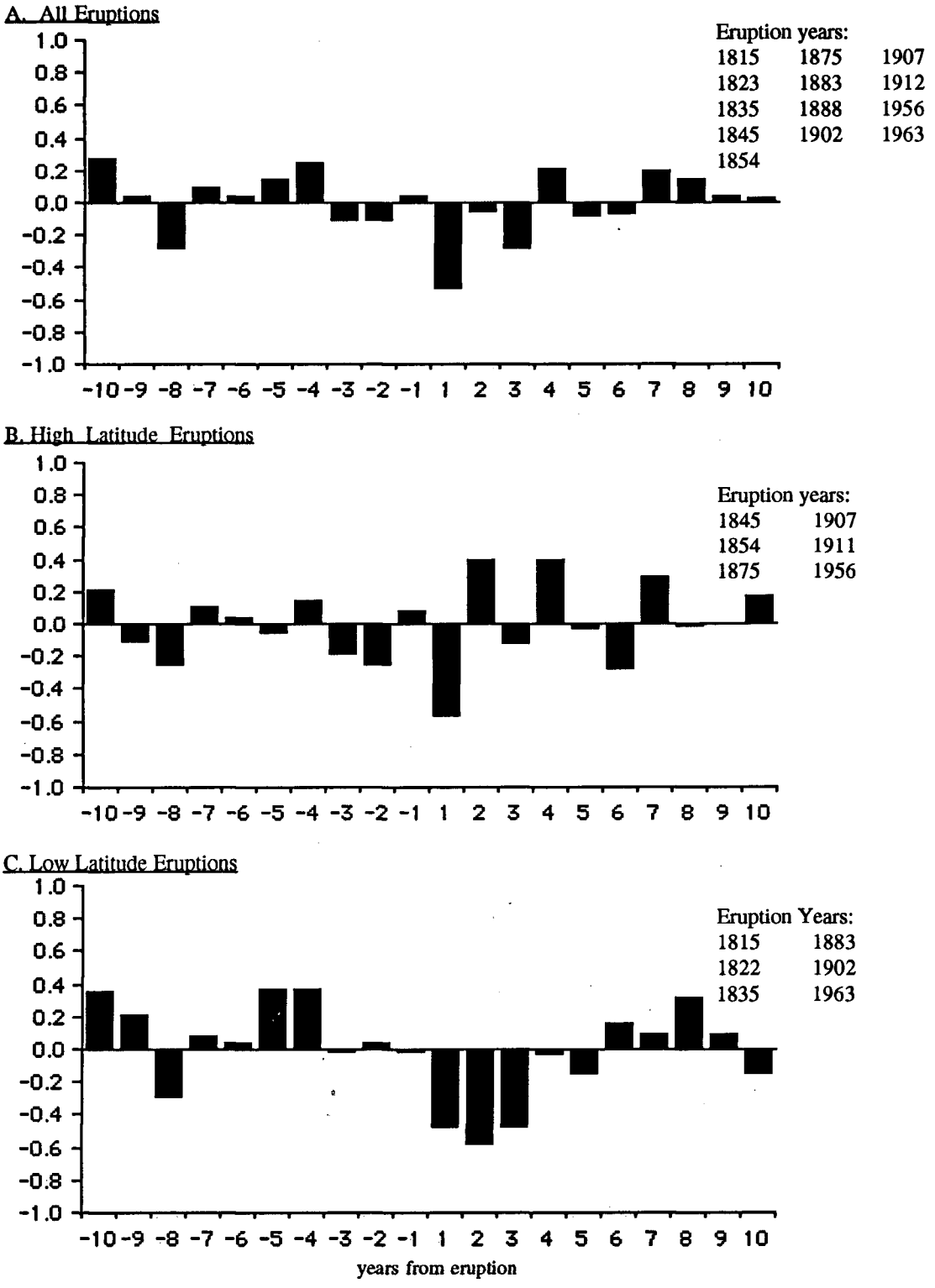
[66] The mathematization of climate and its study is charted in two recent studies: Robert M. Freidman, Appropriating the Weather: Vilhelm Bjerknes and the Construction of a Modern Meteorology (Ithaca: Cornell Univ. Press, 1989); Frederik Nebeker, Calculating the Weather (New York: Academic Press, 1995).

Figure 1.2. Room for Doubt: Volcanic Eruptions and Averaged Annual Temperatures in the Northeastern United States



Source: Demeritt, "Effects of Volcanic Eruptions on Surface Temperatures."

Figure 1.3. Converting the Doubtful: Superposed Epoch Analysis of Annual Temperature (C°) Anomalies Before and After Volcanic Eruptions



While the actual existence of climate itself was thereby rendered indisputable, the status of volcanically induced climatic changes was unsettled. Following up on statements made by Lough and Fritts about the possible circulatory enhancement of these climatic impacts, I examined long runs of temperature data transcribed at several individual stations in northeastern North America (FIGURE 1. 2).[67] But finding the volcanic signal in these noisy climate records was a problem. Where was the signal? And what was noise? Each data point on these graphs, of course, represented countless daily observations constructed by thermometers. These inscription devices are black boxes: they produce writings that can be said to mark the emergence of a fact. I didn't need to worry about the contents of this black box. I took for granted that the statements recorded in temperature log books represented the actual facts of historic temperatures and climate. With these writings in hand, I could forget about all the work and all the other paper that went into producing my FIGURE 1.2. But there was still the problem of noise. My inscription was not convincing enough that it could become a split entity that might be said to represent both the fact of a volcanic impact upon regional climate and a statement about this fact.

To increase my signal and filter out the "noise", I compiled a data base of 35 climate stations in the Northeast and performed a superposed epoch analysis.[68] I entered the climate data from all my stations for 10 years before and after each of my 13 eruptions into this statistical black box, producing a very tidy and impressive inscription (FIGURE 1.3). Having done that I could forget about how FIGURE 1.3 had been produced: the inscription devices that rendered up data, the computer that calculated averages, the software that charted these numbers. My graph had become a black box that produced both writings and the facts that these writings represented. Still, how did I know that these peaks represented a genuine volcanic signal and not some random artifact of the data set or of chance? These are the questions behind Collins's "experimenter's regress."

---

[67] J. M. Lough and H.C. Fritts, "An Assessment of the Possible Effects of Volcanic Eruptions on North American Climate Using Tree-Ring Data, 1602 to 1900 A.D" Climatic Change 10 (1987): 219-39.

[68] H.A. Panofsky and G.W. Brier, Some Applications of Statistics to Meteorology (Univerisity Park, PA: College of Mineral Industries, Pennsylvania State Univ., 1965).

To answer this question I prepared 100 test runs from random years and measured them against my signal. I could then compare the two inscriptions and "test" the statistical significance of my signal. But what is statistical significance and what is an adequate test?

As it turns out, statisticians and climatologists have already come to an agreement about these questions. Unlike the physicists searching for gravity waves, I had a widely accepted method to observe climate and to measure statistical significance, so I did not face an endless experimenter's regress. But I am left with the uneasy feeling that the escape from this circle was a conventional one-- one socially agreed upon by the community of certified investigators and not something that was resolved by reference to the data alone. Having settled upon a representation that would be authoritative, I could present my inscriptions as having been caused by nature itself rather than by the various inscription devices that I used to construct them.

reflexivity and SSK

This encapsulated story is perhaps typical of the strong program of SSK analysis. Following the Edinburgh school, I can say that my research project was the result of a negotiation between various "interests": granting agencies, supervisors, scientific disciplines, etc. The work of Harry Collins and the Bath School provides a way to understand the experimenter's regress that made it impossible for me to settle a scientific controversy by reference to the data alone. Once constructed convincingly enough, my inscriptions led the double life of statements about facts and facts themselves, capable of supporting the construction of still other facts. In all these explanatory narratives, the social is a narrowly drawn community of scientists and other interested investigators with free rein to enroll inscription devices and appeal to laboratory shop talk in order to close scientific controversies and thereby socially construct scientific facts. Though long on the messy details of scientific practice, my story said nothing of economic power, sexism, psychology, or ideological belief, the preferred explanatory devices of marxist and feminist

science critics in geography. My narrative made no mention of my identity as a white middle-class male, well educated and easily assimilated into the norms of a scientific community. Nor did it show much concern for the applications of this socially constructed knowledge or the connections between the institutions of science and society at large. Its conceptions of society and subjectivity are hopelessly underdeveloped. Given these difficulties geographers should be on guard when taking on board the precepts of the strong program in SSK.

Oddly, critics of the strong program within SSK have not seized upon the anemia of its conception of the social in social construction. Instead, they are troubled by the realist epistemology adopted by the strong program for its own accounts of the social construction of scientific knowledge. These critics insist that SSK cannot remain immune from the caustic logic of its own relativism. They advocate reflexivity so as to expose the rhetoric and artifice underwriting all knowledge claims, especially their own. They turn the SSK critique of scientific representation back in on the SSK program itself and its sociological representations of the practices whereby scientific knowledge is socially constructed. The reflexivity program has produced some very interesting experiments in writing and representation. In these new literary forms witty authors often write in multiple voices to call attention to the way in which single monovocality is a conventional tool for constructing certainty.[69] These self-conscious asides have the same wry, ironic tone of Ferris Bueller or Bruce Willis in Moonlighting turning to address the camera. The result goes nowhere, but then that's the whole point. Reflexivity makes a general mockery of any pretense to objective or certain knowledge.

Critics of the reflexivity program rehearse many of the same arguments directed against postmodernism in human geography. Ever more clever displays of reflexivity are

---

[69] See, for example, Michael Mulkay, The Word and the World: Explorations in the Form of Sociological Analysis (London: Allen & Unwin, 1985); Steve Woolgar, ed., Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge (London: Sage Publications, 1988); Malcolm Ashmore, The Reflexive Thesis: Wrighting Sociology of Scientific Knowledge (Chicago: Chicago Univ. Press, 1989).

narcissistic, accomplishing little more than calling attention to their own (usually masculine) presence. Perversely, in fact, reflexivity can actually serve to reinforce the authority of the authorial voice supposedly de-stabilized by reflexive practice. As one of the two Trevor Pinchs comments in Trevor Pinch's reflexive critique of his own reflexivity, mulivocality can make it appear as if other voices had been allowed a say, while of course Trevor Pinch always retained control over the voices of all his staged opponents.[70] Collins and Yearley argue that relativism about sociological representations of science is pointless and leads to political quietism.[71] By focusing exclusively on representation (especially their own), reflexivists have had little to say about the scientific practices producing representations, or the political effects of constructing this representation rather than that one. Such quietism is not inherent to reflexive thinking, but reflexivists in SSK, like some postmodernists in human geography, have been more concerned with imagining themselves as the radical vanguard of some new post-epistemological age than with deconstructing particular scientific claims to represent nature as it really is.

Ironically, even those SSK practitioners like Collins and Yearley concerned about the political quietism of reflexivity have not, for the most part, left the laboratory and made these wider political interventions in opposition or support of particular scientific practices. Although the empirical program of SSK has been concerned with scientific practice, it has examined practice so as to engage in an epistemological argument with philosophers of science about the nature of scientific representation. SSK claimed that the representation of gravity waves, solar neutrinos, neuro-transmitters, and quarks created these scientific objects.[72] It is easy to dismiss these objects of basic research as mere social constructions, artifacts of social convention, laboratory shop talk, or literary inscription. Like sociologists

---

[70] Trevor Pinch and Trevor Pinch, "Reservations about Reflexivity and New Literary Forms or Why Let the Devil Have All the Good Times" in Woolgar, ed., Knowledge and Reflexivity, 178-97.
[71] Collins and Yearley, "Epistemological Chicken" in Pickering ed., Science as Culture and Practice, 309.
[72] Collins, Changing Order; Trevor Pinch, Confronting Nature: The Sociology of Solar-Neutrino Detection (Dordecht: D Reidel, 1986); Latour and Woolgar, Laboratory Life; Andrew Pickering, Constructing Quarks: A Sociological History of Partical Physics (Chicago: Univ. Chicago Press, 1984).

studying the social construction of science, quarks do not leave the laboratory in any discernible fashion. It is much more difficult to be so agnostic about the social constructions of applied science. Penicillin and plutonium leave the laboratory. They may also be socially constructed, but they are scientific constructions of vital importance whose reality seems much harder to deny outright.

Faced with radiation poisoning and the other modern monstrosities of the Cold War, the strong constructivism of SSK seems misplaced. It is immensely powerful for debunking realist epistemologies, normative accounts of scientific practice, and the correspondence theory of truth, but this epistemological critique of scientific representation is only as useful as it is helpful in changing the scientific practices by which the objects of modern science and scientific representations of them are constructed and produced. This political weakness has been exacerbated by a tendency in SSK to draw rather narrow boundaries around the "social" in socially constructed. As Donna Haraway observes, SSK accounts of social construction tend to stop just short of taking account of sexism, racism, economic power, and colonialism in the social construction of scientific knowledge--perhaps because these social explanations seem to be the old reductionist ghosts that blocked true understanding of science in action.[73]

articulating practices of science

Having in a sense then come full circle, from critiques of the truth of representation in human geography, to SSK's discussions of scientific practices, and then to the reflexive program in SSK and its self-absorption with representation, I want to change the conversation. That, it seems to me, is a necessary, though perhaps not sufficient, step in the radical reform of science. The critique of representation is important and useful, but the narrow focus on epistemological questions has been politically disabling. As these discussions have been convened in human geography and in SSK they have distracted

[73] Donna Haraway, "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others" in L. Grossberg, C. Nelson, and P.A. Treichler, eds. Cultural Studies (New York: Routledge, 1992),

attention from the powerful *practices* of science by which representations are produced. Concerned exclusively with representation, we have not paid sufficient attention to the politics of scientific practices and the power relations that they enable.

Epistemological debates about objectivity and relativism, social construction and representation have led to a dead-end because objectivists and relativists are trapped on opposite sides of the same metaphysical dualism. Objectivists believe in a natural world that grounds our representations in terms of their correspondence to a real, objective world. They reject epistemological critiques of representation because they assume that social constructivism necessarily challenges the metaphysical "reality" of the natural objects represented. Relativists, by contrast, believe that representation and reality are indistinguishable and that there can be no grounds for grounding representations. By collapsing the objectivists' dualism into a single, socially constructed monism, relativists conflate anti-realism about scientific entities and the epistemological claim that the grounds for representations are arbitrary and socially constructed with anti-realism about scientific entities and the metaphysical claim that reality is made up. Oddly, objectivists and relativists agree about one thing: representations must be explained either by nature or by society, but the two transcendences can never be mixed together.

If, however, as Bruno Latour claims, science and representation never worked like that-- if reason has never been disembodied, if the Cartesian subject was never centered, if Kant's things-in-themselves were never absolutely separate from the Transcendental Ego, if a subject's beliefs are never entirely detached from their object of knowledge, if society is never dissociated the realm of nature-- then, as he puts it, we were never modern (or postmodern) at all. By Latour's account, nature and society, representations and their objects, have always been hopelessly mixed up. He calls his perspective *amodern*, and it provides some intriguing ways of thinking through the anxieties about science, knowledge,

and nature raised by social constructivist critiques of science and scientific objectivity.[74] Let me elaborate.

In response to an essay I wrote, William Cronon said that without some grounds for knowing whether our socially constructed "'facts' bear some correspondence, however metaphorical, to the world they purport to describe" that scientists might as well count popsicles in Passaic "as the amount of CO2 blowing past Mauna Loa."[75] In a similar vein Imre Lakatos complained that Kuhn's social constructivism reduced science to a form of "mob psychology" in which scientific belief about nature was determined by society and had nothing to do with nature itself.[76] Postmodernists, by contrast, celebrate this loss of faith in objectivity with gay abandon. Belief, they say, is all socially relative anyway, so let's just revel in the play of difference.

The problem with these formulations of objectivity and relativism is that they depend upon a great divide between nature and society. Either you believe, as Cronon and Lakatos do, in a natural world that surpasses us and grounds our representations, or you do not, in which case you hold, as postmodernists like Baudrillard do, that the world is denatured, all surface and simulacra entirely of our own making; that a subject's beliefs never touch any reality outside of themselves; and that they remain forever relative to social contexts that explain their content.[77] We need to imagine some other kind of relationship to nature besides the reification of objectivity and the productionism of relativism.

Latour's realization that we were never modern dispels the great divide between objectivism and relativism. Without the transcendental poles of nature and society to explain it all, objectivists cannot explain the construction of the facts by appeal to a nature

---

[74] Bruno Latour, We Have Never Been Modern, trans. C. Porter. (Cambridge: Harvard Univ. Press, 1993).
[75] William Cronon, "Cutting Loose or Running Aground" Journal of Historical Geography 20 (1994): 42. He was responding to my, "Ecology, Objectivity and Critique in Writings on Nature and Human Societies Journal of Historical Geography 20 (1994): 22-37, a revised version of which appears as chapter 2 of this thesis.
[76] Quoted in Ian Hacking, Representing and Intervening: Introductory Topics in the Philosophy of Natural Science (Cambridge: Cambridge Univ. Press, 1983), 112.
[77] Jean Baudrillard, In the Shadow of the Silent Majorities or, the End of the Social, trans. P. Foss, J. Johnston, and P. Patton (New York: Semiotext(e), New York, 1983).

that surpasses us, any more than relativists can attribute their construction to a society absolutely of our own making. Faith in modern objectivity makes no more sense than postmodern celebration of its loss.

So too is the second great divide separating the modern world from the primitive or premodern. In an amodern world, differences between the capabilities of modern societies and others can be explained without appealing to the development of some different order of rationality, as does Habermas with his system and lifeworld, or by reducing these differences to "equally arbitrary codings of the natural world," as do cultural relativists.[78] Instead, these differences come down to the scale of the networks that different groups are able to construct and maintain.

To assert that the world is made known by articulations from particular, embodied points of view, is not, as Donna Haraway is at pains to explain, to "claim there is no world of which people struggle to give an account, no referent in the system of signs and productions of meanings, no progress in building better accounts within traditions of practice."[79] That is precisely the reductionist claim advanced by both defenders of modern objectivity and their relativist postmodern opponents who do not distinguish anti- realism about scientific theories and epistemological questions of how we know the world from anti-realism about entities and metaphysical questions of whether the world we know actually exists.

This conflation underwrites Cronon's popsicle comment. In the essay to which he responded, I professed deep concern about scientific accounts of mounting atmospheric CO2. Cronon assumed (as he put it) that since I believe these "descriptions of reality bear at least tangential relationship to that reality," I must therefore believe in correspondence and thus be, after all, some kind of "closet realist." However problematic realism with its idealized standards of correspondence, reflection, and objective representation may be,

---

[78] Latour, We Have Never Been Modern, 108.
[79] Haraway, Primate Visions, 12.

Cronon holds that "most of us cannot conceive of any other way we would want to relate to the world."[80] I am trying to suggest that correspondence and reflection, with their promises of possessing passive mirror images of sameness that only pretend to difference, are not the only way we can imagine our "descriptions of reality bear[ing] at least tangential relationship to th[e] reality" to which they refer.

In place of representation, correspondence and all that they imply about resourcing reflections of the Other for the production of the Self, I would suggest *articulation* might be a better way to imagine the construction of knowledge in a relentlessly artifactual amodern world.[81] Now that smart missiles, genetic engineering, organ transplants, and mechanical hearts make the science fictions of Mary Shelley's Frankenstein a commonplace, modern dualisms like mind/body, self/other, imaginary/real and artificial/natural no longer make any sense. Articulation rewrites the boundaries constructing an objective nature that might be the resource for producing an alienated society on the other. It recognizes that nature and society are feats and co-constructions, not pre-existing transcendences that, in the final instance, can explain it all. Articulation refigures the actors in the construction of what is made for us as nature and society. The social in these social constructions is not just "us": it includes other earthlings, humans, non-humans, and even machines and other non-organic actors delegated with surprising competencies and historically specific effectivities.

Science appears as a rather different activity when we realize that we were never modern. Science is not about correspondence, mimesis, or representing anything more real and original or less fictional and constructed than itself. Instead science is about intervening.[82] It is about the mediated relationships among humans and their ever-active non-human partners, but it is important to recognize that it continues to be practiced *as if it*

---

[80] Cronon, "Cutting Loose,"42, 41, 41.
[81] The metaphor is Haraway's. See her, "Promises of Monsters" in Grossberg, Nelson, and Treichler, eds., Cultural Studies, 295-337.
[82] Hacking, Representing and Intervening.

were not. Even as new sciences like genetics and molecular biology work feverishly to produce and radically construct the nature that is their object of study, they proceed by making all traces of this production of nature "extremely difficult to detect."[83] The rhetoric of modern dualism remains one of the most important sources of scientific authority. Changing the conversation is important, but it cannot simply be willed. These rhetorics have been institutionalized so that, as Noel Castree notes, any project of amodern scientific analysis "will, paradoxically, have to work *within that which it opposes* " because "'nature' is one of those things which, as Spivak says, we cannot not want but we can never 'have'."[84]

By this point perhaps, you may be thinking that I have gone off the metaphoric deep end with this talk about articulations and social constructions. What difference, you might ask, does this social theory jargon make for my own practical efforts to make sense of the world?

I am very sympathetic to these concerns, but it seems to me that social constructivism is vital-- both for how people outside of science evaluate the claims of scientific experts and for how scientists conduct their research.

Social constructivism can change how non-experts think about scientific claims and controversies. Debates about objectivity are debates about what will count for real knowledge of the world. Social constructivism undermines exclusive claims to represent the world as it really is, but it does not lead to empty relativism or nihilistic skepticism. Instead it helps temper our tendency either to worship or demonize science and technology. It sounds a wake-up call to overreaching dreams of modern mastery and to correspondingly violent fantasies about a return to a premodern primitive. Such virulent anti-science tirades, now popular among New Agers and in cultural studies, are a heresy born of betrayal by the one true faith. Articulating social constructivism bridles these extreme reactions. Freed

---

[83] Latour and Woolgar, Laboratory Life, 176.

[84] Noel Castree, "Monstrous Promises for Geography? Power and the Production of the Genetic Body" (Paper presented at the annual conference of the American Association of Geographers, Chicago, IL, 1995), 9.

from our expectations of God-like objectivity, we might approach scientists with the same well developed expertise of everyday life that we use when we deal with travel agents. As Collins and Yearley put it, "scientists ... stand roughly in the same position with regard to the natural world as travel agents stand with regard to summer holidays ... Their advice is the best available but it does not constitute the final word."[85]

But what about the practice of science itself? Collins and Pinch believe that social constructivism "is useless to scientists-- it can only weaken the driving force of the determination to discover."[86] Here I part company with them.

I am convinced by feminists and others concerned about sexism and racism in science that much needs to be done to make the laboratory, the work bench, and the classroom friendlier and more welcoming to different kinds of people. A friend of mine has just begun a degree in engineering where before class begins each day, she must endure the idle misogynist chatter of her male peers regaling one another with imaginary tales of sexual prowess and alcoholic consumption. It might be said that this is a problem of baneful social influences polluting the otherwise pure and value-free core of science itself. I hope, however, that I have convinced you otherwise. The marks of history and culture and social power are deeply and inextricably inscribed into the narratives of science. Scientific knowledge is not, and cannot, be disembodied. This has been a powerful and productive fiction, enabling some accounts of nature and constraining the representations of others-- particularly those others said to bear the debilitating marks of gender, race, and subjectivity.

Sadly most of the debate about social constructivism has turned on representation and the possibilities for achieving truth on the basis of some kind correspondence between our ideas about the world and the world itself.

---

[85] Collins and Yearley, "Journey into Space" in Pickering, ed., Science as Culture and Practice, 385.
[86] Harry M. Collins and Trevor Pinch, The Golem: What Everybody Should Know About Science (Cambridge: Cambridge Univ. Press, 1993), 143.

To scientists, this way of talking about their work seems so bizarre because it has so little to say about the practices of intervening by which scientific representations are produced. Satellite images of the earth are constructions, and those who work with them spend most of their time tinkering with these mediating technologies to construct and massage the data.[87] On the frontiers of their disciplines, scientists are very comfortable with the notion that the facts are made up, and subject to revision. Twenty-five years ago there were four Ice Ages-- each with its own name. Now there are forty or forty-two. Glacial geologists and paleo-climatologists grappling with Milankovich cycles, solar forcings, and meltwater events in the deep sea record would be the first to admit that the facts about these matters are made up. Scientific findings can be replicated to be sure, but not because they correspond to the world as it really is. The facts can be replicated because scientists follow the same procedures and make the same interventions as those who constructed the facts initially. Replication and predictability-- those attributes so often said to prove the truth of scientific representations-- are products of practice, not of representation in and of itself. This is one reason why scientific practice is so important. Attention to the practices by which scientists construct the context for validating their representations leads us out of the dead-end conversation about whether representations do or do not correspond to the world as it really is. Pointing to practice provides a compelling rejoinder to scientists who deny the social construction of their own knowledge and the great authority conferred by this effacement.

Attention to scientific practice promises political dividends as well. Science is a labor process, but scientists have been perhaps too slow to consider the connections between their interventions in the laboratory and structures of social domination. Even apparently "benign" sciences like ecology are in a sense, creatures of the Cold War. Odum's ecosystem ecology began as radiation ecology. His dissertation was about the global Strontium cycle. Eniwetok Atoll has the dubious distinction of being the site of both

[87] Pamela E. Mack, Viewing the Earth: The Social Construction of the Landsat Satellite System (Cambridge: MIT Press, 1990).

the first hydrogen bomb detonation (1952) and the first large scale ecosystem study (1954). Integral to the metaphor of eco-system are cybernetics, the mathematics of command and control, first developed during WWII to direct automatic anti-aircraft guns and now used to guide cruise missiles, ICBM's, and the automatic trading programs of international commodities brokers.[88]

The realization that scientific knowledge is mediated, embodied knowledge and that scientific facts are socially constructed makes them no less useful for understanding and living in our world. To insist that science is necessarily a social enterprise is *not*, I want to emphasize again, to say that this is the *only* thing that science is about.

For too long we have been debilitated by the notion of disembodied, Olympian truth and the correspondence theory of knowledge. Thinking that only disembodied knowledge was true knowledge, we have been unable to talk about social relations in and about science. Concerned exclusively with representation, we have not paid sufficient attention to the practices of intervention by which these representations are constructed and produced. If anything, the realization that love and power are hopelessly intertwined with science and the construction of nature will make us more circumspect about the metaphors we choose to articulate with the world.

---

[88] Joel B. Hagen, An Entangled Bank: The Origins of Ecosystem Ecology (New Brunswick: Rutgers Univ. Press, 1992).

2. Ecology, Objectivity, and Environmental History

While the North American environmental movement has won only moderate gains in the legislative arena, it has produced a body of writing remarkable both for its impassioned criticism of the environmental devastation wrought by modern Western society and its sensitive analysis of the historic and geographic dimensions of global change. I wish that I could report historical geographers out in the forefront of this discussion. I cannot. Like other human geographers, we seem to have all but abandoned the once venerated study of human relations with the environment.[1] What little geographic research there is has generally conceived the important questions to be technical ones about natural hazards and their human impacts. Geographers, as a result, have tended to produce socially thin environmental impact statements without enough of the caring and reflexive moral engagement that we must make with the world in this era of global warming.[2] We need a more fully critical effort that both diagnoses the deeper social and economic causes of present environmental problems and points the way forward to some preferable future that we might make for ourselves. To date, geographers writing about North America, in

---

[1] For a similar assessment, see Robert W. Kates, "The Human Environment: The Road Not Taken, the Road Still Beckoning" Annals of the Association of American Geographers 77 (1987): 525-34; Terry G. Jordan, Preadaptation and European Colonization in Rural North America" Annals of the Association of American Geographers 79 (1989): 489-500. The discipline has not really progressed beyond programmatic statements like Margaret FitzSimmons, "Reconstructing Nature" Environment and Planning D: Society and Space 7 (1989): 1-3 and Chris Philo, "De-limiting Human Geography: New Social and Cultural Perspectives" in C. Philo, ed., New Worlds, New Words (Aberystwyth: Institute of British Geographers, 1991), 25.

[2] Further justification for this remark would itself require an extended review of the geographic literature, which neither space nor time will allow. I submit the following, however, as symptomatic of the disengaged and excessively technical bent of geographic scholarship on global change: Risa I. Palm, Natural Hazards: An Intergrative Framework for Research and Planning (Baltimore: Johns Hopkins Univ. Press, 1990); B.L. Turner II, ed., The Earth as Transformed by Human Action (New York: Cambridge Univ. Press, 1990); Antoinette M. Mannion, Global Environmental Change: A Natural and Cultural Environmental History (New York: Wiley, 1991). Some of the reasons for this are suggested by Margaret FitzSimmons, "The Matter of Nature" Antipode 21 (1989) 106-20.

marked contrast to their colleagues interested in less developed countries, have not been up to this critical task.[3]

Instead, historians have provided the most insightful critiques of the environmental crisis in North America. Environmental history emerged only recently as a distinct subfield within the historic profession. "Its goal," according to Donald Worster, a leading scholar and outspoken publicist for the field, "is to deepen our understanding of how humans have been affected by their natural environment through time, and conversely and perhaps more importantly in view of the present global predicament, how they have affected that environment and with what results." From the outset, it embodied "a strong moral concern ... [with] some political reform commitments behind it."[4]

Lately, however, the scientific and epistemological foundations of this project have eroded, severely challenging the way environmental narratives, such as this one, are constructed. Revisions within ecological science have discredited the holistic concepts of equilibrium, ecosystem, and climax used by environmental historians to measure anthropogenic damage to nature.[5] I would like to start by considering the new empirical

---

[3] See, for example, Michael Watts, Silent Violence: Food, Famine, and Peasantry in Northern Nigeria (Berkeley: Univ. California Press, 1983); Susanna B. Hecht and Alexander Cockburn, The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon (1989. New York: HarperCollins, 1990); Martin W. Lewis, Wagering the Land: Ritual, Capital and Environmental Degradation in the Cordillera of Northern Luzon, 1900-1986 (Berkeley: Univ. California Press, 1992).

[4] Donald Worster, "Transformations of the Earth: Toward an Agroecological Perspective in History" Journal of American History 76 (1990): 1089. For reviews of environmental history, see Richard White, "American Environmental History: The Development of a New Historical Field" Pacific Historical Review 54 (1985) 297-335; Donald Worster, ed., The Ends of the Earth: Perspectives on Modern Environmental History (New York: Cambridge Univ. Press, 1988); and the roundtable discussion of Worster, "Transformations of the Earth" by Alfred W. Crosby, Richard White, Carolyn Merchant, William Cronon, and Stephen J. Pyne in Journal of American History 76 (1990) 1087-1147. As the nationality of these authors and their publication outlets would indicate, environmental history is much better established in the United States than in Canada.

[5] I use the word "nature" here and throughout this essay with some ambivalence. In Keywords: A Vocabulary of Culture and Society (rev. ed., London: Fontana, 1983) 219, Raymond Williams called it "perhaps the most complex word in the language." It is also one of the most potent. Nature suggests a very troubling distinction between humans and the other organisms and material objects in the world. In this discursive position as "other," nature has also helped constitute many different sorts of racism, colonialism, sexism, and class domination. In the sense of the inherent force directing the world, nature provides a silent, but transcendent, authorization for scientific and other discourses that are legitimated with an appeal to the innate and immutable characteristics of things-themselves. Through such appeals to nature, science has replaced religion as the pre-eminent form of social legitimation. See Will Wright, Wild Knowledge: Science, Language, and Social Life in a Fragile Environment (Minneapolis: Univ. Minnesota Press, 1992).

claims of ecology and their implications for the critique offered by environmentalists.[6] From there, I will discuss two further challenges to environmental history that move us farther and farther away from authoritative claims to know the world as it really is. Social constructivists have impugned the ideas of objectivity and observer neutrality that legitimate the exclusive power of science to represent nature. But if ecologists cannot represent nature as it really is, then surely environmental historians cannot do so either. Barbara Leibhardt and Elizabeth Ann R. Bird have responded to this challenge from social constructivism by rethinking the relationship between scientific (and historical) inquiry and its objects of study. The extension of a diverse linguistic turn has also destabilized history and the other human sciences. William Cronon has offered an extensive response to the epistemological difficulties posed by various postmodern theories of language and knowledge to historians constructing and evaluating historical narratives and environmental critiques. In the final part of the chapter, I will discuss the possibilities and practice of environmental critique without foundational authority, be it in science or elsewhere.

revision in ecological science

At the moment, ecologists are busy rethinking their discipline. There is now a hollow ring to the bold claims of the 1960's and 1970's that information theory, systems analysis, or mathematical modeling would provide the unifying meta-theory to transform ecology into a mature, nomothetic science like physics. Whether the present ferment marks

---

Unfortunately, the English language provides few substitutes to the word nature, and so its use becomes difficult to avoid. I have tried to use it with care, but readers should take note of these different effects sneaking into my text.

[6] While I am sympathetic to the many local varieties of environmental activism and the many different shades of Green in the environmental movement, I would still maintain that for all their many differences, environmental critics have all depended on ecological discourse to claim an exclusive and privileged knowledge about nature. As I shall explain, revision in ecological science challenges the homeostatic reading of nature predominant among American environmentalists. For a discussion of different national histories of the Green movement, see Samual P. Hays, Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985 (New York: Cambridge Univ. Press, 1987); Anna Bramwell, Ecology in the 20th Century: A History (New Haven: Yale Univ. Press, 1989); John McCormick, Reclaiming Paradise: The Global Environmental Movement (Bloomington: Univ. Indiana Press, 1989); Pierre Alphandéry, Pierre Bitoun, and Yves Dupont, L'équivoque écologique (Paris: La Decouverte, 1991).

the "death of the old ecology," a tolerant and creative "pluralism in ecology," or perhaps the rise of some new "ecology of chaos" depends on the observer.[7] For the time being I would like to focus on the actual substance of these revisions in ecology before considering their foundations in a theory of knowledge.

Contemporary debate fractures the discipline along several ancient and intersecting faultlines of institutional, methodological, and philosophical difference. These divisions were held steady through the 1960's and 1970's by a set of hegemonic ideas about the science of ecology and the nature that it studied. In this period, plant and animal ecologists of many different philosophical persuasions accepted-- and ideographically-minded field ecologists could not effectively challenge-- the idea that ecology was a nomothetic science whose highest goal was to produce broad, context-independent generalizations about nature.[8] To this end, ecologists directed their research to produce and modify statements about niches, trophic levels, and ecosystems. These statements quickly took on an existence of their own. Holistically-inclined systems theorists and reductionist mathematical modelers may have disagreed about the causes of the natural regularities they called ecosystems, but they certainly agreed that the word ecosystem referred to a real natural entity, something that existed quite apart from the mathematical terms in which they described its dynamic equilibrium. Their shared vocabulary of ecosystem and equilibrium not only bridged their differences but also lent itself to holistic (and atemporal) readings by those outside the discipline.[9]

---

[7] Robert K. Colwell, "What's New? Community Ecology Discovers Biology" in P.W. Price, C.N. Slobodchikoff, and W.S. Gaud, eds., A New Ecology: Novel Approaches to Interactive Systems (New York: Wiley, 1984), 392; Robert P. McIntosh, "Pluralism in Ecology" Annual Review of Ecology and Systematics 18 (1987): 321-41; Donald Worster, "The Ecology of Order and Chaos" Environmental History Review 14 (1990): 1-18.

[8] The development of the ideographic/nomothetic distinction in neo-Kantian philosophy is described in J. Nicholas Entrikin, The Betweenness of Place: Towards a Geography of Modernity (Baltimore: Johns Hopkins Univ. Press, 1991), 93-102.

[9] The best histories of recent ecological science are Malcolm Nicolson, "The development of plant ecology, 1790-1960" (unpubl. Phd. diss., Univ. of Edinburgh, 1984); Robert P. McIntosh, The Background of Ecology: Concept and Theory (New York: Cambridge Univ. Press, 1985); Sharon E. Kingsland, Modelling Nature: Episodes in the History of Population Ecology (Chicago: Univ. Chicago Press, 1985); Thomas Söderqvist, The Ecologists: From Merry Naturalists to Saviours of the Nations: A Sociologically Informed

Of course, there were also very real and often bitter disputes in ecology during this period. Donald Worster has described the very important debate over the fundamental level of biological organization.[10] E.P. Odum and other system theorists insisted that ecosystems have a real ontological status, while population biologists and mathematical modelers like Robert MacArthur held that the properties of ecosystems emerge from the interactions of individual species. However, it is my contention that this debate occurred within the context of a much broader consensus about ecology as a nomothetic science. Ecological discourse could accommodate these apparently incommensurable statements because both groups used mathematics to articulate the broad context-independent generalizations about nature that defined ecology as a true science.

The consensus about ecology as a law-finding science, which held the discipline together through the 1960's and 1970's, has eroded with a renewed belief that "pesky 'biological details' matter a lot."[11] Ecologists are not as confident that their statements about ecosystems actually represent context-independent generalizations about nature or even name real objects with an independent existence.[12] Population biologists and fisheries managers no longer hold that the Lotka-Volterra equations, which focus exclusively on predator-prey interactions, provide an adequate basis to predict population fluctuations.[13]

Narrative Survey of the Ecologization of Sweden, 1895-1975 (Stockholm: Almqvist & Wiksell, 1986); Worster, "Ecology of Order and Chaos," 1-18; Greg Mitman, The State of Nature: Ecology, Community and American Social Thought, 1900-1950 (Chicago: Univ. Chicago Press, 1992); Joel B. Hagen, An Entangled Bank: The Origins of Ecosystem Ecology (New Brunswick: Rutgers Univ. Press, 1992); Richard A. Overfield, Science with Practice: Charles E. Bessey and the Nurturing of American Botany (Ames: Iowa State Univ. Press, 1993). Daniel Botkin winds his own idiosyncratic and highly stimulating way across much of this territory as well. Botkin, Discordant Harmonies: A New Ecology for the Twenty-First Century (New York: Oxford Univ. Press, 1990).

[10] Worster, "Ecology of Order and Chaos," 1-18. Questions about methodological individualism and the fundamental level of biological organization were not unrelated to wider social currents. See Evelyn Fox Keller, "Demarcating Public from Private Values in Evolutionary Discourse" Journal of the History of Biology 21 (1988): 195-211.

[11] Colwell, "Community Ecology Discovers Biology" in Price, Slobodchikoff, and Gaud, eds., A New Ecology, 389.

[12] Botkin, Discordant Harmonies reviews much of the recent uncertainty in ecology about the ontological status of their analytical units.

[13] Kenneth H. Mann, "Towards Predictive Models for Coastal Marine Ecosystems" in L.R. Pomeroy and J.L. Alberts, eds., Concepts of Ecosystem Ecology: A Comparative View (New York: Springer-Verlag,

Plant ecologists and park managers, who once saw a dynamic equilibrium in the species composition of forests like the Boundary Waters Canoe Area on the Minnesota-Ontario border, now believe that many species and natural systems are disturbance dependent and require disturbance at some temporal and spatial scale to reproduce themselves.[14] In short, recent revisions in ecological science have not proceeded independent of problems and concerns outside of the discipline.

Although ecologists remain riven by institutional, epistemological, and ontological differences too complicated to consider here in any depth, many agree that the integration of different spatial and temporal scales is the key problem for their discipline. Ecologists hope that greater attention to scale will allow them to produce context-independent generalizations about nature.[15] What appears as a homogeneous forest environment at one spatial scale, is, at another, a mosaic of many different environments. Similarly, paleoecologists interested in very long term vegetation dynamics describe a constant flux of different species and communities where those working at shorter time scales see only stability and equilibrium. Succession is now widely conceived in terms of small-scale gap processes caused by senescence and larger-scale patch dynamics caused by natural disturbances like windfall rather than in the once dominant terms of the autogenic development of relatively larger and more homogeneous landscape units like ecosystems or vegetation formations.[16] Analysis of fossil pollen from plant species returning to a deglaciated North America makes visible an independence in the migration of individual

---

1988), 291-316; Arthur F. McEvoy, The Fisherman's Problem: Ecology and the Law in the History of California's Fisheries, 1850-1980 (New York: Cambridge Univ. Press, 1986).

[14] M.L. Heinselman, "Fire in the Virgin Forests of the Boundary Waters Canoe Area, Minnesota" Quaternary Research 3 (1973) 329-82.

[15] John A. Wiens, "On Understanding a Non-equilibrium World: Myth and Reality in Community Patterns and Processes" in D.R. Strong, ed., Ecological Communities: Conceptual Issues and the Evidence (Princeton: Princeton Univ. Press, 1984), 439-57; Robert M. May, "Levels of Organization in Ecology" in J. M. Cherrett, ed., Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World (Boston: Blackwell, 1989), 339-63; H.L. Shugart and D.L. Urban, "Scale, Synthesis, and Ecosystem Dynamics" in Pomeroy and Alberts, eds., Concepts of Ecosystem Ecology, 279-89.

[16] See, for example, David E. Hibbs, "Gap Dynamics in a Hemlock-Hardwood Forest" Canadian Journal of Forest Research 12 (1982): 522-27; S.T.A. Pickett and P.S. White, eds., The Ecology of Natural Disturbance and Patch Dynamics (Orlando: Academic Press, 1985).

species that undermines the idea of forest communities as organic landscape units whose species composition is fixed by unchanging and unilineal successional pathways to some natural climax.[17]

Recognition of temporal and spatial scale also requires a redefinition of many other ecological concepts. Whereas once ecologists spoke rather loosely in terms of a generalized sort of equilibrium or balance of nature, they now unpack this idea more carefully and break out several different ways of thinking about ecological stability.[18] Although the terminology varies, ecologists often distinguish resilience (the rate at which a population returns to its former population density following a decline), persistence (how long the composition of a community persists without change), variability (the temporal variability of a community's population densities), and resistance (the degree to which species' densities change following a change in the population density of a single species in the community).[19]

More generally, recognition of the importance of scale in ecology signals a greater respect for description and data collection, a more humble approach to ecological complexity, and a renewed skepticism towards mathematical models and abstract theories.[20] Ecologists reject any off-handed dismissal of their discipline's present descriptive bent as somehow being "unscientific." Many still hold out the hope that ecology

---

[17] The landmark paper here is George L. Jacobson, Thom Webb III, and Eric C. Grimm, "Patterns and Rates of Vegetation Change During the Deglaciation of Eastern North America" in W.F. Ruddiman and H.E. Wright, Jr., eds. North America and Adjacent Oceans During the Last Deglaciation (Boulder, CO: Geological Society of America, The Geology of North America, vol k-3, 1987), 277-88. Of course, neither the use of phytolith data, nor the argument that species behave individually was new or unique to these authors. In his dispute with Clements, Herbert Gleason used phytolith data. Gleason, "Vegetational History of the Middle West" Annals of the Association of American Geographers 12 (1922): 78-85. For a recent review of these techniques, see Glen M. MacDonald and Kevin J. Edwards, "Holocene Palynology: I Principles, Population, and Community Ecology" Progress in Physical Geography 15 (1991): 261-89 and idem, "Holocene Palynology: II Human Influence and Vegetation Change" Progress in Physical Geography 15 (1991): 364-91.

[18] For a brief outline of ecologists' uses of the idea of a balance of nature, see Frank N. Egerton, "Changing Concepts in the Balance of Nature" Quarterly Review of Biology 48 (1973): 322-50.

[19] These particular definitions of resilience, persistence, variability, and resistance come from Stuart L. Pimm, The Balance of Nature? Ecological Issues in the Conservation of Species and Communities (Chicago: Univ. Chicago Press, 1991). There are others. See, for example, C.S. Holling, "Resilience and Stability of Natural Ecosystems" Annual Review of Ecology and Systematics 4 (1973): 1-23.

[20] See, for example, the essays in J.M. Cherret, ed., Ecological Concepts.

will eventually mature enough to transcend its descriptive status and become a nomothetic science like physics. For the moment, though, the complexities of natural systems seem to overwhelm ecological theory. Comparing their young discipline to nineteenth century cellular biology, ecologists Lawrence Pomeroy, Eugene Hargrove, and James Alberts urge their colleagues to continue descriptive studies that, like Gregor Mendel's work, may one day provide the basic data for experimentally validated predictions about natural systems.[21]

These revisionary developments in ecology would be of only passing interest outside the discipline, if concepts and meta-theories borrowed from ecological science did not play such a vital role in popular understandings of the environment. Environmental historians have been particularly affected. Their stories about the interaction of nature and culture rely heavily on ecological science. Warren Dean attributed the problems of Brazilian rubber producers to the co-evolution of specially adapted pathogens in the rainforest.[22] Others, on still thinner evidence, have explained the structure of the contact-era forests of eastern North America in terms of fire ecology theory.[23] Explanations culled from ecological science may be appropriate in particular situations, but ecology cannot provide general covering laws. In the case of Indian-set fires, historians have paid scant attention to the pollen record or to the contention of botanist Emily Russell that anthropogenic fires were much less common than environmental historians have suggested.[24] For the most

---

[21] Laurence R. Pomeroy, Eugene C. Hargrove, and James J. Alberts, "The Ecosystem Perspective" in Pomeroy and Alberts, eds., Concepts of Ecosystem Ecology, 17.

[22] Warren Dean, Brazil and the Struggle for Rubber: A Study in Environmental History (New York: Cambridge Univ. Press, 1987), 53-66.

[23] Stephen J. Pyne, Fire in America: A Cultural History of Wildland and Rural Fire (Princeton: Princeton Univ. Press, 1982); William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983); Michael Williams, Americans and Their Forests: A Historical Geography (New York: Cambridge Univ. Press, 1989); Timothy Silver, A New Face on the Countryside: Indians, Colonists, and Slaves in South Atlantic Forests, 1500-1800 (New York: Cambridge Unive. Press, 1990).

[24] Emily W.B. Russell, "Indian-set Fires in the Forests of the Northeastern United States" Ecology 64 (1983): 78-88. Also see the exchange between R.T.T Forman and E.W.B. Russell, "Evaluation of Historical Data in Ecology" Bulletin of the Ecological Society of America 64 (1983): 4-5 and R.L. Myers and P.A. Peroni, "Approaches to Determining Aboriginal Fire Use and Its Impact on Vegetation" Bulletin of the Ecological Society of America 64 (1983): 217-218. For an analysis of the fossil pollen data, see William A. Patterson III and Kenneth E. Sassaman, "Indian Fires in the Prehistory of New England" in G.P. Nicholas, ed., Holocene Human Ecology in Northeastern North America (New York: Academic Press,

part, it would seem, environmental historians have approached ecological science as a mine of potential theories and data about nature, the tools and raw materials with which to construct their own narratives.

The reasons for this reliance are clear enough. Ecologists' authoritative claims to understand nature as well as their apparent independence from the economic forces of environmental destruction have impressed historians and environmental critics alike. In this new science, they find a familiar romanticism. As Donald Worster and others have noted, the organicism of the Romantic movement leavened the early development of ecological thought.[25] Strains of this nineteenth century romanticism persist in scientific concepts like ecosystem, climax, and equilibrium. When environmental historians press their critique of contemporary society and its relations with nature, they can appropriate the scientific authority of ideas infused with the romantic reaction to capitalism. This, of course, is what makes them so attractive to environmentalists. By their very nature these ecological concepts are ready-made to highlight human disturbance of the natural order from which modern humanity is, by definition, alienated.

Donald Worster has been the most enthusiastic advocate of this use of ecological theory. In an otherwise favorable review of William Cronon's Changes in the Land, Worster chided Cronon for failing to use "the idea of nature as a yardstick for comparing different adaptations ... It would have been far more clear and compelling to have said with the ecologist that nature, left alone, demonstrates a marvelous system of organization, that the Indians survived for so long by adapting their lives to that order, and that the English newcomers [to New England] generally did not."[26] The problem is that ecologists no

---

1988); William A. Patterson III and Andrew E. Backman, "Fire and Disease History of Forests" in B. Huntley and T. Webb III, eds., Vegetation History (Dordecht: Kluwer Academic Publishers, 1988), 603-32; John H. McAndrews, "Human Disturbance of North American Forests and Grasslands: The Fossil Pollen Record" in Huntley and Webb, eds., Vegetation History, 673-98.

[25] Donald Worster, Nature's Economy: A History of Ecological Ideas (San Francisco: Sierra Club Books, 1977); Ronald C. Tobey, Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895-1955 (Berkeley: Univ. California Press, 1981).

[26] Donald Worster, "Review of *Changes in the Land* by William Cronon" Agricultural History 58 (1984): 508-509.

longer say this in such unequivocal terms, and so environmental historians cannot rely on the authority of ecology to legitimate their condemnation of modern society.

Not surprisingly, therefore, Worster is also the most prominent and trenchant critic of the revisions in ecology. New ideas about natural disturbance, succession, and the relatively ephemeral composition of contemporary ecosystems dissolve the scientific grounds for making hard and fast distinctions between human and natural disturbance on the landscape and thus between natural and disturbed landscapes and geographies. Without these distinctions it is impossible to argue that old growth forests are somehow more natural than cutover forests and thus best preserved from logging and other human disturbances that, by definition, are unnatural. Worster complains that the new uncertainty about nature, equilibrium, and stability can "serve to justify the destruction wrought by contemporary industrial societies."[27] It blunts the scientific authority for the calls of environmentalists to respect nature, and, Worster fears, leads to an "environmental relativism" whereby it is impossible distinguish "between the balance achieved by nature and that contrived by man."[28] "What," he asks, "does the phrase 'environmental damage' mean in a world of so much natural chaos?"[29]

This is a very important question, but Worster's response is to kill the messenger rather than confront the issues of ontology and epistemology posed by revision in ecological science. Worster seems content to dismiss the science he dislikes, on the grounds that it is a social construction, while still appealing to the authority of Clements' and Odum's ecology as "a scientific check" on contemporary society.[30] The fundamental questions posed by ecologists about nature and our ability to know it demand a more direct response than head-in-the-sand conservativism. With his intransigence, Worster risks being ignored at a time when we need to hear his critique of modern society more than

---

[27] Donald Worster, "History as Natural History: An Essay on Theory and Method" Pacific Historical Review 53 (1984): 13.
[28] Worster, Nature's Economy, 242, 241.
[29] Worster, "Ecology of Order and Chaos," 16.
[30] Worster, Nature's Economy, 241.

ever. Worster tells his readers to respect nature, but as I read the contemporary literature in ecology, it says that recognizing a nature actually "out there" to respect is much more complicated than it may seem. In a world where the stamp of humanity is more extensive than ever and distinguishing the natural from the artificial is, at best, highly problematic, we must act to shape the best world we can, rather than appeal to some extra-social "nature" to arbitrate between the moral and the immoral. As Donna Haraway has observed, the kind of nature that Worster speaks for and tells us to respect is not so much a thing-in-itself as a rhetorical place in our language. By displacing the represented object (nature) from the surrounding relationships that constitute it and relocating it in the authorial domain of the representative, this strategy authorizes the representatives, be they scientists or environmentalists, to speak exclusively for a nature rendered inarticulate by this very act of distancing.[31] Insofar as Worster and environmental critics like him present us with only two options, either heed their exhausted romantic creed-- "respect nature"-- or fall off the precipice of relativism, they have failed, it seems to me, to provide a useful response to the contemporary challenges posed by ecological science.

social constructivism

Social constructivism poses a second challenge to the critical project of environmental history. Ironically enough, environmental historians are themselves responsible for much of their own discomforting skepticism about ecology's claims to represent nature accurately. They were quick to deploy the work of Thomas Kuhn and others who argued that scientific knowledge is socially constructed. They cheered as their critique discredited the objectivity claims of foresters, nuclear engineers, and other scientists opposed by the environmental movement. Now, however, environmental

---

[31] A very similar politics of representation are at work in the debate about women's reproductive rights. By claiming the exclusive right to speak for the unborn, anti-abortionists silence pregnant women who are discursively reconstituted as beings with opposing interests. Donna Haraway, "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others" in L. Grossberg, C. Nelson, and P.A. Treichler, eds., Cultural Studies (New York: Routledge, 1992), 311-15.

historians and their allies rest uneasily as they realize that ecology, their scientific darling child, is no different from any other science; its knowledge is also socially constructed and cannot claim to be a mirror of nature. More disorienting still is the realization that even their own critiques of science and our society can no longer claim a privileged vantage point from which to represent the world as it really is out there.

Donald Worster's Nature's Economy, a history of ecological ideas, was in the forefront of this historicist variety of social constructivism. His systematic assault on scientific objectivity claims proceeded in two ways. First, Worster distinguished between science and ideology by documenting the influence of outside, "non-scientific" ideas on particular scientists. A.G. Tansley's attack on Clementian climax ecology was not motivated by an objective re-evaluation of the data, but by a fervent wish "to put down the threat to the legitimacy of human empire posed by the natural climax theory." Second, Worster measured the inaccuracy of scientific knowledge by charting the shifting fortunes of the reductionist and holistic metaphors in ecology against the implicitly unchanging ontological status of nature. Since nature does not change while the predominate scientific representations of it do, scientific knowledges must be "valid relatively, suited to or at least rooted in their times."[32]

By following this general two pronged strategy, other environmental historians have critiqued the sciences of nature. John Perkins outlined the effects on scientific thinking of the public uproar over DDT use. He also applied Kuhn's theory of scientific revolutions to explain the internal paradigm shifts in agronomy and economic entomology.[33] In The Death of Nature, Carolyn Merchant described the eclipse of an older tradition of animism and analogical, holistic thought by the mechanistic, Cartesian

---

[32] Worster, Nature's Economy, 241, 345.

[33] John H. Perkins, Insects, Experts, and the Insecticide Crisis: The Quest for New Pest Management Strategies (New York: Plenum Press, 1982). See also Thomas R. Dunlap, DDT: Scientists, Citizens, and Public Policy (Princeton: Princeton Univ. Press, 1981).

paradigm of the Enlightenment.[34] More recently, she has attempted to map such scientific paradigm changes onto larger ecological revolutions that encompass environmental changes as well as shifts in social and economic practice.[35] Similarly, Arthur McEvoy documented the interpenetration of changing ecological conditions, legal practice, and economic power with science in the California fishery.[36]

These attacks on scientific objectivity erode the epistemological foundation that many environmental historians seek to build beneath their wider critique of modern society and its relations with the biogeochemical environment. If scientists cannot claim to represent nature truly, then environmental historians cannot rely upon ecology to provide the truth about nature. Ecology may be a preferable science to nuclear engineering, but it cannot claim to occupy a privileged vantage point from which to represent nature more accurately than other sciences. This realization is particularly troubling because environmental historians have relied so heavily upon the authority of favored scientists like Rachel Carson to unveil the truth about human devastation of the environment.

The social constructivist approach to knowledge goes still further in undermining the epistemological foundations of environmental history. As commonly practiced, environmental history relies upon an instrumental irony in which historic actors are unaware of the underlying social influences on their thinking to which only the historian and reader are privy. In unveiling the contextual nature of scientific knowledge, this approach displays a "fairly inflexible commitment to epistemological realism."[37] But if

---

[34] Carolyn Merchant, The Death of Nature: Women, Ecology and the Scientific Revolution (San Francisco: Harper & Row, 1980). For a rather different view of these changes, see Denis Cosgrove, "Environmental Thought and Action: Pre-Modern and Post-Modern" Transactions of the Institute of British Geographers 15 (1990): 344-58.

[35] Carolyn Merchant, Ecological Revolutions: Nature, Gender and Science in New England (Chapel Hill: Univ. North Carolina Press, 1989).

[36] McEvoy, Fishermen's Problem.

[37] Steve Woolgar, "Irony in the Social Study of Science" in K.D. Knorr-Cetina and M. Mulkay, eds., Science Observed: Perspectives on the Social Study of Science (Beverly Hills: Sage Publications, 1983), 262. For a fuller critique of this instrumental irony, see Steve Woolgar, Science, The Very Idea (Chichester: Tavistock, 1988), 89-111. Richard White has also expressed some ambivalence about this use of irony in western American history. White, "Trashing the Trails" in P.N. Limerick, C. A. Milner, and C. E. Rankin, eds., Trails: Toward a New Western History (Lawrence, KA: Univ. Press of Kansas, 1991), 34-35.

scientists cannot claim to represent nature as it really is, then surely the same can also be said of historians and their claims to represent scientists, or nature, as they really are. Like proponents of the strong program in SSK, environmental historians are vulnerable to having their skepticism turned back on themselves. For the most part, though environmental history has resisted the reflexivity turn sweeping across SSK. Instead, a number of environmental historians have called for the development of new theories of "historical change and causation" that would accommodate social constructivism without yielding to relativism in which there are no reasonable grounds for choosing between different scientific knowledges or environmental histories.[38]

Barbara Leibhardt and Elizabeth Ann R. Bird have each turned to anthropology as a guide to evaluating different accounts of nature without relying on a realist epistemology. Leibhardt appealed to Clifford Geertz who "steered clear of relativism by separating good interpretations from bad according to how well they capture and made sense of the complexities of human action." She would apply similar criteria to environmental histories, evaluating them "on the ability to describe the 'thickness' of the relationships at issue."[39] Unfortunately, Geertz's ethnography tends to ignore power relations and subsume social conflicts to a shared symbolic vocabulary, so is not a terribly good model of rich social analysis.[40] Certainly his recognition of complexity in social and ecological relationships is valuable, and in tune with much of the present thinking in ecological science. However, his notion of thickness cannot overcome the problems of judgment and evaluation facing environmental historians. In practice, it turns out to be as difficult to distinguish the thick

---

[38] Richard White, "Environmental History, Ecology, and Meaning" Journal of American History 76 (1990): 1114. For similar concerns, see Richard White, "American Environmental History: The Development of a New Historical Field" Pacific Historical Review 54 (1985): 334; John Opie, "Environmental History: Pitfalls and Opportunities" Environmental Review 7 (1983): 15.

[39] Barbara Leibhardt, "Interpretation and Causal Analysis: Theories in Environmental History" Environmental Review 12 (spring 1988): 26.

[40] For critiques of Geertz in human geography, see, for example, Caroline A. Mills, "'Life on the Upslope': The Postmodern Landscape of Gentrification" Environment and Planning D: Society and Space 6 (1988): 169-89; Derek Gregory, Geographical Imaginations (Cambridge, MA: Blackwell, 1994), 146-50.

from the thin as it is to separate the natural from the artificial. Rather than resolving this pressing dilemma, Geertz's terminology simply restates it in a new way.

James Clifford's ideas about authoritative modes of ethnographic representation guide Elizabeth Ann R. Bird's understanding of the relationship between science and nature. An ethnography, Clifford argues, does not faithfully reproduce its object of study; instead, it textualizes a previous multi-subjective encounter in which the ethnographer(s) and native subjects mutually constitute one another. Bird has applied to this idea to scientific inquiry.[41] Like the strong program of SSK, she reverses the traditional relationship between reality and representations of it: scientific practice actually constitutes the facts of nature it purports to represent. Furthermore, as Bruno Latour and Steve Woolgar have argued, this "process of construction involves the use of certain devices whereby all traces of production are made extremely difficult to detect."[42] However, Bird goes beyond these sociologists of science in asserting the active role of nature "in negotiating reality ... Nature's role in that negotiation takes the form of actively creating something materially new and of resisting or accommodating the range of metaphorical and theoretical imaginings with which it is approached."[43] For her, scientific texts, like Clifford's ethnographies, are textualizations of earlier, multisubjective processes whereby science and nature mutually construct one another.

Many environmental historians find the social constructivist approach to knowledge unsettling. It seems to undermine any secure foundation for legitimate critique of our society and its environmental policy. Quite the contrary in fact. It is possible to "argue against environmentally destructive technologies, but not on the grounds that they are anti-natural." Such distinctions are impossible to make. "A better argument," Bird replies,

---

[41] James Clifford, The Predicament of Culture: Twentieth-Century Ethnography, Literature, and Art (Cambridge: Harvard Univ. Press, 1988); Elizabeth Ann R. Bird, "The Social Construction of Nature: Theoretical Approaches to the History of Environmental Problems" Environmental Review 11 (1987): 255-64.

[42] Bruno Latour and Steve Woolgar, Laboratory Life: The Social Construction of Scientific Facts (London: Sage Publications, 1979), 176.

[43] Bird, "Social Construction of Nature," 25.

"should rest on the grounds that those technologies do not foster the nature we want to exist."[44] Here environmental historians can make a valuable contribution: not by directing us to true laws of nature that we must respect-- a chimerical wish at best-- but by providing a historical context for our discussions of the kind of nature we hope to make.

linguistic turns

The epistemological realism of conventional environmental history faces a third challenge in the recent "linguistic turn" in history. This rather unfortunate label refers to the ascendance of many different ideas about language and knowledge that directly assault the ideal of objectivity which, as Peter Novick has shown, serves as the founding myth of the profession.[45] Historians and sociologists of science, like Thomas Kuhn, emphasize the theory-ladenness of observation. They disavow the scientific method as an Olympian gateway to singular truth about the world, and by implication, discredit the natural sciences as a model for an objective history.[46] Philosophers like Hilary Putnam and Richard Rorty reject the correspondence theory of truth. They insist that there can be no "God's Eye point of view" secure above language and cultural values from which to hold a mirror to nature.[47] Post-structuralist literary critics like Jacques Derrida deny that language is a transparent medium for the transmission of content; on the contrary, they argue, language actually produces meaning. Their emphasis on narrative form and rhetorical practice blurs the sacred distinctions between history and fiction.[48] The result of these many different

---

[44] Bird, "Social Construction of Nature," 261.
[45] Peter Novick, That Noble Dream: The Objectivity Question and the American Historical Profession (New York: Cambridge Univ. Press, 1988).
[46] Thomas Kuhn, The Structure of Scientific Revolutions (2d ed. Chicago: Univ. Chicago Press, 1970).
[47] Hilary Putnam, Reason, Truth, and History (New York: Cambridge Univ. Press, 1981) 50; Richard Rorty, Philosophy and the Mirror of Nature (Princeton: Princeton Univ. Press, 1979). For a sympathetic introduction to Rorty, see C.G. Prado, The Limits to Pragmatism (Atlantic Highlands, NJ: Humanities Press International, 1987); Alan R. Malachowski and Jo Burrows, eds., Reading Rorty: Critical Responses to Philosophy and the Mirror of Nature (and Beyond) (Cambridge, MA: Blackwell, 1990).
[48] See, for example, Jacques Derrida, Of Grammatology, trans. G. Spivak (Baltimore: Johns Hopkins Univ. Press, 1976). This point is forcefully made by Hayden White, The Content of the Form: Narrative Discourse and Historical Representation (Baltimore: Johns Hopkins Univ. Press, 1987).

linguistic turns has set Ranke's historic ideal, telling the past as it really was, adrift from its moorings in a foundational theory of knowledge.

Although this ferment shakes the very foundations of their discipline, historians have been rather slow to respond, perhaps because it seems to rehash a familiar debate about objectivity that is as old as the profession itself. A few have enthusiastically embraced the post-foundational situation and the concomitant focus on language and the construction of meaning.[49] Others have redoubled their commitment to the traditional justifications of objective history in some form of realism, be it empiricism, Hempel, or simple "common sense."[50] Many more historians have been bewildered by the whole controversy. The fulminations of arcane philosophers, literary critics, and their various disciples seem to say precious little to the familiar vexations of archival research or the actual business of writing history. Discussions of postmodernism and the foundations of historical knowledge are only just beginning to move beyond the programmatic to influence historians' actual work.[51]

William Cronon is the first environmental historian to respond at any length to these epistemological concerns. Because of their avowedly critical aims, environmental historians stake a great deal on epistemological realism. They aspire to do more than just tell good stories about people and nature; they want their diagnosis of our society and its environmental problems to lead to social action. "Without a clear demonstration of

---

[49] See, for example, Joan W. Scott, Gender and the Politics of History (New York: Columbia Univ. Press, 1988).

[50] J.H. Hexter, The History Primer (New York: Basic Books 1971) 270, quoted in Novick, Noble Dream, 594. Novick's book provides a useful roadmap of the debate over realism in the American profession, although he is not especially sensitive to the political implications of these challenges. For all their other differences, both the Left and the Right defend realism by indisciminate assaults on postmodern theories and theorists. In tone, the fulminations of Brian Palmer, Descent into Discourse: The Reification of Language and the Writing of Social History (Philadelphia: Temple Univ. Press, 1990) read much like David Harvey, The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change (Cambridge, MA: Blackwell, 1989). On the Right, see Gertrude Himmelfarb, The New History and the Old (Cambridge, MA: Harvard Univ. Press, 1987).

[51] It would be possible to qualify this broad-brush assessment somewhat. Many quarters of the discipline, particularly feminist, post-colonial, and intellectual historians, have taken up these questions about language and the social construction of knowledge, but in the main, historians have continued their research undisturbed by these esoteric and seemingly irrelevant debates

causality" and the authority of truth, Richard White and his colleagues worry that their stories and the critical impulse underwriting them will be unconvincing.[52] In this context, Cronon's response is particularly important because it will help set the terms of future discussion about the problems and possibilities of historical knowledge and environmental critique.

In Cronon's analysis of the many different and incommensurable histories of the Great Plains, he acknowledges the centrality of narration to environmental history. Like other humans, environmental historians tell stories about nature, but "their narrative form has less to do with nature than with human discourse." Narratives organize human reality in terms of beginnings, middles, and ends. This structure orders an otherwise messy chronicle of past events by linking connected facts, themselves determined by the narrative structure, and excluding extraneous details from the story.[53]

Historians have imposed one of two basic plot lines on the history of the Great Plains. Historians like Frederick Jackson Turner and Walter Prescott Webb depicted sagas of frontier progress, in which white settlers transformed an empty or savage wilderness into a prosperous region of productive farms, civilized towns, and American democracy. On the other hand, New Deal reformers saw in the Great Plains a tragic story of human ignorance resulting in environmental disaster and miserable poverty. As Cronon shows, the meaning of these very different stories is prefigured by their representation of the beginning and its juxtaposition with the ending. The difference between the two not only sets progressive histories apart from tragic ones, it also "gives us a chance to extract a moral from the rhetorical landscape."[54] This moral framework dictates, in large measure, how the reader will judge the people, places, and events of the story.

---

[52] White, "Environmental History, Ecology, and Meaning," 1114

[53] William Cronon, "A Place for Stories: Nature, History, and Narrative" Journal of American History 78 (1992): 1352, 1347-76.

[54] Cronon, "Place for Stories," 1370.

Through their writing then, historians exercise considerable power over the objects they represent. In addition to configuring meaning, the placement of the beginning and ending also determines who and what will be included and excluded in the story. This process is never innocent. Turner and Webb's histories of frontier progress, like the New Dealer's stories of tragic ignorance and human misery, were centrally concerned with the development of white society. They systematically ignored both pre-contact aboriginal history (called, tellingly enough, prehistory) and the many stories of death and destruction, resistance and revival of native peoples relegated to reservations. There are countless other erasures at work in the history of the American West: women, ethnic and racial minorities, and class struggles have been systematically silenced as well. Environmental historians are familiar with the prominent erasure of nature and make it their business to recover "the earth itself as an agent and presence in history."[55] As they do so, however, they must also acknowledge the tyranny of the narrative and appreciate that story-telling is inevitably an exercise of power. With the flick of a pen or the stroke of a key, historians can erase the struggles and aspirations of entire cultures from the landscape or enframe them in unfavorable or unflattering ways.

In these different theories of narrative and language, then, environmental historians confront the troubling artifice in their representations of nature. Traditionally, historians have maintained that their craft, despite the important elements of creativity and imagination, is at some fundamental level a reflection of an external reality against which individual histories can be measured and evaluated. Cronon's analysis of the many different and incommensurable histories of the Great Plains points to the very artificial, perspectival, and constructed nature of historical knowledge. If so many different histories of the same thing are possible, how then, Cronon asks, "are we to choose among the infinite stories that our different values seem capable of generating?"[56] He is afraid that

---

[55] Donald Worster, "Doing Environmental History" in Worster, ed., Ends of the Earth, 289.
[56] Cronon, "Place for Stories," 1370.

acknowledgment of the indeterminacy of meaning and the plurality of possible histories leads to relativism whereby historians have no rational means to choose between stories.

Unfortunately, Cronon's attempt to "accommodate the lessons of critical theory without giving in to relativism" does not escape the terms of an objectivist/relativist dichotomy whereby relativism is the only alternative to a realist epistemology. Rejecting relativism, Cronon clings to the idea of "the past (and nature) as *real* things to which our storytelling must somehow *conform* lest it cease being history altogether (emphasis added)." He points to a tripartite structure of rules and institutions that ensures the correspondence of history to this external reality. First, historians agree that "our stories cannot contravene known facts about the past." To this stricture, environmental historians would add the further requirement that "our stories must make ecological sense." Finally, Cronon says, historians "write as members of communities, and we cannot help but take those communities into account as we do our work."[57]

Simply put, "community, past reality and nature itself" cannot provide the "ultimate justification of history."[58] They cannot secure a foundation for the establishment of historic truth through correspondence with external reality. They cannot make the past and nature "real things to which our storytelling must somehow conform."[59] The correspondence theory of truth is dead. To hope otherwise seems completely at variance with the first twenty-five pages of Cronon's essay in which he described the many different, indeed incommensurable, stories that different historians have written about the Great Plains and what they each took to be its nature and its past. As Cronon so astutely observed, what passes for nature and history in any particular story is an effect of its narrative structure.

But Cronon is on to something important when he points to the power that the rules and structures of historical writing exercise over the stories historians tell. More than

---

[57] Cronon, "Place for Stories," 1374, 1372, 1372, 1372, 1373.
[58] Cronon, "Place for Stories," 1374. I have reversed the order of these two phrases from that in the original.
[59] Cronon, "Place for Stories," 1372.

simply an effect of narrative structure, what pass for nature, the past, and the facts about them are also an effect of the rules and structures of the historical discipline. History is a discourse with its own particular politics of truth.[60] Cronon seems close to saying as much when he describes the process of criticism that shaped his own essay. The profession evaluates individual texts, enforcing these rules, sanctioning truth claims, and disciplining wayward accounts of the past. The discourse works to shape the range of possible stories, but not by making them converge on an improved or somehow more accurate representation of the past, as Cronon is left arguing with his insistence on the past and nature as "real things to which our storytelling must somehow conform."[61] Historical texts conform to past reality in large measure because historical discourse produces the past reality to which they conform.

Historic facts, after all, are constructed by this particular discursive community. Under the right circumstances, facts can unravel and lose their truth status within this discourse. Think, for instance, of the now discredited, but at the turn of the century near unanimous denunciation by American historians of the abolitionists as irresponsible agitators and of the Reconstruction governments imposed on the South by the federal government as criminal outrages.[62] Some might respond that these racist statements were interpretations and therefore of a different order than the historic facts from which they were constructed. Such facts, like the date of American entry into the Second World War, may seem somehow more concrete, more real, but the difference lies not in the nature of December 7, 1941, but rather in the difficulty of challenging the consensus that has developed around its status as a fact.[63] American warships had been skirmishing with

---

[60] The phrase, of course, belongs to Michel Foucault, Politics, Philosophy, Culture: Interviews, L. Kritzman, ed., (New York: Routledge, 1988), 118. His extensive writings provide a diverse and insightful guide to the workings of discursive formations and the relations between power and knowledge.
[61] Cronon, "Place for Stories," 1372.
[62] On the changing interpretations of the Civil War, see Thomas J. Pressly, Americans Interpret Their Civil War (2d ed. New York: Collier Books, 1965); Novick, Noble Dream, 72-80.
[63] Bruno Latour, Science in Action (Cambridge, MA: Harvard Univ. Press, 1987) describes the tremendous resources aligned behind facts and the great difficulty of challenging them.

German submarines since September 1941, but these anonymous encounters in the North Atlantic do not live in infamy.[64] The attack on Pearl Harbor, unlike the anti-submarine operations, is so widely acknowledged that I do not need to assert its status as a fact with a footnote. Some facts are so well established and taken for granted that they become like second nature to us, inhering in our very language. Garry Wills has recently argued that Lincoln's Gettysburg Address transformed the United States from a plural concept, requiring a plural verb in the antebellum period, to a singular idea necessitating a singular verb.[65]

Just as historic facts are constructed by historians, facts about nature are constructed by natural scientists. With Cronon's second requirement that environmental history "make ecological sense," he does not enter a privileged realm of truth about nature.[66] Rather he simply requires himself to conform the facts as set down by a second discursive community, ecological science. Ecological discourse has its own particular discursive rules and disciplinary structures that help produce (and police) facts about nature. And at the moment, environmental historians find the politics of truth about nature changing rapidly in ecological discourse.

Cronon and many other environmental historians are troubled by the social constructivist suggestion that history and even nature itself are things we construct. Part of the confusion stems from a polemical conflation of epistemological anti-realism (our ideas about electrons are made up) and ontological anti-realism (electrons themselves are a socially constructed object). Acknowledging the situated and socially constructed qualities of knowledge does not have to lead to anything-goes relativism. Relativism is logically self-refuting and morally repugnant, but it is not the only game in town. Though knowledge may be partial, we can use it all the same. Its constructed nature does not make

---

[64] Dan Van Der Vat, The Atlantic Campaign: The Great Struggle at Sea, 1939-1945 (London: Hodder & Stoughton, 1988).
[65] Garry Wills, Lincoln at Gettysburg: The Words That Remade America (New York: Simon & Schuster, 1992).
[66] Cronon, "Place for Stories," 1372.

it any less of a guide to our world as it is and as we want it to be. As long as we agree to live by them, constructed or not, facts, science, and history can help explain the world we make for ourselves to ourselves. This process of construction always involves the negotiation of relationships between many different actors, not all of them human. But, a recognition of the discursive construction of knowledge does not preclude making moral choices about the world as we happen to understand it, despite what some environmental historians may fear. Such anti-foundationalism simply undermines exclusive claims to legitimate knowledge about the world, claims that both environmentalists and their political opponents have used entirely too much.

beyond foundationalism

Moving beyond foundationalism and the objectivist/relativist dichotomy will require a new approach to environmental critique and a new politics of participation.[67] The North American environmental history project has lost the firm, authoritative foundation that underwrote its critique of our society and our relations with the other organisms and material objects in the world. No longer can environmental historians call upon ecology to propound holistic concepts that measure anthropogenic damage. No longer can they rely upon Science and its claims of objectivity to authorize their representations of nature and prescriptions of social action. No longer can environmental historians claim objectivity for themselves and arbitrate between different accounts by appealing to the facts alone.

Of course the challenges posed by this sweeping anti-foundationalism affect much more than this select group of academics. In its wake, the entire Green movement finds the diagnostic element of its critique decoupled from its utopian vision. Greens, like many other social critics, have advanced their normative program by positioning it as the only logical response to an objective diagnosis of the planet's environmental woes. Like

[67] For a useful guide to escaping this dichotomy, see Richard J. Bernstein, Beyond Objectivism and Relativism: Science, Hermeneutics, and Praxis (Philadelphia: Univ. Pennsylvania Press, 1983).

environmental historians, Greens have relied upon ecological theory to describe human devastation to nature and upon the scientific authority of ecology to provide what Donald Worster enthusiastically calls "a scientific check" on social action.[68] Without an epistemological foundation on which to make these claims, Green critics will have to advance their utopian vision of a sustainable world by some other means. They are not alone. The idea of a singular, transcendental truth about the world underwrites the entire Enlightenment project. The consequences of this anti-foundationalism are enormous.

Let me restrict myself then to some brief comments about the possibilities and practice of an anti-foundational environmental critique, such as this one. The arguments against foundationalism are not just anti-epistemological; they are also political. The authoritarian strategies of the environmental movement, though perhaps once helpful as counterarguments to the claims of a totalitarian science of technocrats and a narrow instrumentalism serving chiefly the interests of capital, have now outlived their utility. Exclusive knowledge claims serve only to divide, to empower a few anointed experts, and to exclude the many different voices that can and should speak-- and that we need to hear-- in the ongoing conversation about nature.[69] Green critics, therefore, should end their efforts to build an epistemological Mount Sinai atop science and the facts from which to commune with nature and bring its commandments down to the children of Israel. Instead, they should be satisfied with a more humble, but ultimately less malevolent, and more attainable goal: simple participation in the ongoing conversation about the nature we have made and the one we hope to make.

Ultimately, of course, environmental narratives are not legitimated in the lofty heights of foundational epistemology but rather in the more approachable and more contested realm of public discussion and debate. But in understanding the dynamics of the

---

[68] Worster, Nature's Economy, 241.

[69] For a discussion of this very danger, see Peter J. Taylor, "Technocratic Optimism, H.T. Odum, and the Partial Transformation of the Ecological Metaphor after World War II" Journal of the History of Biology 21 (1988): 213-44.

public sphere, pragmatic philosophers like Richard Rorty who celebrate the possibilities of open conversation in liberal society are unnecessarily optimistic about the possibilities of free and open discussion. In practice, the "we" in conversations about nature is not an especially inclusive one. It tends to include far more white, middle class, male academics (like me) than other categories of people, to say nothing of reaching out beyond the boundary between humans and other earthlings to allow them to participate as well.

In this conversation, we should look to science not as a mirror to nature but as a useful tool for engaging our world critically. Ecology, like every other science, is a discourse with its own particular rules and disciplinary structures that produce representations of nature. These representations involve the exercise of power, and we should treat them as such. This situation does not rule out appropriations from ecological science or other fields of knowledge where they prove useful and convincing. Science can still provide an important way to make our relationships with the world visible to us. These knowledges are necessarily perspectival, situated ones, but this fact makes the atmospheric carbon dioxide measurements at Mauna Loa no less important in helping us reevaluate anthropogenic carbon releases.[70]

The political response to global warming has been slow thus far, as the recent summit in Rio de Janeiro sadly demonstrated. Even so, the knowledge produced by scientists at an observatory 11,000 feet above the tropical Pacific has helped bring into focus a whole complex of different relationships connecting environmental groups, atmospheric scientists, rubber tappers, petroleum companies, international bankers, and politicians to each other and to tropical rain forests, computer models, carbon dioxide, water vapor in clouds, and a host of other trace compounds in the atmosphere that absorb

---

[70] Some of the first discussions of these measurements took place at a 1972 conference at the Brookhaven National Laboratory. George M. Woodwell and Erene V. Pecan, eds., Carbon and the Biosphere: Proceedings of the 24th Brookhaven Symposium in Biology (Washington: U.S. Atomic Energy Commission, 1973).

infrared radiation.[71] The wide range of these relationships suggests the great power and utility of science to make visible our relationships with the world and the other creatures, things, and miscellaneous earthlings with whom we share it.

Of course, the very act of representing the world scientifically establishes a particular kind of relationship between representatives and the objects they represent. As we consider this process we should always bear in mind that different actors bring different resources to these encounters and that the relations of power that result are rarely, if ever, equal ones. Here, historians and geographers can play a crucial role by helping to situate competing knowledges about the world.[72] This effort can make visible the material and discursive effects of different environmental narratives. It provides us with the means to move beyond foundationalism, to evaluate competing accounts, not in terms of their truth or falsehood, but in terms of their likelihood to produce the kind of world we hope to live in and leave behind us.

---

[71] One of the best guides to new and different relationships created by the deforestation and development of the tropical rainforests is Hecht and Cockburn, Fate of the Forest.

[72] Both phrase and the vision of situated knowledges belong to Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective" reprinted in her, Simians, Cyborgs, and Women: The Reinvention of Nature (New York: Routledge, 1991), 183-201.

3. The Nature of Metaphor

Despite the apparent common ground shared by environmental historians interested in nature and cultural geographers writing about landscape, the two groups have had little to say to one another. Some of this estrangement is the inevitable result of disciplinary distance, but simply bringing the two closer together will not be enough to spark meaningful discussion. In that hypothetical conversation environmental historians and cultural geographers would likely talk past one another because, quite literally, they speak different languages and use incommensurable metaphors. Some translation is required. By reviewing the metaphors in environmental history and cultural geography, I hope in this chapter to point the way towards some new metaphorical terrain indicated by the work of Bruno Latour and Donna Haraway. Approaching the world from this general direction, environmental historians and cultural geographers might make more sense to one another. In very different ways, Latour and Haraway each provide metaphoric tools that make it possible to imagine nature as both a real material actor *and* a socially constructed object without reducing it, ultimately, to a single pole of the nature/culture dualism. Their metaphors for nature can provide environmental historians and cultural geographers with corrective lenses for the dizzying double vision produced by the nature/culture dualism that fixes nature and landscape as either autonomous natural actors or absolute social productions.

Environmental historians focus upon "nature as a historical actor."[1] In so doing, they distinguish themselves from other historians who typically treat nature as an object of human contemplation and controversy or as the physical stage for a quintessentially human

[1] Carolyn Merchant, Ecological Revolutions: Nature, Gender and Science in New England (Chapel Hill: Univ. North Carolina Press, 1989), 7.

drama. Environmental historians are committed to integrating the independent agency of nature in their narratives because it "reminds us that there are different forces at work in the world and not all of them emanate from humans."[2] In pressing their colleagues to study nature's "autonomous place in history," environmental historians have seized upon Carl Sauer's writings about human impacts on the landscape to form an intellectual pedigree that legitimates both the metaphor of nature as an autonomous actor and the status of environmental history within the discipline.[3]

In cultural geography, by contrast, the appeal of new landscape metaphors is bound up with a critique of Sauer's methodological discussions of landscape. Sauer, it is commonly argued, over-emphasized mere description of artifacts on the landscape and ignored the processes that give these objects meaning and thus landscapes power. Whatever the merits of this common caricature of the Berkeley School-- and it has been challenged-- many cultural geographers now seek to remedy these perceived shortcomings by describing landscapes as texts.[4] Other cultural geographers prefer metaphors of icon, spectacle, way of seeing, or theater. Despite important differences between them, all these metaphors of cultural production highlight the cultural construction of landscape through contested processes of signification. They make landscapes malleable cultural projections, whose shape and meaning are determined, ultimately, by the linguistic and social contexts associated with them.

The different reception given Sauer by environmental history and cultural geography reflects disagreement over the ontology of nature and landscape, as real things

---

[2] Donald Worster, "Doing Environmental History" in D. Worster, ed., The Ends of the Earth: Perspectives on Modern Environmental History (New York: Cambridge Univ. Press, 1988), 292-93.

[3] William Cronon, "Modes of Prophecy and Production: Placing Nature in History" Journal of American History 76 (1990): 1122. Sauer's legacy is explicitly claimed by William Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983), 170; Richard White, "American Environmental History: The Development of a New Historical Field" Pacific Historical Review 54 (1985): 320; Worster, "Doing Environmental History," 306.

[4] Denis Cosgrove, "Place, Landscape, and the Dialectics of Cultural Geography" Canadian Geographer 22 (1978): 66-72; James S. Duncan, The City as Text: The Politics of Landscape Interpretation in the Kandyan Kingdom (Cambridge: Cambridge Univ. Press, 1990); Peter Jackson, Maps of Meaning: An Introduction to Cultural Geography (London: Unwin Hyman, 1989).

existing wholly prior to and independent of cultural ways of knowing them. As environmental historians defend the hard won idea of nature as a historical actor "exist[ing] apart from our understanding of it," cultural geographers question a similar dualism about landscape as either the distribution of real, material objects in space or human perceptions of these objects.[5] This important difference of opinion is inscribed in their respective metaphors. If nature is a historical actor, it exists and acts on humans independently of their perceptions of it. Environmental historians reveal "the earth itself as an agent and presence in history."[6] Their stories critique existing social practices by revealing the perils of ignoring the independent activity of nature. If, on the other hand, landscape is some kind of cultural production, then its form and meaning are not to be sought by reference to "nature," but rather, must always be reckoned in terms of the cultural contexts associated with it. Reading of landscape is thus "constitutive of reality rather than mimicking it." In the same way that "written texts are not simply mirrors of reality outside themselves, so cultural productions, such as landscapes, are not 'about' something more real than themselves."[7]

These metaphoric perspectives are irreconcilable. Radically different worlds are disclosed by the metaphors of nature as agent and landscape as text. Yet, I am sympathetic to both. Environmental historians first looked to the work of Sauer in order to understand nature as an active participant in human history. Some of the criticisms made of Sauer's approach in cultural geography might also be made of a particular style of environmental history. Cultural geographers appropriated metaphors of cultural production to turn attention toward the social construction of meaning. This perspective has proven valuable in denaturalizing hegemonic ways of seeing landscape. Environmental historians, however, would respond that the world is not denatured. Too sharp a focus on human ways of

---

[5] William Cronon, "Cutting Loose or Running Aground Journal of Historical Geography 20 (1994): 40.
[6] Worster, "Doing Environmental History," 289.
[7] Trevor J. Barnes and James S. Duncan, "Introduction: Writing Worlds" in T.J. Barnes and J.S. Duncan, eds., Writing Worlds: Discourse, Text, and Metaphor in the Representation of Landscape (New York: Routledge, 1992), 5.

seeing makes nature seem illusory, a blank slate on which different humans struggle to inscribe their particular readings. Environmental historians are committed to representing the agency of nature as autonomous from cultural ways of understanding it. They insist that "no landscape is completely cultural; all landscapes are the result of *interactions* between nature and culture."[8] Speaking of natural agency in this way, environmental historians occlude consideration of the ways in which this agency is understood through cultural lenses. Of course, it is this representational dilemma that prompted cultural geographers to take up metaphors of cultural production in the first place.

By convening this conversation between environmental history and cultural geography, I will explore in more detail the different worlds disclosed by their metaphors. As I do so, however, it will be with more than simply review in mind. Without simultaneously changing the terms of the discussion, my effort to bring environmental history and cultural geography closer together will only reproduce the shouting matches staged recently in the Journal of American History and the Annals of the Association of American Geographers.[9] To this end, I find the work of Bruno Latour and Donna Haraway vitally important because it provides a new vocabulary for discussing nature as a monstrous hybrid, a lively, if socially constructed actor. In the final part of this chapter, I will discuss the different ways their metaphors enframe nature and enable us, perhaps, to think about it simultaneously as an embodied material actor and as a socially constructed object.

---

[8] Donald Worster, "Seeing Beyond Culture" Journal of American History 76 (1990): 1144.

[9] The Journal of American History 76 (1990) printed responses to Donald Worster, "Transformations of the Earth: Toward an Agroecological Perspective in History," 1087-1106. They included included papers by Cronon, "Modes of Prophecy," 1122-31; Alfred W. Crosby, "An Enthusiastic Second," 1107-10; Carolyn Merchant, "Gender and Environmental History," 1117-21; Richard White, "Environmental History, Ecology, and Meaning," 1111-16; and Worster's reply, "Seeing Beyond Culture," 1142-47. The Annals of the Association of American Geographers debate was in reaction to Marie Price and Martin Lewis, "The Reinvention of Cultural Geography" Annals of the Association of American Geographers 83 (1983): 1-17. Printed responses included Denis Cosgrove, "Commentary," 515-16; James S. Duncan, "Commentary," 517-19; Peter Jackson, "Berkeley and Beyond: Broadening the Horizons of Cultural Geography," 519-20; and the reply by Marie Price and Martin Lewis, "Reply: On Reading Cultural Geography," 520-22.

cross-sections and vertical themes in the history of landscape

Though they call their sequential landscape cross-sections environmental histories, Richard White, William Cronon, and Timothy Silver have each pursued a narrative strategy advocated by geographers Carl Sauer and H.C. Darby.[10] Landscape cross-sections allow these environmental historians to widen the frame of conventional historical accounts to include natural actors. Cronon relies upon "the tools of an ecologist" to reveal the "changing circumstances of such things as pine trees, pigs, beavers, soils, fields of corn, forest watersheds and other elements of the New England landscape."[11] Such matters were often ignored by historians focused exclusively on human actors. As White concludes, "social change clearly has environmental consequences, but environmental change, in turn, also affects societies. The process is reciprocal."[12]

Insisting upon the agency of nature, environmental historians pursue an explicitly political project. With this metaphor, they distinguish themselves from intellectual history's concern with ideas about nature and consolidate a place for themselves within the American academy where environmental history got its start. In the agency of nature, environmental historians also find a wider political message aimed at American society in an age of limits. Social critics as well as scholars, environmental historians prosecute their critique according to the conventions of academic discourse. "Nature," writes Richard White, "is not infinitely malleable. Changes in the physical world rebound back to affect societies which initiate them."[13] This claim is so authoritative because it is backed up by

---

[10] Richard White, Land Use, Environment, and Social Change: The Shaping of Island County, Washington. (Seattle: Univ. Washington Press, 1980); White, The Roots of Dependency: Subsistence, Environment, and Social Change Among the Choctaws, Pawnees, and Navajos (Lincoln: Univ. Nebraska Press, 1983); Cronon, Changes in the Land; Timothy Silver, A New Face on the Countryside: Indians, Colonists, and Slaves in South Atlantic Forests, 1500-1800 (New York: Cambridge Univ. Press, 1990). On the methodological injunctions of Sauer and Darby, see Sauer, "Forward to Historical Geography" reprinted in Sauer, Land and Life: A Selection from the Writings of Carl Ortwin Sauer, J. Leighley, ed., (Berkeley: University of California Press, 1963), 351-79; Darby, "On the Relations of Geography and History" Transactions of the Institute of British Geographers 19 (1953): 1-11.

[11] Cronon, Changes in the Land, vii.

[12] White, Roots of Dependency, 323.

[13] White, Roots of Dependency, 323.

scrupulously documented archival research and a careful marshaling of facts and arguments derived both from the historical literature, and, as a specifically *environmental* history, also the literature of ecological science. Behind White's claims about the agency of nature stand the collective conclusions of countless historians and ecologists.

Although Cronon, Silver, and White use the sequential landscape cross-sections advocated by Sauer, they are open to relatively few of the criticisms with which Sauer has been tagged. They do not work with the kind of superorganic theory of culture that has been said to afflict Sauer and cultural geography more generally.[14] Unlike the new cultural geographers whose critique focuses upon Sauer's methodological and programmatic addresses, environmental historians read Sauer's substantive (and diverse) writings about landscape change.[15] While it might reasonably be said that Cronon, Silver, and White tend to privilege landscape changes *per se* and to ignore the ideological constitution and consequences of these changes, this is not the result any theoretical or disciplinary stricture against discussing the cultural meanings of changing landscape patterns, as has been said of Sauer's cultural geography. Environmental historians are unmarked by the legacy of the Sauer-Hartshorne debate and its narrow focus on place facts, *landschaftskunde,* and scientific legitimacy. Cronon's Changes in the Land, for example, analyzes the meaning of improvement and enclosure in Lockean discourse and its legitimation of the appropriation of aboriginal lands.

There are, however, other difficulties with narratives structured by sequential landscape cross-sections linked by vertical themes. Cronon, Silver, and White pay relatively little attention to the conflicts and differences within each of their cultural categories.[16] Their focus on the encounter between Europeans and native peoples requires

---

[14] James S. Duncan, "The Superorganic in American Cultural Geography" Annals of the Association of American Geographers 70 (1980): 181-98.

[15] Carl Sauer's most famous programmatic essays, "The Morphology of Landscape" and "Forward to Historical Geography," are reprinted in Sauer, Land and Life, 315-79.

[16] This is more true of White's Land Use, Environment, and Social Change than it is of his Roots of Dependency.

them to minimize intra-group difference so as to highlight inter-group difference. Thus, all European colonists became farmers and aboriginals horticulturists or hunters and gatherers. The dichotomous treatment of natives and newcomers and a focus on production on the land tends to universalize the activities of men and to slight those of women. Generally, these male historians are much more thorough in their treatment of women's work in Amerindian societies, where women often tended the crops, than in Euro-colonial ones where usually they did not.

Such erasures are a necessary part of any narrative driven by the juxtaposition of introductory and concluding landscape cross-sections. In each of these books, the opening cross-section of the native cultural landscape sets the stage for a story about decline and degradation that ends with another cross-section: the degraded colonial landscape. This juxtaposition, and its attendant distinction between (relatively) homogenized native and European peoples, is fundamental to the meaning of these stories. As Cronon himself observed of this rhetorical strategy: "Our narratives take changes in the land and situate them in stories whose endings become the lessons we wish to draw from those changes."[17] Without the contrast between the introductory and concluding landscape cross-sections it would be impossible to see either the agency of nature or to grasp its meaning. For Cronon, as for Silver and White, the story is both tragic and educational: "By integrating New England ecosystems into an ultimately global capitalist economy, colonists and Indians together began a dynamic and unstable process of ecological change .... We live with their legacy."[18]

By freezing space in a single moment of time, these environmental historians make it difficult to appreciate the complex of different temporalities embedded in a single cross-section. The landscape and the people on it, as Cronon himself admitted, are not static in the way that the snapshot before and after comparisons of these narratives can perhaps

---

[17] William Cronon, "A Place for Stories: Nature, History, and Narrative" Journal of American History 78 (1992): 1370.
[18] Cronon, Changes in the Land, 170.

suggest.[19] By tying the success of Euro-colonial people(s), their cultural landscape, and capitalism together in their concluding cross-sections, Cronon and Silver suggest a necessary and sufficient explanatory link between the very different phenomena they describe. The move between description and explanation is more difficult than this narrative strategy implies. The explanatory equivalences made between the arrival of European colonists, capitalism, and the resulting degraded landscapes of capitalist commodity production over-simplify a complex and hotly debated transition to capitalism in North America. They also suggest that environmental devastation is a problem exclusive to European colonists and capitalist societies. As Gadgill and Guha show so poignantly in their environmental history of India, environmental devastation is neither that simple nor that culturally exclusive a problem.[20] By describing the "shaping of Island County," Washington, through multiple cross-sections, Richard White's first book, Land Use, Environment, and Social Change, makes a longer, and in this regard, more satisfying sweep over evolving cultural landscapes, but he too tends to ignore the various social and economic forces directing the succession of suburban landscapes upon the failure of Island County forestry and agriculture. Nature may be an actor in human histories, but the strands of these histories are woven at many different scales of time and space. Landscape cross-sections tend to freeze the many different temporalities of human and natural activity in a singular temporal rhythm of explanation.

metaphors of cultural production in cultural geography

The present turn to landscape metaphors of cultural production marks a significant break with the methods and metaphors of landscape analysis emphasized by Carl Sauer and practiced by the Berkeley School. Much of their appeal lies in the sour legacy of the Berkeley School, widely demonized for antiquarian "object fetishism," whose "range was

---

[19] Cronon, Changes in the Land, 169-70.

[20] Madhav Gadgil and Ramachandra Guha, This Fissured Land: An Ecological History of India (paperback ed. Berkeley: Univ. California Press, 1992).

limited to the interpretation of historical, rural, and relict landscapes, and to static mapping of the distribution of culture traits, from barns and cabins to field systems and graveyards."[21] This dim view of the Berkeley School of cultural geography, though by no means universal, is widely held in the discipline.[22] Critics cite the naïve empiricism and atheoretical stance of practitioners who focused on material artifacts as the lens through which to view cultural groups. Their new metaphors of cultural production emphasize the active social construction, representation, and interpretation of absolutely cultural landscapes and their contested meanings. Comparison of landscape to a text, icon, spectacle, or way of seeing sets human geographers' sights beyond morphology and any vestigial links to physical geographers' metaphors of natural agency. It also signals a proclivity to set aside the hiking boots preferred by Sauer for the patent leather shoes more appropriate to fieldwork in the cafés and art museums now of empirical interest to cultural geographers.[23]

Although there are important differences between these various metaphors of cultural production, the general idea of landscape as a cultural production means that landscape is not something already "out-there," like environmental historians' nature, waiting patiently to be discovered and represented faithfully as it really is. If the physical form, meaning, and representation of landscape are in some sense integumentary, then the traditional distinction between the imaginary, representational sense of landscape and its physical dimension becomes difficult to maintain. As Daniels and Cosgrove put it, "a landscape park is more palpable but no more real, nor less imaginary than a landscape

---

[21] The first quote is Duncan, City as Text, 11; the second is Peter Jackson, Maps of Meaning, 1.
[22] Kay Anderson and Faye Gale, "Introduction" in K. Anderson and F. Gale, eds., Inventing Places: Studies in Cultural Geography (Melbourne: Longman Chesire, 1992); Liz Bondi, "Gender Symbols and Urban Landscapes" Progress in Human Geography 16 (1992): 157-70; Denis Cosgrove and Peter Jackson, "New Directions in Cultural Geography" Area 19 (1987): 95-101; Derek Gregory and David Ley, "Culture's Geographies" Environment and Planning D: Society and Space 6 (1988): 155-56.
[23] Denis Cosgrove and Stephen Daniels, "Fieldwork as Theatre" Journal of Geography in Higher Education 13 (1989): 169-83.

painting or poem."[24] Metaphors of text and cultural production suggest the complexity of these relationships and the possibility for still other interpretations of landscape. In the favorable estimation of Barnes and Duncan, such metaphors convey "the inherent instability of meaning, fragmentation or absence of integrity, lack of authorial control, polyvocality and unresolvable social contradictions."[25]

The enthusiasm of cultural geographers for these new metaphors owe much to a particular reading of post-structuralism and Derrida's famous phrase, "there is nothing outside the text". There are a number of ways to understand this. Often, it is read literally, as applying simply to books, documents, and other written texts. To introduce "a more sociological, less deterministic concept of intertextuality," many geographers appeal to the hermeneutics of the anthropologist Clifford Geertz for whom cultures are not "idealities to be stared at but texts to be read."[26] Geertz's world-as-text analogy emphasizes that meaning is not given; it must be found. This is an important, if by now well-worn, observation, but it assumes the coherence of meanings, found through Gadamer's dialogic fusion of horizons, that a more nuanced reading of post-structural general textuality dissipates. As Gayatri Spivak, translator of Derrida's Of Grammatology, notes Derrida's infamous dictum can *also* be translated as "there is no absolute extra-text."[27] I understand Derrida to mean that there can be no metaphysically transcendent ground from which to fix the meaning of the world absolutely and unequivocally. Grounds are always grounded by heterogeneous processes that leave heterogeneous traces yielding still other possible grounds. These traces cannot not be suppressed in presenting the world as it is made to be.

---

[24] Stephen Daniels and Denis Cosgrove, "Introduction: Iconography and Landscape" in D. Cosgrove and S. Daniels, eds., The Iconography of Landscape (New York: Cambridge Univ. Press, 1988), 1.

[25] Barnes and Duncan, "Introduction" in Barnes and Duncan, eds., Writing Worlds, 7.

[26] The first quotation is James S. Duncan and Nancy Duncan, "(Re)-Reading the Landscape" Environment and Planning D: Society and Space 6 (1988): 199; the second is Clifford Geertz, Negara: The Theatre State in Nineteenth Century Bali (Princeton: Princeton Univ. Press, 1980), 135.

[27] Gayatri C. Spivak, "Speculations on Reading Marx: After Reading Derrida" in D. Attridge, G. Bennington, and R. Young, eds., Post-structuralism and the Question of History (New York: Cambridge Univ. Press, 1987), 30. Also see Spivak's introduction to Derrida, Of Grammatology , trans G. C. Spivak (Baltimore: Johns Hopkins Univ. Press, 1976).

Spivak uses the phrase "the worlding of a world" to describe these mechanics that fix truths about the world.[28] To this way of thinking general textuality is not something that refers only to documents "divorced from ... historical, social, and political processes," or to meaning that is accessible by hermeneutic reference to some "extra-textual field of reference."[29] It neither reduces the world to a literal text nor abides the phenomenological opposition of world and text, things-in-themselves and experience of them. Instead, this general textuality recognizes that truths are relational and yet can only be achieved by closing off the possibility of still other, partial truths. It makes geographers open and honest about the politics of closure that they effect whenever they break the chain of substitutive signification to fix the meaning of landscape as they see it to be. The world may be like a book, in that it must always be read and interpreted, but the two are by no means the same thing, as Geertz's world-as-text analogy and a common misreading of post-structural textuality both seem to suggest.[30]

One of the earliest and most influential applications of the Geertz's text metaphor in cultural geography is David Ley's evocative analysis of the landscapes of inner Vancouver. He read opposing real estate developments as rich projections of alternative visions of (post) modern urban life, but in Ley's "hermeneutics of the built environment," the ruptures and discontinuities within the 1960's "ideology of liberal reform" and 1980's neo-conservativism are downplayed. As a result, stories about the bare knuckled worlds of urban politics, patronage, and federal-provincial-municipal negotiation fade into the background, as do the exigencies of capital circulation in the redevelopment of Vancouver's old industrial districts as housing for a new class of gentrifiers. Instead, Ley's discussion is framed around urban design where the metaphor of text provides him with a convenient

---

[28] Gayatri C. Spivak, The Post-Colonial Critic: Interviews, Strategies, Dialogues, S. Harasym, ed. (New York: Routledge, 1990), 1.

[29] The first quotation is Duncan and Duncan, "(Re)-Reading the Landscape," 119; the second is James S. Duncan and David Ley, "Introduction: Representing the Place of Culture " in J. Duncan and D. Ley, eds., Place/culture/representation (London: Routledge, 1993), 9.

[30] For an insightful discussion of textuality, see Martin Jay, "The Textual Approach to Intellectual History" Strategies 4/5: (1991): 7-18.

way to read landscape design ideologically in terms of liberal reform and neo-conservatism. With the eclipse of conflict within these analytical categories, however, the landscape becomes a mirror that passively "displays the ideology of neo-conservativism" and liberal reform. [31]

In contrast to this allusive use of the text metaphor, James Duncan has outlined a bold theory for reading landscapes as texts. Their meanings, he argues, are constrained by social discourses "constituted by a set of narratives, concepts, and ideologies relevant to a particular realm of social practices."[32] This is an important departure from Foucault's notion of discourse, because it builds into Duncan's analysis the hierarchical distinction between ideology and practice that Foucault sought to dispel. Whereas Foucault was concerned with the combination of statements, practices, and institutions that were the conditions for the possibility of discourse, Duncan's discourses are sets of ideas *about* an institution whose existence he already takes for granted. As a result Duncan reads landscape in terms of what Foucault called "juridico-discursive" power-- a kind of centralized power, modeled on the state and legislating action in terms of repression/liberation, censorship/license, and prohibition/permission.[33]

For all its rich detail, Duncan's empirical account of the juridico-discursive power of kingship and its inscription in landscape texts puts out of sight other axes of power at work in the Kandyan Kingdom (in present day Sri Lanka). If the example of peasants in other places provides any indication at all, Kandyan peasants actively resisted feudal appropriations from the king and nobles alike, but Duncan's exclusive focus on the sovereign power of the state allows no place outside the hegemonic terms of kingship

---

[31] David Ley, "Styles of the Times: Liberal and Neo-Conservative Landscapes in Inner Vancouver, 1968-1986" Journal of Historical Geography 13 (1987): 54, 42. Also see David Ley, "Liberal Ideology and the Postindustrial City" Annals of the Association of American Geographers 70 (1980): 238-58.

[32] Duncan, City as Text, 16.

[33] Michel Foucault, The History of Sexuality: An Introduction, trans. R. Hurley. (1976. New York: Vintage Books, 1990), 87-89. Foucault outlined his ideas about discourse in The Archaeology of Knowledge, trans. A.M. Sheridan. (1969. New York: Pantheon, 1972).

discourse for peasants to contest the corvée labor used to build the new palace landscape.[34] Ethnicity and colonialism are even harder to discuss in terms of the juridico-discursive power of landscape texts, because, unlike the state, they operate diffusely without a central lever that might be manipulated to tighten or release the grip of their power. Although kingship discourses came to Kandy from southern India along with Tamil migrants, the relations between ethnicity and the politics of landscape interpretation receive short shrift in The City as Text. As the bitter struggles between Tamil separatists and the Sinhalese majority in contemporary Sri Lanka attest, this ethnic dimension intersects with contested claims about the sovereign power of the state, but it cannot be understood entirely in these terms. Neither can colonialism. The 1814 rebellion, dramatic focus of the book, took place within the context of a rapidly expanding British imperial system, but colonialism fades from the scene in The City as Text except where the reports of British invaders provide some insight into the struggle for indigenous meaning in the palace dispute.[35] My point here is not to lambast Duncan for writing about local politics instead of class struggle, ethnicity, or colonialism. Rather, I am concerned with the way in which his framework for discussing political conflict in Kandy abstracts these events from any relationship to other axes of social power or to the world beyond the narrow borders of Kandy. The fact that Kandy was formally subsumed to the British Empire in the immediate wake of this civil war suggests that the outcome of this indigenous political struggle is not as easily disentangled from these other axes of social power, specifically from an encroaching British colonial system, as Duncan's narrative seems to imply.

As a more general manifesto for geographic research, Duncan's theory for reading landscapes as texts might easily be seen as the latest rendition of the old colonial project of geography. "Landscapes anywhere," Duncan claims, "can be viewed as texts which are

---

[34] Compare the accounts of peasant resistance in Herbert P. Bix, Peasant Protest in Japan, 1590-1884 (New Haven: Yale Univ. Press, 1986); Rodney H. Hilton, Class Conflict and the Crisis of Feudalism: Essays in Medieval Social History (2nd ed. London: Verso, 1990).

[35] Duncan, City as Text, 84.

constitutive of discursive fields, and thus can be interpreted socio-semiotically ... to uncover the underlying, multivocal codes which make landscapes cultural creations, to show the politics of design and interpretation and to situate landscape at the heart of social processes." His methodological discussions pay little attention to the relations of power wrapped up with geographers' readings of landscape texts.[36] This proprietary claim and his particular reading of Kandy are both authorized by the conceit that landscape is a coherent text with identifiable meanings available for the geographer to read and appropriate. This fiction effaces all historical, cultural, and other differences separating geographers from their objects of inquiry as it favors the interpretive power of geographers over their subjects. "Although the cosmic symbolism of Kandy may seem radically 'other' to us," the text metaphor recuperates these differences and reassures us, that "fundamentally it [Kandy] is not different from any other landscape."[37]

The metaphor of landscape as text also suppresses any trace of other, non-human actors from the production of landscape. Many cultural geographers are simply not interested in questions where non-humans are very prominent. In the case of Ley's studies of the city, for instance, it may be perfectly appropriate to think of landscape "as a text in which social relations are inscribed." As a general theory of landscape, however, Duncan and Duncan's more bold claim that "*any* landscape can be analyzed as a text " inflicts considerable violence.[38] It treats landscape as a blank page that only human actors can read and write upon. The naïveté of such a proposition has become all too apparent in an era of ozone holes and AIDS where those who refuse to acknowledge the liveliness of gaseous molecules and tiny strands of nucleotides do so at their peril. More important for human geography, however, such a program would abdicate all interest and concern over such

---

[36] Duncan, City as Text, 184. Duncan makes similar claims for the text metaphor in Duncan and Duncan, "(Re)-Reading the Landscape."

[37] Duncan, City as Text, 7. I am indebted for these points to Vincent Crapanzano, "Hermes' Dilemma: The Masking of Subversion in Ethnographic Description" in J. Clifford and G.E. Marcus, eds., Writing Culture: The Poetics of Ethnography (Berkeley: Univ. California Press, 1986), 51-76; Derek Gregory, Geographical Imaginations (Cambridge, MA: Blackwell, 1994), 149-50.

[38] The emphasis here is mine. Duncan and Duncan, "(Re)-Reading the Landscape," 123.

non-human matters to science. Science is too important to be left to just the scientists, just as nature is too important to be left to the geographers of "natural hazards." By suppressing all trace of such nonhumans from the landscape, the metaphor of landscape as text hamstrings human geographers trying to challenge the hegemony of science on a familiar conceptual terrain.

Other landscape metaphors of cultural production also emphasize the interpretation of cultural ideas as they are reflected in and help to produce the meanings of landscape. Following art historian Erwin Panofsky's iconography, Stephen Daniels argues that in later Georgian England woodland was an icon that "symbolize[d], and so 'naturalize[d]', varying and conflicting views of what social order was or ought to have been." During this period when common lands were being enclosed and large rural estates physically transformed, the meaning of these landscape "improvements" was debated and contested through the woodland symbols deployed in art, prose, poetry, and other media.[39] Daniels' most recent writings introduce metaphors like text and spectacle to describe how landscapes communicate meaning, but like his previous use of icon, such metaphors focus on the different political ideologies projected onto and expressed symbolically through landscape. In Fields of Vision, his discussions of St. Paul's Cathedral and John Constable's *The Haywain* are compelling because they historicize these enduring, yet multifaceted and perpetually reinterpreted symbols of England.[40] But by presenting landscape as a symbol of something else-- what Erwin Panofsky termed, "the basic attitude of a nation, a period, [or] a class"-- metaphors of icon, spectacle, and text tend to eclipse discussions of

---

[39] Stephen Daniels, "The Political Iconography of Woodland in Later Georgian England" in Cosgrove and Daniels, eds., Iconography of Landscape, 43; Edwin Panofsky, Studies in Iconology (New York: Harper & Row, 1962). Panofsky has also inspired Brian S. Osborne, "The Iconography of Nationhood in Canadian Art" in Cosgrove and Daniels, eds., Iconography of Landscape, 162-78; John Eyles and Walter Peace, "Signs and Symbols in Hamilton: An Iconology of Steeltown" Geografiska Annaler 72B (1990): 73-88.

[40] Stephen Daniels, Fields of Vision: Landscape Imagery and National Identity in England and the United States (Cambridge: Polity Press, 1993); Stephen Daniels and Denis Cosgrove, "Spectacle and Text: Landscape Metaphors in Cultural Geography" in Duncan and Ley, eds., Place/culture/ representation, 57-77.

landscape changes *per se*. Landscape becomes interesting only in so far and as much as it frames the social and provides a passive stage for an exclusively cultural drama.[41]

Like Daniels, Denis Cosgrove uses a number of different metaphors of cultural production to describe landscape. In calling landscape a way of seeing and, more recently, a kind of theater, Cosgrove argues that transformations of the landscape idea were deeply implicated in the transition to capitalism. His substantive accounts, however, concentrate "primarily on the cosmological beliefs and attitudes of political and technical elites," and so pay relatively little attention to dissenting visions of landscape.[42] This is an important omission, both empirically and theoretically. For instance, in seventeenth century England, federal-era Maine, and the Gitskan territories in late nineteenth century British Columbia, the arrival of surveyors and the replacement of traditional property systems by the abstract grid of the rectangular survey and exclusive individual property rights was bitterly resisted by peasants, squatters, and native peoples alike.[43] To be sure, the eventual victory of capitalist title holders and of the survey system was aided by their overwhelming economic and juridical power, but the means they used to measure these gains were an inseparable part of this power, a fact not unnoticed by those who resisted the new survey system. Discussion of these struggles is crucial, not because of any commitment to "history from the bottom up" for its own sake, but because this diversity and its suppression play an important part of any diagnosis of social power. In The Palladian Landscape, Cosgrove provides more detailed treatment of social conflict than he did in Social Formation and Symbolic Landscape-- his descriptions of the political struggles between Venice and the provincial nobility of Vicenza and the economic tensions between patrician landlords and

---

[41] Panofsky, Studies in Iconology, 7.

[42] Denis Cosgrove, Social Formation and Symbolic Landscape (London: Croom Helm, 1984); Cosgrove, The Palladian Landscape: Geographical Change and Its Cultural Representations in Sixteenth Century Italy (Leicester: Leicester Univ. Press, 1993), 9.

[43] Keith Lindley, Fenland Riots and the English Revolution (London: Heinemann Educational Books, 1982); Alan Taylor, Liberty Men and Great Proprietors: The Revolutionary Settlement on the Maine Frontier (Chapel Hill: Univ. North Carolina Press, 1990); Robert Galois, "The Burning of Kitsegukla" B.C. Studies 94 (1992): 59-81.

the peasantry of the *terrafirma* are fascinating-- but this discussion is not convened in terms of the landscape idea whose hegemonic legacy interests him. As a result, landscape tends to become an ideological concept that mystifies social relations and the economy the only field of real conflict that could explain the ultimate hegemony of this particular way of seeing. Cosgrove's claim to understand economy and culture, the material landscape and the "imaginary" landscape, as mutually constitutive is therefore subverted.

Like the text metaphor, Cosgrove's landscape metaphors, way of seeing and theater, tend to emphasize the cultural production of landscape and to ignore the agency of non-humans. The suppression of non-human agency, in fact, is the chief merit of the theater analogy, which treats landscape as an empty "stage on which various players perform roles which are scripted but whose interpretation is the responsibility of the individual actor and a great deal of ad-libbing takes place."[44] Cosgrove's analysis of the history of landscape as a way of seeing is more attentive to the dual sense of landscape as both an affective engagement with scenery through art and an objective observation of real, visible phenomena. By calling attention to the cultural and historic specificity of landscape as a way of seeing, Cosgrove convened an important critique of this dualism and its implications for geographers' uses of landscape as a central disciplinary concept. Geographers interested in the pursuit of objective, disinterested knowledge must renounce the affective aspect of landscape because emotive connection to the world dissolves objective knowledge claims into individual subjectivity. Seeing the world as alienated outsiders, Cosgrove suggests, geographers have been unable to imagine sublime beauty, the meaning of place, and "the affective bond between human beings and the external world," except in individualistic terms of personal perception and private experience.[45] Daniels calls this ambiguity "the duplicity of landscape" and like Cosgrove sees the

---

[44] Denis Cosgrove and Mona Domosh, "Author and Authority: Writing the New Cultural Geography" in Duncan and Ley, eds., Place/culture/representation, 31.
[45] Cosgrove, Social Formation and Symbolic Landscape, 18.

tensions between the realistic and illusory, subjective and objective, natural and artificial senses of landscape as the source of its conceptual power.[46]

Feminist writers have taken this critique of the landscape way of seeing one step further by noting that vision is a peculiarly masculinist epistemic system. Gillian Rose, in her Feminism and Geography, appeals to Lacanian psychoanalysis to suggest that the possessive gaze of the geographer looking out upon landscape is an eroticized one. The gaze simultaneously individuates and constitutes his manly self as distinct from the (m)Other. Such masculinist vision, she argues, is both voyeuristic, seeing the world as separate from self, and narcissistic, seeing the world as pleasurable reflections of the same self. Thus, the two sides of Daniels' duplicitous landscape dualism, pleasure in beholding and fear that objective knowledge will be dissolved by such subjective pleasure, can be seen as the oscillating desires and fears of the masculinist Subject of geography. Psychoanalysis also provides an explanation for the feminization of nature and its construction as Other to a masculinized culture. Rather than locating this nature/culture dualism as Cosgrove does, in the particular social and economic context of sixteenth century Europe, Rose uses psychoanalytic theory to universalize it as an inherent result of geographers' masculinist anxieties over the conflict between their narcissistic pleasure in what Sauer called "maternal natural landscape" and their voyeuristic desire for critical distance. Rose's critique of the masculinist vision of geography is quite compelling, yet I find it only a partial resolution to the problematic construction of a passive, feminized nature in geography.[47]

By locating all the action in the desires of the human psyche, Rose's psychoanalytic geography renders nature, that is everything non-human, almost as passive and ever malleable as the feminized (m)Other Nature she is concerned to destabilize. This should

---

[46] Stephen Daniels, "Marxism, Culture, and the Duplicity of Landscape" in R. Peet and N. Thrift, eds., New Models in Geography: The Political Economy Perspective (London: Unwin Hyman, 1989), II: 196-220.

[47] Sauer, Land and Life, 325, quoted in Gillian Rose, Feminism and Geography: The Limits of Geographical Knowledge (Minneapolis: Univ. Minnesota Press, 1993), 69.

come as no surprise since denaturalization was one of the chief aims of Lacan's assaults on the biological proclivities of Freudian psychoanalysis.[48] Furthermore, her focus on the individual subject and the process of psychological individuation between Self and Other tends to eclipse the historically and culturally specific conditions in which subjectivity is constituted. In careless hands, psychoanalysis can normalize white, middle-class, heterosexual, nuclear families. While I find it is necessary to interrogate the construction of nature and the masculinization of the gaze, I also think it vital to anticipate and imagine alternative ways of living in the world.

So I return to environmental historians who insist upon the active agency of nature. In criticizing intellectual historians concerned only with human ideas about nature and wilderness, Richard White writes, "physical nature in this literature becomes peculiarly passive and inanimate. The powerful mistress of the determinists disappears into a hall of mirrors where we see, not her, but rather changing reflections of our own cultural progress."[49] The same might easily be said of cultural geography and its various landscape metaphors, text, icon, spectacle, way of seeing, and theater. Despite the hope of Daniels to "emphasiz[e] the biophysical world," landscape metaphors of cultural production have, both in theory and practice, served to make nature ephemeral and epiphenomenal.[50] These metaphors treat nature as a blank page or an empty stage on which the drama of culture is written and acted out. They provide no way to think about nature as a lively, heterogeneously embodied actor. In moments of metaphorical extravagance the material "reality" of landscape disappears altogether: "[L]andscape seems less like a palimpsest whose 'real' or 'authentic' meanings can somehow be recovered, than a flickering text

---

[48] For an accessible introduction to Lacanian psychoanalysis, see Elizabeth Grosz, Jacques Lacan: A Feminist Introduction (New York: Routledge, 1990).

[49] White, "American Environmental History," 316.

[50] Daniels, "Marxism, Culture, and the Duplicity of Landscape," 197. Similar sentiments are expressed by Margaret Fitzsimmons, "The Matter of Nature" Antipode 21 (1989): 106-20; Cindy Katz and Andrew Kirby, "In the Nature of Things: The Environment and Everyday Life" Transactions of the British Institute of Geographers 16 (1991): 259-71; Chris Philo, "De-Limiting Human Geography: New Social and Cultural Perspectives" in C. Philo, ed., New Worlds, New Words (Aberystwyth: Institute of British Geographers, 1991), 25.

displayed on a word-processor screen whose meaning can be created, extended, elaborated, and finally obliterated by the merest touch of a button."[51] Environmental historians insist that nature is not that malleable and the real not that easily dissolved into the imaginary. The fact that they often articulate this belief metaphorically in terms of a feminized nature suggests the power and sensitivity of Rose's important feminist critique, but Lacanian psychoanalysis has little to offer those concerned with thinking about non-humans, so I will return to environmental historians and their insistence on nature as a real, autonomous actor in human history.

environmental history and the agency of nature

Environmental historians assert the active agency of nature in human history, but they narrate its effects in a variety of different ways. Alfred Crosby has worked extensively on what he terms the "Columbian Exchange," that is the Eurasian, disturbance-adapted microbes, pathogens, plants, and animals that traveled along with and often well ahead of European colonists as they reached out to the western hemisphere and Australasia. The combined effects of this "portmanteau" of biological invaders, Crosby argues, disrupted aboriginal lifeways in the New World much more completely and more devastatingly than European colonialists who, quite unknowingly, carried with them a disorderly but powerful bunch of biological stowaways that have now touched all corners of the globe. In discrete chapters, he depicts the coincident effects of various biological invaders and explains how they combined in time and space to create an ecological imperialism that paved the way for successful European colonization. In emphasizing the agency of these important, and often ignored, non-human invaders from Europe, Crosby tends to ignore the cultural ways in which colonized people understood, interacted, and adapted to these new presences.[52] In New Zealand, for example, the Maori were quick to adopt European

---

[51] Daniels and Cosgrove, "Introduction" in Cosgrove and Daniels, eds., Iconography of Landscape, 8.
[52] Alfred W. Crosby, The Columbian Exchange: Biological and Cultural Consequences of 1492 (Westport, CT: Greenwood Publishing Co. 1972); Crosby, Ecological Imperialism: The Biological Expansion of

cultigens; in fact, Maori farmers supplied much of the food consumed in the early European settlements of Auckland and Wellington. The Maori were devastated by Eurasian diseases, but they were also subjected to genocidal wars of conquest in which their land was confiscated and the social systems based on it were disrupted.[53] By downplaying these more conventionally "social" struggles and treating biological invaders and their "impacts" as independent from the cultural ways in which they were mediated, Crosby's fine scholarship borders, at times, on the biologically determinist.

More so than any other "natural" catastrophe, the droughts on the Great Plains during the 1930's are emblematic in American popular culture of the power of nature to affect human societies. Their place in environmental history, however, is a hotly contested one. James C. Malin did much of his best work in the 1940's and 1950's on the inter-relations between people and the environment in this region. A stubborn critic of the Clementian idea of a stable vegetation climax, Malin believed that drought and disturbance had always been a part of life on the Great Plains; that dust, erosion, and dust storms were natural, not anthropogenic; and that European settlement and agriculture, once suitably adapted to aridity, should proceed unhindered either by such concerns or New Deal land-use controls.[54] While perhaps less self-consciously political, recent work has followed Malin in treating the drought and its impact as an exogenous factor beyond human control or calculation. As these historians tell it, the Dust Bowl is a story of human perseverance, courage, and adaptation in the face of natural catastrophe compounded by the equally unpredictable and uncontrollable Great Depression. Not coincidentally, they are more celebratory than critical of American agriculture on the Plains.[55]

Europe, 900-1900 (New York: Cambridge Univ. Press, 1986). The quotation is Ecological Imperialism, 270.

[53] Eric Pawson, "Two New Zealands: Maori and European" in Anderson and Gale, eds., Inventing Places, 15-33.

[54] James C. Malin, The Grassland of North America: Prolegemena to Its History, with Addenda and Postscript (Gloucester, MA: Peter Smith, 1967); Malin, History and Ecology: Studies of the Grassland, R.P. Swierenga, ed. (Lincoln: Univ. Nebraska Press, 1984).

[55] R. Douglas Hurt, Dust Bowl: An Agricultural and Social History (Chicago: Nelson Hall, 1981); Paul Bonnifield, The Dust Bowl: Men, Dirt, and Depression (Albuquerque: University of New Mexico Press,

Donald Worster is the most trenchant critic of this view of Plains history. His Dust Bowl argues that the Dust Bowl resulted from the systematic failure of capitalist agriculture to respect the balance of nature. The "capitalist ethos" demanded a short-term profit maximizing agriculture that plowed under drought-resistant perennial grasses to make way for winter wheat and summer fallow that earned a higher return in wet years but yielded only dust and despair in the all too frequent dry ones.[56] Such an idealist diagnosis tends to ignore the different positions that people occupy and to discount the structural constraints on human behavior. Worster's more recent writings on modern agriculture provide a more sophisticated analysis of this instrumentalist attitude to nature. In Rivers of Empire, he argues that instrumentalism is symptomatic of a particular concentration of social power and "technical hubris" engendered by capitalism. Still, the focus of critique remains an exploitative attitude to nature that makes it impossible to respect "the patterns of nature [which] set a course for our lives-- not the only course, or the only possible course, but a reasonably clear course that wise societies have followed in the past, foolish ones have scorned."[57]

While I sympathize deeply with Worster's plaintive cry for a new environmental ethic of care, his exhortation to respect nature presents several critical problems. If, as he argues, "knowing the earth well-- knowing its history and its limits" is fundamental to continued life on earth, then how are we to know the earth better?[58] This is a vital question, but Worster's answer is ambivalent. In the post-Enlightenment West, science has historically been authorized to represent and speak for nature. Environmental historians rely upon ecological science for explanatory concepts like ecosystem and equilibrium that

---

1979). For a brillant analysis of these various narratives of Plains history, see Cronon, "A Place for Stories."

[56] Donald Worster, Dust Bowl: The Southern Plains in the 1930s (New York: Oxford University Press, 1979).

[57] Donald Worster, Rivers of Empire: Water, Aridity, and the Growth of the American West (New York: Pantheon, 1985); Worster, "Seeing Beyond Culture," 1145.

[58] Worster, "Transformations of the Earth," 1106.

organize their narratives.[59] The authority of ecological science allows Worster to say "with the ecologist that nature, left alone, demonstrates a marvelous system of organization."[60] As environmental history's most careful student of ecological science, Worster is also "willing to challenge this authority," and rightly so. Worster has provided a searing critique of the possible uses of revisionary ideas in ecology about natural disturbance "to justify the destruction wrought by contemporary industrial societies."[61]

His critique of the social consequences of scientific representations of nature is vitally important, but so too is reflexivity about the effects of one's own accounts of nature. Worster's homeostatic nature and capitalist disturbances of it are constituted by a thoroughly romanticized aboriginal past of ecological peace and harmony. This strategy is most obvious in Dust Bowl and Rivers of Empire, where native peoples are denied an identity of their own outside the rhetorical framework by which their difference from modern society constitutes capitalist damage to nature.[62] Worster's programmatic essays promote this sort of orientalist critique of Western capitalism.[63] I endorse wholeheartedly his critique of modern agriculture and would also draw important distinctions between capitalist wheat monoculture on the Great Plains and the practices of Filipino peasants. Worster, however, lumps Filipino peasants into a larger collective: "anonymous traditional farmers." Members of this violently homogenized category are all the same, "whether they were in medieval Sweden, or ancient Sumer, in the Ohio River valley of the Valley of Mexico." He cannot acknowledge these cultural differences, because undifferentiated "traditional practices ... that retained much of the wisdom of nature" produce the rhetorical

---

[59] See chapter 2.

[60] Donald Worster, "Review of Changes in the Land by William Cronon" Agricultural History 58 (1984): 508-509.

[61] The first quotation is Worster, "The Ecology of Order and Chaos" Environmental History Review 14 (1990): 2; the second Worster, "History as Natural History: An Essay on Theory and Method" Pacific Historical Review 53 (1984): 13. Worster's major account of the history of ecology is Nature's Economy: A History of Ecological Ideas (San Francisco: Sierra Club Books, 1977).

[62] I owe this point to Cronon, "A Place for Stories," 1365.

[63] Donald Worster, "World Without Borders: The Internationalizing of Environmental History" in K.E. Bailes, ed., Environmental History (Lanham, MD: University Press of America, 1986), 661-69; Worster, "Doing Environmental History" in Worster, ed., Ends of the Earth, 289-307.

mirror of colonialism in which Worster constitutes and critiques the West by appropriating the Primitive as the raw material for the production of the West.[64] Worster's trick is simply to reverse the polarity of this old dualism and valorize the Primitive rather than the West, but the effect produces just more of the same: a teleology in which progress produces loss, alienation, and ecological exploitation. We need to unlearn our privilege as loss, because such stories make it difficult to imagine a new relationship with nature without an impossible (and violent) return to the primitive.

Unlike Worster, who would retain the culture/nature dichotomy for the strategic purpose of "reminding us that there are different forces at work in the world and not all of them emanate from humans," Carolyn Merchant argues that humans are inseparable from the nature around us.[65] In fact, she claims this dualism is a major part of the problem. Her first book, The Death of Nature, is an account of the development of Cartesian dualisms in European science. In Ecological Revolutions, she expands this argument by connecting these scientific paradigm shifts to shifts in organic systems of human-environment relations in New England.[66]

The bold and all-encompassing sweep of her narrative makes for an imperial attitude about the details of New England's particular histories. In describing native peoples' traditional mimetic consciousness, Merchant maps the Iroquois Corn-mother myth onto the Malecites and Penobscots, Algonquian groups who only adopted agriculture after European colonization of the area.[67] Merchant's teleology also disables diagnosis of the forces making ecological revolutions inevitable. The development of capitalism she attributes to systemic contradictions between increasing population density and the

---

[64] Worster, "Transformations of the Earth," 1097, 1096.
[65] Worster, "Doing Environmental History" in Worster, ed., Ends of the Earth, 292-93.
[66] Carolyn Merchant, The Death of Nature: Women, Ecology and the Scientific Revolution (San Francisco: Harper & Row, 1980); Merchant, Ecological Revolutions.
[67] Merchant, Ecological Revolutions, 70-74. On the adoption of maize agriculture by native peoples in the Northeast, see David Demeritt, "Agriculture, Climate, and Cultural Adaptation in the Prehistoric Northeast" Archaeology of Eastern North America 19 (1991): 183-202; Dean R. Snow, "Eastern Abenaki" in B.G. Trigger, ed., Handbook of North American Indians: Northeast (Washington: Smithsonian, 1978), 137-47.

ecological and economic requirements of colonial agriculture. The squeeze between increasing population density and opportunities on the farm certainly helped foster inequality, primitive capital accumulation, the development of wage labor, and by 1860, the capitalist mode of production in the long settled Connecticut River Valley.[68] At the same time, however, many other people were leaving this area for northern New England, where they tried, with some limited success, to maintain a more traditional agrarian economy in which labor was organized through the patriarchal family.[69] Surely the capitalist ecological revolution in these thinly settled corners of New England demands a different explanation than in the more crowded and rapidly industrialized portions of the region. Without some attention to scale and the uneven production of space, in short without some sense of historical geography, her nested spheres of ecology, production, reproduction, and consciousness erase the different histories *within* New England.

For Merchant, New England is an important place to study because the same processes that took place "in 2,500 years of European development" are repeated in "New England in a tenth of that time." Merchant's claim that "New England is a mirror on the world" violently suppresses all difference and local identity in the global unfolding of a singular History of ecological revolutions. Her history operates with the appropriative logic of Hegel whereby the only hope for resolving the dialectical contradictions between environmental exploitation and ecological crisis lies in reversing the course of History: "philosophical changes that would reintegrate culture with nature, mind with body, and male with female modes of experiencing and representing 'reality.'"[70]

---

[68] Christopher Clark, The Roots of Rural Capitalism: Western Massachusetts, 1780-1860 (Ithaca: Cornell University Press, 1990).

[69] For recent accounts of the early nineteenth century settlement of northern New England, see Taylor, Liberty Men and Great Proprietors; Demeritt, "Climate, Cropping, and Society in Vermont, 1820-1850" Vermont History 50 (1991): 133-65; Jamie H. Eves, "'The Valley White with Mist': A Cape Cod Colony in Maine" Maine Historical Society Quarterly 32 (1992): 74-107.

[70] Merchant, Ecological Revolutions, 1-2, 265. I owe this point to Robert Young, White Mythologies: Writing History and the West (London: Routledge, 1990).

The development of a new environmental ethic is a laudable goal, but dreams of transcendence and final symbiosis are violent in their effects. As Donna Haraway notes, stories beginning with original innocence and privileging the return to wholeness "imagine the drama of life to be individuation ... [and] alienation.... In this plot women are imagined either better or worse off, but all agree they have less selfhood, weaker individuation, more fusion to the oral, to Mother, less at stake in masculine autonomy."[71] "Primitive" people are similarly placed in such a history. To demonize the anthropocentricism of the Judeo-Christian tradition, deep ecologists use the "Orient" as a resource, reading in selective fashion the diverse spiritual traditions of Asia to formulate their doctrine of biocentrism.[72] Merchant is not unaware of these problems, and her recent work offers important criticisms of the ethnocentric, essentialist, and racist overtones of radical ecology.[73]

I am not as confident, however, that the ethics of biocentrism can be so easily recovered. With its insistence on the "unity of humans and nonhuman nature," the language of biocentrism disables consideration of the processes by which what passes for nature is actually determined.[74] By speaking of ecology and ecosystem, as both the models by which we know nature and as this object itself, Merchant reifies the knowledge of nature into the thing itself. This makes it very difficult to criticize the process by which particular boundaries are drawn. In the Boundary Waters Canoe Area of Minnesota, where lightning-set fires are now allowed to burn, and in the Brazilian rainforest, where indigenous peoples and rubber tappers are forcibly removed from their homes to make way for wilderness reserved for "biodiversity," such boundary-making is literally a matter of life and death.[75]

---

[71] Donna Haraway, Simians, Cyborgs, and Women: The Reinvention of Nature (New York: Routledge, 1991), 177.

[72] For this critique, see Ramachandra Guha, "Radical American Environmentalism: A Third World Critique" Environmental Ethics 11 (1989): 71-89; Timothy Luke, "The Dreams of Deep Ecology" Telos 76 (1988): 65-92.

[73] Carolyn Merchant, Radical Ecology: The Search for a Liveable World (New York: Routledge, 1992); Merchant, Earthcare: Women and the Environment (New York: Routledge, 1996).

[74] Merchant, Radical Ecology, 77.

[75] Daniel B. Botkin, Dicordant Harmonies: A New Ecology for the Twenty-First Century (New York: Oxford University Press, 1990), Susanna Hecht and Alexander Cockburn, The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon (1989. New York: HarperCollins, 1990).

William Cronon's Nature's Metropolis breaks from this kind of appropriative holism by focusing squarely on the processes by which "the boundary between human and nonhuman, natural and unnatural" is determined and transformed. He links this nature/culture dualism with another, closely intertwined binary: the country and the city. The terms of such dualisms cannot exist without the constitutive tension between them in which difference marks off the place where city (or country or nature) is not: "our own flight from 'the city' creates 'the wild' as its symbolic opposite and pulls that seemingly most natural of places into our own cultural orbit. We alter it with our presence, and even with the ways we think about it."[76] In breath-takingly executed chapters about commercial and transportation links, commodity and capital flows, cultural fears and fetishes, Cronon describes the multi-dimensional traffic between Chicago the city and its country hinterland, traffic between capital and nature, traffic that at once marked out and transformed the opposing poles of these intertwined binary pairs. By highlighting the necessary and constituent relations between them, Cronon shows how difficult is it is to talk about "nature" as a thing apart from the relations, both human and nonhuman, that bring it into being.

To unravel these complex relations he relies on stratigraphic metaphors of surface and depth. Here, Cronon draws a guarded distinction between "'first nature' (original, prehuman nature) and 'second nature' (the artificial nature that people erect atop first nature)," while acknowledging "that the nature we inhabit is never first or second nature, but rather a complex mingling of the two."[77] The uses of this distinction become clear in his discussion of the transportation facilities constructed at Chicago. Situated on the swampy shores of Lake Michigan with only a few feet of stubborn fluvial sands and silts separating it from the Mississippi drainage, Chicago could only be made into a metropole linking the lakes with the prairie by dredging the harbor and river, fighting the spring

---

[76] William Cronon, Nature's Metropolis: Chicago and the Great West (New York: Norton, 1991), xvii, 18-19.

[77] Cronon, Nature's Metropolis, xvii.

floods, and later by building railroads less subject to such nonhuman perturbation. "A kind of "second nature,' designed by people and 'improved' toward human ends, gradually emerged atop the original landscape that nature-- 'first nature'-- had created." This distinction between first nature and second allows him to differentiate between what people made and what original first nature did prior to and independently of human action. By displacing the culture/nature dualism into a stratigraphy he can excavate, Cronon reveals the autonomous agency of nature: "Nature met every new scheme [to dredge the harbor] with new sand, and the harbor continued to be a problem, long into the future."[78]

Although the distinction between first and second nature and stratigraphic metaphors of surface and depth are common to Marxist theorizing about capitalism, and Cronon uses them to similar effect, he is a strong critic of Marx's labor theory of value because it ignores the agency of nature. "Beneath the geography of capital, underpinning it and sustaining it even as the two transformed each other," Cronon insists, "there was still the geography of first nature."[79] In excavating the autonomous agency of first nature beneath the capitalist transformations of second nature, Cronon appeals to the bioenergetics of Henry Odum's ecosystem science: "In any ecosystem, only the sun produces. All other beings consume in a long chain of killing and eating." Odum's scientific studies of energy and mass fluxes through bounded ecosystems put a rather different spin on the Marxist concept of relations of production and the labor theory of value that underwrites it. The social relations of production revealed by Cronon's careful analysis of capitalism "depended on still more encompassing ecological relations of *consumption* ...[M]ost of the labor that goes into *'producing'* grain, lumber, and meat involves *consuming* part of the natural world and setting aside some portion of the resulting wealth as 'capital.'"[80]

---

[78] Cronon, Nature's Metropolis, 56.

[79] Cronon, Nature's Metropolis, 200. For a different use of the stratagraphic metaphor and the distinction between first and second nature, see Neil Smith, Uneven Development: Nature, Capital, and the Reproduction of Space (Oxford: Basil Blackwell, 1984).

[80] Cronon, Nature's Metropolis, 150. Emphasis in original.

This is an important argument, not least because it suggests to humans the importance of care for other, nonhuman organisms and their inter-relations with their environments, but I want to highlight the importance of always remembering that human knowledge of nature comes to us already socially constructed in powerful and productive ways. I am uncomfortable with the way in which Cronon's metaphor of eco-system slips away from the figurative bounds of metaphor and claims to be the world itself. In categorical statements, such as, "In nature's economy, all organisms, including human beings, consume high-grade forms of the sun's energy," Cronon matter of factly states what nature is. This certainty, however, is dependent upon the silent appropriation of ecological science and the trophic-dynamic ecosystem models pioneered by Eugene Odum. Ecology is a discourse, not the living world itself. By conflating the two in categorical statements about first nature, Cronon fixes the very "boundary between human and nonhuman, natural and unnatural," that his book so brilliantly shows to be "profoundly problematic."[81]

His critique of the naturalistic metaphors of railroad boosters might apply equally well to his conflation of the science of ecology with first nature itself: "We recognize such rhetoric as an exercise in mystification."[82] Standing behind Eugene Odum's trophic-dynamic model of ecosystems (and thus Cronon's understanding of first nature) is Odum's dissertation on the global strontium cycle, and behind that plutonium and Eniwetok Atoll, site both of the first hydrogen bomb detonation (1952) and the first large scale ecosystem study (1954), both sponsored in part by the U.S. Atomic Energy Commission.[83] Lurking not too far behind this institution are the Cold War and the ever-present danger of nuclear Armageddon. Ecosystem ecology got its start as radiation ecology, but the insistent press

---

[81] Cronon, Nature's Metropolis, 150, xvii. For an account of Odum's energy ecosystem models, see Peter J. Taylor, "Technocratic Optimism, H.T. Odum, and the Partial Transformation of the Ecological Metaphor after World War II" Journal of the History of Biology 21 (1988): 213-44; Joel B. Hagen, An Entangled Bank: The Origins of Ecosystem Ecology (New Brunswick: Rutgers University Press, 1992), 100-45.
[82] Cronon, Nature's Metropolis, 73.
[83] Hagen, Entangled Bank, 108-11.

of the outside world upon the modern science of ecology hardly stops there. Integral to the metaphor of eco-system are cybernetics, the mathematics of command-control, first developed to control automatic anti-aircraft guns and now used to guide the U.S. Navy's cruise missiles and the automatic trading programs of international commodities brokers.[84]

My point here is not to rule out of bounds Cronon's appropriation of this *particular* science-- ecosystem science-- because it is "biased" by these "outside" influences. Nor is it write off Cronon's marvelous book for making use of the insights of ecological science. I too believe, "The fertility of the prairie soils and the abundance of northern forests had far less to do with human labor than with autonomous ecological processes that people exploited on behalf of the human realm." The work done by ecologists provides some vital insights into the ways in which this happens, but it is also socially constructed in powerful and productive ways. We must always bear this in mind. "Nothing in nature," Cronon insists in a similar vein, "remains untouched by the web of *human* relationships that constitute our common history."[85] Surely this applies as much to the agency of first nature (and our knowledge of it) as to the ways in which capitalism systematically transformed second nature(s). Nature's Metropolis provides a tour de force account of this process, but in relying upon a stratigraphic metaphor and the distinction between first and second nature Cronon determines the essence of what nature "really" is. In so doing, he re-introduces the problematic dualism between nature and culture that his book so effectively subverts.

Ultimately, the recovery of nature as an autonomous actor in human history, a real thing independent of cultural ways of knowing it, may prove to be a dangerous political maneuver. If nature simply "is", then it becomes very difficult to talk about the power/knowledge relations enabled by the material and discursive preservation of nature's essential reality. In fact, the realist epistemology by which this reality is disclosed is based

---

[84] Donna Haraway, Primate Visions: Gender, Race, and Nature in the World of Modern Science (Routledge, New York, 1989), 84-111; Norbert Wiener, Cybernetics, or Control and Communication in the Animal and the Machine (New York: Wiley, 1948).
[85] Cronon, Nature's Metropolis, 149, 19.

upon the complete denial of any connection between science and politics, the discourses particular to the opposing poles of the nature/culture dualism.[86] By introducing the particular history of ecosystem science and its connections to thermonuclear fallout and the Cold War, I closed the distance so essential in maintaining the boundaries sacred in realist epistemology between fact and fiction, science and politics, nature and culture. This tactic, however, still holds out the possibility that some *other* science, yet untainted by this contaminating closeness, might not be weighed down by the burden of worldly relationships impinging upon its stories about nature. On the epistemological scales of realism, truth rises because it is disembodied, free from the earthly burdens of cultural context. True knowledge, like the environmental historians' nature, simply is. It is transcendent and thus ultimately independent of all cultural context.

This modern fiction has been immensely powerful and productive. As "the place where we are not," nature operates to define culture and thus determine who/what counts within the category of environmental history's "we."[87] Along with its close cousins, sex/gender, mind/body, male/female, the nature/culture dualism has worked to naturalize the essential differences marking these unequal categories within an economy of signs of difference. Feminists, anti-racists, and lesbian and gay activists, in particular, are wary of the ways in which this essential nature has served as a resource to fix the boundaries of what passes for the (un)real, the (ab)normal, the (un)human, and the (un)natural. Nature naturalizes because the word itself connotes both the nonhuman, the sense of principal interest to environmental historians, and those fundamental, unalterable qualities that inhere in the essence of a thing itself-- the facts of nature, the nature of a thing, etc. Unlike the metaphors of cultural geography, which emphasize the cultural construction of meaning, environmental historians' metaphor of nature as agent precludes such considerations because "the boundary between the artificial and the natural is the very thing we

---

[86] For an account of this epistemic structure, see Bruno Latour, We Have Never Been Modern, trans. C. Porter (Cambridge: Harvard Univ. Press, 1993).
[87] Cronon, Nature's Metropolis, 17.

[environmental historians] most wish to study."[88] While I think it vital to understand the actions of nature, and applaud the work of environmental historians to this end, I also think it crucial to understand the other sense of the word "nature" as that which is unalterable, essential, and beyond human equivocation. We need to be very cautious about the great power exercised by claims to know the true nature of things.

metaphors of nature

In this chapter, I have reviewed the different metaphors deployed by environmental historians and cultural geographers to understand nature and landscape. I argue that the environmental history metaphor of nature as agent provides a powerful means of seeing our world and our history as products of both human and non-human actors. My concern, however, is that the recovery of nature as autonomous actor and the insistence that nature exists independently from cultural ways of knowing, makes it difficult to talk about how what passes for nature is determined in particular contexts. By re-enforcing a nature/culture dualism and relying on a closely related realist epistemology, the metaphor of nature as actor tends to preclude consideration of the ways in which particular formulations of nature are imbricated in relations of power.

Second, I argue that landscape metaphors of cultural production focus attention front and center on the ways in which landscapes are constructed and their meanings fixed through social processes. Unfortunately, there is a dangerous tendency within cultural geography to reify text as writing *tout court.* By reducing the world to a blank slate or an empty stage on which only human actions matter, this understanding of textuality precludes any discussion of the nonhuman actors brought into view by the metaphors of environmental history. By discounting the non-human, cultural geographers' metaphors reinforce environmental historians' unfortunate misreading of general textuality and the post-structural critique of the mechanics of truth as "an endless postmodernist

---

[88] Cronon, "A Place for Stories," 1350.

deconstruction of texts" or "a confused, relativistic morass."[89] Equally, however, the metaphor of nature as agent, by positing a pre-existent nature, forecloses the kind of careful consideration of the material and discursive forces fixing the world's meaning enabled by the metaphors of cultural geography.

Initially, I had wanted to review recent work in environmental history and cultural geography because I thought that historians' agency of nature might complement geographers' socially constructed landscapes. Now I believe such a union impossible because these estranged disciplines work with irreconcilable metaphors. Each discloses important, if partial truths about our world, but they are mutually exclusive because environmental historians and cultural geographers occupy alternate poles of the nature/culture dualism. If nature is an autonomous agent, then it cannot be a cultural production, and vice versa. Environmental historians and cultural geographers will not be able to reconcile their differences until they find a new language able to describe nature as both a real actor in human history *and* as a social constructed object of these histories.

Given these intractable difficulties, perhaps it is time to switch to some new metaphors for nature. Here I find the work of Bruno Latour and Donna Haraway to be vitally important, not so much for their substantive claims about nature (though these are important as well), but rather for the language though which they frame their claims. I make no apologies if these metaphors seem like opaque "jargon" to those who prefer "plain language." All language is metaphorical. If Latour and Haraway seem strange and jarring at first glance, it is because their metaphors for nature destabilize the nature/culture dualism so deeply ingrained in our "everyday" language.

Bruno Latour describes the activities of nature and society in the symmetrical terms of nature/culture hybrids or quasi-objects.[90] He compares the practice of science to

---

[89] The first quotation is Cronon, "A Place for Stories," 1374; the second Worster, "Seeing Beyond Culture," 1145.

[90] The easiest entree to the work of Bruno Latour is through his Science in Action: How to Follow Scientists and Engineers through Society (Cambridge: Harvard Univ. Press, 1987). Also helpful are Madeleine Akrich and Bruno Latour, "A Summary of a Convenient Vocabulary for the Semiotics of Human

network building in which scientists try to enroll various hybrids and quasi-objects in collective networks of alliance. To this way of thinking, Pasteur is no longer the great discoverer of long hidden bacterial microbes, but rather a master of logistics whose singular achievement was the three-step assembly of the network of modern medicine. First, Pasteur enrolled microbes in petri dishes and on microscope slides carefully designed to be hospitable to them. Then, with this change of scale enabled by the laboratory, Pasteur could control bacilli that "if let loose in nature, laugh at men or kill them."[91] Finally, the control of these unruly microbes by the forces of medicine could only be translated beyond the laboratory as far and as fast as Pasteur was able to effect another change of scale by enrolling the hygienists to clean up city sewers and make the wider world conform to the sterile conditions of the laboratory under which the microbes could be enrolled and their activities proscribed.

Latour's vocabulary of networks provides a helpful way to think about how and why the socially constructed facts of science actually work for us without appealing either to realism and the correspondence of these facts to some world external to them, or to relativism and some form of pragmatic agreement about arbitrarily constructed facts. This conception of networks of quasi-objects dispels the great divide separating the Modern world from the primitive or premodern. Differences between the capabilities of modern societies and others can be explained without appealing to the development of some different order of rationality, as does Habermas with his system and lifeworld, or by reducing these differences to "equally arbitrary codings of the natural world," as do cultural relativists. Instead, the differences come down to the scale of the networks that different

---

and Nonhuman Assemblies" in W. E. Bejker and J. Law, eds, Shaping Technology/Building Society: Studies in Sociotechnical Change (Cambridge: MIT Press, 1992), 259-64; Steven C. Ward, "In the Shadow of the Deconstructed Metanarratives: Baudrillard, Latour, and the End of Realist Epistemology" History of the Human Sciences 7 (1994): 73-94.

[91] Bruno Latour, The Pasteurization of France, trans. A. Sheridan and J. Law (Cambridge: Harvard Univ. Press, 1988), 74.

groups are able to construct and maintain: "Modern knowledge and power... add many more hybrids in order to recompose the social link and extend its scale."[92]

More importantly, Latour's metaphors break down the great Modern divide separating nature (things-themselves) from culture (humans-in-themselves). Is Pasteur's vaccine a technical fabrication of science? Or, purely a product of nature? This is the stark choice that the metaphors of cultural geography and environmental history present. With Latour's vocabulary it becomes possible to describe the monstrous nature/culture hybrids of science as both these things at once:

> Quasi-objects are in between and below the two poles, at the very place around which dualism and dialectics had turned endlessly without being able to come to terms with them. Quasi-objects are much more social, much more fabricated, much more collective that the 'hard' parts of nature, but they are in no way the arbitrary receptacles of a full-fledged society. On the other hand they are much more real, nonhuman and objective than those shapeless screens on which society-- for unknown reasons-- needed to be projected.[93]

His metaphors make it possible to follow environmental historians in talking about the agency of nature without appealing to a transcendent Nature beyond culture and ignoring the ways in which nature is constructed for us in language, as the metaphors of cultural geography have so powerful explicated.

Donna Haraway proposes a different, if closely related, set of metaphors for thinking about nature as both a lively actor and an artifact of social construction. She complains that Latour "pays too little attention to the non-machine, *other* non-humans in the interactions."[94] While it is certainly true that Latour's metaphors were first deployed to understand technology without recourse to the categories of a transcendent Social,

---

[92] Bruno Latour, We Have Never Been Modern, trans. C. Porter. (Cambridge: Harvard Univ. Press, 1993), 108, 109.
[93] Latour, We Have Never Been Modern, 55.
[94] Donna Haraway, "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others" in L. Grossberg, C. Nelson, and P.A. Treichler, eds., Cultural Studies (New York: Routledge, 1992), 332.

Haraway's reading ignores the ways his vocabulary has also been productively deployed to study the lively relations between laboratories, microbes, and Pasteurians, and between scallops, scientists, and fishers.[95] Haraway is much closer to the mark with her complaint that in his attempt to resist a merely "social" explanation of science and the technical, Latour renders inadmissible "matters like masculine supremacy or racism or imperialism or class structures ... because they are the old 'social' ghosts that blocked real explanation of science in action."[96] Although Latour provides a stunning new way to dispel the great Modern divide separating the poles of culture and nature, his accounts do tend to stop just short of considering how these poles (and their construction) have become resources for the discursive production of power.

Donna Haraway prefers the metaphor of cyborg for speaking of what she calls artifactual nature. She comes to the cyborg metaphor from feminism and its dual effort to reveal both the social construction of all knowledge and the actual mechanics of women's real oppression. In so doing, feminists find themselves, like environmental historians, in the difficult position of "holding on to both ends of a pole." Both realism and relativism, Haraway complains, are "'god-tricks' promising vision from everywhere and nowhere equally and fully, common myths in rhetorics surrounding Science."[97] Cyborg imagery presents a useful alternative to the stark choice often presented between realism and relativism because it embraces "the skillful task of reconstructing the boundaries of daily life, in partial connection with others," while simultaneously refusing any innocent "revolutionary subject" or "universal, totalizing theory."[98] Cyborg vision is partial:

---

[95] Latour's technology studies include Jim Johnson [Bruno Latour], "Mixing Humans with Non-humans: Sociology of a Door-Opener" Social Problems 35 (1988): 298-310; Latour, "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts" in W.E. Bijker and J. Law, eds., Shaping Technology/Building Society: Studies in Socitechnical Change (Cambridge: MIT Press, 1992), 225-58. For examples of biological applications of Latour's network theory, see Latour, Pasteurization of France; Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieux Bay" in J. Law, ed., Power, Action, and Belief: A New Sociology of Knowledge? (London: Routledge, 1986), 196-229.

[96] Haraway, "Promises of Monsters," 332.

[97] Haraway, Simians, Cyborgs, and Women, 188, 191.

[98] Haraway, Simians, Cyborgs, and Women, 181, 176, 181.

artificial and fantastic but also embodied and actively engaged with the world. As an alternative to relativism, cyborg vision provides "partial, locatable, critical knowledges sustaining the possibility of webs of connection called solidarity in politics and shared conversations in epistemology." In contrast to realism, cyborg vision is content with "the privilege of partial perspective;" cyborgs embrace the accountability and responsibility that come with "situated knowledges."[99]

Just as Haraway's cyborg imagery and her vision of situated knowledges marks the producers of knowledge about nature as actors embodied in real, if also artificial ways, so too her metaphor insists that "the object of knowledge be pictured as an actor and agent."[100] This move alone is not enough, however, because while nature is a wily actor, it is also an object bounded in specific, powerful, and productive ways:

> Organisms are *biological* embodiments; as natural-technical entities, they are not pre-existing plants, animals, protists, etc., with boundaries already established and awaiting the right kind of instrument to note them correctly. Organisms emerge from a discursive process. Biology is a discourse, not the living world itself. But humans are not the only actors in the construction of the entities of any scientific discourse; machines (delegates that can produce surprises) and other partners (not 'pre-or extra-discursive objects,' but partners) are active constructors of natural scientific objects.... The siting/sighting of such entities is not about disengaged discovery, but about mutual and usually unequal structuring, about taking risks, about delegating competencies.[101]

Haraway's Primate Visions deploys this metaphor to describe what Latour would call a heterogeneous network comprising white male and female primate scientists, the National Institute of Health, laboratories in Japan, field stations in Africa, human evolution, Koko, the human genome, advertising, and Tarzan, among others making up primate science. She shows not only how primate science was constructed but also how this network was

---

[99] Haraway, Simians, Cyborgs, and Women, 191.
[100] Haraway, Simians, Cyborgs, and Women, 198.
[101] Haraway, "Promises of Monsters," 298.

underwritten by many strands, especially those of capitalism, racism, patriarchy, and colonialism, and how primate science enframes the world so as to make some activities possible while closing off still others.[102] Latour's writings on science and nature tend to shy away from such political engagements. On the other hand, Haraway's metaphors of cyborg and artifactual nature provide fewer resources than Latour's language of networks for explaining why some ways of bounding the material-semiological objects called nature have proven more persistent than others.

The metaphors of Latour and Haraway, like the metaphors of environmental history and cultural geography, enable some critical projects while they proscribe others. No metaphor can provide total, unmediated vision. Rather, metaphors are enframing devices that make the world knowable while always already precluding still other ways of ordering the world. In this chapter, I have suggested some of the ways in which the metaphors of cultural geography and environmental history work to enframe nature and landscape so as to pose alternate questions about, on the one hand, the important activities of nonhumans, and, on the other, the ways in which nonhumans are socially constructed for us through language. These are both important questions to ask, but they need to be posed simultaneously in a way that neither the metaphor of nature as agent, nor that of landscape as cultural production will allow.

In the chapters that follow I attempt to flesh out these theoretical concerns as I turn to conservation of the Maine Woods, an object that was at once both a real material actor and a socially constructed object.

---

[102] Haraway, Primate Visions.

II. THE OBJECTS OF FORESTRY

Forestry in Maine is again controversial. A century ago conservation advocates insisted that the only way to save the Maine Woods from destruction was to treat it as a crop and a renewable resource. They advanced a variety of new, scientific ways of knowing the forest and representing it mathematically. If people are now unhappy with forest practice in the Maine Woods, it is as much because they object to the way that foresters represent the forest as because they disagree with the aims of their practices. The following portfolio of images explores some of the ways, both past and present, in which the Maine Woods has been constructed as an object of forestry.

gain.

2,000 square miles
Maine's forest (an
area the size
ware) were clea
the last 15

Numbers on clear-cuts ban dispute

tate's bias distorts analysis of measure's economic ef

OPMENT IN
NORTH WOODS:

ARE MAINE'S FORESTS FOREVE

Carter claims state study flawed by King's bias

Experts: Wood
would harvest crisi

State says clear-cut plan threatens 15,600 jobs

Analysts say clear-cut plan would cost state 15,600 jobs

Clear-cut's impact on ecosystem

eft, is separated from the water by several hundred yards
ts largely invisible from the water.

A clear-cut near the western shore of Moosehead Lake,
of uncut forest. State law prohibits clear-cutting too close t

Natural Resources Council of Maine

A BATTLE *for* M E'S FOREST

● Backers of a referendum to ban clear-cutting say it would preserve Maine's woods. Foes say it would be a costly debacle. Both agree that the stakes are huge.

By DIETER BRADBURY
Staff Writer

INSIDE

Environmentalists have shifted th
clear-cutting debate from
Legislature to the
Mainers

Referendum puts forest industry on defensive

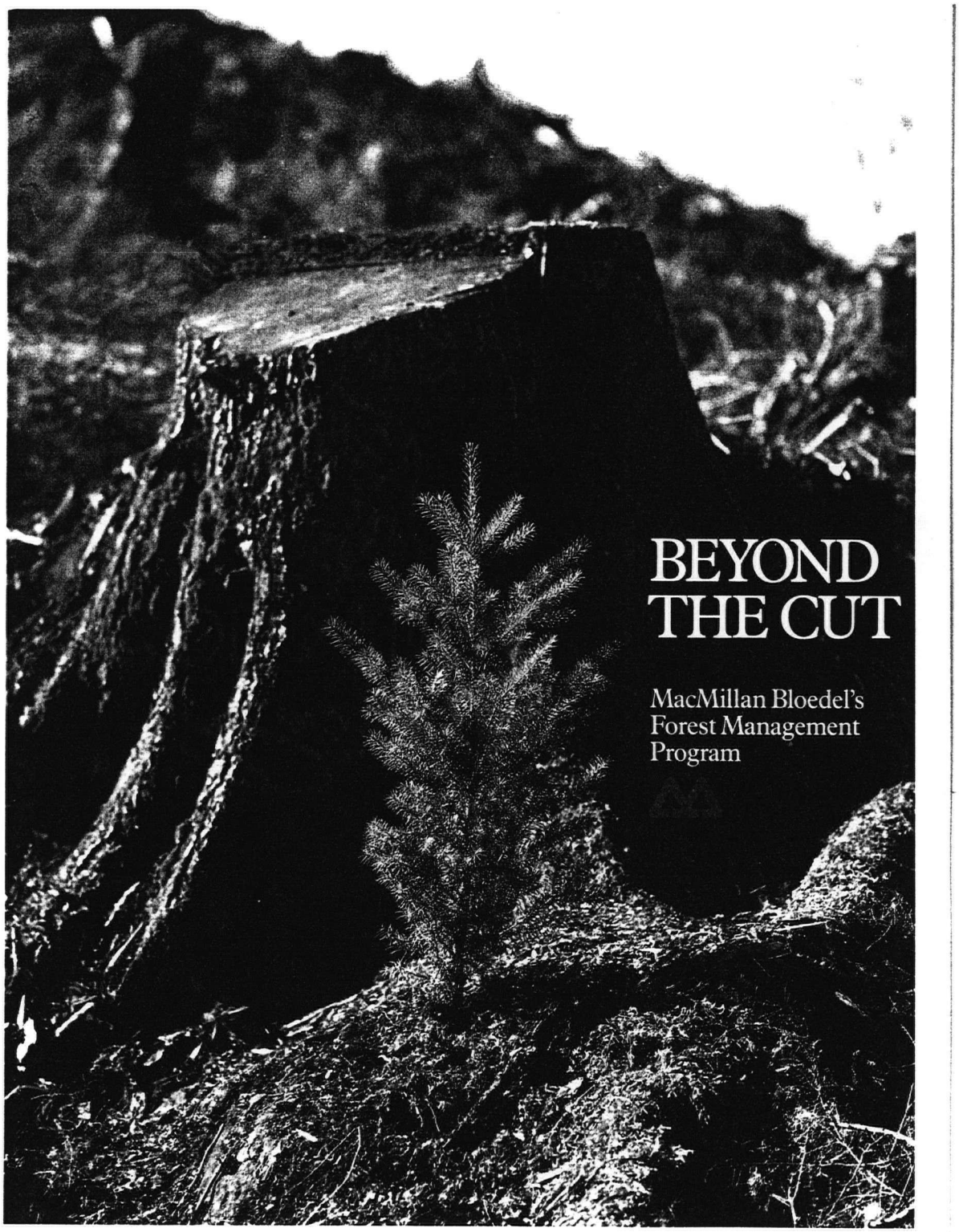
In th
head
pany
patch
cured tree farms and unc
threaded with muddy roads.
Boulder fields pepper
spots where loggers ha
mechanized harvesters
acre of unwanted bee
Nearby, valuable spruce

But
115
ual stakes are
Maine's forest-produc
30,000 people and generat
$5 billion a year.

A logging
d follows
line

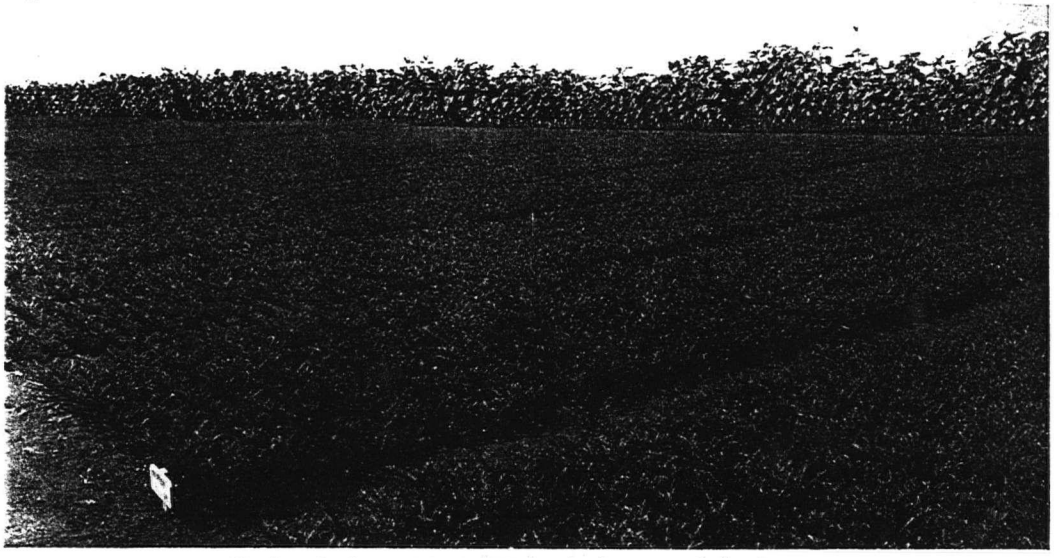
Support strong in cities

In March, Market Decisions,
respected South Portland resear
firm, conducted a poll and foun
that 71 percent of the state's resi-
dents favored the referendum.
Support was even stronger in
southern Maine and in urban areas.
"I have an instinct against clear-
cutting," said James L. Tabor, 76, a
retired dairy marketing manager
who lives in Naples, near Sebago
Lake. "I just basically distrust the
paper industry. I think their sights
are set on the short term and not
the long term."
Although Tabor owns
wood lot in Naples
since he sa
Maine



Source: MacMillan Bloedel, Beyond the Cut: MacMillan Bloedel's Forest Management Program (n.d.), n.p.

Timber as a Crop



Starting a lumber crop: transplants in a lumber company's forest nursery

Wild grass was once the only source of hay. After a while hay became valuable enough to be treated as a cultivated crop.

Until recently wild timber was the sole source of forest products in America. Now timber is beginning to become valuable enough to be cultivated -- to be cropped.

So enters forestry.

It is useless to bewail the "destruction" of the wild forests. They could not be preserved in large areas (outside of public ownership) any more than the wild grass of the prairies could be preserved.

Forestry is a matter of economics, not esthetics. It is practiced only when practicable.

It now promises to become practicable. Hundreds of forest operators are feeling their way toward the new era on a hundred million acres of forest land.

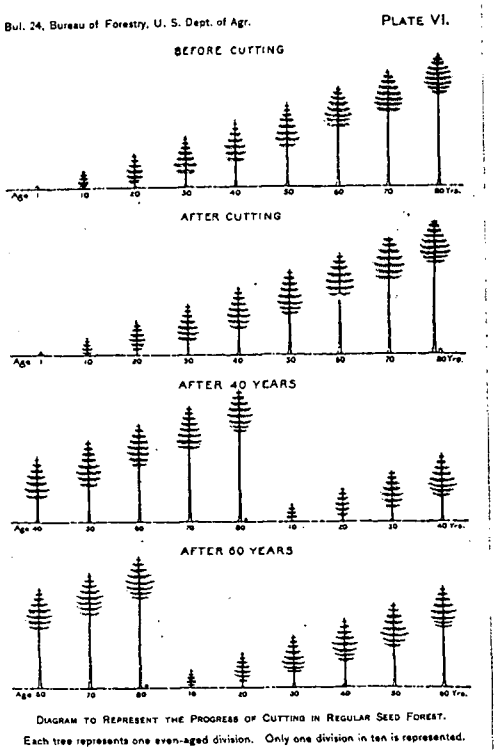
But one thing is sure -- forest products must be patronized if they are to be produced by private enterprise. Forest use and forestry are united twins.

National Lumber Manufacturers Association

702 Transportation Building, Washington, D. C.

American Forests 34 (1928): 349

a)



b)

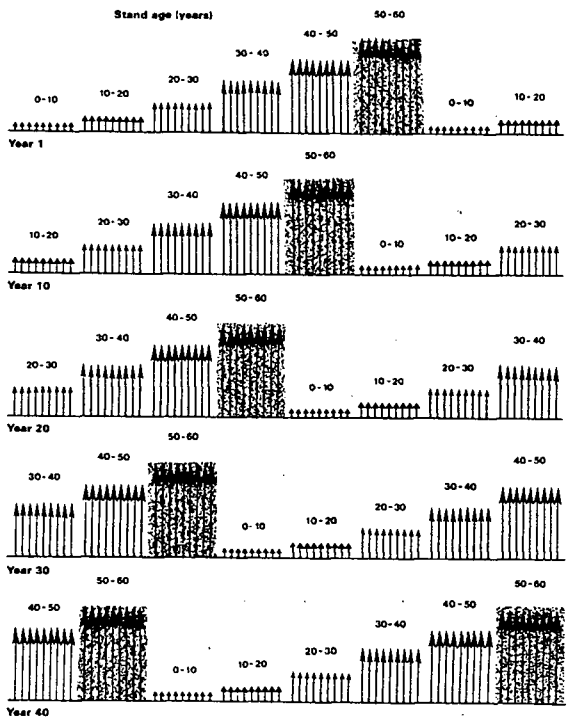


Figure 5.3 This diagram shows the oldest age class of a forest being harvested (the 50–60 year old stand). The volume of timber in this age class stand is equal to the increase in volume on all the younger age class stands over the ten years that this age class is being harvested. If the forest has a 'normal' age class structure, as shown in this diagram, this rate of harvest can be maintained in perpetuity: sustained timber yield (from Kimmins and Duffy 1991).

Two views of the Normal forest. a) Gifford Pinchot, A Primer of Forestry (Washington: Bureau of Forests, bul. 24, 1900), II: 24; b) Hamish Kimmins, Balancing Act: Environmental Issues in Forestry (Vancouver: UBC Press, 1992), 68.

AMERICAN FORESTS

Vol. 34 JUNE, 1928 No. 414

The Maine Wilderness Is *Not* Passing

By GEORGE T. CARLISLE, JR.

The article "The Passing of the Maine Wilderness" by John C. Phillips in the April issue of this magazine, calling the State of Maine to task for failing to preserve some of its priceless wilderness heritage as a perpetual asset, has been vigorously protested by several prominent people of the Pine Tree State. They take the ground that conditions described by Mr. Phillips have been misrepresented, and that what has happened has been in the course of desirable and necessary economic development, through which the State is the gainer rather than the loser. The Editor is glad to present their views in the following article by Mr. George T. Carlisle, Jr., of Bangor, Maine.

IN the April issue of AMERICAN FORESTS AND FOREST LIFE, Mr. John C. Phillips writes of the State of Maine. The prominence given his article, as well as his misrepresentation of the true situation, demands an answer.

At the close of the Revolutionary War, Massachusetts, in common with the rest of the country, was in a very poor financial condition, but it had great natural resources. One of the greatest of these resources were the so-called Eastern lands, located in what is now the State of Maine, and it was only natural that she should try to realize some revenue from them. All manner of schemes for colonization were tried, even to sales by lottery, but little progress was made. Institutions desiring State aid were given, in lieu of cash, townships in the Eastern lands with a colonization clause.

Perhaps the most famous sale was that to Mr. Bingham, comprising some two million acres. This land was first purchased by General Knox, when Secretary of War in the Cabinet of President Washington. General Knox expected to sell enough land to meet his payments, but was unsuccessful. In 1793 he assigned his interest to Mr. Bingham, who paid 12½ cents an acre, or about $260,000 in cash. The Bingham Estate held the lands for many years, finally completing sales about 1880. They did not make an average of three per cent on the investment.

There is plenty of material here for a new crop, so why not harvest this one and give the young trees a chance, asks the author

It is noted that for various services rendered, William King, first Governor of Maine, received three townships. A

The authority of science and the rhetoric of multiple use helped to marginalize complaints about managed forests as merely aesthetic or sentimental.

** * * I am a thorough believer in the preservation of beautiful and distinctive forests for public enjoyment as parks or recreation areas. * * * The bulk of our forest land must be devoted to commercial timber growing. * * * The economic benefits from timber use and general timber replacement are as one with the social benefits from forest perpetuation, and any course calculated to promote the former will to an equal degree conserve the latter.*

—COL. W. B. GREELEY, Recent U. S. Forester.

Using Forest Products Makes Forest Playgrounds

THE forest lover and the forest user have much in common. The latter is the chief hope of the former for the future.

As Col. Greeley has so well pointed out, the Forests under government ownership and the State and National Parks can be but a small part of the land that may be devoted to forests.

As privately owned timber is removed it will be effectively replaced in a scientific and businesslike manner only as such work is economically justifiable.

Liberal use of forest products means, henceforth, the stimulation of managed reforestation.

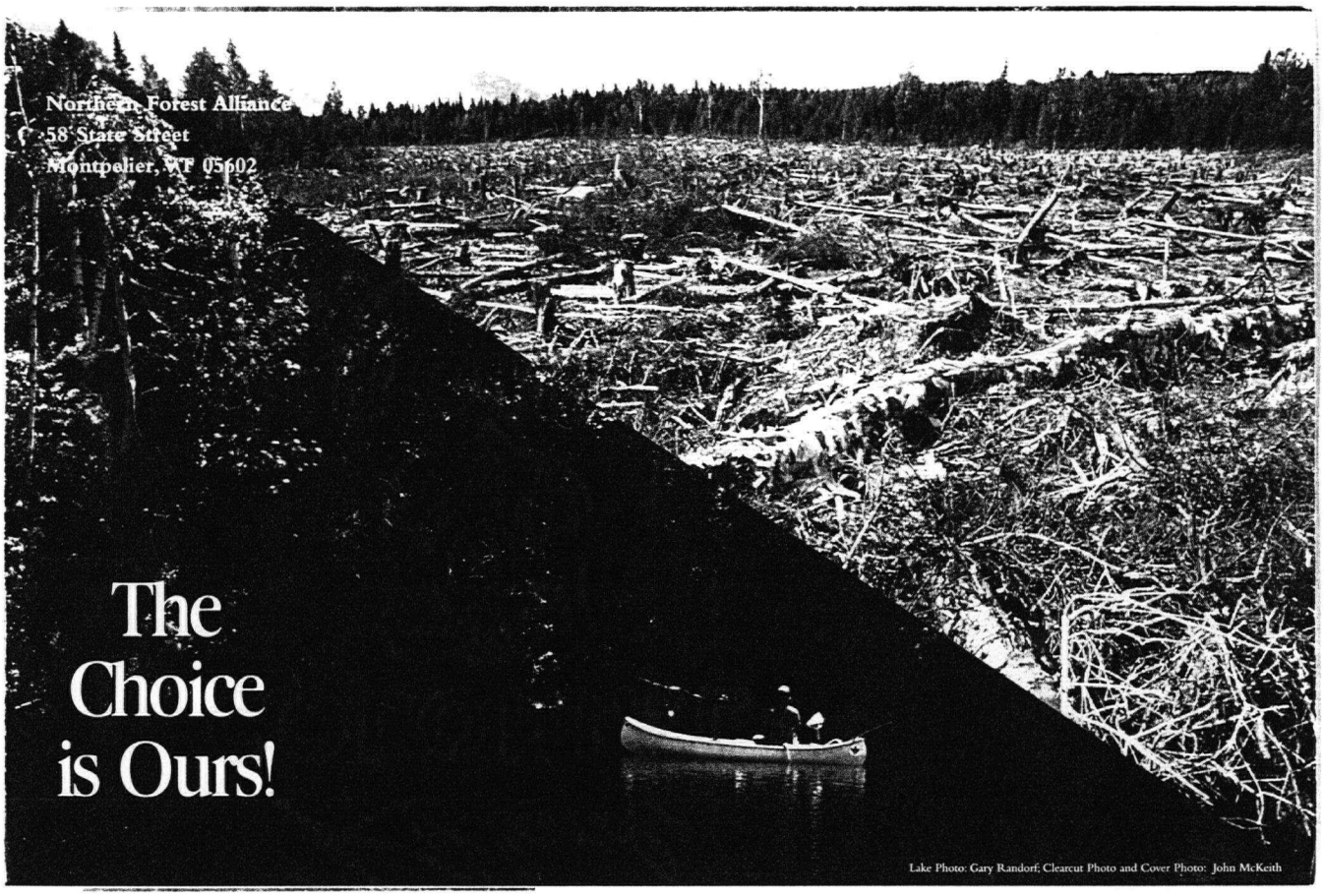
Continuously profitable forest industries eventually will keep all privately owned timber land clothed with forests.

Commercial forests can be made to answer the requirements of camping, fishing, hunting, hiking and nature enjoyment about as well as public forests and wild parks. They can be everywhere in the forest zones—not remote and few—available to the masses of the people.

Using forest products makes forest playgrounds.

National Lumber Manufacturers Association

American Forests 34 (1928): 321



Trafficking in dramatic pictures of the forest, environmental activists suggest that forestry is incompatible with conservation. Source: Northern Forest Alliance, The Northern Forest: A Legacy for the Future (Montpelier, VT: [1994?]), n.p.

Source: The Wilderness Society, The Northern Forest: A Region at Risk (Boston, [1996?]), n.p.

The Green Party's Drastic Forestry Ban Would...

Create complex harvesting regulations that would severely reduce wood and paper production in Maine.

The Green Party's proposed ballot measure would create complicated new forestry regulations that would drastically limit any wood harvesting on privately-owned woodlots in Maine's unorganized townships. This area includes over 10 million acres of forest land, or roughly half of our state.

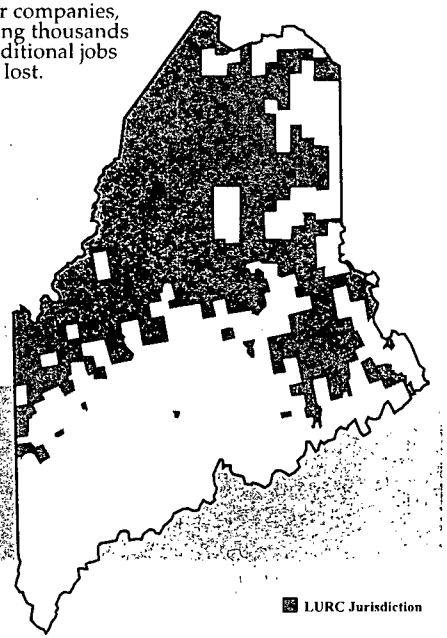
The promoters of the measure want voters to think it's just about clearcutting. In fact, 90% of the measure's provisions are regulations that would limit all wood harvesting – including selective cutting. Only one provision in the entire three-page measure is about clearcutting. It would prohibit clearcutting even when it's needed to restore the health, quality, and diversity of the forest.

The rest of the measure is a series of complex provisions that would limit any wood harvesting. One provision would prohibit harvesting more than one-third of the volume of wood per acre on any privately-owned woodlot in any 15-year period. Other provisions include complicated formulas that would further limit the number, size, and species of trees that could be selectively harvested. These broad restrictions would reduce wood production in Maine by up to 50% or more and arbitrarily ban the use of most sound forest management practices.

Cause the loss of thousands of Maine jobs and damage our state's entire economy.

Maine's forest products industry includes thousands of small and large landowners and employers, ranging from tree farmers to small logging and wood products firms to large paper companies and sawmills. Together, they provide over 50,000 local jobs. Overall, the forest products industry accounts for over $5 billion in sales and paychecks each year.

By forcing drastic reductions in wood production, the Green Party's Forestry Ban would devastate Maine's forest products industry, causing the loss of thousands of jobs throughout our state. This would affect thousands of other businesses in sectors that provide goods and services to wood and paper companies, causing thousands of additional jobs to be lost.



The Forestry Ban would drastically limit all wood harvesting in Maine's unorganized townships (shaded areas) and increase cutting pressures in southern Maine, where its restrictions would not apply.

Unfairly hurt people in Maine's unorganized townships and increase pressures on southern Maine forests.

The measure's regulations would only apply to woodlots in half of our state, in the unorganized townships. This makes no sense from a forest management standpoint. It would be totally unfair to the thousands of people in unorganized townships whose livelihoods depend on wood harvesting. And, it would increase cutting pressures on forests in southern Maine, where the restrictions would not apply.

Cost Maine taxpayers millions of dollars for more government bureaucracy and red tape.

The Green Party's measure would require the Land Use Regulation Commission (LURC) to enforce the complex new wood harvesting restrictions on over 10 million acres of land. This new regulatory burden would create huge amounts of new government bureaucracy and red tape — costing taxpayers millions of dollars.

Damage the health of our forests and wildlife habitats.

The measure's harvesting restrictions would arbitrarily prohibit many sound, scientific forest management practices that are needed to reduce tree diseases and encourage the growth of healthy, commercially-valuable trees. It would also prevent forest management practices that are used to maintain the diversity of wildlife habitats. Wildlife experts have concluded that this effect of the measure would especially hurt species such as deer, moose, partridge, snowshoe hare, and various songbirds.

Source: Citizens for a Healthy Maine Economy, Information About the Green Party's Drastic Forestry Ban (Portland, 1996), n.p.

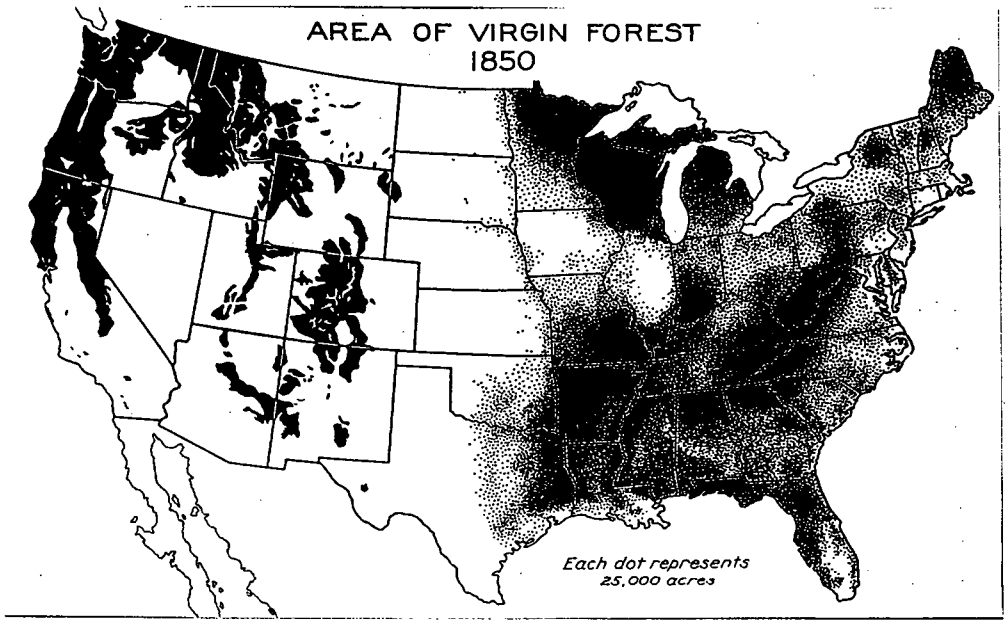
4. Picturing the Forest

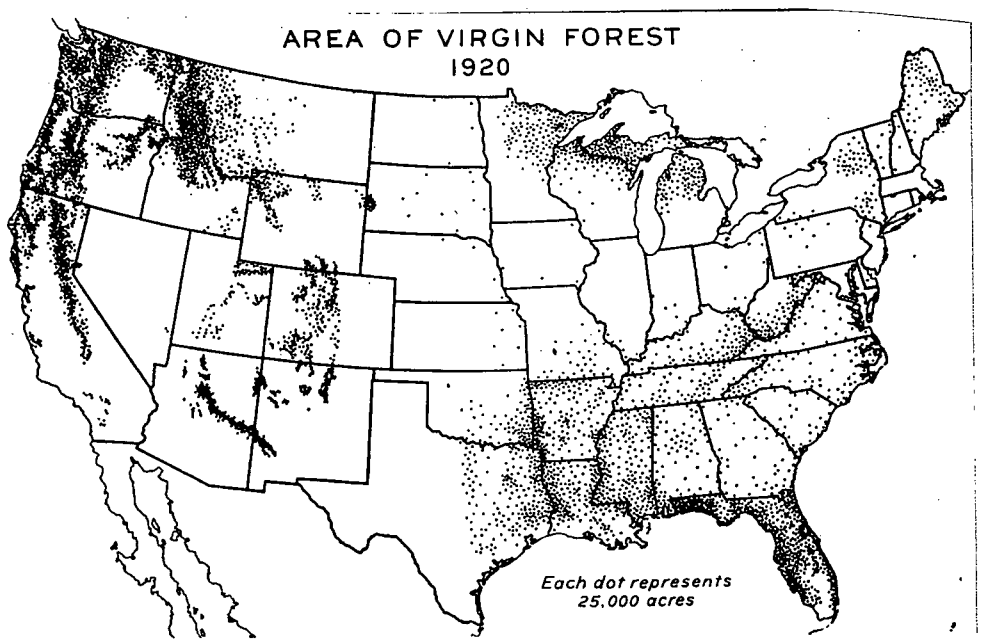
In 1925, the new chief of the U.S. Forest Service William B. Greeley stated that the challenge of forestry was to manage the "age-old contest" between "human wants and natural resources." His formulation was traditional enough. Americans had been worrying about the prospects of a timber famine for nearly half a century. But the dramatic images he used to picture the problem were new and their effects quite profound. Greeley illustrated his point with three maps depicting the rapidly shrinking area of uncut forest in the United States (FIGURE 4.1). They demonstrated the inevitable logic of his argument: with "the end of this supply ... plainly in sight," the United States "must shortly find some means of replenishing the storehouse of splendid virgin timber." The visual simplicity of his maps, combined with the fine detail and mathematical precision with which tiny dots represented the remaining forest area, reinforced the certainty of his conclusions. With its original forests melting away as they had in "every other country," the United States "must come, in the last analysis... to forestry:" that stage "in the economic scheme of things" where "systematic timber growing ... not only becomes economically feasible but ... is impelled by purely commercial forces."[1]

Much like contemporary views of the fragile spaceship earth, pictured from orbit, Greeley's images of the forest legitimated the relationship between his analysis and its object. "Such relationships," as Timothy Mitchell notes, "are never simple. Objects of analysis do not occur as natural phenomena, but are partly constructed by the discourse that describes them. The more natural the object appears, the less obvious this discursive

[1] W.B. Greeley, "The Relation of Geography to Timber Supply" Economic Geography 1 (1925): 1, 3, 13, 10, 1-14. On Greeley, see his Forests and Men (Garden City: Doubleday, 1951).

Figure 4.1 Greeley's Picture of Diminishing Forest Supplies





Greeley, "Relation of Geography to Timber Supply," 4-5

construction will be."[2] Greeley constructed the American forest in terms of the material limits of nature-- "nature's undrained warehouses"-- and absolute physical space-- "[t]he stern facts of geography." His maps of the timber supply reinforced the sense that the coming scarcity was a natural one. "It was inevitable," he claimed, "that our timber resource should shrink rapidly." The apparent precision, accuracy, and realism of his maps worked to naturalize this construction. Small black dots, exactly representing the remaining area of virgin forest in 1920, were scattered across a vast sea of barren whiteness that was the continental United States. Set up in this way, as an object, the American forest seemed to stand quite apart from, and thus to legitimate, the way it was represented to be.[3]

Such pictures of the forest had been the stock and trade of the forest conservation movement for nearly half a century. They imparted both an urgency and a certainty to fears that the nation's forest would soon be exhausted. They led to calls for the forest to be "strictly economized."[4] Against this outcry, many in the forest products industry insisted that the predictions of a timber famine were "written without a real knowledge of all the facts."[5] These arguments about the state of the forest provided both the context and the impetus for the institution of forest science in United States.

forest for the trees

The debate about the future forest supplies and the possibilities of a timber famine, which began in the United States in the 1870's and raged on through the 1930's, was predicated upon an unprecedented capacity to picture the forest, to represent it both in great detail and in total. This power of representation endowed the forest with dimensions that had been inconceivable until scientific knowledge of it could be constructed quantitatively

---

[2] Timothy Mitchell, "The Object of Development" in Power of Development, ed. J. Crush (New York: Routledge, 1995), 130, 129-157.
[3] Greeley, "Relation of Geography to Timber Supply," 3, 9, 3, 12, 13, 13, 7.
[4] J.P. Bass, "Our Northern Forests" Bangor Daily Commercial 7 September 1895, 4.
[5] "Management of Maine Forests" Bangor Daily Commercial 28 March 1901, 4.

and archived systematically.[6] Turn-of-the-century conservationists spoke increasingly in the singular about a new, large-scale conceptual entity called the forest. In this regard, conservation discourse broke quite sharply with previous modes of thinking about forests and trees.

As a symbol, the forest had long loomed large in American culture, but as an object of knowledge it did not figure prominently in eighteenth and nineteenth century science. Instead, botanists and natural historians scoured the globe for individual species to collect and classify. Motives were utilitarian to be sure, and botanizers were alive to the potential uses of the new species they catalogued, but natural history served other purposes as well.[7] Science had been the "handmaid of religion" until Darwinian evolution and Protestant fundamentalism tore them asunder.[8] Taxonomy revealed the divine plan of God's creation.[9] Scientific knowledge was also a mark of gentlemanly distinction for the members of exclusive scientific societies.[10] The American Academy of Arts and Sciences, modeled on Britain's Royal Society, was intended to encourage the development of "an extensive and well digested body of American natural history" on which to cement a truly American identity, independent of Britain.[11]

---

[6] Michel Foucault defines such an archive as "the set of rules which at a given period for a given society define: The limits and forms of the sayable." Foucault, "The Politics and the Study of Discourse," [1968] in G. Burchell, C. Gordon, and P. Miller, eds., The Foucault Effect: Studies in Governmentality, (Chicago: Univ Chicago Press, 1991), 59.

[7] In emphasizing the explicitly utilitarian aims of science, North American historians have tended to ignore the ways in which the practice of science cultivated class and national identities. See, for example, Suzanne Zeller, Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation (Toronto: Univ. Toronto Press, 1987); John C. Greene, American Science in the Age of Jefferson (Ames: Iowa State Univ. Press, 1984), 188.

[8] J. H. Balfour, Botany and Religion (Edinburgh, 1859), viii. In Catholic France, by contrast, the Enlightenment infused scientific rationalism with a strong dose of anti-clericism.

[9] For a discussion of North American ideas about divine design, see David N. Livingstone, "The Idea of Design: The Vicissitudes of a Key Concept in the Princeton Response to Darwin" Scottish Journal of Theology 37 (1984): 329-57; Carl Berger, Science, God, and Nature in Victorian Canada (Toronto: Univ. Toronto Press, 1983); Thomas McPherson, The Argument from Design (London: Macmillan, 1972).

[10] This point is emphasized by Martin Rudwick, The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists (Chicago: Univ. Chicago Press, 1985).

[11] James Bowdoin, "A Philosophical Discorse, Publickly Addressed to the American Academy of Arts and Sciences..." in Memoirs of the American Academy of Arts and Sciences 1 (1783): 12-13, quoted in Greene, American Science in the Age of Jefferson, 188. Jacob Bigelow also believed that knowledge of their natural history cultivated "patriotism" and pride in the "place of our birth and residence." Bigelow, "Inaugural

Although the value of private botanizing and amateur science was widely proclaimed, government financed scientific surveys were the chief vehicles for producing new knowledge about American lands and forests. Like many states, Maine sponsored scientific expeditions to inventory the natural resources of the public domain and fulfill the dream of a unified and "exact knowledge of our country."[12] In 1837 and 1838 and again in 1861 and 1862, parties of scientists ranged over the state collecting specimens and taking geological cross-sections.[13] Properly named and classified, a single representative specimen could serve as the template for identifying all others of its species or type, so classification was not simply a scientific matter. Personal prestige and regional pride also played a role in taxonomic debates.[14] Gathered together in the State's natural history cabinet, the specimens collected on the state geological and natural history surveys displayed all the positive, factual knowledge about the "hidden treasures" of the Maine Woods.[15] New techniques of lithography and color printing disseminated this information to those not able visit the state capital and see its natural history cabinet in person.[16] The

---

Address, delivered in the Chapel at Cambridge" North American Review 4 (1816-17): 273. On the rise of such scientific societies, James E. McClellan, Science Reorganized: Scientific Societies in the 18th Century (New York: Columbia Univ. Press, 1985).

[12] U.S. Secretary of the Interior, Annual Report (1872): 15. On the state geological surveys, see Walter B. Hendrickson, "Nineteenth Century State Geological Surveys: Early Government Support of Science" Isis 52 (1961): 357-91; Gerald Nash, "The Conflict between Pure and Applied Science in Nineteenth Century Public Policy: the California State Geological Survey, 1860-1874" Isis 54 (1963): 217-28.

[13] Charles T. Jackson, Report on the Geology of the State of Maine (Augusta, 1837-39), 3 vols; Ezekiel Holmes, ed., Reports upon the Natural History and Geology of the State of Maine (Augusta, 1861-62), 2 vols.

[14] See, for example, Suzanne Zeller, "George Lawson: Victorian Botany, the Origins of Species, and the Case of Nova Scotian Heather" in P. A. Bogaard, ed., Profiles of Science and Society in the Maritimes Prior to 1914 ([Sackville, NS]: Centre for Canadian Studies, Mount Allison Univ., 1990), 51-62.

[15] Jackson, Geology of the State of Maine, III: v. For a discussion of these spectacular representations and their cultural politics, see Barbara Stafford, Artful Science: Enlightenment, Entertainment, and the Eclipse of Visual Education (Cambridge: MIT Press, 1994), ch. 3; Donna Haraway, Primate Visions: Gender, Race, and Nature, in the Modern World (New York: Routledge, 1989), 36-42.

[16] On these techniques, see Barbara Stafford, Voyage into Substance: Art, Science, Nature, and the Illustrated Travel Account, 1760-1840 (Cambridge: MIT Press, 1984); Martin J.S. Rudwick, "The Emergence of a Visual Language for Geological Science" History of Science 14 (1976): 149-95; Ada Graham, Kate Furbish and the Flora of Maine (Gardiner: Tilbury House, 1995). The efforts of the Maine Natural History Survey to popularize and disseminate its findings received particular praise. By popularizing science, declared the Daily Edinburgh Review 7 July 1862, Maine "will do a great deal more for the social

state of Maine also published catalogues enumerating the flora and fauna of the state. Yet the forest itself, as something more than the sum of countless individual species, seemed to escape comprehensive knowledge, because the natural history cabinet and catalogue could not picture it that way.

At the national scale, matters were even more uncertain. The discovery of the treeless prairies had dispelled the common eighteenth century European belief that America was literally a "universal forest," but the forest was still too enormous to picture in its entirety.[17] Vast portions of the American west had not been explored, and what was known about the western forests was widely scattered in local, state, federal, territorial, and private repositories. Even more discouraging for American nationalists was that the best and most complete botanical collections were not housed in the United States but in Europe. Asa Gray owed much of the success of his Manual of the Botany of the Northern United States, published in 1837, to the fact that he visited the British botanical gardens at Kew and the Muséum d'Histoire Naturelle in Paris before sending his manuscript to the printer. Upon his return, he determined to build Harvard University an archive and herbarium to rival those of Europe. Gray spent a lifetime classifying and cataloguing plant specimens sent to him from every corner of the continent by a vast network of botanizers and correspondents. The growing collection of plant specimens represented ever more perfect knowledge of the flora of North America.[18] Although his Manual went through five

---

comfort and morality of its people than the notorious 'Liquor Law' of that State ever could." Quoted in Holmes, ed., Natural History and Geology of the State of Maine, II: 5.

[17] Volney, A View of the Climate and Soil of the United States of America (London, 1804), 8, quoted in Michael Williams, Americans and Their Forests: A Historical Geography (New York: Cambridge Univ. Press, 1988), 23. On the exploration of the treeless prairies and the resulting perception of a great American desert, see Martyn J. Bowden, "The Great American Desert and the American Frontier, 1800-1880: Popular Images of the Plains and Places in the Westward Movement" in T. K. Hareven, ed., Anonymous Americans: Explorations in Nineteenth Century Social History (Englewood Cliffs, NJ: Prentice-Hall, 1971), 48-79.

[18] Michel Foucault clearly overstates his case when he claims that the late eighteenth century marked the end of classificatory natural history. Taxonomy did not lose steam until the late nineteenth century when evolution unsettled the fixed categories of divine creation. Foucault, The Order of Things: An Archaeology of the Human Sciences (New York: Random House, 1970). James Larson suggests that it was the discovery of space and patterns of species distribution as much as of time and episodes of extinction that disrupted the two-dimensional order of the natural history table. Larson, "Not Without a Plan: Geography and Natural History in the Late Eighteenth Century" Journal of the History of Biology 19 (1986): 447-88.

editions in his lifetime, each enumerating more species and genera than the last, Gray left his magnum opus, The Flora of North America, unfinished when he died in 1888.[19]

In addition to this floristic tradition of classifying the individual species of the forest, botanists also busied themselves identifying vegetation types. The two types of inquiry were related-- identifying vegetation units depended upon sound taxonomic knowledge-- but vegetation, that is, the ensemble effect produced by a community of interacting plants, had a rather different genealogy.[20] It first came into view as a distinct object of scientific knowledge at the end of the eighteenth century. Influenced by Kant and German romanticism, Alexander Humboldt and other exact scientists searched for the invisible processes and organic structures underlying visible phenomena.[21] Whereas classical, Linnean taxonomy had been based on the outward visible form of individual species, Humboldt's science of vegetation was concerned with different objects:

> plant geography traces the connections and relations by which all plants are bound together among themselves, designates in what lands they are found, in what atmospheric conditions they live, and tells of the destruction of rocks and stones by what primitive forms of the most powerful algae, by what roots of trees, and describes the surface of the earth in which humus is prepared. This is what distinguishes geography from nature study, falsely called nature history.[22]

Humboldt pioneered a variety of representational techniques to bring vegetation into view. His isolines of equal averaged temperatures traced the kind of sensible, if not

---

[19] A. Hunter Dupree, Asa Gray, 1810-1888 (Cambridge: Harvard Univ. Press, 1959).

[20] Malcolm Nicolson, "Alexander von Humboldt, Humboldtian Science, and the Origins of the Study of Vegetation" History of Science 25 (1987): 167-94.

[21] D.M. Knight, "The Physical Sciences and the Romantic Movement" History of Science 9 (1970): 54-75; H.A.M. Snelders, "Romanticism and Naturphilosophie and the Inorganic Natural Sciences, 1798-1840" Studies in Romanticism 9 (1970): 193-215; C. A. Culotta, "German Biophysics, Objective Knowledge, and Romanticism" Historical Studies in the Physical Sciences 4 (1975): 3-38; Michael Friedman, Kant and the Exact Sciences (Cambridge: Harvard Univ. Press, 1992).

[22] Humboldt, Flora Fribergensis Specimen, (Berlin, 1793), 9-10 quoted in Richard Hartshorne, "The Concept of Geography as a Science of Space: From Kant and Humboldt to Hettner" Annals of the Association of American Geographers 48 (1958): 100.

immediately visible relations between climate, plants, and animals that gave rise to the physiognomy of landscapes. Similarly, his famous cross-sectional engraving of the Andes, the "Tableau physique des Andes et pays voisins," simultaneously illustrated the location of particular plant and animal species, altitudinal vegetation zones, forms of agriculture, underlying geological structures, and other measurable geographic parameters as part of one integrated picture.[23]

In the United States, botanists were generally more concerned with the distributions of individual plant species than with the practice of Humboldt's integrative plant geography. Schooled on the empiricism of the Scottish Enlightenment, American naturalists did not take on board Humboldt's skepticism about the truth of superficial appearances, but his interest in the relations between climate and vegetation struck a chord.[24] As Americans began to grapple with the treeless prairies, the plant geography of Humboldt and his followers like Augustin and Alphonse de Candolle provided a way both to picture the full extent of the prairies and to explain the underlying causes of naturally deforested landscapes.[25] In 1848, the Smithsonian Institution asked Asa Gray to prepare a report on the forests of the United States, but he demurred when he realized that the scale of the undertaking would detract from his efforts to complete the flora of North America.[26] In 1858, Joseph Henry, secretary of the Smithsonian, published the first "map of the forest

---

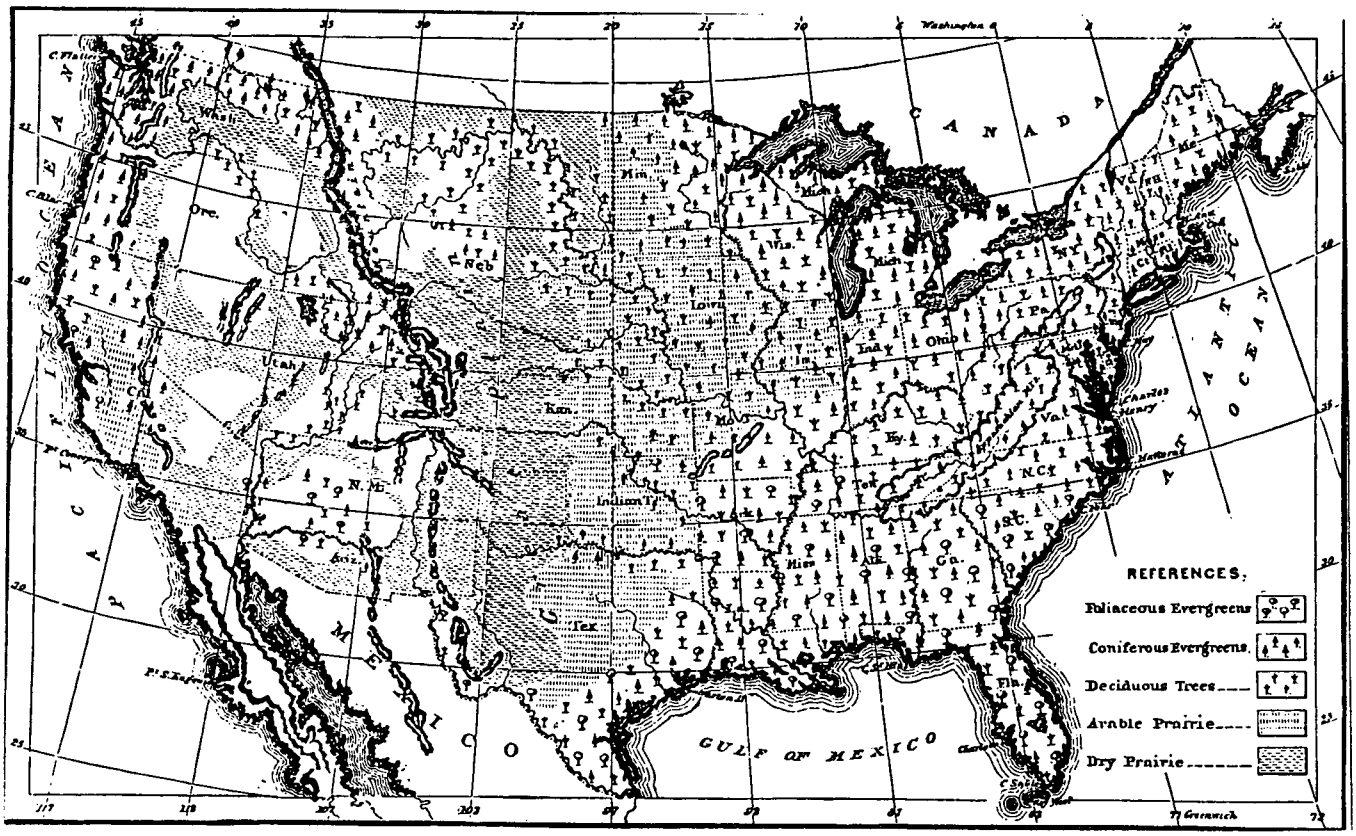
[23] On isothermal lines, see A. H. Robinson, and H. M. Wallis, "Humboldt's Map of Isothermal Lines: A Milestone in Thematic Cartography" Cartographic Journal 5 (1967): 119-23. The Tableau was published as an insert to Humboldt, Essai sur la géographie des plantes (Paris, 1807). For a critique of the tableau as an appropriation of indigenous knowledge, see Mary L. Pratt, Imperial Eyes: Travel Writing and Transculturation (New York: Routledge, 1992), 120-43.

[24] See, for example, Lewis C. Beck, "On the Geographical Botany of the United States" Transactions of the Albany Institute 1 (1830): 10-21; C. Pickering, "On the Geographical Distribution of Plants" Transactions of the American Philosophical Society n.s. 3 (1836): 27-84; Asa Gray, "Statistics of the Flora of the Northern United States" American Journal of Science and Arts 12 (1856): 204-32; 13 (1857): 62-84, 369-403.

[25] To my knowledge, there is no history of nineteenth century American biogeography, but see Janet Browne, The Secular Ark: Studies in the History of Biogeography (New Haven: Yale Univ. Press, 1983); Ronald L. Stuckey, ed., Essays on North American Plant Geography from the Nineteenth Century (New York: Arno Press, 1978). On the Candolles and the development of European plant geography, see Gareth Nelson, "From Candolle to Croizat: Comments on the History of Biogeography" Journal of the History of Biology 11 (1978): 269-305.

[26] Dupree, Asa Gray, 189.

Figure 4.2 "Forest and prairie lands of the United States" by Joseph Henry, 1858



Joseph Henry, "Meteorology and Its Connection with Agriculture," plate 6

and prairie lands of the United States." He distinguished areas of "Deciduous Trees" from "Foliaceous" and "Coniferous Evergreens" and traced the outline of the forest-prairie transition in very general terms, but large portions of eastern Oregon and central Nevada were left blank.[27] The Yale botanist William Brewer, who produced the landmark maps of the American forest for the 1870 census, confessed that there was still "no published map of any considerable area in our country ... in which the woodlands are laid down from actual survey."[28]

Even where federal lands had actually been surveyed, the knowledge was frustratingly fragmented and incomplete. Although the U.S. Army Corps of Engineers, the General Land Office, and the Coast and Geodetic Survey each sponsored major scientific expeditions in the 1860's and 1870's, the results did nothing to clarify the picture of the American forests.[29] U.S. Army surveys, complained William Brewer, were of little use because they were classified "for the use of the Department."[30] The General Land Office and the Geological Survey were not immune from criticism either. A correspondent in The Nation bemoaned, "the cartographic methods have been so diverse and imperfect that no general map of value can be constructed from the immense number of township maps filed in the Land Office."[31] Land office field notes were not much better. "Under the ordinary system of surveys," conceded the Commissioner of the General Land Office, "the field-

---

[27] Joseph Henry, "Meteorology and Its Connection with Agriculture" in U.S. Patent Office Report, Agriculture (1858): frontspiece. Also, see J.G. Cooper, "On the Distribution of the Forests and Trees of North America" Annual Report of the Board of Regents of the Smithsonian Institution (1858): 246-80. For discussion of this and other early efforts to map the American forests, see Williams, Americans and Their Forests, 23-32.

[28] William H. Brewer, "The Woodland and Forest Systems of the United States," in Francis A. Walker, A Statistical Atlas of the United States, Based on Results of the Ninth Census (Washington, 1874), quoted in Williams, Americans and Their Forests, 25.

[29] On these scientific explorations of the American West, see A. Hunter Dupree, Science in the Federal Government: A History of Policies and Activities to 1940 (Cambridge: Harvard Univ. Press, 1957); William Goetzmann, Exploration and Empire: The Explorer and Scientist in the Winning of the American West (New York: Alfred A. Knopf, 1966); Thomas G. Manning, Government in Science: The U.S. Geological Survey, 1867-1894 (Lexington: Univ. Kentucky Press, 1967), 1-59.

[30] W.H. Brewer to J.R. Hawley, 13 May 1874 quoted in Manning, Government in Science, 33.

[31] "The Proposed Reform in Our Land and Scientific Surveys" The Nation 28 (9 January 1879): 27, 27-28.

notes cannot disclose, with any degree of accuracy, which are pine lands and which are not."[32]

In part, these charges and counter-charges were the product of political jockeying by the various federal offices responsible for surveying the vast western lands, but they also reflected anxiety about the fragmentation of scientific knowledge. Ironically, the flood of information produced by government natural history surveys and the widespread popularity of private botanizing frustrated efforts to make any sense of it and to realize what Thomas Richards calls the Victorian fantasy of total, comprehensive, and universal knowledge.[33] The tension between inductive and deductive knowledge was much older than Richards makes it out to be, but he identifies a problem that haunted efforts to represent, know, and thereby to control the American forest. Whereas Moses Greenleaf needed only a few pages to provide a statistical view of what was known in 1816 about Maine's natural resources, a half century later, Ezekiel Holmes needed two large volumes simply to list the fossils and other specimens that had been collected and classified on his state-sponsored natural history expeditions of 1861 and 1862.[34] Naturalists imagined science as a Baconian enterprise. "All that we can do," offered the botanist John Lindley, "is to throw our pebbles upon the heap, which shall hereafter, when they become sufficiently accumulated, become the landmark of Systematic Botany."[35] The problem was that as the facts accumulated, they proved increasingly difficult to manage and archive. Although facts were imagined as building blocks for a system of over-arching and total knowledge, their vast numbers overwhelmed efforts to digest them. Catalogues of positive

---

[32] Quoted in Hough, ed., Report upon Forestry I: 14.

[33] Thomas Richards, The Imperial Archive: Knowledge and the Fantasy of Empire (London: Verso, 1993). On the popular practice of botanizing and natural history, see Charlotte M. Porter, The Eagle's Nest: Natural History and American Ideas, 1812-1842 (Tuscaloosa: Univ. Alabama Press, 1986); David E. Allen, The Naturalist in Britain: A Social History (London: Allen Lane, 1976).

[34] Holmes, ed., Natural History and Geology of the State of Maine, 2 vols.

[35] John Lindley, The Vegetable Kingdom (3rd ed. London, 1853), xii, quoted in Porter, Natural History and American Ideals, 156.

facts could not be unified so as to provide a complete knowledge of the forest. Instead, they only yielded what came to be called information: disjunct, fragmentary, incomplete.[36]

The problem became more acute as results from the ambitious scientific surveys of the 1870's began pouring into Washington. The mandates for these expeditions were different, so that while they accumulated a huge volume of information about the public domain, it was uncoordinated and difficult to synthesize. In 1878, the National Academy of Sciences urged the consolidation of all federal agencies responsible for collecting scientific knowledge about the western territories. In response, Congress created the U.S. Geological Survey, but the patchwork of scientific institutions was such that in 1886, the Allison Commission told Congress that a centralized department of science would tend "to the increase and systematization of knowledge tending to promote the general welfare of the country."[37] Without this kind of comprehensive, scientific knowledge it was difficult even to speak of the American forest or of the Maine Woods as coherent objects.

Science was not the only game in town, of course, but other knowledges of the forest were no better situated to represent the Maine Woods as a whole. Prospective lumbermen, speculators, and settlers were interested in isolated parcels of land, and the maps and surveyors' books in the Maine and Massachusetts Public Land offices were organized to provide this information, in the belief that "Our Public Lands need only to be known in order to be rapidly settled."[38] Land office plats traced township lines and occasionally the rivers, without any hint of what else they contained. More detailed descriptions of the landscape were available from the surveyors' notebooks, but these

---

[36] My discussion of the tensions between positive and comprehensive knowledge and of the distinction between knowledge and information is drawn from Richards, Imperial Archive.

[37] U.S. Congress, Joint Commission to Consider the Present Organization of the Signal Service, Geological Survey, Coast and Geodetic Survey, and Hydrographic Office with a View to Secure Greater Efficiency ... (Washington: 1886), 7. quoted in Dupree, Science in the Federal Government, 194-231. On the debates over the consolidation of government science, see Manning, U.S. Geological Survey, 1-59; Thomas G. Manning, U.S. Coast Survey vs. Naval Hydrographic Office: A 19th Century Rivalry in Science and Politics (Tuscaloosa: Univ. Alabama Press, 1988).

[38] VIATOR, "The Best Method of Settling the Public Lands" Eastern Argus 23 January 1827.

qualitative descriptions were idiosyncratic.[39] Land office documents were practical tools for alienating the public domain into many private ones. In general, they served this purpose very well. By describing the standing timber and identifying rivers for driving, timber cruises enabled lumbermen to scout out lumbering chances and to plan logging operations.[40] One newspaper correspondent mused that the land office papers had been so heavily "examined and re-examined" that they "begin to look as if they had been kept in a logging camp."[41] They provided a patchwork of local knowledge about discrete parcels of land, but these disparate sources of information did not add up to anything more, certainly not to the kind of global estimates of standing timber of interest to Greeley and other turn-of-the-century conservationists.

These representational frustrations contributed to the sense that American forests were, for all practical purposes, inexhaustible. In 1839, the Democratic Review declared, "as our natural resources are boundless, our nation will exhibit a picture of prosperity which will excite the world's admiration."[42] Americans had long compared their new nation to the Garden of Eden, and as long as the forest escaped precise measurement, it was difficult to unsettle this faith in endless natural abundance. What could not be represented must be infinite. The geographer Moses Greenleaf, who made it his life's work to explore and chart "the extensive wilderness in the interior" of Maine, concluded that since its extent was "great beyond calculation" it must be "almost inexhaustible."[43] This was precisely what boosters and land promoters wanted to hear. They puffed Maine's forests as vast beyond comprehension. The Machias Union looked forward to the day

---

[39] Lloyd C. Irland, "Rufus Putnam's Ghost: An Essay on Maine's Public Lands, 1783-1820" Journal of Forest History 30 (1986): 66, 60-69.

[40] On timber cruising, see Richard G. Wood, A History of Lumbering in Maine, 1820-1861 (Orono: Univ. Maine Press, 1935), 81-86.

[41] Eastern Argus 11 February 1835.

[42] "Thoughts on the Times" Democratic Review 6 (December 1839): 462, quoted in Arthur A. Ekirch, The Idea of Progress in America, 1815-1860 (New York: Columbia Univ. Press, 1944), 77.

[43] Moses Greenleaf, A Statistical View of the District of Maine (Boston, 1816), iii. See also, Greenleaf, A Survey of the State of Maine, in Reference to Its Geographical Features, Statistics and Political Economy (Portland, 1829).

when "the almost interminable forests, which stood in their might for years, unharmed, would soon bow before the hardy sons of progress; the vast resources of minerals and other valuable native products would leave their hidden beds to grace their proper sphere, and add to the possession of men."[44]

Turn-of-the-century conservation discourse unsettled this confidence by deploying a variety of new statistical and cartographic techniques to picture the nation's forests quantitatively, both in great, individual detail and in total as a single whole. William Brewer's plates for the Statistical Atlas of the 1870 census took the first stab at this.[45] While several previous maps had pictured the areal extent of forest vegetation types in the United States, Brewer's maps represented their density as well as their distribution. Brewer constructed the nation's diverse forests into a larger totality by converting local differences to a single, numerical scale-- acres of forest per square mile. Variations in the density of forest cover could then be represented by the dispersion of color differences across a map of the entire nation. The measure was admittedly crude. In the first federal Report on Forestry, Franklin B. Hough complained that the word woodland was so "variable in meaning ... [as] to mislead in statistical reports."[46] Brewer conceded as much, saying the amount of woodland was "understated east of the Mississippi River and overstated west of it." Different types of forest contained different volumes of wood, and Brewer hoped that further study-- "perhaps by some future United States Commission of Forests"-- would augment and improve "what is known of the woodlands."[47]

Still, picturing the nation's forests as parts of a single, inter-related whole had several important effects. Unlike previous maps based upon forest type, Brewer's measure was able to account, at least in part, for the effects of dispersed land clearing on the forest.

---

[44] "Progressive" Machias Union 6 July 1853.

[45] On the history of the U.S. Census, see Carroll D. Wright, History and Growth of the U.S. Census (Washington: GPO, 1900); Margo J. Anderson, The American Census: A Social History (New Haven: Yale Univ. Press, 1988); Ross Eckler, The Bureau of the Census (New York: Praeger Publishers, 1972).

[46] Franklin B. Hough, Report Upon Forestry (Washington, 1878), I: 29.

[47] Brewer, "Woodland and Forest Systems," quoted in Williams, Americans and Their Forests, 25-27.

Americans had long celebrated this as the basis of both social progress and national identity. They imagined themselves as a continental nation united not by force, or ethnicity, or religion, so much as by this common experience of the forest frontier. Other plates in the 1872 Atlas depicted an alarming concentration of immigrants in the cities of the Northeast, but Brewer's maps reinforced a traditional sense of the United States as "Nature's nation," rooted in a common soil, a shared experience, and thus a distinctively American identity.[48]

As a national self-portrait, the census represented the imagined community of the nation to itself. By charting the recession of the forest at a continental scale, Brewer's maps narrated the birth of a continental nation. In the North, the dense virgin forests had been driven back to the northern tip of peninsular Michigan, to the recesses of the Adirondacks, and to the far reaches of northern and eastern Maine. In the South, the advance of agriculture across the coastal pine plains was slower, but just as steady. Only the great forests of the Pacific Northwest remained unmoved, but even there, Brewer's 1872 maps recorded traces of settlement in the Willamette Valley. Comparison with previous censuses charted quite precisely the pace and progress of agricultural settlement. Steady increases in population and agricultural production, measured by every census, proved to Americans the superiority of their common system of republican government and private property to Europe, where the sweat of peasants and proletariats enriched kings and capitalists.[49] As Joseph C. G. Kennedy, superintendent of the 1860 census, put it, "the truth as presented by the census will teach us the importance of union and harmony, and stimulate a proper pride in the country and people as one and indivisible."[50] This sense of national unity was a fragile one-- as the sectional differences to which Kennedy alluded showed so painfully. But by offering what Francis A. Walker, superintendent of the 1870 and 1880 censuses,

---

[48] Perry Miller, Nature's Nation (Cambridge: Harvard Univ. Press, 1967).

[49] See, for example, U.S. Census Office, Population of the United States in 1860 (Washington, 1864), v; John E. Rolfe, "Improvements of the Age" Maine Farmer 20 December 1860; "The Resources of Our Country" Oxford Democrat 16 October 1863.

[50] U.S. Census Office, Preliminary Report on the Eighth Census (Washington, 1862), 118-19 quoted in Anderson, American Census, 68.

called "a grand monumental exhibit of the resources, the industries, and the social state of the American people," the census maps demonstrated to their viewers "the astonishing progress which has been made during a century of political, social, and industrial freedom."[51]

At the same time, however, the representation of a single, continental American forest helped put some old concerns in a new light. It provided a way to relate the progress of settlement to the fuel and lumber shortages plaguing settlers on the plains and in the older areas of the country as well as to the difficulties of lumbermen forced to go "farther into the interior [of Maine] for the purpose of obtaining large and small lumber."[52] Suddenly, these once isolated problems could appear to be connected: local manifestations of an underlying national problem with the forest. In a very real sense, this continental American forest was something that had not existed before. The expansion of railroads had only just begun to integrate regional lumber markets into a national one stitching regions of forest deficit together with those of surplus into a national forest economy. In the 1860's, people began wondering if sporadic local shortages portended a "permanent national *famine* of wood."[53] This was a question that had not been possible to ask previously, and Brewer's map had not been designed with this question specifically in mind. His interest was natural history, and his map an attempt to classify the forest types of the nation. He quantified the density of forest cover so as to be able to map the forest prairie boundary more precisely than had previously been possible. But Brewer himself recognized that his observations of forest density nation-wide also spoke to these new concerns about

---

[51] Francis A. Walker, "The Eleventh Census of the United States" and "Defects of the Census of 1870," both in Walker, Discussions in Economics and Statistics, ed. D.R. Davis (1899 reprint. New York: Augustus M. Kelley, 1971), II: 76, 50. On Walker's work for the census, see James P. Munroe, A Life of Francis A. Walker (New York: Henry Hold & Co., 1923), 109-26, 194-209.

[52] "The Conservancy of Our Forests" Forest and Stream 1 (8 January 1874): 339, quoting Maine Farmer.

[53] Frederick Starr, "American Forests: Their Destruction and Preservation" in U.S. Department of Agriculture, Report (1865): 210-34. See also, U.S. Department of Agriculture, Report (1872): 45; (1878): 245.

deforestation. He attributed the thin forest cover in the settled areas of New England and the middle states to "prodigal use and needless waste."[54]

Swept up by these concerns, Franklin B. Hough spoke in 1873 at the American Association for the Advancement of Science meeting in Portland, Maine, "on the duty of governments in the preservation of forests."[55] Three years later he was appointed by Congress to "ascertain the annual amount of consumption ... of timber and other forest products; the probable supply for future wants; the means best adapted to the preservation and renewal of forests," among other forest matters.[56] His mandate, like the census maps of the nation's woodland, signaled the beginnings of a change in the way that Americans imagined the forest. Previously, the federal census, like other statistical collections, had enumerated the volume and value of forest production-- that is, the commodities produced by sawmills, shingle makers, and other manufacturers of forest products. This focus on human labor as the source of all wealth and value had a distinguished pedigree in political economy. It presumed that the world was inert and without intrinsic value until given it by the addition of capital and human labor. Forest products, in this view, were really human products, created and improved by human labor. Boosters and business leaders bragged about the volume and value of the forest products they had manufactured, not about the forests that underwrote the production of this wealth. Speaking of forest consumption and mapping the volume of standing timber changed the register in which national wealth was calculated. When the U.S. Congress asked Hough to look into the consumption, supply, "preservation and renewal of forests," it acknowledged a debt, indeed a reliance upon, the productive actions of a non-human nature. Americans had long constructed their national identity out of the encounter with wildest nature, but rather than being virgin and lying in wait for improvement by ax and plow, the forest seemed increasingly fragile and in need of

---

[54] Quoted in Williams, Americans and Their Forests, 27.
[55] Franklin B. Hough, "On the Duty of Governments in the Preservation of Forests" Proceedings of the American Association for the Advancement of Science 12 (Salem, 1874): B1-10.
[56] Hough, ed., Report Upon Forestry, I: 3.

protection. The image was just as easily feminized, but the differences were consequential. As something that might be used up or dissipated, the forest became a finite quantity. This representation helped change the conversation from one about planting and producing individual trees to one about preserving the stock of trees-- the forest-- already there.

Measurement of this quantity, however, was no easy task. Although published as a plate in the Statistical Atlas to the Ninth Census, Brewer's map was not based on official census enumerations. He cobbled his estimates of woodland density together from a variety of sources. For his Reports Upon Forestry, Hough collected an avalanche of statistics, so many in fact that his reports were described, without intended irony, as "entirely exhaustive."[57] Hough looked to the Treasury Department's foreign trade records for "proof of the exhaustion of supplies," but since they excluded the much larger domestic consumption of the forest, the result was not very satisfactory.[58] In the absence of an actual forest inventory, he tried to make use of the agricultural census schedules, which since 1850 had inventoried acres of improved and unimproved farm lands. For states like Ohio, where most of the land was in farms, the results were alarming. In many counties, agricultural clearing had reduced the forest area by eighty percent or more. Hough wondered, "How long the remaining woodlands can meet the demands made upon them at the present rates?"[59] Elsewhere, however, the picture was less clear. In Maine, for example, only a quarter of the total land area was enumerated by the agricultural census schedules, so there was little basis for deciding the question of a timber famine.

To help answer these questions, the 1880 Census devoted an entire volume to enumerating the forest. Although the Interior Department was chiefly interested in a

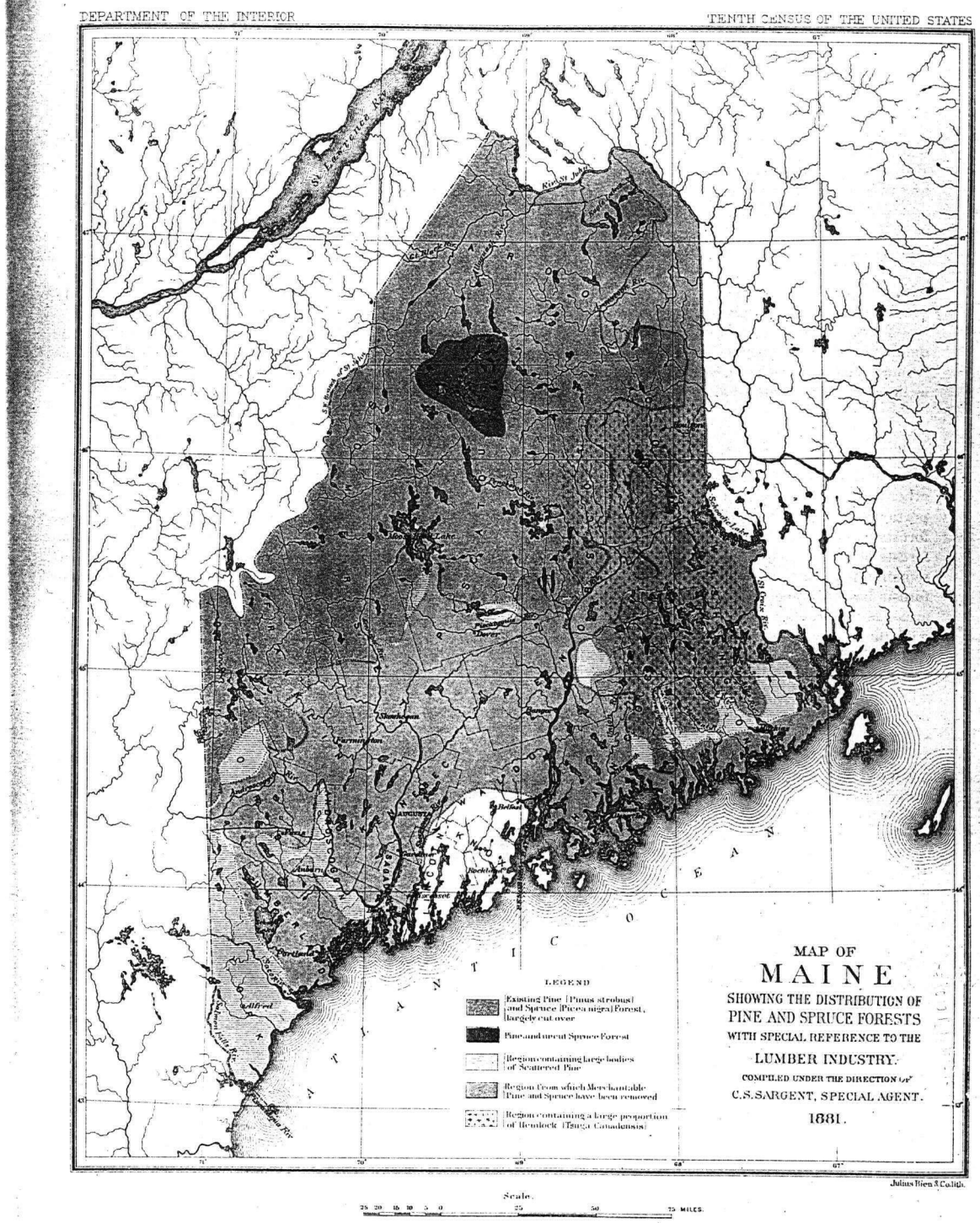
---

[57] William G. Le Duc, Commissioner of Agriculture, letter of transmissal in Hough, ed., Report Upon Forestry, I: 4. A wit in The Nation, however, picked up on this comment and noted "with feelings of at least mitigated regret" that the House Committee on Printing had "so far failed to pass" the appropriation for the second statistical volume. "American Forestry" The Nation 28 (30 January 1879): 87, 87-88.

[58] Hough, Report Upon Forestry, II: 104.

[59] B.F. Hough, "Decrease of Woodlands in Ohio" in Nathaniel H. Egleston, Report Upon Forestry, IV: 180, 174-80. On this report, see Michael Williams, "Ohio: Microcosm of Agricultural Clearing in the Midwest" in R.P. Tucker and J.F. Richards, eds., Global Deforestation and the Nineteenth Centry World Economy (Durham: Duke Univ. Press, 1985), 3-13.

Figure 4.3 "Map of Maine Showing the Distribution of Pine and Spruce" by C.S. Sargent, 1883



Source: Sargent, Report on the Forest of North America, 496

thorough accounting of the nation's forest supplies, the author of the census Report on the Forests of North America, the Harvard botanist Charles S. Sargent, was attracted to the project because it allowed him "great facilities for travel at Government expense" conducting fieldwork and collecting specimens that will "greatly enrich the [Harvard University] Arboretum in every way."[60] The final 612 page report reflected this compromise. It combined a systematic catalogue of forest species with economic information about the physical properties of American woods and the prospects for future supply. Color maps graphically illustrated the inroads made by logging in such key producing areas as Maine Woods (FIGURE 4.3). Other maps showed the density of forests both regionally and nation-wide (FIGURE 4.4), as well as the acreage destroyed annually by fire. Although Sargent's estimates of standing timber were based on "incomplete and often unsatisfactory" enumerators' returns, this picture of the forest proved much more compelling than the listing of 158 genera and 412 species that fascinated Sargent and his botanical colleagues.[61]

Sargent's dramatic images stoked fears of a timber famine. Americans were already beginning to worry about the unintended environmental consequences of economic development, and the picture of the nation's forest as a whole confirmed their fears about the vanishing forest. Shocked by the "alarming diminution of forest area" pictured in Sargent's maps, the New York Lumber Trade Journal worried openly about "the most serious and many sided calamities-- timber famine."[62] Sargent himself tried to downplay the alarm. Conceding that "local exhaustion is ... already felt in many parts of the country," he maintained that the days "when the United States will experience a real timber famine are not yet very near." He warned, however, that "a forest, whatever its extent and resources,

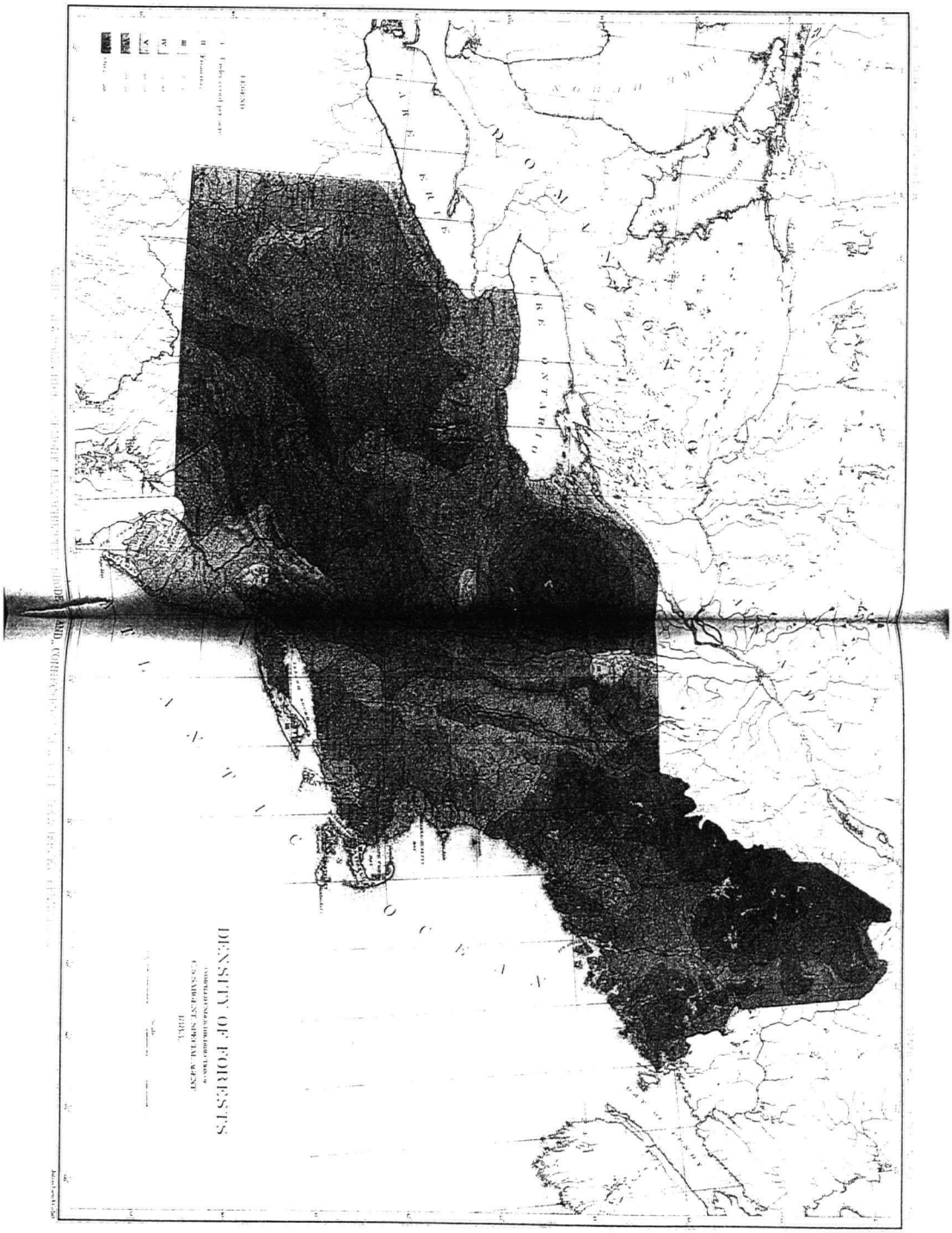
---

[60] Charles S. Sargent to Sir Joseph Hooker, 13 October 1879, quoted in S. B. Sutton, Charles Sprague Sargent and the Arnold Arboretum (Cambridge: Harvard Univ. Press, 1970), 81. On Sargent's conduct of the census survey, see Sutton, Charles Sprague Sargent, 77-92.

[61] Charles S. Sargent, Report on the Forests of North America (Washington, vol. 9 of the Tenth Census of the United States, 1884), 485.

[62] New York Lumber Trade Journal 1 January 1887, 15 July 1886.

Figure 4.4 "Density of Forests" by C.S. Sargent, 1883



Source: Sargent, Report on the Forest of North America, 494

can be exhausted in a surprisingly short space of time." Though Americans could take some comfort that their forests were "still capable of large production... grave fears should be felt for their future extent and composition." Sargent recommended that state governments become involved in forest protection in the east, while in the west, he looked to the federal government to take "active protective measures" by withdrawing lands "from entry or sale."[63]

Although his prescription differed from that offered by Greeley forty years later, their conclusions both rested upon a picture of the quantity of the nation's forestland. Like the rhetoric about an impending timber famine that they supported and advanced, these efforts to quantify the nation's forestland imparted a liquid quality to the forest. They depended on a totalizing view of the nation's trees aggregated together as a coherent object of knowledge. Early nineteenth century concerns with natural history and arborculture, by contrast, had focused on individual trees, largely dissociated from one another. Representing the nation's forest as a whole made individual trees and local demands upon them completely interchangeable. If, as Charles Sargent predicted in 1884, the pine forests of the Great Lakes were soon driven to "extinction," people on the plains would still be able to "depend upon the more remote pine forests of the Gulf region or those of the Pacific coast." Maps of the nation's forests, which once extended "from the Atlantic sea-board in one nearly unbroken sheet," showed them being liquidated wholesale, receding like water in a sink as "great and increasing drains [were] made upon them."[64] Whatever their cause and wherever they took place, such demands had the same effect on aggregate supply, which ebbed and flowed as expenditures were drawn upon it.

This liquid metaphor was doubly apt, because the nation's forest was being liquidated in two strikingly new ways. Most obviously, of course, the vastly accelerated pace of late nineteenth century logging was liquidating the forest at an unprecedented pace.

---

[63] Charles S. Sargent, "The Protection of Forests" North American Review 135 (October 1882): 394, 401, 401, 400, 386-401.
[64] Sargent, Report on the Forests of North America, 489, 10, 490.

Drawn into the market, the material properties of the forest were being converted into a rapidly accumulating pile of sawdust, lumber, and money. The liquidity of this forest capital depended upon expanding its reach and rendering the world ever more fluid and fungible through the alchemy of the market. All that is solid melts into air, as Marx so famously put it. A long cascade of commodity exchanges bound the fate of individual trees in the Maine Woods together with those of trees across the continent. Integrated into a national price fixing market, they were both interchangeable and inter-related. Their survival depended less and less on the immediate circumstances of their habitats than on doings in a market that was no longer fixed in place. An open winter in the Great Lakes sent prices higher, more Maine lumber to market in New York, and more loggers into the Maine woods the next year. The census maps and the pictures of the nation's forest as an integrated whole made the consequences of these connections visible, but it was easier to unify the forest on paper than to harmonize the diverse productive forces that were reshaping it.

In response to this wholesale liquidation, conservation advocates represented the nation's forest as a reservoir to be conserved and drawn down as needed. Samuel Hays contends that they drew their ideas about forest conservation-- and indeed even the word conservation itself-- from hydrology and the movement to conserve western waters for irrigation, but their usage might just as easily have come from capitalism itself.[65] For in representing the forest as a liquid quantity and charting the ebb and flow of supply and demands upon it, conservation discourse mirrored its liquefying effects. It converted local differences, whatever their cause and wherever they took place, to a universal measure of exchange. Often, this measure was capital's own. Sargent used board feet to take stock of the nation's forests. Such were capital's alchemic powers to bring radically different things

---

[65] Samuel P. Hays, Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920 (1959. reprint with new preface. New York: Atheneum, 1975), 5.

into the same universe of value that usually there was no other way to account for the ebb and flow of supply and drains upon it.

truth in numbers

Late nineteenth century forest scientists sought mathematical confirmation for their theory of a timber famine. The instinct was a new one. No longer content with qualitative observation, they tried to picture the nation's forest as a whole and to measure its total quantity as precisely as possible. Austin Cary expressed this new faith in numbers in the 1894 report of the Maine Forest Commissioner. While he granted that his work measuring spruce logs and stems "may seem to practical men of small and remote value," he insisted that it is the "slow fundamental work, work which combines mathematics and biology in the effort to establish fundamental principles and relations, [that] has in it the promise of the largest results."[66] U.S. Forest Service chief Gifford Pinchot hoped this kind of precise, mathematical work would "raise forestry from pure empirics to the position of a true science."[67] He promoted quantitative research in hopes of legitimating the budding science of forestry and elevating it to the level of hard science.

These aspirations and Pinchot's hierarchical distinction between mere description and true scientific explanation drew upon and reinforced the cultural authority of quantitative science. Because of its reputation as an "objective and universal language," apparently distinct from both the material world it represents and the people who use it, mathematics is often thought to be a uniquely privileged vehicle to truth.[68] Galileo claimed that the book of nature was written in the language of mathematics.[69] By linking mathematics with explanation and experiment in optics, astronomy, and mechanics, Galileo

---

[66] Austin Cary, "On the Growth of Spruce," in Maine Forest Commissioner, Report (1894): 28, 20-36.
[67] Press Bulletin, no. 144, 17 December 1906, quoted in Harold T. Pinkett, Gifford Pinchot: Private and Public Forester (Urbana: Univ. Illinois Press, 1970), 93.
[68] David Harvey, Explanation in Geography (London: Edward Arnold, 1969), 179.
[69] Quoted in E. J. Dijksterhuis, The Mechanization of the World Picture: From Pythagoras to Newton, trans. C. Dikshoorn (1950. Princeton: Princeton Univ. Press, 1986), 499.

and other early scientists enjoyed remarkable success predicting and controlling physical phenomena. Yet despite these achievements and the respect they won for mathematized science, mathematics was not well connected to either explanatory theory or empirical observation in other areas of science until the mid-nineteenth century when both the natural and physical sciences were rapidly transformed by the development of quantitative observation and experimentation and the expression of hypotheses in mathematical terms.

Historians of science have struggled to explain the sudden mathematization in which Cary and Pinchot participated. The problem is particularly pressing because quantification seems to hold the key to the rapid pace of scientific and technical progress in the period. Thomas Kuhn argues provocatively that new theories, not empirical observation and experiment, were the driving force behind this mathematization of nineteenth century science. "To discover a quantitative regularity, " he insists, "one must normally know what regularity one is seeking, and one's instruments must be designed accordingly." Kuhn is surely right to emphasize the role of theory in guiding the experimental measurements that confirm it. [70] The American forests would not have been observed, charted, and counted so carefully but for theories about a timber famine.

That said, Kuhn's bold claims overstate the importance of formal theory in the mathematization of American forest science. The quantitative focus of forest scientists like Greeley and Sargent characterized a style of nineteenth century science that Susan Faye Cannon calls "Humboldtian." Armed with new conceptual and instrumental tools that enabled them to take and represent measurements precisely, practitioners of Humboldtian science were critical of the abstract and metaphysical explanatory theories of the past. Far from being backwards amateurs too unsophisticated for calculus, or naive Baconians who fetishized the fact, Humboldtian scientists were, by Cannon's account, apostles of

---

[70] Thomas Kuhn, The Essential Tension: Selected Studies in Scientific Tradition and Change (Chicago: Univ. Chicago Press, 1977), 219. For other views on the mathematization of science, see W. R. Shea, ed., Nature Mathematized: Historical and Philosophical Case Studies in Classical Modern Natural Philosophy (Dordecht: D. Reidel, 1983); T. Frängsmyr, J.L. Heilbron, and R. E. Rider, eds., The Quantifying Spirit in the 18th Century (Berkeley: Univ. California Press, 1990).

scientific progress "participating in the latest wave of international scientific activity." Their "accurate, measured study of widespread but interconnected real phenomena" paved the way for scientific advances in geology, meteorology, oceanography, biogeography, and the other natural sciences.[71]

Forest scientists partook of this quantifying spirit.[72] They used new instruments like the scaling table and the sample plot to take precise, quantitative measurements of forest volume and tree growth and to account for the balance between drains and gains to the forest. New mathematical theories of forest growth and depreciation enabled foresters to determine harvest rates and calculate the value of the forest exactly. The combination of quantitative measurement techniques with mathematized concepts such as the age class completed the mathematization of forest science. The result was the normal forest: an idealized forest landscape of equal sized blocks of even-aged, single-species stands with a normal distribution of age classes, varying from the youngest to mature and merchantable timber. The normal forest provided a robust, predictive model "with which to compare an actual forest to bring out its deficiencies for sustained yield management." It was widely celebrated as the highest achievement of quantitative forest science, enabling foresters to produce "an ideally regulated or organized forest."[73] In their crusade, American conservationists hoped the institution of true forestry would see this model of science realized across the nation.

To understand their success, it is necessary first to consider the mathematization of forestry that underwrote it. Internalist histories of science, such as those of Kuhn and Cannon, provide some clues, but they fail to account for the novelty of this faith in the truth of numbers. Numbers fascinated nineteenth century Americans, and their predilection for

---

[71] Susan Faye Cannon, Science in Culture: The Early Victorian Period (New York: Science History Publications, 1978), 105.
[72] Henry E. Lowood, "The Calculating Forester: Quantification, Cameral Science, and the Emergence of Scientific Forestry Management in Germany" in Frängsmyr, Heilbron, and Rider, eds., Quantifying Spirit, 315-42.
[73] A.B. Recknagel and John Bentley, Forest Management (New York: John Wiley & Sons, 1919), 124-25.

counting was noted with curiosity by European travelers. "Arithmetic," concluded the English writer Thomas Hamilton, "comes by instinct among this guessing, reckoning, expecting, and calculating people."[74] This fascination with numbers is still with us today, and it makes it difficult to understand Hamilton's puzzlement at the trust Americans placed in numbers rather than the qualified judgments of their superiors. The onslaught of statistics offended his aristocratic sensibilities. Hamilton thought it vulgar that the precise financial worth of individual members of society should be public knowledge, but the fetish for numbers was not simply an American peccadillo. Statistics was also a peculiarity of the English and of nineteenth century Europeans more generally.[75]

Kings and countries had long collected national wealth statistics and enumerated able bodied citizens for the purposes of taxation and military levy, but the early years of the nineteenth century witnessed an unprecedented avalanche of printed numbers. In the enthusiasm for quantitative measurement, seemingly everything that could be counted was, especially those things having to do with the population: birth and death rates, illiteracy and criminality, insanity, causes of death, marital status, race, religion, and so forth. Michel Foucault has argued that such detailed knowledge at the level of individuals and their bodies was the hallmark of the modern "art of governmentality."[76] Operating continuously

---

[74] Thomas Hamilton, Men and Manners in America (1833 reprint. New York: A.M. Kelley, 1968), 222, quoted in Patricia C. Cohen, Calculating People: The Spread of Numeracy in Early America (Chicago: University of Chicago Press, 1982), 175. See also, Alexis de Tocqueville, Democracy in America, eds. J. P. Mayer and M. Lerner, trans. G. Lawrence (New York: Harper and Row, 1966), 262-63, 508-10. On the rise of statistics in North America, see James Cassedy, Demography in Early America: Beginnings of the Statistical Mind (Cambridge: Harvard Univ. Press, 1969); James Cassedy, American Medicine and Statistical Thinking, 1800-1860 (Cambridge, Harvard Univ. Press, 1984); George Emery, Facts of Life: The Social Construction of Vital Statistics, Ontario 1869-1952 (Montreal: McGill-Queen's Univ. Press, 1993).

[75] On the statistical movement in Europe, see Michael Cullen, The Statistical Movement in Early Victorian Britain: The Foundations of Empirical Social Research (New York: Barnes & Noble, 1975); Donald A. MacKenzie, Statistics in Britain, 1865-1930: The Social Construction of Scientific Knowledge (Edinburgh: Edinburgh Univ. Press, 1981); Ian Hacking, "Biopower and the Avalanche of Printed Numbers" Humanities in Society 5 (1982): 279-95; Theodore Porter, The Rise of Statistical Thinking, 1820-1900 (Princeton: Princeton Univ. Press, 1986), 17-88.

[76] Governmentality was the subject of Foucault's 1978 and 1979 lectures, of which only one, to my knowledge, has been published in English: Foucault, "Governmentality" in Burchell, Gordon, and Miller, eds., Foucault Effect, 87-104.

and uniformly over the entire body politic by scrutinizing and normalizing individual subjects, this form of disciplinary power, Foucault suggested, shattered an older conception of government and sovereign power modeled on the household, in which authority was centralized in the father figure who was the head of the body politic. In the Order of Things, Foucault showed how Adam Smith presaged this dispersion of an ontological body politic that the sovereign might master by positing the wealth of nations as an effect of the diffuse desires and divided activities of its individual producers and consumers. The hand of the market was invisible and thus impossible either to know or to govern effectively. Like Foucault himself, many nineteenth century Americans reveled in this benign opacity. They resisted the expansion of the federal census and what one southern journalist called "this Federal prying into the domestic economy of the people."[77]

Yet prying was precisely what Progressive conservationists like Greeley dreamed of doing. They wanted to use the powers of the state to ameliorate the unintended consequences of competitive, *laissez faire* capitalism. Such regulatory and disciplinary power entailed a knowledge of its own, a statistical knowledge of the nation's population, its productive activities, and their effects, made possible, in large part, by the census and the production and cartographic representation of statistics.[78] Francis Walker, superintendent of 1870 and 1880 censuses, thought it "simply absurd" to contend:

> that a government which has a right to tax any and all products of agriculture and manufactures, to supervise the making and selling of butterine, to regulate the agencies of transportation, to grant public moneys to schools and colleges, to conduct agricultural experiments and distribute seeds and plant cuttings all over the United States, to institute scientific surveys by land and deep soundings at sea, has not the full authority to pursue any branch of statistical information which may

---

[77] Quoted in Wright, History and Growth of the U.S. Census, 38. See also, Cohen, A Calculating People, 160-62.

[78] Stuart Woolf, "Statistics and the Modern State" Comparative Studies in Society and History 31 (1989): 588-604.

> contribute to wise legislation, intelligent administration, or equitable taxation, or in any other way promote the general welfare.[79]

It might well be argued that the mathematization of the American forest was not driven by developments internal to the natural sciences but by these social ones.[80] The first quantitative measurements of the nation's forest as a whole were taken as part of the U.S. Census. Obviously, the numbers that produced this first quantitative picture were a direct product of this new statistical discourse on human populations. By picturing the forest exactly, forest scientists hoped to subject its growth and activity to the same precise knowledge and regulatory control as the human population. In addition to its methods and aims, mathematized forest science also owed its visual form to the new discourse on human populations. Although natural scientists like Humboldt had pioneered techniques for representing quantitative information visually, forest scientists relied most of all on a body of representational practice developed by statisticians and social reformers for scrutinizing human populations.[81]

The forest census maps of Brewer and Sargent were choropleth maps. They used a cartographic technique first developed to represent human population statistics. In 1819, Charles Dupin used gradual shadings from black to white to symbolize the distribution and density of illiteracy in France.[82] Although American social reformers and political economists were collecting similar sorts of information about the moral and vital statistics of the citizenry, this technique for representing population statistics cartographically did not appear in the United States until 1861, when the Census Office published "a map showing

---

[79] Francis A. Walker, " Eleventh Census of the United States" in Walker, Discussions in Economics and Statistics, II: 80.

[80] Peter J. Bowler suggests as much in The Norton History of the Environmental Sciences (New York: Norton, 1993), 273. The connections between statistics and the growth of the natural and social sciences are also explored by Lawrence Goldman, "The Origins of British 'Social Science": Political Economy, Natural Science, and Statistics, 1830-1835" Historical Journal 26 (1983): 587-616.

[81] See Edward Tufte, Visual Display of Quantitative Information (Chesire, CT: Graphics Press, 1983).

[82] H. Gray Funkhouser, "Historical Development of the Graphical Representation of Statistical Data" Osiris 3 (1938): 300, 269-404. On choropleth mapping, see Michael Blakemore "Choropleth Map" in Dictionary of Human Geography, eds. R.J. Johnston, D. Gregory, and D.M. Smith (3rd ed. Oxford: Blackwell, 1994), 65-66.

the distribution of the slave population of the southern states," produced by shading each county according to the percentage of the population that was enslaved. Sold "for the benefit of the Sick and Wounded Soldiers of the U.S. Army," the map was wildly successful.[83] It provided a detailed knowledge, at once individualized and totalizing, that enabled those interested in the slave population to calibrate their management exactly. Relying on these statistical maps during his march through Georgia, General William Tecumseh Sherman bragged, "No military expedition was ever based on sounder or surer data."[84]

Graphical methods provided mastery over the vast quantities of information being amassed by the census and the other projects of nineteenth century inventory science. Americans trying to picture their forest felt this frustration keenly. One reviewer of Hough's Report upon Forestry complained that this "mass of material... affords but little assistance to the student searching through much chaff for a few stray kernels of knowledge."[85] Statistical maps abstracted this wealth of individual data into discrete categories and represented their dispersion across the imaginary space of the map. Such visual presentation provided what the International Statistical Congress called the power of "revealing at a glance the principle relations of facts."[86] The seeing eye had long been considered the self-evident ground for truth, so it should be no surprise that Congressional advocates of a Statistical Atlas of the Census should appeal to the visual power of graphics. The U.S. Secretary of Interior touted its potential to "exhibit to the eye the varying intensity of settlement ... and other facts of material and social importance which have been obtained" by the census.[87] Truth depended on the immediacy and transparency of representation, and statistical maps seemed to deliver this in abundance. The International

---

[83] Anderson, American Census, 67-68.
[84] Lloyd Lewis, Sherman: Fighting Prophet (New York: Harcourt Brace, 1932), 432 quoted in Anderson, American Census, 64.
[85] "American Forestry" The Nation 28 (30 January 1879): 87, 87-88.
[86] Compte rendu de la troisième session du Congrès International de Statistique... (Vienne, 1858), 402 quoted in Funkhouser, "Historical Development of the Graphical Representation," 314.
[87] U.S. Congress, Letter from the Secretary of Interior, 5 July 1872, H. ex. doc. 9 (42-3), 1563.

Geographical Congress in Paris awarded Francis Walker a First Class Medal for the Statistical Atlas, which French geographers praised for making "the results of the 9th Census ... clear to the eye even of the ignorant."[88]

But the meaning of graphical signs was conventional, not self-evident and unmediated. The relationship between the arrangement of marks on the map and the exact quantity of forest depended upon a complex and controversial grammar. This was no less true of other forms of representation, whose mimetic qualities are wholly conventional--five-hundred years of tradition lies behind the self-evidence of the relationship between the scale and orientation of a line on a two-dimensional map and the three dimensions of an actual river.[89] But without any established practices, cartographers and statisticians debated the best way for graphics "to accomplish completely its magnificent role of universal and international expression" of statistical data.[90] Legends helped spell out the meaning of particular symbols, but scale, color scheme, and symbolization varied from figure to figure. Reading them required skill and experience that belied the immediacy and transparency of an "international language of science," which one American essayist cheered graphs were "fast becoming."[91] As late as 1899, John Martin, president of the Royal Statistical Society of London, hoped an international "agreement as to the best method of expressing vital or other statistics of international interest would render graphic tables immediately legible to statisticians of all nationalities."[92]

---

[88] Chevalier to Walker, 25 February 1875, quoted in Munroe, Francis Amasa Walker, 126.

[89] This point is made abundantly clear by J.B. Harley, "Deconstructing the Map" Cartographica 26 (1989): 1-20; Denis Wood, The Power of Maps (New York: Guilford, 1992).

[90] Émile Cheysson, "Les méthodes de statistique graphique à l'Exposition universelle de 1878" Journal de la Societe de Statistique de Paris 19 (1878): 324 quoted in Funkhouser, "Historical Development of the Graphical Representation," 320. The standardization of graphic signs remained controversial. See, for example, Lewis M. Haupt, "On the Graphic Presentation of Statistics" Journal of the Franklin Institute 148 (1899): 384-90.

[91] G. Stanley Hall, "The Graphic Method" The Nation 29 (1879): 238-39.

[92] John B. Martin, "On Some Developments of Statistical Research and Methods during Recent Years" Journal of the Royal Statistical Society 59 (1896): 621, quoted in Funkhouser, "Historical Development of the Graphical Representation," 320.

The conventional nature of this legibility did not itself present an epistemological problem as long as the underlying numbers were represented faithfully and mechanically. But as statistical maps and graphs became more common, it soon became clear that they did more than just summarize statistical facts. "Sometimes," explained a reviewer of the 1874 Statistical Atlas, "they exhibit facts that absolutely refuse to be shown by mere numerical tables. In short ... the very reason of their being is because words and numbers cannot or will not tell the whole truth."[93] The implications of this realization were unsettling. It suggested that the discovery and presence of the fact itself did not guarantee its true meaning. Rather, its significance was contingent and relative to its arrangement and representation. The persistent visual metaphors of exhibiting, seeing, and revealing affirmed faith in the independent existence of a hidden truth, but if "the great facts in political and social science" were true in and of themselves, then why did they need "maps and diagrams" to be "made readily and impressively intelligible in all their relations?"[94]

This anxiety runs through discussions of graphs and statistical maps. The French statistician Jacques Peuchet complained graphics served no "useful purpose in the study of statistics," being "but plays of the imagination as foreign to this science as the details of natural history or of topography with which some writers unfortunately wish to embellish it."[95] Peuchet resented graphics for making the craft knowledge of statisticians available to those without "the peculiar mathematical and intellectual training necessary" to become adepts, but he harbored substantive concerns as well.[96] He worried that the process of abstracting and representing the original numerical data in maps and graphs violated the sovereignty of the individual sensate fact that was the ground for truth in science.

---

[93] WHB, "Walker's Statistical Atlas of the United States" American Journal of Science and Arts 3d ser 10 (December 1875): 84, 83-88.
[94] "Notice of Walker's Statistical Atlas of the United States" American Journal of Science and Arts 3d ser 9 (January 1875): 74-75.
[95] Jacques Peuchet, Statistique élémentaire de la France (Paris, 1805), 33 quoted in Funkhouser, "Historical Development of the Graphical Representation," 295. A referee made this same complaint about the graphs in my first publication. "Real scientists," I was told, "present their data in tables."
[96] WHB, "Walker's Statistical Atlas of the United States," 83.

Ironically, Auguste Comte had leveled the very same objection against statistics, because aggregation and averaging "would habitually lead us in practice to reject as numerically improbable events which nevertheless take place."[97]

Though less concerned with the formal rules of inference in Comte's positivism, statisticians had similar concerns about graphic illustration and statistical mapping. At the Third International Statistical Congress in 1857, the German political economist Ernst Engel expressed "some reservations" about graphical methods "because it seems to me they are not scientific."[98] In contrast to the raw numbers, for which "no explanation would be required," the German statistician Georg von Mayr believed, "graphic representation of statistical results" required "special consideration," because it was secondary and its true meaning depended upon convention.[99] Even the most enthusiastic supporters of "graphic illustration," like Francis Walker, made this same hierarchical distinction between number and its representation. They tended to discount graphs and statistical maps as mere visual aids: means of popularizing statistics and bringing its "results within the comprehension of the least skilled and the least learned."[100] Like those skeptical of graphing, they believed that visual representation was supplemental to the underlying mathematical truths it illustrated.

Yet, the raw numbers on which they founded their faith were themselves no less artificial. They too were products of convention and representational practice. Nineteenth century statisticians argued furiously about how numbers and statistics could best represent society. Exact enumeration depended upon the construction of prior theoretical categories

---

[97] Auguste Comte, Cours de philosophie positive (Paris, 1835), II: 371, quoted in Porter, Rise of Statistical Thinking, 155. Comte had a personal axe to grind as well, because the Belgian statistican Adolphe Quetelet appropriated the title of Comte's science, *physique sociale,* obliging Comte to coin a new title for his project: sociology.

[98] Compte rendu, 402, quoted in Funkhouser, "Historical Development of the Graphical Representation," 315. On Engel, see Ian Hacking, "Prussian Numbers 1860-1882" in L. Kruger, ed., Probabilistic Revolution (Cambridge, MA: MIT Press, 1987), I: 377-94.

[99] Georg von Mayr, Die Gesetzmässigkeit im Gesselschaftsleben (Munich, 1877), 70 quoted in Funkhouser, "Historical Development of the Graphical Representation," 333-34.

[100] Francis A. Walker, "The Eleventh Census of the United States" in Walker, Discussions in Economics and Statistics, II: 78.

defining what would and what would not be counted. Idealists like Frederic LePlay believed that the individual was the proper object of statistical science. He selected representative families and collected quantitative information about their budgets down to the most minute detail. Atomists, by contrast, insisted that the best way to represent society statistically was on the basis of averages calculated from very large collections of individual-level data.[101]

Foresters were less given to such sophisticated methodological discussion. Their calculations of forest growth, for instance, relied on a mixture of both approaches to statistical representation. To calculate the typical growth rate of second growth spruce, Bernhard Fernow collected measurements from 100 sample trees from six separate sites in Maine.[102] Ralph S. Hosmer used many more samples to construct his spruce yield table, which predicted future volume based on present stand age, but they were all from a single site near Greenville, Maine.[103] Gifford Pinchot thought that measurements from twelve sample plots "represent accurately the average conditions" of the Adirondacks, but he said nothing about how he selected the "representative" sample areas from which his average was constructed.[104]

Those of a more inductivist sensibility were less inclined to accept these results as truly representative. Austin Cary declined to write the US. Forest Service a monograph about spruce because any generalization would require "several years travel & long first hands study of the species in the different parts of its habitat in the United States." Instead, he proposed a detailed, local study of spruce in Maine as the only way to "give any better or surer information," but the Forest Service was interested in something of more general

---

[101] Ian Hacking, The Taming of Chance (New York: Cambridge Univ. Press, 1990),133-41, 95-104.
[102] Cary to Fernow, 11 February 1896, Bangor, U.S. Forest Service. Correspondence with Austin Cary, RG 95. U.S. National Archives microfilm, Washington, DC. (hereafter, USFS, Cary Correspondence).
[103] Ralph S. Hosmer, "A Study of the Maine Spruce," in Maine Forest Commissioner, Report (1902): 65-108.
[104] Gifford Pinchot, The Adirondack Spruce: A Study of the Forest in Ne-Ha-Sa-Ne Park (New York, 1898), 3.

applicability, and nothing came of Cary's counter-proposal.[105] Although Cary hesitated to make generalizations about spruce on a national scale, he was confident that his exact, numerical measurements provided "safe and trustworthy knowledge" about its condition in Maine. His conclusions "cannot be discredited, because for the facts no authority was taken but the woods themselves."[106]

Cary's direct appeal to the facts was somewhat disingenuous, because he was also appealing to the cultural authority of science. Against mere speculation about the forest, he weighed in with proven and precise scientific knowledge. The late nineteenth century conflict between religion and Darwinism had confirmed, at least for American liberals, the necessity of excluding *a priori* theorization and metaphysics even more rigorously from scientific observation of the natural world.[107] In this climate of empiricism, direct experience could be the only foundation for authoritative knowledge. "Facts at first hand," declared Cary, was the "motto" of forest science. "Mere opinion had to be cast aside, and methods of real investigation devised which should ascertain directly the fundamental facts from which alone could safe conclusions be drawn."[108]

The fundamental facts "were to be obtained only in the woods," but the problem was that the facts could not be experienced, let alone represented, "directly," as Cary claimed.[109] Even such apparently simple activities as counting and measuring depended upon prior theoretical categories and the construction of conventional measures. One of the persistent problems with timber inventories in Maine was that cruisers had difficulty distinguishing black spruce from white spruce.[110] This, of course, is Kuhn's point about

---

[105] Cary to [B.E. Fernow], 22 February [1897?], East Machias; Cary to B.E. Fernow, 20 November 1895, Bangor, USFS, Cary Correspondence.
[106] Austin Cary, "The Forests of Maine" Paper Trade Journal 25 (25 April 1896): 364-65.
[107] Dorothy Ross, The Origins of American Social Science (New York: Cambridge Univ. Press, 1991), 54-60; David E. Shi, Facing Facts: Realism in American Thought and Culture (New York: Oxford Univ. Press, 1995), 66-78.
[108] Austin Cary, "The Forests of Maine" Paper Trade Journal 25 (25 April 1896): 364-65.
[109] Austin Cary, "The Forests of Maine" Paper Trade Journal 25 (25 April 1896): 364-65.
[110] Edward Jack, "The Spruce" New York Lumber Trade Journal 15 July 1887, pp. 3-4.

the mathematization of the sciences.[111] Far from being the pristine realm of empirical fact that they are so often said to be, science and mathematics are impregnated with theory.[112] Cary's calculations depended upon taxonomy, the selection of trees to sample, conventions of enumeration, and theoretical assumptions about rates of growth and patterns of succession. The woods did not speak for themselves. They needed numbers to represent them, but numbers were no different. Their meaning also depended upon the way they were represented to be.

My point here is not to contrast the artificiality of numerical and scientific representation with some other, more direct and realistic representation of the forest. Nor, at the other, idealist extreme is it to suggest that the scientific representation is completely divorced from "the world."[113] Rather, it is to question the effects of this problematic opposition of representation and reality.

This dualism naturalized representation. It made the appearance of a representation secondary to an underlying presence that guaranteed its truth. Statistical maps seemed merely to "present to the eye the chief results arrived at," mathematical results that already existed independently and that maps simply represented second hand.[114] Physical marks on the page appeared to be essentially inert material objects categorically distinct from the meta-physical meaning they represented. The numbers themselves could be transcribed but the quantities they represented seemed immutable and fully independent of the means by which they were physically reproduced and re-presented in printed copies. The appearance of this two dimensional order was part of the much wider institution of what Timothy Mitchell calls "the world-as-exhibition", a characteristically modern (and European) way of

---

111 Kuhn, Essential Tension, 219.

112 David Bloor relies on Wittgenstein to make this same argument about mathematics. Bloor, Knowledge and Social Imagery (London: Routledge & Kegan Paul, 1976). Trevor Barnes makes a similar case about quantification in economic geography. Barnes, Logics of Dislocations: Models, Metaphors, and Meanings of Economic Space (New York: Guilford, 1996), 161-84.

113 Kuhn has often been accused of such idealism. This is a common misreading proferred with equal enthusiam by supporters and opponents of post-structuralism.

114 "Notice of Walker's Statistical Atlas of the United States," 74-75.

enframing the world to appear as something picture-like, known in terms of a relationship "between the material realisation of things themselves and their invisible, meta-physical structure" or meaning. Such an absolute distinction produced a tremendous certainty of representation. It rendered scientific truths objectively-- that is, in the form of objects that could appear to be absolutely distinct from their meaning and the representational framework through which this effect was produced.[115]

This set of binary oppositions is much older than Mitchell indicates. The Cartesian cogito was also founded on the certainty of representation in the theater of the mind's eye, while in An Essay on Human Understanding, a foundational text for the Anglo-American tradition of empiricism, John Locke compared the mind to a blank slate, impressed upon by external things-in-themselves. What was different about the late nineteenth century, however, was that the world had been arranged even more representationally. A vast exhibitionary machinery produced an unending cascade of realistic representations, objects carefully set up and specially arranged to signify. The vast quantity and incredible realism of these representations evoked the sense that there must be something else, some original order, more real than the present one, of which these objects were merely copies. When Karl Pearson, whose Grammar of Science was perhaps the most influential turn-of-the-century exposition on the scientific method in the United States and Britain, described the bedrock of the Cartesian cogito, he compared consciousness to a central telephone exchange relaying, processing, and storing immediate sense impressions from an external world.[116] The fact that he, like Descartes and Locke, had to appeal to metaphor to articulate the self-evidence of experience suggests that empiricism and the difference between reality and representation on which it is founded are not as self-evident as they sometimes seem.

---

[115] Timothy Mitchell, Colonising Egypt (1988. Berkeley: Univ. California Press, 1991), xii. The phrase "certainty of representing" is from Martin Heidegger, "The Age of World Picture" in his The Question Concerning Technology and Other Essays, trans. W. Lovitt (New York: Harper & Row, 1977), 127.
[116] Karl Pearson, The Grammar of Science (3rd ed. London: Adam & Charles Black, 1913), 44-46.

Pearson's appeal to a metaphor of technologically disembodied speech also registered some of the disorientation caused by the modern avalanche of information.

New representational technologies like the census, the statistical map, and the photograph produced an unprecedented effect of certainty, but this certainty had a paradoxical quality. The source of objective truth was the difference between representation and reality, but this distinction, on which the certainty of the modern world-as-exhibition depended, was itself produced through the practice of representation. It was only possible to verify the truth of growth tables and the other representational tools of mathematized forest science by taking surveys and other empirical observations. Representation and reality, as it turned out, were not nearly as distinct as they appeared. The so-called real world against which the truth of particular representations might be tested could only be grasped through other representations. Austin Cary's scientific knowledge of the forest rested on measurements, maps, and other representations of the forest, not the forest itself. It was predicated upon setting up the world representationally: rearranging objects to stand for something, and the whole set-up evoking a larger truth. This appearance depended upon the discernability of representation as merely representation, an inert frame completely separate from the prior and pristine reality it illustrated. The apparent realism with which pictures of the forest were set up and the way in which their structure presented them to the viewer as a model of something else reinforced the matter of fact distinction between external reality and its precise representation in numbers, maps, and pictures. Although this binary effect was the result of particular social practices of arrangement and erasure, it seemed increasingly as if it were not, as if abstractions like Nature, Number, and the American forest somehow existed apart from and prior to the material realm in which they were realized and represented.

Quantification imparted a degree of precision and accuracy to forest science that had not been possible previously. It enabled the forest to be depicted more completely and in more exact detail than ever before. Numbers could be set up and manipulated as pure

symbols, drained of any inherent meaning as things themselves. This was crucial, because it allowed the form of quantitative knowledge to change without altering its meaning. Unlike other representations of the forest, numerical ones could be tabulated, averaged, and graphed without changing. Even an arch empiricist like Austin Cary recognized that while direct experience of the forest was the bedrock of scientific knowledge, it did not guarantee certainty. The form of knowledge was also important. Informal and qualitative knowledge was prone to be "inaccurate." It often proved unreliable because "it cannot be conveyed to another man," at least not in any precise and reproducible fashion.[117] Quantitative knowledge, by contrast, was much easier to replicate, because it relied on standardized rules that left much less to individual discretion and interpretation.

Such pragmatic considerations were certainly an important force behind the mathematization of science, especially of applied sciences like forestry, which were more concerned than most with "working," but faith in numbers rested on metaphysics and those age old dualisms between mind and body, thought and action. As an *a priori* analytical language, existing quite apart from the material world, mathematics seemed to present an ideal form in which to represent the world. The philosopher Carl Hempel compared it to a "theoretical juice-extractor" squeezing out "the implications of a given set of" empirical findings "but add[ing] nothing to their content."[118] The significance of arguing that numbers were mere signs, empty in themselves, was that what they represented could then be thought of as something more, existing apart from the numbers themselves. Although this mysterious juice could not be known until after it was represented, the sharp distinction between mathematics as pure thought and the material it represented assured forest scientists that the properties of the forest they represented mathematically were more than

---

[117] Austin Cary, "Topographical and Timber Maps," in Maine Forest Commissioner, Report (1902): 145, 142-49.

[118] Hempel, "Geometry and Empirical Science" in H. Feigl and W. Sellars, eds., Readings in Philosophical Analysis (New York: Appleton-Century-Crofts , 1949). 235, 236. In geography, this view of mathematical analysis was most forcefully advanced by Harvey, Explanation in Geography, 183.

just statistical artifacts. They were material facts, essential truths about the forest, that had been there all along just waiting to be discovered.

Fortified by this representational power, forest scientists were confident about discovering the essential nature of the forest. Foresters busied themselves collecting measurements and statistics, sorting through these numerical representations, and arranging them to represent the true state of the forest. By quantifying the facts whenever possible and representing scientific knowledge of the forest mathematically, foresters achieved a degree of uniformity, precision, and analytical rigor that characterized the exact sciences like physics.

But more than physics envy was involved in the mathematization of American forestry. Mathematics provided a set of powerful tools useful for reducing the flood of individual data to manageable proportions. A measurement of breast height diameter could conveniently represent the volume and, with some additional calculation, the age of an entire tree. A sample transect could represent an entire forest, so that the forest could be known at a distance by means of a simple numerical inscription.[119] This involved work to be sure. Representation was a practical affair. Sample plots had to be laid out, transects paced off, and regular measurements recorded; field notes were taken down and transcribed in the office; computations were worked up with the aid of slide rules and adding machines.[120] It took George Kephart and three other foresters nearly a year of arduous field work to survey, map, and inventory the Penobscot River lands of the Lincoln Pulpwood Company. When they were done, company executives in Bangor had available at their fingertips quantitative information about the species composition, age structure,

---

[119] This point is emphasized by Bruno Latour, Science in Action (Cambridge: Harvard Univ. Press, 1987), 237-57.

[120] William C. Hodge described the physical challenges of performing this kind of survey work for the Great Northern Paper Company. "On account of the lack of roads we have had to cover three towns from the same main camp. This has necessitated packing trips of three & days at a time. For such a trip the services of a packer are indispensible, making an extra man in the survey party, which thus contains five men in all. The packer assists the compass man in taking the notes as far as he is able but his attention is pretty well confined to getting his pack through the windfals." Hodge to Overton Price, 12 August 1902, Seboomook, ME, U.S. Forest Service. Correspondence with W.C. Hodge, RG 95. U.S. National Archives microfilm, Washington, DC.

volume, and layout of vast holdings that they had probably never seen in person. Indeed, short of repeating the year of field work that Kephart and his colleagues had performed in preparing their report there was no other way to gain this kind of knowledge "in person."[121]

Part of this improved power to know at a distance came from the way that numbers enabled foresters to reduce the many subjective qualities of things in the world to a single common denominator.[122] They provide a way to make the dissimilar similar and equally subject to rational calculation. Enumerated on paper, very different qualities like temperature and tree volume can be compared and correlated simultaneously because their numerical representatives are subject to the same formal rules of mathematics. Numbers are easier to manipulate than their actual referents. Sitting at the center of a vast archive of numerical representations of the forest, foresters were well placed to exercise great control over the object of those representations.[123]

Forestry is an applied science, less concerned with representing nature, than with managing it. This requires reliable representations, to be sure, but it also means that the grounds for evaluating forestry are not the absolute accuracy of its representations as much as the efficacy of its interventions and the adequacy of the knowledge on which they are based. As paid consultants, foresters well understood that the conditions of adequacy in science were contextual in the extreme:

> A hunger for accuracy is part of the make-up of every good surveyor and map-maker. At the same time, he has to remember that if such work costs more than it is worth to the man who pays for it, it will not be

---

121 George S. Kephart, Campfires Rekindled: A Forester Recalls Life in the Maine Woods of the Twenties (Marion, MA: Channing Books, 1977), 20, 39-46.

122 The phrase belongs to Max Horkheimer and Theodor W. Adorno, Dialectic of Englightenment, trans. J. Cumming (1944. New York: Herder & Herder, 1969), 7.

123 In his Imperial Archive, Thomas Richards argues that the idea of an imperial archive was a Victorian fantasy because it was easier to unify texts than an empire. He misses, I think, as an essential point about networks. Representations are not powerful because they capture something about the world, but because the world has been translated into their terms. I owe this observation to Bruno Latour, "Give Me a Laboratory and I Will Raise the World" in K. D. Knorr-Cetina and M. Mulkay, eds., Science Observed: Perspectives on the Sociology of Science (London: Sage, 1983), 141-70.

> done. Accuracy to a certain degree is necessary; on the other hand, there are limits of cost. A proper balance between the two is required. The result may be called an efficient map.[124]

There was a price to be paid for the mathematization of the American forest. Anything that could not be counted or somehow reduced to a number did not count. Forest inventories kept track of the standing volume of timber, but the quality of merchantable timber, so important in determining the market value of a logging chance, escaped precise measurement and thus effective management. The standard tool of quantitative forestry was the yield or growth table, which predicted the future volume of a stand based on its age. By measuring the volume and age of a number of sample plots, it was possible to construct a linear regression that determined the dependent variable, growth, in terms of the independent one, age. Scatter around the line of the linear regression expressed some of the imprecision of this relationship and indicated, at least obliquely, that volume was not solely determined by age, but usually this material, which lay bare the construction of the yield table, was consigned to an appendix. Instead, most foresters confronted the yield table in the form of a 2x2 table in which volume was directly given by age without any hint of the limitations of this mathematical relationship.[125] This abstraction ignored the effects of interspecific relations on growth. Persistent problems with insect and fungus pests and with succession in the cut-over have proven what a serious omission this was, but the growth table remains indispensable to forestry because it predicts future growth, the statistic necessary for calculating present harvest size and value.

Climate, soil quality, physiography, and other site specific factors affecting growth were also difficult to account for in mathematical growth tables. This independence from local particularities was what gave mathematical methods their power. They could be

---

[124] Austin Cary, A Manual for Northern Woodsman (2nd ed. Cambridge: Harvard Univ. Press, 1911), 111. This point is also emphasized by James Sewall, "Crusing for Quick Values in the Northeast" Journal of Forestry 22 (1924): 65-68.

[125] See, for example, W.H. Meyer, Yields of Second Growth Spruce and Fir in the Northeast (Washington: U.S. Dept. Agriculture, tech. bull. 142, 1930).

applied anywhere without regard to place or context, but excessive reliance on these mathematized tools led to what the distinguished forester David M. Smith calls "canned systems." On field trips at forestry school in Germany, Smith recalled, "the first step was to lay out some fixed area plots to determine where the stand stood in relation to the yield table. If it didn't fit the yield table, well, there was something wrong."[126] Rather than exercising individual discretion, too often foresters tried to follow the book, sometimes with disastrous results.

---

[126] Harold K. Steen, ed., David M. Smith and the History of Silviculture: An Interview by Harold K. Steen (Durham, NC: Forest History Society, 1990), 58.

5. Forest Knowledges and the Famine

The most public manifestation of the efforts to mathematize forest science was the controversy over future forest supplies. Unlike most of the discussion of quantification in forestry, which took place in the relative quiet of the academic literature, debate about the prospects of a timber famine raged in the popular press and in the halls of government. The representation of the American forest as a rapidly shrinking quantity had important policy implications. In the wake of Sargent's 1880 census report and its dramatic pictures of the nation's evaporating forests, editorialists threw wild estimates of remaining reserves back and forth in their columns. Banner headlines announced, "The End of Lumber in Sight."[1] In 1910, Gifford Pinchot, chief of the U.S. Forest Service, published his best-selling Fight for Conservation in which he declared, "the United States has already crossed the verge of a timber famine so severe that its blighting effects will be felt in every household in the land." The image of a nation starving for wood was a provocative one, and Pinchot used it to galvanize support for sweeping changes in the way that the nation's forests were owned and managed.[2]

Others disagreed-- both with Pinchot's dim diagnosis and with the stark conclusions he drew from it. Representatives of the forest products industry fiercely opposed the government-mandated conservation measures Pinchot and other conservationists proposed to alleviate the forest problem. But it was difficult to impeach this opposition as naked self-interest as long as it was couched in the same scientific terms as the claims of ardent conservationists. Rather than rejecting forest conservation out of hand, industry representatives offered their own, often very different pictures of the forest,

---

[1] "The Lumber Supply" Bangor Daily Commercial 2 January 1901, p. 4, quoting New York Times.
[2] Gifford Pinchot, The Fight for Conservation (New York: Doubleday, Page & Co., 1910), 14-15.

future supply, and demand. In 1903, the National Wholesale Lumber Dealers' Association discounted the more pessimistic timber famine forecasts for failing to take second growth into account. It noted that if "the conclusions of the census of 1880 had been valid, the entire stock of White Pine in the United States would have been out of existence in 1890."[3] Such representations legitimated specific programs of action by setting up and constructing the forest as an object for which they could speak, but representation never went unopposed. Public discourse was wide open, particularly in a budding field such as conservation where there were no widely recognized authorities and claimants had to struggle to establish their credibility. Although there was some consensus on the importance of mathematical methods, it was much harder to reach firm conclusions about the actual size of the forest, its rate of growth and depletion, and its future prospects-- the facts on which conservation policy was founded.

The Eleventh Census in 1890 discontinued the forest inventories of Brewer and Sargent, much to the disappointment of the Forest Service and its chief Bernhard Fernow.[4] The reasons were unclear, but Fernow blamed Henry Gannett, geographer to the U.S. Census, with whom he had been debating about the scope of deforestation in the United States. Fernow charged that "as far as Mr. Gannett's estimates and calculations of woodland areas are concerned, they are wholly irrelevant to the question at issue, namely, the question of timber supply; for he overlooks entirely the character of such wooded lands as timber producers."[5] In the absence of reliable census statistics, the U.S. Forest Service stepped in with research and quantitative estimates of its own. In 1895, Fernow put the amount of standing saw timber at 562 million acres. In 1907, William B. Greeley told the National Conservation Commission that the national supply was down to 515 million acres. A year later, E.A. Zeigler put the figure at 495 million acres, while Royal Kellogg

---

[3] Forestry and Irrigation 9 (4 April 1903): 203.

[4] Technically, Fernow was chief of the U.S. Forest Bureau, which was not renamed the U.S. Forest Service until 1905, but I will refer to it by its more familiar name.

[5] U.S. Forest Service, Report (1890), quoted in Andrew Denny Rodgers III, Berhard Eduard Fernow: A Story of North American Forestry (Princeton: Princeton Univ. Press, 1951), 201.

testified that the nation's forests were being cut "three times as fast as they were growing."[6] Others begged to differ. Gannett, geographer to the Geological survey, thought alarmism about "the destruction of our forests" was "all bosh."[7] James E. Defebaugh, editor of American Lumberman, also concluded that Forest Service estimates tended to "exaggerate the seriousness of the exigency," but agreed that with the general picture that officials drew from this quantitative picture of the forest: Americans were no longer "drawing on the surplus" but had begun to deplete "the capital fund" of the forest. Conservation, he argued, was a national necessity. That, of course, was one of the conclusions of William Greeley's 1925 article for Economic Geography.[8]

local knowledge

This debate about timber supplies, growth, and depletion echoed in Maine, but the state was more than simply a stage for national discourse on the timber famine. As one of the first states to have divested its public domain and to have developed a lumber industry, Maine was widely held out as a sign of things to come in the rest of the nation. Some people thought that the incredible pace of industrial logging in the privately held Maine Woods foretold nationwide disaster as short-sighted lumbermen and landowners sacrificed the needs of the public and of future generations on the altar of profit and immediate self-interest. Others celebrated the Maine Woods as a model of wise use in which enormous fixed-capital investments led corporations to manage the forest scientifically so as to conserve a long-term sustained yield. Nearly everyone agreed that Maine presented a

---

[6] U.S. Congress, Report of the National Conservation Commission, Henry Gannett, ed. (Washington: GPO, S. Doc. 676, 1909), II: 640-42, 203-69, 188-90.
[7] Quoted in Michael Williams, Americans and Their Forests: A Historical Geography (New York: Cambridge Univ. Press, 1989), 431.
[8] James E. Defebaugh, History of the Lumber Industry of America (Chicago: American Lumberman, 1906), I: 273, 272. For discussion of these and other estimates, see Marion Clawson, "Forests in the Long Sweep of American History" Science 204 (15 June 1979): 1168-74; Williams, Americans and Their Forests, 431-46.

picture of national significance. They disagreed bitterly, however, about the state of this forest and what it might mean.

As in the nation at large, debate about a timber famine in Maine began in the late 1870's and 1880's. Over a century of logging in the Maine Woods had left only the uppermost reaches of the Androscoggin, Kennebec, Penobscot, and St. John watersheds uncut. The average size of logs rafted on the Penobscot, for example, shrank from 223 feet in 1851 to about 100 in 1891.[9] As high quality logs became scarce and more expensive, it became difficult for Maine's lumber industry to compete with producers in the South and Lake States who enjoyed both more up-to-date equipment and cheaper sources of logs to make the dimension lumber for which Maine had long been renowned. Although the actual volume of sawn lumber did not decline until after 1910, it generated neither the profits nor the steady employment of former days.[10] Commentators warned that "the lumber industry in Maine is waning," and with it, the economic foundation of tidewater towns like Bangor that depended on the annual drive of logs to provide jobs in the mills, in the woods, and in the shops on Exchange Street that catered to the woodsmen.[11]

The sight of once busy mill sites lying vacant symbolized this restructuring and made palpable fears of a timber famine. The rise of the pulp and paper industry in Maine made local log shortages even more acute. With their higher fixed costs, pulp and paper manufacturers could afford to bid up the price for logs, land, and stumpage, further accelerating the decline of the lumber industry in Maine. J. P. Bass, a prominent landowner and editor of the Bangor Daily Commercial, cautioned that with "the capacious maw of the hungry chemical vats" and other "modern industrial uses" consuming so much of the forest, the Maine Woods "cannot be too carefully guarded or too strictly economized."[12]

---

[9] In 1833, it had been 343 feet. Figures for 1833-57 are available from David Norton, Sketches of the Town of Old Town, Penobscot County, Maine (Bangor, 1881), 25-26. The 1891 estimate is from F.L. Harvey, "Preservation of Our Forests" in Maine Forest Commissioner, Report (1891): 37, 29-41.

[10] For production statistics, see Austin H. Wilkins, The Forests of Maine (Augusta: Maine Forest Service, bull. 8, 1932), 51.

[11] Harvey, "Preservation of Our Forests," 36.

[12] "Our Northern Forests" Bangor Daily Commercial 7 September 1895, 4.

He was not alone in his anxiety about ravenous pulp mills. Their tremendous capacity to "eat the forests from the face of the earth" captured the essence of the timber famine. It was not a natural disaster, but a man-made one in which greed and an uncontrolled appetite for wood promised to leave Maine and the nation as a whole starving for forests.[13]

People deployed this rhetoric of gluttony, waste, and resultant famine to refer to a number of different problems associated with deforestation and indiscriminate logging. For some, the timber famine meant that there would soon be no more lumber. Others attributed their difficulties with agricultural pests and poor crops to "climatic changes" brought on by "the removal of these magnificent forests." On the Great Plains it was hoped that ploughing and planting trees would bring rain, while in Maine deforestation was blamed for all manner of climatic calamities. Such popular beliefs received some support in the scientific literature, where the relationship between forests and climate was being hotly debated in the late nineteenth century.[14] Flooding, silting, and streamflow changes were also commonly blamed on unrestricted logging and the disappearance of the forest, which "moderat[es] alike freshets and drought."[15]

These themes were brought together by George Perkins Marsh, whose Man and Nature has come to be the contemporary symbol of the dawning historical realization that logging and land clearing have unintended ecological consequences. Drawing on his experience as a classical historian and American ambassador to Italy, Marsh described deforestation in his native Vermont and in ancient times when "man's ignorant disregard of the laws of nature" led to the fall of the Roman Empire.[16] The comparison created

---

[13] "Uses of Wood Pulp" Bangor Daily Commercial 9 January 1899, 4. For similar anxieties about the pulp and paper industry, see Bangor Daily Commercial 2 December 1895, 4.

[14] Maine Board of Agriclture, Report (1869): 65-85. On the scientific debate, see Kenneth Thompson, "Forests and Climate Change in America: Some Early Views" Climatic Change 3 (1980): 47-64; Henry N. Smith, "Rain Follows the Plow: The Notion of Increased Rainfallfor the Great Plains, 1844-1880" Huntington Library Quarterly 10 (1947): 169-93.

[15] "Save the Forests" Eastern Argus 17 February 1883. See also, Bangor Daily Commercial 20 June 1872; "More Forest Area Needed" New York Lumber Trade Journal 15 January 1887, 2; "Need of Saving Forests" Bangor Daily Commercial 18 February 1909, 4.

[16] George Perkins Marsh, Man and Nature: Or, Physical Geography as Modified by Human Action (1864. Cambridge: Harvard Univ. Press, 1965), 11. Traditionally, historians have regarded Marsh's book as a

unsettling feelings for people schooled on American exceptionalism. By comparing the United States to classical Greece and Rome, Marsh implied that a similar fate would befall American society if deforestation were allowed to continue unchecked.[17] The deforested Mediterranean became a regular stop on the European tour of Americans traveling to Europe for an education in forestry. Remarking on the dry hills of Italy where "there must probably have once been tree growth," Austin Cary could not help but think of Maine.[18] The experience and his visit to the scientifically managed German forests left him "feel[ing] a great deal more confident about taking hold of our own woods to manage them for steady spruce supply."[19]

The European encounter had a similar effect on other American foresters. Many went to German universities, while others were taught by or read the books of German professors, who were the leading authorities in late nineteenth century forest science. Over and over again they were told that "if history teaches anything, [it] is the lesson taught by European experience."[20] Europe reflected the future of America. With its frontier closing and its finite supplies of virgin timber being drained away, the United States faced a choice. It could either follow the path of German forestry or pursue that of Greek tragedy. In short, the timber famine presented more than simply an economic or environmental problem. The nation's sense of itself was also at stake.

---

turning point in American attitudes to the environment, but I would suggest that Marsh's book was less a cause than an effect-- and a convenient marker-- of this shift. In their memoirs both Gifford Pinchot and Charles S. Sargent attribute their initial concerns about forest conservation to Marsh's book, but Marsh's book is scarcely mentioned in contemporary writings. Pinchot, Breaking New Ground (New York: Harcourt Brace, 1948), 4; Sargent to R.U. Johnson, 25 November 1908, quoted in S.B. Sutton, Charles Sprague Sargent and the Arnold Arboretum (Cambridge: Harvard University Press, 1970), 77.

[17] On the turn-of-the-century re-evalauation of American exceptionalism, see Donald K. Pickens, "Westward Expansion and the End of American Exceptionalism: Sumner, Turner, and Webb" Western Historical Quarterly 12 (1981): 409-18.

[18] Austin Cary, Travel Diary, April 1896, Box 1664, Austin Cary Papers, Univ. Maine.

[19] Cary to B.E. Fernow, 18 October 1896, Bangor, U.S. Forest Service. Correspondence with Austin Cary, RG 95. U.S. National Archives microfilm, Washington, DC. (hereafter, USFS, Cary Correspondence).

[20] B.E. Fernow, "Scientific Forestry in Europe: Its Value and Applicability in Canada" in Canadian Commission of Conservation, Report (1910): 33.

In Maine, community and personal identities rested on lumbering and the forest. W.F. Ganong, a New Brunswick native and professor of natural history at Smith College, objected to the smell and "indiscriminate rapacity" of the pulp mills, but most of all he feared the industry would destroy the character of the primeval forest and that corporate accountants would displace the romantic river drivers who peopled it.[21] Maine was the Pine Tree State, although the white pine, which crowned the state seal, had been logged so heavily that it was a relative rarity by the mid-nineteenth century. The Bangor Daily Commercial wondered, "How long will it be before Maine will feel called upon to remove the historic pine tree from her seal and substitute therefor the chimney of a pulp mill?"[22] The industrial assault on the forest also threatened the basis for local pride and masculine identity in woods work. With the forests gone, it would no longer be possible to sing, as the logging shanty did:

> Come, all ye sons of freedom throughout the State of Maine,
> Come, all ye gallant lumbermen, and listen to my strain;
> On the banks of the Penobscot, where the rapid waters flow
> O! we'll range the wild woods over, and a-lumbering we will go.
> O! we'll range the wild woods over, and a-lumbering we will go.[23]

As far as Maine's farmers were concerned, this would not have been an entirely bad thing. They had long held that the Maine Woods and the lumbermen who owned it must make way for agricultural settlement. Conservationists had to work against this ingrown

---

[21] "New Brunswick Forests" Bangor Daily Commercial 27 May 1899, 4. On Ganong, see Mary E.J.E. Sanger, "William Francis Ganong, Regional Historian" (M.A. thesis, Univ. Maine, 1980). This was also a theme pursued by Maine writers Fannie Hardy Eckstorm and Holman Day. Eckstorm, David Libbey: Penobscot Woodsman and River-Driver (Boston: American Unitarian Association, vol. IV of True American Types, 1907); Eckstorm, The Penobscot Man (Bangor: Jordan-Frost, 1924); Day, King Spruce: A Novel (New York: A.L. Burt & Co., 1908); Day, The Rider of the King Log (New York: A.L. Burt & Co., 1919).

[22] "Pine Trees of Maine" Bangor Daily Commercial 26 February 1901, 4, quoting New York Tribune.

[23] "The Logger's Boast" in John S. Springer, Forest LIfe and Forest Trees: Comprising Winter Camp-Life among the Loggers and Wild-Wood Adventure... (New York, 1851), 132-33. For an analysis of its provenance and evolution, see Fannie Hardy Eckstorm and Mary Winslow Smyth, Minstrelsy of Maine: Folksongs and Ballads of the Woods and the Coast (1927. Ann Arbor: Gryphon Books, 1971), 41-43.

prejudice. In calling for government action to conserve the forest, George F. Talbot challenged nearly a century of agrarian rhetoric about the agricultural destiny of Maine. He asserted that forestry, not agriculture, "is our leading interest, and that upon which all others are more or less dependent."[24] But suspicions ran deep in rural Maine, especially in northern Aroostook County where large landowners had long refused to sell to settlers on the grounds that clearing forest land and improving it for agriculture destroyed its value for logging.[25] Henry A. Prentiss, a Bangor lawyer whose extensive forest land holdings had often put him in conflict with squatters, believed the greatest obstacle to forest conservation in Maine was "public opinion [which] favored the clearing of land in the interests of farmers." He thought "farmers should be educated up to the needs for the preservation of our forests."[26]

For Prentiss and others interested in the Maine lumber industry, a timber famine posed a serious business concern. In 1888, Talbot along with Prentiss and many other leading landowners and lumbermen organized the Maine Forestry Association to consider "the problem of preserving and restoring the forest growth upon the wild and rough lands of the State."[27] At its first meeting, in Bangor, University of Maine professor F.L. Harvey told the association that at the present rate of cutting, the Maine Woods would last only another 50 years, but other predictions were even more dire. John E. Hobbs of South Berwick warned that with New England stripped of its white pine and the Lake States

---

[24] G.F. Talbot, "Mr. Hobb's Forestry Bill" Daily Eastern Argus 12 February 1889, 2. On Talbot, see David C. Smith, A History of Lumbering in Maine, 1861-1960 (Orono: Univ. Maine Press, 1972), 341-43, 367

[25] Richard W. Judd, Aroostook: A Century of Logging in Northern Maine (Orono: Univ. Maine Press, 1989), 93-94. This was also true in northern Quebec and Ontario. R. Peter Gillis and Thomas R. Roach, Lost Initiatives: Canada's Forest Industries, Forest Policy and Forest Conservation (Westport, CT: Greenwood Press, 1986).

[26] Quoted in "The Forestry Meeting" Bangor Daily Commercial 18 December 1888, 1. For an example of Prentiss's strained relationship with settlers and squatters, see Henry M. Prentiss to Marcellus H. Judkins of Prentiss Plt., Me, 14 May 1874, Bangor, Letterbook I: 229-31, Box 1409 Prentiss and Carlisle Company Papers, Univ. Maine Library.

[27] "Forestry Preservation" Bangor Daily Commercial 23 November 1888, 1. The charter members of the Maine Forestry Association included political elites such as Governor Robie and Senator Nelson Dingley and large landowners like R.G. Pingree, J.P. Bass, and Henry A. Prentiss, as well as prominent sawmill owners such as the Todds of Calais, John C. Talbot of Machias, and from Bangor, William T. Pearson, Frank Gilman, William H. McCrillis, E. S. Coe, N. C. Ayer, and John Appleton, "lumbermen all."

being logged at a ferocious pace, the "time cannot be far distant when there will be a dearth of lumber in the North."[28] In 1892, Senator Eugene Hale, sponsor of one the first bills to create federal forest reserves in the West, warned a Skowhegan audience that in forty years northern Somerset County would "be as barren as the platform on which he stood," unless drastic and immediate measures were taken.[29]

Much of this timber famine rhetoric was not place specific. It focused on general problems of forestry and ignored the differences between logging practices in Maine and the rest of the country. Lantern slides from the Adirondacks and dramatic photographs of the "desolation" caused by clearcutting and railroad logging were presented as "the best illustration in this country of the forestry question" in Maine and the nation as a whole, despite the fact that these practices were not common in the Maine Woods.[30] The apparent universality of these images of the forest was key to their success with urban middle class audiences neither familiar with, nor terribly interested in the details of logging practice, but it alienated those who made their living in the Maine Woods. They resented being tarred by such a broad brush.

If not unique, problems in Maine were at least locally specific. Unlike the Lake States where higher fire frequencies prevented much of the cut-over from growing back to forest, in Maine, as one seasoned lumberman noted, the second growth comes up so thick that "no sooner are our timber lands here stripped than a new and vigorous growth springs up, which, in 20 to 40 years, is again ripe for the axe."[31] Nor did northern and eastern Maine suffer the erosion problems of the Adirondacks and White Mountains where land

---

[28] F.L. Harvey, "Preservation of Our Forests" in Maine Forest Commissioner, Report (1891): 32, 29-41; "Forestry Convention" Bangor Daily Whig and Courier 19 December 1888, 5. Hobbs revised his speech for publication in "The Depreciation of Our Forest Growth and Its Effects Upon Our Various Industries" in Maine Forest Commissioner, Report (1891): 61-75. For other accounts of the conference, see Bangor Daily Commercial 18 December 1888, 1; 19 December 1888, 4.

[29] "Are the Forests of Maine Being Materially Reduced?" The Lumberman's Review (September 1892): 7.

[30] Daily Eastern Argus 26 January 1889, 3. For other examples of this kind of placeless rhetoric, see S.A.C., "The Merchantable Timber of the Adirondacks" Forest and Stream 40 (1 June 1893): 471 (quote); John C. Phillips, "The Passing of the Maine Wilderness" American Forests 34 (1928): 195-98, 232.

[31] "Our Maine Lumber" Bangor Daily Commercial 4 February 1873. Also see, Llewellyn Powers, "Forests and Pulp Mills of Maine" Paper Trade Journal 25 (11 April 1896): 316.

slides swept away the soil and left barren rock in the wake of logging operations. Although railroads and portable sawmills, and with them a more intensive system of clear-cut logging were beginning to enter the Maine Woods towards the end of the nineteenth century, for the most part, lumbermen still relied on the rivers to float their logs to tidewater mills. As a result, they only cut selected softwood species from stands that were logged as often as once every twenty years. This led to problems with highgrading of only the merchantable species, but it was certainly not true, in Maine at least, that logging resulted in an "alarming diminution of forest area."[32] Second growth rapidly recolonized abandoned fields and cut-over clearings so that the quantity of forestland in Maine, if perhaps not the quality, was actually increasing in the late nineteenth century.

These differences left an opening for those lumbermen who rejected the interference of conservationists and the large landowners behind the Maine Forestry Association. The industry was divided. While landowners and integrated producers stood to profit from the increasing value of their holdings, independent contractors, who had long done most of the actual logging in the Maine Woods, lived on the margin between what they paid in stumpage fees to landowners and what they got from the sale of logs to the mills. They worried that timber famine hysteria would drive up the price of stumpage and make their margins even thinner. Prominent Kennebec River operators like William Snow, Hiram Moore, and David Rowell publicly denied the danger of depletion.[33] Experienced lumbermen on the Penobscot said the same thing.[34] They opposed measures to regulate or scrutinize their cutting methods in the name of eliminating waste and conserving the forest. These and other conservation measures were based upon an incorrect picture of the forest:

> This forestry agitation is, for a large part, based on wrong premises. I believe in taking care of the forests but when it is said that the forests of

---

[32] "Forest Area" New York Lumber Trade 1 January 1887.
[33] "Are the Forests of Maine Being Materially Reduced?" The Lumberman's Review (September 1892): 7.
[34] "On the Penobscot" New York Lumber Trade Journal 1 December 1887, 13; Bangor Daily Commercial 5 May 1888, 4.

> Maine are disappearing, such [a] statement is dead to the wrong. Why two cords of wood are growing in Maine, to-day, where one was growing ten years ago. I never saw the sapling pine growing faster than it is to-day. What Maine wants is not so much a protection of the forests as more railroads to bring them to the markets.[35]

the authority of science

The Maine Forestry Commission, created in 1890, waded into the debate about the depletion of the Maine Woods with the authority of science behind it. One of its first acts was to hire Austin Cary to investigate the supplies and growth of spruce, the principal species used by pulp and paper manufacturers and sawmillers in Maine. Cary published two landmark reports describing the condition of spruce stocks and the effects of logging upon them. Using measurements from representative sample plots, he calculated that the average annual growth rate for Maine spruce was 40.7 cubic feet per acre per year. By multiplying this figure by the total area of forest and subtracting harvest estimates, he concluded that the Kennebec watershed was being logged at roughly twice the rate it was growing back. Similar conditions obtained on the Androscoggin, but there Cary saw signs of hope. With the advent of large, vertically integrated forest products companies that owned their own land and performed the logging on it to strict, conservative standards, forest use on the Androscoggin was much more efficient than elsewhere in Maine. Fewer trees were wasted and more value was added to each log in the manufacturing process. So great were the potential productivity increases from the efficient use of formerly worthless forest growth that Cary wondered if total production would decrease at all. Even if it did, Cary was not concerned because pulp and paper manufacturing provided workers with more high paying, full-time jobs than the old saw mills.[36]

---

[35] Bangor Daily Commercial 28 December 1888, 3.

[36] Cary, "On the Growth of Spruce. In Maine Forest Commissioner, Report (1894): 20-36; Cary, "Spruce on the Kennebec and Androscoggin Rivers" in Maine Forest Commissioner, Report (1896): 15-203.

Cary believed that these figures would resolve the timber famine question in Maine, so "much debated with little result," but his hopes proved unfounded.[37] U.S. Forest Bureau chief Bernard Fernow disputed Cary's conclusions. His own report on northeastern spruce, published in 1894 for the New Hampshire Forest Commission, put the rate of spruce growth, after deductions for logging waste, at 20 cubic feet per acre per year, half of Cary's estimate. Consequently, Fernow believed the danger of forest depletion was much greater than Cary made it out to be.

Cary and Fernow disagreed about the numbers and their significance because they disagreed about the methods of their construction. As the man who performed much of the actual field work for Fernow, Cary was particularly well placed to criticize Fernow's calculations and the data on which they were based. Cary told Fernow privately that his "method of reasoning seems altogether false & misleading." To calculate average annual growth, Fernow divided the volume of standing merchantable spruce by its age. Cary granted that in the ideal conditions of an even-aged, rotation or normal forest "this is of course true." But, he asked, "[i]s it true of a selection forest or of natural woods? I think not."[38] Fernow's method discounted the growth both of immature spruce of unmerchantable size and of other merchantable species commonly found in the Maine Woods but ignored by the ideal typical model of Fernow's German forest science. Cary accounted for the growth of immature spruce in making his calculations, and as a result, his estimates were nearly double those of Fernow. This methodological dispute was of more than local significance, because, as Cary noted, Fernow's method "has been used in estimating the growth of the country" as a whole.[39] If Fernow's method led to an exaggerated sense of the danger of logging in the Maine Woods, then it might also be true that the rhetoric of a nation-wide timber famine was also off the mark.

---

[37] Cary, "The Forests of Maine" Paper Trade Journal 25 (25 April 1896): 364-65.
[38] Cary to Fernow, 31 July 1895, East Machias, USFS, Cary Correspondence.
[39] Cary to Fernow, 10 July 1895, Bangor, USFS, Cary Correspondence

Fernow responded in print. In a review of Cary's reports, he argued that the effects of logging were much more severe than Cary's figures allowed for. Cary counted on the growth of already established, but suppressed and immature spruce. Fernow insisted that logging damage to them would be so severe that such advanced reproduction could account for only a minor part of second generation spruce growth. As a result of this oversight, Fernow charged, Cary grossly overestimated forest growth and underestimated the true rate of forest depletion and the danger of unrestricted logging.[40] This criticism stung, particularly since Cary's reports had discussed at great length but not actually accounted for logging damage and advanced reproduction. Seeing Gifford Pinchot make a similar assumption two years later, Cary wondered how logging could have been done without the 33% mortality to sapling spruce that Cary's experiments found typical of operations in Maine. Before Cary would accept Pinchot's numbers he wanted to know more about his methods: "Have you found this [i.e. low juvenile mortality] to be so or practically so by actual trial? If so, then it essential for us elsewhere to learn your methods exactly."[41]

Most of these subtleties, however, were lost on non-specialists. The general public tended to look at the bottom line rather than the details of its construction. Although Cary thought that his precise, scientific measurements would "tell with the hard-headed lumbermen and landowners," support for forestry research was not universal.[42] The attention to detail that won Cary the respect of his peers sometimes seemed like dilettantism in the state capital. Cary sought the public support of U.S. Forest Bureau chief Bernard Fernow whose endorsement "would probably have considerable weight with the legislative committee."[43] Cary spoke to influential organizations like the Maine State Grange, the Maine State Board of Trade, and the American Pulp and Paper Association. He also worked the press, giving frequent interviews on forestry matters in Maine. Despite this

---

[40] B.E. Fernow, "The Maine Forests" 26 (28 August 1897): 688, quoting Garden and Forest.
[41] Cary to Pinchot, 30 March 1899, Indian Rock, ME, USFS, Cary Correspondence. He is asking about Pinchot's Adirondack Spruce.
[42] Cary to Fernow, 16 April 1895, USFS, Cary Correspondence.
[43] Cary to Fernow, 1 February 1897, Augusta, USFS, Cary Correspondence.

relentless public relations campaign, legislative support for forestry research remained precarious. Cary complained to Pinchot:

> Much depends on the impression forestry makes in Maine in the next ten years. Our professor at Orono needs help, otherwise the next legislature may let the public instruction side of it at least drop.[44]

Partly this crisis of confidence turned on utility. People doubted if the recommendations of forest science were practical, but they also wondered if they were true. Although Cary and other forestry proponents spoke widely throughout the state, most people confronted their conclusions in published form, either in the newspaper or in the reports of the Maine Forest Commissioner. The impersonal nature of these encounters with science put public faith in specialized, expert knowledge to the test. Unable to evaluate the details of his scientific work personally or interrogate him directly, people had to take Cary at his word. Anthony Giddens argues that this kind of trust in expert systems is a hallmark of modernity, but his schematic account of the disembedding of "social relations from the immediacies of context" does not explain how trust in expert systems developed.[45]

In the Maine Woods, forest scientists like Cary struggled to establish their authority in the face of an older system of traditional lore and subjective knowledge about the forest. A. H. Carter of the Berlin Mills Company ridiculed "theorists who are continually talking about the destruction of the forests."[46] He and other lumbermen argued that they were "best qualified to judge" because of their long, personal experience in the Maine Woods.[47] This was a standpoint epistemology. Woodsmen insisted that they should be believed because of who they were. Identity gave them access to special knowledge about the forest and guaranteed its truth.[48]

---

[44] Cary to Pinchot 31 October 1903, USFS, Cary Correspondence.
[45] Anthony Giddens, The Consequences of Modernity (Stanford: Stanford Univ. Press, 1990), 28.
[46] "Lumber Plentiful" Bangor Daily Commercial 18 February 1899, 3.
[47] Bangor Daily Commercial 5 May 1888, 4.
[48] Standpoint epistemologies are now most often invoked by feminists, but this was not always so. For a discussion of standpoint epistemologies, see Sandra Harding, The Science Question in Feminism (Ithaca:

The appeal to identity, however, did not travel very well. Caulked boots and callused hands, the signs of personal experience that lumbermen used to identify themselves to one another, worked fine in face-to-face encounters, but they did not carry much weight in the impersonal public sphere where the future of Maine's forest was increasingly being decided. As legislators, editorial writers, and ordinary citizens, inspired by dramatic pictures of the nation's shrinking forests, became concerned about the Maine Woods, the ability to communicate with strangers at a distance was at a higher premium than ever. Personal reputations and experience still counted, especially in a small state like Maine where many lumbermen doubled as familiar community leaders, but lumbermen found themselves at a disadvantage in these discussions because they had no way to represent their personal experience or the subjective knowledge they had gained from it to others.

Forest scientists had a much easier time of it. While they too grounded their knowledge in first-hand experience with the woods, they came away from the forest with more than just experience. They brought back a variety of numbers and quantitative measurements that represented their forest knowledge and enabled the processes of forest growth and depletion to be visualized by the public at large. These inscriptions were both immutable and mobile. They could be printed and circulated without change so that what they represented could be witnessed at a distance. By looking at Austin Cary's table of spruce growth, it was possible to know the rate of growth per year by age class without actually having to visit the forest or count the trees in it. Some lumbermen rejected this as empty and impractical theory, but when they spoke of their own personal knowledge they had nothing to show for it, while Cary did. In debating the timber famine, Cary could point to his numbers as proof of the truth of his claims. Lumbermen made the same distinction between their own qualitative representations of the forest and the underlying reality to

---

Cornell Univ. Press, 1986); Harding, "Rethinking Standpoint Epistemology: What Is 'Strong Objectivity'?" in Feminist Epistemologies, eds. L. Alcoff and E. Potter (New York: Routledge, 1993), 49-82.

which they corresponded, but such personal testimony did not set up the distinction between representation and objective reality as convincingly. It was relatively easy to impeach the claims of lumbermen as idiosyncratic, to say nothing of interested. Unlike the woodsmen's traditional knowledge, which was contingent upon personal identity and a subjective experience of the forest, scientific numbers were objective. It did not matter who took a caliper reading, because, as one editorialist put it, "a measurement is a measurement."[49] Since the result of quantitative analysis and calculation was invariant and independent of the identity of the persons performing it, it alone could testify truthfully about the state of the forest.

This points to a second distinction between the production of objective, scientific knowledge and the subjective, personal knowledge of the woodsmen. Although both rested ultimately on some kind of interaction with the forest, scientists relied much more heavily upon instruments to construct and represent their experience for them. The loggers' knowledge of the forest was a kind of bodily knowledge. Years of sweat and physical labor taught them to size up a logging chance at a glance, to identify tree species and spot butt rot that would diminish the value of a log and might even result in fatal injury to the logger.[50] This experience was no less dependent upon technologies like the axe and the compass than the scientists who worked with calipers, growth tables, and other instruments, so the difference is not between the enchantment of the logger's direct and tangible experience of nature and the alienation of the scientist's technologically mediated knowledge. Both depended upon technology and physical manipulation of the environment; it is just that the results of these labor processes were rather different. Loggers' craft knowledge was a by-product of the transformation of the forest into commodities that could be exchanged for money. The dollar was both the object and the

---

[49] "About Scale Rules" Bangor Daily Commercial 27 January 1909, 5.

[50] The phrase bodily knowledge belongs to Richard White, "'Are You an Environmentalist or Do You Work for a Living?': Work and Nature" in Uncommon Ground: Toward Reinventing Nature, ed. W. Cronon (New York: W.W. Norton, 1995), 172, 171-85.

representation of this procedure. Scientists, by contrast, worked their instruments to rearrange the forest so as to construct signs of a different sort. They produced inscriptions: numbers, charts, graphs, and other written traces that made the forest visible and represented scientific knowledge of it. These inscriptions were the immutable mobiles that scientists pointed to and passed around as objective signs of the truth of their knowledge.

This appearance of objectivity and the sense of trust and credibility that it fostered rested upon the dual structure of scientific representation. First, foresters constructed and arranged a variety of material objects. To discover the growth rate of spruce, Austin Cary had to select and core sample trees, "avoiding any bunches or depressions in [their] surface;" determine the thickness by distinguishing wood growth from bark and "mak[ing] a fair deduction for bark;" count the trees rings to determine their age; and scale their volume using a scaler's rule.[51] The form-- indeed, even the existence of these objects of scientific knowledge-- depended upon the specific, productive activities of the people who represented them. Representing reality and speaking of it was also simultaneously enframing it and constructing its boundaries through defining acts of exclusion. Cary, not the tree, differentiated between growth and bark. But the appearance of objectivity depended upon a second step whereby all traces of this construction were erased.[52] Objectivity was an effect produced by the representation of docile, material objects, divorced from polluting contextualizations and named by formal abstractions ("data") for which people might then speak authoritatively. It worked best when set up so that the data, not the scientist who constructed them, seemed to be doing the talking.

Cary did not perform this scientific ventriloquism particularly well. His reports were first person narratives, relying as much on the woodsman's personal authority of having been there as on the new, self-effacing style of scientific writing. He emphasized

---

[51] Austin Cary, "Spruce on the Kennebec and Androscoggin Rivers," in Maine Forest Commissioner, Report (1894): 27.

[52] Bruno Latour and Steve Woolgar, Laboratory Life: The Social Construction of Scientific Facts (Beverly Hills: Sage Publications, 1979), 176.

the difference between the qualitative estimates of timber cruisers, which depended upon "spot judgment" and experience, and his own quantitative survey methods in which "the effects of conscious and unconscious choice were guarded against by [measuring]... every tree which came in my way." But he also confessed that the initial "results of this [quantitative] work ... were not so satisfactory as they were later, after further practice."[53] Such traces of individual bias and subjectivity clouded the appearance of objectivity on which the authority of scientific knowledge rested. They also revealed the degree to which the replication of scientific observation, so often said to prove its objective truth, depended not so much on the nature of the thing being observed as on the training and discipline of the observer. By imposing rules and set procedures, quantification excluded significant degrees of individual discretion from the process of scientific observation, and in this way, made it easier to repeat and more uniform from one observer and to the next. While this may have made quantitative observations more reliable, it did not liberate them from the peculiar context of their construction. Rather, quantification and the mathematization of forest science simply extended and institutionalized the context in which quantitative observations of the forest were made.

These ambiguities do not appear in the scientific reports of Gifford Pinchot. He was much more adept at disengaging the facts of his forestry research from the cultural contexts in which he constructed and represented them. He wrote his Adirondack Spruce in the passive voice, thereby denying his own role in its production. Sample plots were "analyzed so that their exact contents were known." This method of disembodying knowledge production suggested that anyone who repeated the measurements would have found the same thing. Rather than relying on the authority of his personal expertise, Pinchot referred to tables, figures, and sample measurements whose number, he assured the reader, "is great enough to establish a trustworthy basis" for inference. Pinchot's figures were so

---

[53] Cary, "Spruce on the Kennebec and Androscoggin Rivers" in Maine Forest Commissioner, Report (1894): 52, 124, 54.

convincing because the quantities they recorded seemed to exist prior to and independent of their representation.

This binary effect, on which the certainty of representation depended, was the result of enframing and erasure. Pinchot selected and measured a variety of sample plots, but he moved the discussion away from the empirical specificities of his samples to the underlying truth they represented:

> When a series of averages are made out it often happens that the successive figures do not follow quite regularly... In such cases the values are plotted on cross-section paper and a regular curve is drawn through or near the points which represent them. The points through which the curve actually passes are then taken as the true values. In this way accidental irregularities are avoided, and the results are brought much nearer to the truth.[54]

In this way, particular sample measurements became insubstantial objects, mere tokens of the forest for which they stood. If representative samples were simply signs, empty in themselves, then the forest could become something more, an abstraction somehow more original, more real than the material signs to which it gave form. Of course, this mathematized abstraction of forest science was not conceivable until the census and the tools of statistical science made it possible to construct, collect, and arrange the numerical and cartographic signs that represented it, yet it seemed increasingly as if the American forest existed prior to and apart from the social conditions of its construction. This dualism imparted an almost mechanical quality to representation, whose meaning seemed less the product of the active and interested efforts of the people enframing it than of the objects they enframed. As a result, manipulation of the data and making them "regular by a curve," far from corrupting their meaning, brought them "much nearer to the truth," which they merely represented second hand.[55]

---

[54] Pinchot, Adirondack Spruce, 39,40, 44, 44.
[55] Pinchot, Adirondack Spruce, 44.

It was still possible to contest these mathematized abstractions, but counter-claims had to be couched in the same scientific terms. Public debate over the depletion of the Maine Woods became increasingly technical in the wake of Austin Cary's scientific reports, which served as a benchmark for future debate. In 1902, Maine Forest Commissioner Edgar Ring and George F. Talbot, a founder of the Maine Forestry Association, argued publicly about a prospective timber famine in Maine. The remarkable thing about this editorial exchange is that both Ring and Talbot found it necessary to conduct their debate in terms of specific, scientific numbers. Ring cited a new, state-sponsored survey of standing merchantable spruce to argue that the annual growth increment, which he estimated at 3% or 637 million board feet, could easily support an annual harvest of 370 million board feet of spruce.[56] Talbot countered that Ring's annual growth estimates were far too optimistic and "decry in advance as unnecessary any prudent legislation the present exigency may require." He pointed to Austin Cary's measurements of Androscoggin spruce logs as proof that Maine's lumber industry was dependent upon old growth timber that required more than a century to mature.[57] Given this fact, Talbot figured that the annual growth rate of spruce could be no more than 0.75%, and thus that the annual harvest must exceed growth.[58] Ring was unconvinced:

> I know of no reason why I should change my mind in reference to the estimates as to the stand of spruce in Maine and the annual growth and consumption made in my report for 1902. I think the figures... were very conservative... I believe that the average (annual growth of spruce) throughout the State will equal 3 per cent, provided careful cutting is carried on and forest fires are kept out.[59]

---

[56] Maine Forest Commissioner, Report (1902): 5-10.
[57] Cary, "On the Growth of Spruce" in Maine Forest Commissioner, Report (1894): 33, 20-36. The average age of the 1050 logs from the 1892-93 harvest he sampled was 189.
[58] G.F. Talbot, "Condition and Prospective Value of the Maine Forests" Daily Eastern Argus 13 January 1903, 6.
[59] Personal communication to Hugh J. Chisholm, quoted in Chisholm, "History of Papermaking in Maine and the Future of the Industry" in Bureau of Industrial and Labor Statistics for the State of Maine, Report (1906): 167, 161-69.

As public discussions of the Maine Woods became more technical, they also became more exclusive. It was difficult for non-experts to know what to make of these figures. Most people were unfamiliar with the specialized literature that was the currency of scientific debate. They had to depend on experts, because they lacked the technical knowledge necessary to interpret or criticize the competing measurements and mathematical theories that went into the construction of these scientific claims. A small group of forestry technocrats was becoming increasingly central to any public deliberation about the future of the forest.

This dependence on expert knowledge presented a quandary for students of American democracy. Americans had long celebrated the participatory nature of their Republican form of government. Political power was held by the people, who elected representatives from their local communities to act in their name. Knowledge and political authority were not the same thing, of course, but at its core, representative democracy depended upon an informed citizenry able to negotiate reasonable and mutually acceptable outcomes in an open public sphere. As the nation became larger and more complex, this ideal of face-to-face, communicative action proved increasingly illusory. Without the technical knowledge necessary to evaluate competing, scientific claims about a timber famine, how could the general public decide intelligently what to do about it? Rhetoric, social power, and self-interest still counted in these discussions, but to many, they seemed like a perversion of the rational democratic process. Many Progressive-era conservationists advocated delegating management authority to trained professionals. Insulated from partisan political pressure, corruption by special interests, and interference by the ignorant masses, scientific experts would "work out a planned and orderly scheme for national efficiency, based on the elimination of waste and directed toward the best use of all we have for the greatest good of the greatest number for the longest time."[60] There were also

---

[60] Gifford Pinchot, The Training of a Forester (3d ed. Philadelphia: J.B. Lippincott & Co., 1917), 24-25. The classic exposition of this anti-democratic streak in the Progressive conservation movement is Hays, Conservation and the Gospel of Efficiency.

voices of concern. Though generally optimistic about the parallel course of science and democracy, John Dewey worried about the "eclipse of the public" as knowledge became increasingly specialized and about the consequent authoritarian tendencies of a citizenry so reliant on expert, technocratic knowledge that it maintained only the right, but not the actual ability to participate effectively in public deliberations.[61]

The ascendance of a mathematized forest science in the Maine Woods was shot through with these tensions, but there was also a sexual politics involved. The rhetoric of scientific forestry was aggressively masculine. Forest scientists emphatically distinguished their hard science of conservation from the soft and sentimental forms of feminine thought of those "amiable sentimentalists," who, as Carl Schurz lampooned, "have fallen in love with the greenness of the woods and [who] break out in hysteric wails when a tree is cut down."[62] The tag "hysterical" appears over and over again in conservation discourse.[63] It was the irrational and unrealistic dream against which a sane and sensible scientific forestry defined itself. Numbers were critical to this masculinization of forest science. As a highly formalized language of abstraction, mathematics allowed scientific foresters to deny the presence of any subjective values or personal sentiments in their work. These denials fostered an appearance of detached objectivity crucial to the credibility, cultural authority, and, as feminist critics of science have been keen to emphasize, the masculine subjectivity of science.[64]

---

[61] Dewey, The Public and Its Problems in Dewey, The Later Works, J.A. Boydston, ed. (Carbondale: Southern Illinois Univ. Press, 1984), II: 307. For discussion of Dewey, science, and the problem of democracy, see David W. Marcell, Progress and Pragmatism: Dewey, Beard, and the American Idea of Progress (Westport, CT: Greenwood Press, 1974); John P. Diggins, The Promise of Pragmatism: Modernism and the Crisis of Authority (Chicago: Univ. Chicago Press, 1994).

[62] Quoted in Robert E. Ficken, "Gifford Pinchot Men: Pacific Northwest Lumbermen and the Conservation Movement, 1902-1910" Western Historical Quarterly 13 (1982): 166. William Ross declared in 1912, that British Columbia would pursue "a sane, business-like policy of conservation, free from sentimental extravagence." Quoted in Gillis and Roach, Lost Initiatives, 146-7.

[63] See, for example, New Hampshire Forestry Commission, Report (1901-02): 39.

[64] See, for example, Evelyn Fox Keller, Reflections on Gender and Science (New Haven: Yale Univ. Press, 1985); Gillian Rose, Feminism and Geography: The Limits of Geographical Knowledge (Minneapolis: University of Minnesota Press, 1993).

Gendered as this rhetoric was, it was not simply a case of masculine, scientific knowledge displacing feminine ways of knowing the forest. Mathematized scientific knowledge of the Maine Woods pit one construction of masculinity, founded in rationality and numbers, against an older, working-class masculinity embedded in physical labor and personal experience. Forest scientists were so hyper-masculine because they had to defend the legitimacy of science against loggers and lumbermen who deployed a series of hierarchical and gendered dualisms to indict expert opinion that ran counter to local common sense as foreign and fanciful. They accused forest scientists, many of whom came from away, of being naive and impractical theorists with book knowledge but no real experience of the woods:

> Speakers at forestry meetings are constantly prating about the necessity of preserving the native forests intact from the lumberman's axe...These remarks serve very well for city orators, but they lack the sense begot of practical experience in lumbering... Practical forestry will never permit sentiment to usurp common sense, or theory to take the place of fact.[65]

The president of the American Realty Company, the Maine woodlands subsidiary of the International Paper Company, complained that in his experience, the "scientific education gained in forestry schools" was a little practical value:

> We find when we get them into the woods that the information they possess is almost entirely of a technical nature, and hardly one of them knows how to build a camp, swamp a road, construct a bridge or culvert, much less to saw or chop a tree so that they know in what direction it will fall. The only forester that would be worth a cent to us would be the man who first learns how to handle an axe and then familiarizes himself completely with all the work of lumbering from the stump to the mill.[66]

---

[65] "Our Forests" Bangor Daily Commercial 18 March 1886, 1, quoting Manufacturers' Gazette.
[66] Charles Oak to Austin Cary, 28 January 1907, Bangor, Box 603, Austin Cary Papers, Univ. Maine.

Scientists parried this rhetoric and defended their challenged masculinity by turning these same gendered dualisms against those conservationists demanding an end to logging and the wholesale preservation of the Maine Woods. Conservation was a plastic term, and many different programs of action traveled beneath its wide banner. By publicly ridiculing those who supported preservation as irrational, naive, and impractical, forest scientists won the support both of powerful business interests in the state and of woodsmen, for whom, as Austin Cary noted, "the Maine woods are not a Paradise. On the contrary, the part they play there ... is usually both hard and monotonous."[67] Such forthright comments and the "spirit of virility" they demonstrated won Cary the praise of his peers who acknowledged "how much the present and future generations are and will be indebted to men of your generation and type."[68] By providing hard, numerical proof of a timber famine, Cary and other conservation pioneers transformed forestry from "the laughing stock of the old woodsmen who allowed, 'there would be wood enough as long as man existed'" into a respected profession and a cause of public interest and concern.[69]

Still, popular suspicion of scientific forestry ran deep in Maine. Even if, in the public sphere, this construction of scientific objectivity and authority ultimately carried the day, in the woods it was another matter. Loggers greeted Cary and his work with disdain:

> Men in the camps I visited frequently could not believe there was such a thing as systematic scientific study of forest growth, and would not believe my errand when I told them. Sometimes they thought I was a game warden or detective. I shall never forget an incident that happened in the winter of 1903-04 in northern New Hampshire. I was measuring trees and counting rings one very cold day on the west side of Mount Washington and happened to take out my belt axe to smooth off a radius for the purpose. There was a big woodsman standing near, and the attitude of the whole crew was well illustrated by his exclamation, "Ah,"

---

[67] Austin Cary, "Maine Forestry in Retrospect and Prospect, address to the Maine Forestry Association, Bar Harbor, ME, 24 August 1922," 15, Box 1663, addresses, Austin Cary Papers, Univ. Maine.
[68] J.W. Watzek, Jr. to Austin Cary, 12 April 1935, Chicago, Box 1663, misc. letters, Austin Cary Papers, Univ. Maine.
[69] Maine Forest Commissioner, Report (1902): 47.

> he says, "I know now who that is; that is George Washington with his little hatchet."[70]

Cary trumpeted his field skills and practical woods knowledge, but he found it difficult to get the men in the woods to heed his instructions. The men, Cary complained, "are dull & indifferent, [while] the bosses think they know it all & are jealous of their rights." He conceded that antagonism between loggers and professional foresters made the application of scientific forestry principles in the Maine Woods a "very imperfect business."[71] Although most of Maine's large paper companies and land-owners had professional foresters on staff by 1920, they did not, as the forester David M. Smith recalled, "elbow the old bull-of-the-woods logging bosses out of the way" until after the Second World War.[72]

Class divisions were important, but these difficulties also reflected the underlying tensions between maximizing profits and maximizing a sustained yield. "[T]rained to hard cutting," lumbermen looked more to the balance sheet than the health of the land. Cary and other conservationists insisted that over the long term they were the same thing, but logging bosses were not always so sure:

> [W]hen told that we wish to cut conservatively, [the logging boss] is pretty sure to leave what he does leave not in the shape of small growth so much as in strips of scattering timber and odd corners on rough and difficult land. This makes the logging show up cheaper, but it may be on the other hand that what is left standing is the very stuff that most needs cutting of any on the land.[73]

---

[70] Austin Cary, "Informal talk given at Forest Club, Victoria, BC, 28 December 1914," Box 1663, addresses, Austin Cary Papers, Univ. Maine.

[71] Cary to Pinchot, 29 November 1898, Indian Rock, ME, USFS, Cary Correspondence.

[72] Harold K. Steen, ed., David M. Smith and the History of Silviculture: An Interview by Harold K. Steen (Durham, NC: Forest History Society, 1990), 17. George S. Kephart recalled that the 1920's woods boss of the Lincoln Pulpwood Company's Nicatous Lake operations in eastern Maine "looked upon me, a forester, as one of the company's newfangled notions, to be tolerated but not welcomed in the woods." Kephart, Campfires Rekindled: A Forester Recalss Life in the Maine Woods of the Twenties (Marion, MA: Channing Books, 1977), 84.

[73] Austin Cary, "Management of Pulp Wood Forests: The System of Forestry Practiced by the Berlin Mills Company" in Maine Forest Commissioner, Report (1902): 129, 127-30.

So although the picture of a nation starving for wood and the mathematization of forest science won widespread acceptance for the idea of scientific forest conservation, it was not entirely clear what that would actually mean. Foresters had to grapple with the meaning of conservation and the contradictions between short-term profits, private interests, and business practice on the one hand and long-term sustainability, public welfare, and scientific theory on the other.

6. Properties of the Forest

The turn-of-the-century conservation movement rested on a series of metaphors, now familiar from years of use, but strikingly new at the time. Metaphors made the strange, technical practices of conservation familiar, lending force and popular appeal to conservation discourse. Forestry advocates hoped to avert a timber famine by convincing Americans to conserve their natural resources and to treat the forest "as a crop rather than a mine or quarry from which we take what is useful and then abandon as waste."[1] While professional foresters upheld this new construction of the forest, they disagreed about many scientific details as well as about the wider implications of conservation for forest management, ownership, and the public interest. Conservation was a slippery term, and not all Americans, or even all foresters, agreed with Gifford Pinchot that the best way to conserve the forest was to represent it as "working capital whose purpose is to produce successive crops."[2] Indeed, many argued that such narrow instrumentalism was the greatest threat to the future of the forest.

The story of the Maine Woods cannot be told without recognizing that conserving the forest has usually meant different things to different people. Cultural, economic, and social differences were consequential here, but so too were the ways in which the nature of the forest was constructed and represented. In Maine, debate about forest conservation turned as much on the way the forest was represented as on the question of what should be

---

[1] Bernhard Fernow, "Address" Proceedings of the American Forestry Association 10 (1889): 143, quoted in Michael Williams, Americans and Their Forests: A Historical Geography (New York: Cambridge Univ. Press, 1989), 403.

[2] Gifford Pinchot, A Primer of Forestry (Washington: U.S. Forest Service, bulletin 24, 1905), 41.

done to it. Contemporaries disagreed about forest policy because they disagreed about the essential properties of the forest in need of protection. They asked: Is the forest a mine? Is it a kind of crop with a future beyond the present cut? Is it capital? Primeval wilderness that once desecrated is forever lost? Or is it something else entirely?

These metaphorical descriptions of the forest ran through conservation discourse, but they were much more than just rhetoric. Very different programs of action flowed from competing definitions of the Maine Woods as a crop, a mine, or a kind of capital. By highlighting some aspects of the forest at the expense of others, these metaphors provided a practical tool kit for conserving the forest. Public policy disputes about the regulation of private property, the institution of publicly owned forest reserves, and the role of the state in forestry depended, in large measure, on the struggle to define metaphorically the nature of the Maine Woods. If so much present-day debate about forest conservation seems to rehash old positions, despite the very different practices now at issue, it is because we continue to deploy many of the same metaphors to represent the forest.

crops, mines, and capital

Scientific forestry was founded on the metaphorical transformation of the forest from a mine into a renewable resource. Conservation advocates attributed the alarming picture of the nation's forests melting away to destructive, cut-and-run logging, a practice they compared to "timber mining."[3] With little fixed investment and no long-term interest in the forest or the communities it sustained, lumbermen treated the forest as a "mine," to be cut-over and then abandoned to fire and waste. They maximized short-term profits by highgrading the forest without any regard for future growth. This pattern of exploitation

---

[3] Benton MacKaye, "Some Social Aspects of Forest Management" Journal of Forestry 16 (1918): 212, 210-14. For other uses of the term, see Fernow, "Address" Proceedings of the American Forestry Association 10 (1889): 143; William B. Greeley, Forests and Men (Garden City: Doubleday, 1951), 124; M.A. Grainger, Woodsmen of the West (1908. reprint. Toronto: McClelland & Stewart, 1964), 55; Austin Cary, "Spruce on the Kennebec and Androscoggin Rivers" in Maine Forest Commissioner, Report (1896): 193-94, 15-203.

repeated itself from coast to coast. In Maine, forest capital stripped the woods of their rich pines and then picked up stakes for Pennsylvania and the Lake States, moving on again from there to new opportunities elsewhere. As long as forest supplies were abundant, this had not been a problem, but with the frontier closing and new areas of virgin forest no longer available, America stood on the brink of a timber famine.[4]

Timber mining was the most frequent metaphor used to condemn destructive logging, but the forestry profession used other metaphors to similar effect. "[H]eretofore," complained the New York Lumber Trade Journal, the term "'lumberman' has, in America, been synonymous with forest destroyer. Who will lead off in giving the term the significance it has in Europe,-- that of a producer or grower?"[5] Cary warned that hard cutting and mistreatment of the Maine Woods was "killing the goose that lays the golden egg," while Fernow compared cut-and-run logging to skimming "all the cream" of the forest and "leav[ing] the rest to perdition."[6] Butchery was another favorite:

> The lumbermen, accustomed to carry on his business like the butcher, slaughtering and finding his profit in the difference of the price he paid the cattle and the price he got for the meat, is not readily turned into a forester, who like a breeder finds his profit in the sale of the young increase, treating his herd as the capital.[7]

Foresters were confident, however, that timber mining was a developmental phase beyond which the nation would soon progress. Building their nation with axe and plow, Americans devalued the forest, looking upon it an obstacle to settlement. During this

---

[4] For a discussion of the forest frontier, see David C. Smith, "The Logging Frontier" Journal of Forest History 18 (1974): 96-106.

[5] "Forest Conservation" New York Lumber Trade Journal 15 July 1887, 2.

[6] Cary, "Spruce on the Kennebec and Androscoggin Rivers," 48; Fernow, "Address to the Canadian Forestry Association, 6 September 1912, Victoria, BC" quoted in Andrew D. Rogers III, Bernhard Eduard Fernow: A Story of North American Forestry (Princeton: Princeton Univ. Press, 1951), 53. Fernow used the same cream metaphor in his 1898 speech to the American Pulp and Paper Association. Fernow, "Forestry and Wood Pulp Supplies" Paper Trade Journal 27 (11 February 1898): 157-62.

[7] U.S. Division of Forestry, Report (1892): 314. For similar rhetoric in the popular press, see E. Russell "Wood Butchers" Colliers 43 (8 May 1909): 19-20; R. Phillips, "Vanishing Forests of America" Harper's Weekly 48 (13 February 1903): 228-29.

pioneering phase, offered Gifford Pinchot, settlers counted the forest "as an enemy rather than a friend." Having "passed the inevitable stage of pioneer pillage of natural resources," the country, he insisted, was settling down to a new age of scientific conservation.[8] Ironically, the scarcity that Americans found so troubling was also a sign of social progress, "[f]or forest destruction is the beginning of civilization."[9] Scarcity was widely regarded as "a stage which must be attained by every country which hopes to maintain proper economic equilibrium."[10] Without it, conservation and social development were impossible. Only a country that had progressed beyond its "pioneering days," when its rich resources were "exploited for their cream," could "settle down to more conservative business."[11] This evolutionary perspective lent a sense of historical inevitability to the institution of true, scientific forestry.

Just as changing forest practices could be understood in evolutionary terms, so too could the forestry movement itself. The first step, what Pinchot called "the pioneer phase," consisted of public education and consciousness raising.[12] This missionary work was essential, because in a democracy, as President Roosevelt told the Society of American Foresters, conservation "can come only from the intelligent conviction of the people themselves that it is wise and useful."[13] By the turn-of-the-century, this effort had largely succeeded. Stock condemnation of greedy and short-sighted logging was a regular feature

---

[8] Gifford Pinchot, A Primer of Forestry: Part II, Practical Forestry (Washington: U.S. Dept. Agriculture, Bureau of Forestry, bulletin 24, 1905), 82; Gifford Pinchot, The Fight for Conservation (New York: Doubleday, Page, & Co., 1910), 128. Fernow offered the same evolutionary analysis: "In any wooded country, newly settled, the first problem is to get rid of the woods; for forests... are enemies to the kind of civilization to which we aspire," B.E. Fernow, Government Activity in Forestry: An Address Delivered in Burlington, Vt., January 24th 1906 (Pittsford, VT: Vermont State Forestry Commission, bulletin 2, 1906), 4. For other evolutionary descriptions of forestry in the United States, see W.B. Greeley, "The Relation of Geography to Timber Supply" Economic Geography 1 (1925: 9; Arthur B. Recknagel and Samuel N. Spring, Forestry: A Study of Its Origin, Application, and Signigicance in the United States (New York: Alfred A. Knopf, 1929), 36-37.

[9] Fernow, "Address to the Canadian Forestry Association, 6 September 1912, Victoria, BC" quoted in Rogers, Fernow, 53.

[10] Report of the Royal Commission on Pulpwood (Ottawa: A.C. Acland, sessional paper 30, 1924), 119.

[11] Fernow, "Forestry and Wood Pulp Supplies" Paper Trade Journal 27 (11 February 1898): 157-62.

[12] Pinchot, The Training of a Forester (3d ed. Philadelphia: J.B. Lippincott, 1917), 28-29.

[13] Theodore Roosevelt, "Forestry and Foresters" Proceedings of the Society of American Foresters 1 (1905): 4, 3-9.

of newspaper editorials and public discourse, due in large measure to the late nineteenth-century campaign by Hough and Fernow, among others, to alert the public to the dangers of a timber famine.

As the public became interested in the problems of forest conservation, professional foresters found it more difficult to maintain control of the issue. Muck-racking journalists compared logging the Maine Woods for pulp, which usually involved "the most barbarous and cheapest of methods," to "rape of the wilderness."[14] Such graphic rhetoric made for eye-catching copy that appealed to urban middle-class sentiments, but rape was not a language often invoked by professional foresters. Their complaint was not with exploitation of the forest *per se*, but with wasteful timber mining that depleted forest resources without regard for future use. Talk of rape resonated much more with those whose idea of conservation involved protecting the forest from any human use whatsoever. It sexualized a virgin forest whose "virginity" was the object of an impossible desire. Framed as that which was untouched by man, wilderness was doomed to fall because the very act of "having" it, even in parks or forest reserves, involved a kind of violation that spoiled the purity and impenetrability upon which primeval wilderness was founded.[15]

Professional foresters played on popular desires to preserve pristine wilderness, but their approach to conserving the forest, like their conservation rhetoric, was aimed to rather more utilitarian ends. Foresters emphasized that conservation did not mean withdrawing forest resources from human use, but rather using them more fully and efficiently. As President Theodore Roosevelt put it in his first message to Congress, "The fundamental idea of forestry is the perpetuation of forests by use."[16] This was as contradictory a desire as the longing to conserve untouched wilderness. It denied that land use involved trade-

---

[14] John C. Phillips, "The Passing of the Maine Wilderness" American Forests 34 (1928): 198, 195-98, 232. For similar rhetoric, see V. Shaw, "Rape of the Redwoods" Overland new ser. 39 (March 1902): 738-42.

[15] William Cronon makes this point in "The Trouble with Wilderness; or, Getting Back to the Wrong Nature" in W. Cronon, ed., Uncommon Ground: Toward Reinventing Nature (New York: W.W. Norton, 1995), 83, 69-90.

[16] Quoted in Maine Forest Commissioner, Report (1902): 50.

offs, or at least any conflicts that rational scientific planning could not resolve. Conservation would allow Americans to preserve their forest and exploit it too.[17]

Although the tensions between this utilitarian view of conservation, which many contemporary environmentalists would now call "shallow" ecology, and a "deeper," romantic desire to preserve the primeval forest are plain in retrospect, they were not as clear-cut at the time. In New York, the total ban on logging in Adirondack park, instituted in 1893, created much "antagonism between those interested in the preservation of the forests and the lumbermen," but even there Lieutenant-Governor Woodruff believed "these differences will all be reconciled by the important system of forest management sure to result from the original investigations" being conducted by Gifford Pinchot and the U.S. Forest Bureau.[18] The sky was the limit for scientific forestry; its potential seemed as limitless as it was untested. As long as multiple use was only a plan on the drawing board, it was possible to maintain, as Austin Cary did in 1896, that conservation could accommodate "the interests of the lumbermen and of the sight-seer" without "many points [of] clash."[19] Both demanded the elimination of reckless timber mining. Experience would later bring, as Cary put it in 1922, the "realization ... that [economic] use conflicts with esthetics." When forced to choose, Cary came down on the side of utilization: "the bulk of our forest land must and ought to serve in the first line an economic purpose."[20] But that day of reckoning was still a long time off at the turn-of-the-century, and even today it is sometimes argued that the ecologically sensitive management of the forest companies makes parks or other government-mandated conservation measures unnecessary in the Maine Woods. Far from being at odds, forest production and forest preservation seemed,

---

[17] Austin Cary used this very expression. The choice, he explained, is not "between having our cake and eating it" but rather "adopt[ing] that third alternative which growth and reproduction in all living things render possible-- take and use such as is grown and fit, and assure ourselves, by conservatism and moderation in leaving the stock necessary for reproduction and growth, of a steady future supply." Cary, "Spruce on the Kennebec and Androscoggin Rivers," 148.

[18] "The Banquet" Paper Trade Journal 28 (18 February 1899): 130, 147.

[19] Cary, "Spruce on the Kennebec and Androscoggin Rivers," 138.

[20] Austin Cary, "Maine Forestry in Retrospect and Prospect, address to the Maine Forestry Association, Bar Harbor, ME, 24 August 1922," 15, Box 1663, addresses file, Austin Cary Mss., Univ. Maine.

at the turn-of-the-century, to be two sides of the same coin. The Society for the Protection of New Hampshire Forests, the largest and most influential conservation group in New England, entertained both goals.[21] Founded in 1901 by wealthy scions of Boston society, it was organized "to preserve intact the scenic beauty" of the White Mountains of New Hampshire, but its charter also called for the application "to the forests of the principle of continuous yield."[22]

The application of sustained-yield principles to the actual management of land was what Pinchot called, somewhat self-servingly, the second or "permanent phase" of the forestry movement.[23] True scientific forestry involved treating the forest as a crop, a practice that depended, in some sense, upon the contrast with timber mining to give it meaning. Unlike mining, which was dirty, grubby, and destructive, timber cropping was clean and productive, felicitously associated with farming. Rather than being concerned solely with the present cut, forestry was conducted with an eye to future harvests by "prepar[ing] for, encourag[ing], and preserv[ing] the young growth."[24] Leaving the young timber to grow had long passed in Maine "as the sum and substance of right forest management," but Cary and other professional foresters emphasized that there was much more to scientific forestry than this simple "formula." To foster and actually increase forest growth, instead of simply getting out of the way, foresters needed to know about "[t]he conditions of tree growth, the means of producing the most and the best timber, the

---

[21] On its work, see Charles D. Smith, "The Mountain Lover Mourns: Origins of the Movement for a White Mountain National Forest, 1880-1903" New England Quarterly 33 (1960): 37-56.

[22] Society for the Protection of New Hampshire Forests, Report (1901-02): 4. Even Percival Baxter, who later gave the land around Mount Katahdin to the state as a public park to be kept "forever wild," initially imagined the park as a mixed use facility providing a "supply of timber and pulp" as well as "a recreation ground in the most picturesque region of the state." Baxter, Mount Katahdin State Park, an Address Given ... at the Annual Meeting of the Maine Sportsmen's Fish and Game Association (Augusta: Maine Senate, 1921), 6-7. On Baxter's changing sense of wilderness, see John W. Hakola, Legacy of a Lifetime: The Story of Baxter State Park (Woolwich, ME: TBW Books, 1981), 101-23.

[23] Pinchot, Training of a Forester, 27. In his memoir, Breaking New Ground (New York: Harcourt, Brace, & Co., 1947), Pinchot belittled the accomplishments of his predecessors Hough and Fernow, as mere promotion, taking for himself most of the credit for the actual establishment of forest conservation in the United States.

[24] Pinchot, Primer of Forestry, 66

conditions favorable to the germination of tree seeds and the growth of young plants, tree diseases and enemies," and so forth.[25] "[J]ust as necessary as the weeding of a garden," judicious thinning and culling could not only improve the value of a present stand, but also secure the reproduction of the next generation. "Indeed," offered one enthusiastic forestry proponent, "forestry is but another name for gardening."[26]

Foresters made much of the comparison between farming and forest conservation. It won for them some of the cultural standing traditionally accorded to agriculture, but forestry advanced some new ideas about the American landscape. Whereas traditional agrarian paeans celebrated the transformation of forest into farmland, foresters lamented the clearing of upland New England as an economic waste. "Nature herself," declared the New Hampshire forestry commission, "absolutely commands that whatever may be the preference of its inhabitants, at least one half of it [New Hampshire] shall remain perpetually devoted to the production of wood and timber."[27] Since most of New England would never be settled and much of it never should have been, foresters saw it as "the duty of the forestry profession" to lift the region from its "present deplorable, non-productive condition" by turning it over to forest crops.[28]

Whether the crop was trees or potatoes made no difference to Bangor & Aroostook Railroad President Franklin W. Cram. He got the freight from both of them and waxed that northern Maine "rightly may be termed a natural producing and reproducing 'forest farm.'"[29] But the difference meant a great deal to grangers and others concerned by farm abandonment in New England. They hoped to "devise some means to prevent the southern half of Maine from all growing up to forest."[30] Foresters soon realized that farmers,

---

[25] Cary, "Spruce on the Kennebec and Androscoggin Rivers," 187.
[26] "The Banquet" Paper Trade Journal 28 (18 February 1899): 130, 147.
[27] Forestry Commission of New Hampshire, Report (1885): 9.
[28] James W. Towmey, "The Woodlot: A Problem for New England Farmers" The Scientific Monthly 5 (1917): 193, 193-203.
[29] F.W. Cram to Dr. Kenneth C. M. Sille, president of the Maine Historical Society, 2 January 1923, Box 553 Gilbert mss., Univ. Maine.
[30] G. Morgan of Fryeburg, ME "Forestry and Taxation" Daily Eastern Argus 17 February 1887, 3.

perhaps more than any other group or class, had to be actively convinced of the necessity of maintaining the forest as a permanent feature of the landscape. In 1887, the chief of the U.S. Division of Forestry prepared a pamphlet for the national Grange entitled, "What is forestry?" In it, Fernow wrote, "It is the same as agriculture-- a business. The difference is only in the kind of crop...It is the production of a wood crop we are after from ground that would otherwise have been left not only unproductive but unsightly in addition."[31] Although foresters were always quick to admit that agriculture was the highest of all land uses and that conservation would not prevent *bona fide* farmers from pre-empting land even in national forest reserves, suspicions lingered.

In Maine, the first bill to the Maine Forest Commission was defeated because of the perception that it "is a timberland owners' bill. They will not sell their lands to the settlers. They would be glad to have the whole surface of the State covered with trees, and the tillers of the soil driven out of it."[32] At the bill's first hearing before the Agriculture Committee, in 1889, an Aroostook County farmer objected "that in his county they were burning up the forests to clear land, just as they did in Kennebec one hundred years ago; and that it was a troublesome inconvenience and expense for a settler to get a permit to burn up the timber and wood which had no marketable value."[33] Although the bill passed in the next session, fire regulations and later wildland tax rates, also advocated in the name of forest conservation, remained sore points with rural Maine voters. Their uneasiness was not entirely misplaced. Professional foresters expressed little sympathy for settlers, blaming them, sometimes more than the lumbermen themselves, for the fire and appalling waste that plagued the forest fringes. For the most part, treating trees as a crop meant getting people, especially squatters who had a very different vision of the forest and its future, out of the way. Large landowners, loath to pay the added school, road, and property taxes that came with settlement, could not have agreed more. The rhetoric of forest conservation and tree-

---

[31] U.S. Division of Forestry, Report (1887): 9.
[32] G.F Talbot, "The Woods and the Railroads" Daily Eastern Argus 15 February 1889, 2.
[33] G.F. Talbot, "Forestry Legislation-- Fires" Daily Eastern Argus 14 February 1889, 2.

farming gave both new legitimacy and new energy to their efforts to expel Franco-American settlers from the unorganized townships of northern Maine. A wave of trespass suits and expulsions swept over the upper St. John valley in the 1890's, and it was difficult to escape the conclusion that it was linked to the forest conservation movement on whose heels it came.[34]

Despite all the rhetoric about timber cropping, actual tree planting was relatively uncommon in the United States. Labor and nursery costs were much higher than in Europe, where tree planting and reforestation of the cut-over were standard practice. In 1913, the University of Maine opened a nursery to provide spruce and white pine seedlings at nominal cost, but most of their stock went to farmers who planted it on sub-marginal farmland.[35] The biggest strike against replanting was that it had "to compete in the market" against "forest supplies from virgin growth with only the cost of harvesting and transportation placed on them." As long as these supplies were available and the price of lumber did not reflect the true, long-term costs of reforestation, timber mining would always be cheaper than conserving forest crops. Sadly, concluded Bernard Fernow, "there seems no money in the business."[36] Pulp and paper companies in the Northeast did experiment with replanting their lands, but their efforts were driven by periodic fears that a Canadian export duty on pulpwood would cut off sources of future supply.[37] Their plantations were not located on cut-over woodlands but on abandoned farms where superior soils made an imported species, Norway spruce, not native spruce, the choice of pulp and paper manufacturers. In 1909 and 1910, the International Paper Company set out

---

[34] See the Squatters' claims file, Box 426, Peirce Family Papers, Univ. Maine Library. On the relations between agriculture and the lumber industry in northern Maine, see Richard W. Judd, Aroostook: A Century of Logging in Northern Maine (Orono: Univ. Maine Press, 1989), 81-101.

[35] "Forestry Work in Maine" Paper Trade Journal (10 May 1917): 60.

[36] U.S. Division of Forestry, Report (1892): 314.

[37] On this controversy, see Bill Parenteau and L. Anders Sandberg, "Conservation and the Gospel of Economic Nationalism: The Canadian Pulpwood Question in Nova Scotia and New Brunswick, 1918-1925" Environmental History Review 19 (1995): 55-83. Also Thomas Roach and Richard W. Judd, "A Man for All Seasons: Frank Dixie Barnjum, Conservationist, Embargoist, and Speculator" Acadiensis 20 (1991): 129-44.

160,000 Norway spruce seedlings on farmland in Phillips, Maine, while the Pejepscot Paper Company maintained its own Norway spruce plantations elsewhere in the state.[38] S.D. Warren, Eastern Manufacturing Company, and other paper companies also experimented with forest plantations, but most found, as the International Paper Company explained to its shareholders in 1920, "that nature knows better than man how to plant her seeds."[39]

In already established forests American foresters insisted that replanting was both unnecessary and impractical because natural reproduction would quickly replace the overstory after harvesting. In this way, turn-of-the-century forestry scientists distinguished themselves from the previous generation of amateurs and agitators like Hough who had held out tree planting and arborculture as the salvation to the timber famine. In 1898, the Pennsylvania commissioner of forests spelled out American forestry dogma:

> Forestry begins with properly conducted lumbering operations. Planting is, of all methods of forest restoration, the most expensive and is not likely to be resorted to extensively in this country for years to come. Indeed, there is small reason why it should be. With us, the first step toward forest restoration, after suppression of fires, is to see that in lumbering enough seed trees are allowed to restock the ground.[40]

Although they called it timber cropping, this approach to forestry had little in common with agriculture as farmers understood it. Farmers could not reap what they had not sown. Editorialists, in fact, made this very point about unsustainable timber mining: it involved "reaping where we have not sown."[41] But foresters maintained that actual tree

---

[38] "I.P. Leading in Practical Forestry" Paper Trade Journal (26 May 1910): 60; "Forest Planting and Protection" Paper Trade Journal (7 February 1918): 101-105. See also, Bangor Daily Commercial 20 March 1889, 4; "Need of Spruce Farming" Paper Trade Journal 26 (14 August 1897): 645; International Paper Company, Annual Report (1909): n.p.

[39] International Paper Company, Annual Report (1920): 16. On the history of plantation forestry in Maine, see Philip T. Coolidge, History of the Maine Woods (Bangor: Furbish-Roberts Printing Co., 1963), 664-79.

[40] "Pennsylvania Forests" Paper Trade Journal 27 (26 March 1898): 265. See also, W. P. Townsend to Austin Cary, 1 March 1909, Townsend, TN; misc letters file, Box 1664, Austin Cary Mss., Univ. Maine.

[41] J.W. Heburn, "Reaping Where We Have Not Sown" American Magazine 62 (July 1906): 247, 247-58.

planting was not essential to scientific forest conservation. They were more concerned with protecting the future growth of existing forests than with establishing entirely new ones. Logging the forest may have been like harvesting a crop, but the forest could also be compared to "a savings bank from which you could draw in interest every year."[42] Gifford Pinchot mixed both metaphors. In "conservative lumbering," the forest "is treated as working capital whose purpose is to produce successive crops."[43]

To the large, absentee landowners who controlled much of the Maine Woods, the comparison made perfect sense. They related to the forest not as farmers, whose acquaintance with their crop was won with sweat of the brow, but as financiers. For them, the forest was quite literally capital, and they treated it like any other financial asset. Often, complained the Maine Forest Commissioner, their "actual knowledge of their own property, excepting as to what revenue it yields, is very little."[44] The only thing that counted was the balance of the annual stumpage account.

Scientific description of the forest as capital appealed to this interest. It provided a compelling way to dramatize the difference between conservative and destructive forest uses. Logging that depleted the forest was like invading the principle of an investment. Timber miners "were making wanton drafts on the sources of their wealth, which it will take generations of careful effort to repair."[45] On the other hand, "[c]onservative forestry is forestry which retains the assets at hand in the woods."[46] It was akin to collecting an annual dividend of arboreal growth without invading the principal. This was the essence of forestry, Austin Cary told the American Pulp and Paper Association. "Forestry, by which I mean keeping the land in full bearing, would require that only the interest be taken, that the principal of the investment be retained."[47]

---

[42] U.S. Division of Forestry, Report (1887): 9-10.
[43] Pinchot, Primer of Forestry, 41.
[44] Maine Forest Commissioner, Report (1896): 12-13.
[45] "Our Timber Wealth" Bangor Industrial Journal 9 June 1882, quoting St. Louis Republican.
[46] C. A. Schenck, Forest Policy (Darmstaadt: C.F. Winter, 1911), 3.
[47] Austin Cary, "How to Apply Forestry to Spruce Lands" Paper Trade Journal 27 (19 February 1898): 161.

In a very real sense, of course, the forest was already being represented by the dollar sign; conservationists simply took advantage of this fact. Lumbermen had been little impressed by the "doctrine of indirect and deferred benefits" preached by those early prophets of timber famine.[48] In the 1880's and 1890's, "the man who talked about forestry matters to a practical lumberman was apt to be considered a visionary, if not a bore."[49] So forestry proponents changed their tune. They emphasized that forest conservation, understood as the conservation of forest capital, "is generally identical with sound business." It was practical, business-like, and profitable.[50] This was Pinchot's "permanent phase" of applied forestry, and industry officials soon perked up their ears.[51] J.E. Defebaugh, editor of the American Lumberman, thought Pinchot and other "disciples of forestry" took a great step forward when, at the 1905 American Forest Congress, they "began to demonstrate that direct benefits could be made to result from forestry as a science and as a practice."[52]

Conservationists had to offer this account of scientific forestry to win converts, but their understanding of the forest as capital did more than simply reflect the dramatic ways in which productive forces, integrated through a national, price-fixing market, were commodifying and liquidating the nation's forest. It also affected their practice. Representation of the forest as capital and scientific interest in its growth and accumulation illuminated a variety of forest properties and relationships that had long escaped notice. A synopsis of the topics covered in a series of public lectures, delivered in 1907 by Austin Cary "before schools, granges, and such local audiences," provides a sense of the wide range of these new scientific concerns:

---

[48] U.S. Forest Service, Forest Preservation and National Prosperity (Portions of addresses delivered at the American Forest Congress, Washington, 2-6 January 1905) (Washington: U.S.F.S., circular 35, 1905), 25, quoted in Harold T. Pinkett, Gifford T. Pinchot: Private and Public Forester (Urbana: Univ. Illinois, 1970), 56.

[49] "Conservation of Forest Wealth" New York Lumber Trade Journal 1 July 1896, 12.

[50] "Forest Management in Maine" Bangor Daily Commercial 18 November 1899, 4.

[51] Pinchot, Training of a Forester, 27.

[52] Quoted in U.S. Forest Service, Forest Preservation and National Prosperity, 25.

> the growth and utilization of the forest, methods of saving for the next cutting when one cutting is made, tree diseases, problems of soil and exposure, methods of work in the great forests or the small piece of woodland on a farm, and tell them what is being done scientifically in forestry and in the acquirement of knowledge of the woodlands.[53]

Non-merchantable species, previously ignored by lumbermen as little more than a nuisance, were reconstituted as competition and weeds. Foresters compared the relationships between individual trees to a state of "incessant warfare between species," but they tended to understand the process of forest succession in terms of an orderly sequence of discrete plant communities.[54] This construction was indebted to the work of Frederick Clements, an American plant ecologist whose model of climax ecology, remembered the silviculturalist David M. Smith, "had a powerful grip on ... the naturalistic school of forestry."[55] Clements argued that vegetation was "an organic entity" with a predictable life-history "comparable in its chief features with the life-history of an individual plant." If left undisturbed, the "climax formation is able to reproduce itself, repeating with essential fidelity the stages of its development."[56] But whereas Clements and his colleagues represented natural successional pathways, foresters were more interested in intervening. They experimented with girdling hardwoods, herbicides, and other technical treatments to insure that the second growth of spruce and other merchantable species succeeded over their competitors.[57]

By comparing the forest to liquid capital, foresters aided its liquidation. As the forester C. A. Schenck explained in 1911, "Growth, in conservative forestry, is the

---

53 "Professor Cary to Deliver Lectures on Forestry in Maine" Paper Trade Journal 45 (31 October 1907): 38.
54 W.M. Munson, "Distribution of Plants in Forest Regions" in Maine Forest Commissioner, Report (1902): 123.
55 Harold K. Steen, ed., David M. Smith and the History of Silviculture: An Interview by Harold K. Steen (Durham, NC: Forest History Society, 1990), 79.
56 Frederick E. Clements, Plant Succession: An Analysis of the Development of Vegetation (Washington: Carnegie Institution, 1916), 3.
57 On these early efforts, see, for example, D. A. Crocker, "Forestry in the Pulp and Paper Industry" Paper Trade Journal (16 June 1927): 34-40.

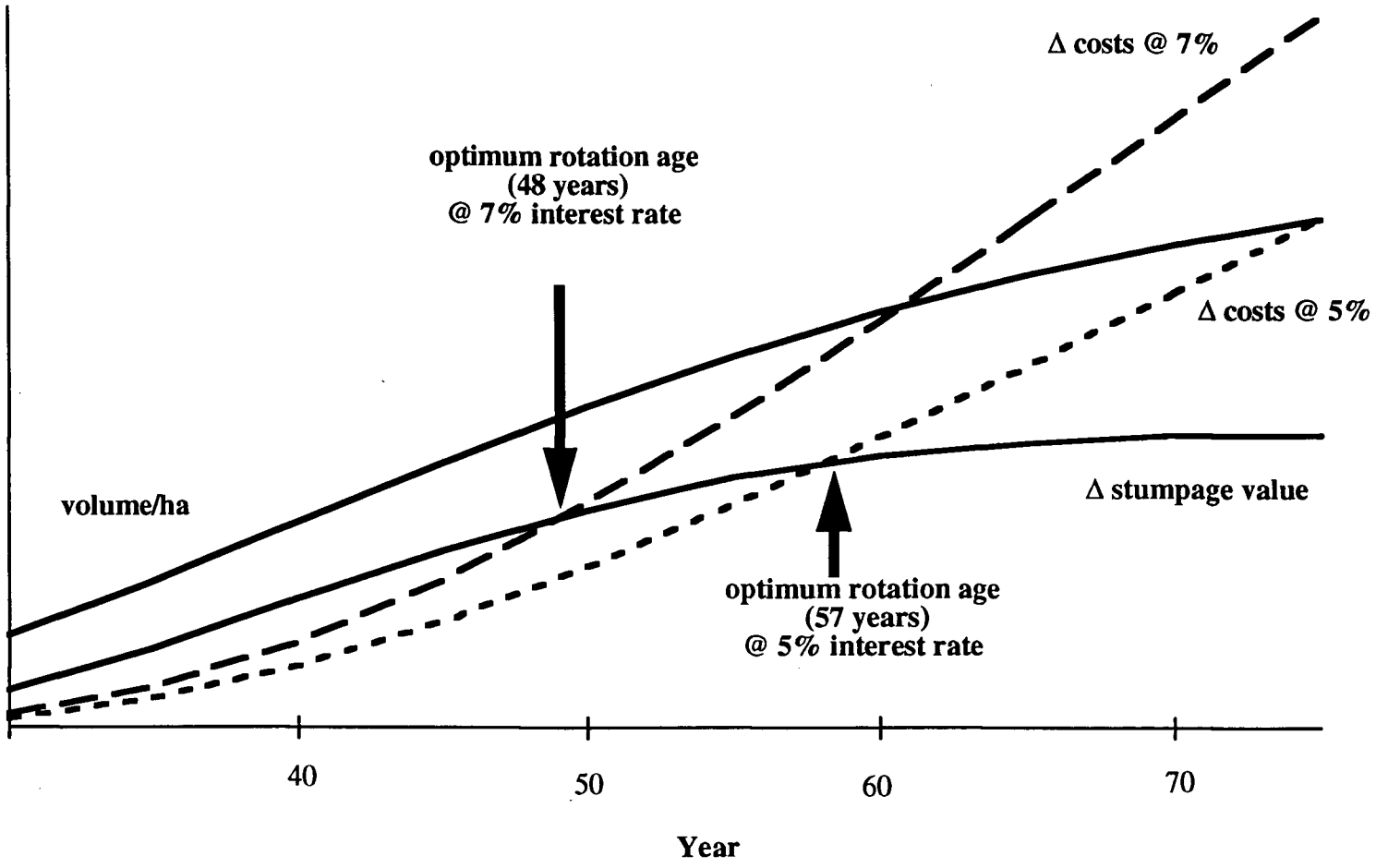
making of revenue."[58] Little else mattered. Those intangible and aesthetic forest values treasured by tourists and others with a sentimental eye for scenery were rendered invisible by the scientific construction of the forest as capital. Since forest "growth is like interest," defined by the accumulation of exchange value, foresters studied the growth, development, and reproduction of merchantable species.[59] They developed methods to measure stands and calculate growth rates. This information allowed them to prepare growth tables for determining harvest size for various rotation times in the normal forest.

Figuring the actual returns to capital from these tables, however, was more complicated, despite a major program by the U.S. Forest Bureau to determine "the precise money value of trees of different diameters."[60] Although forest growth could be understood as a kind of capital, it was not quite the same thing. Foresters had to grapple with the contradictions of comparing the sustained yield from forest growth to the dividend from a capital fund that was fluid and fungible. Maximizing financial income was not necessarily the same thing as maximizing tree growth. As markets and technologies changed, so too did the exchange value of the forest. Some forms of forest growth, such as the sapling white pine used for sugar box shooks, ceased to be valuable when replaced in the 1870's by cheaper India jute sacks, while others, like poplar, sky-rocketed in price when manufacturers discovered how to pulp them for paper.[61] American foresters like Austin Cary complained that in the rush for profits, the Maine Woods had been cut so as to "shove the producing power of the land down to a fraction of what we take from it," but their calls for the forest to be treated as capital generally ignored the opportunity costs of doing so.[62] While leaving the young growth to mature might increase both the eventual

---

[58] Schenck, Forest Policy, 21.
[59] Cary, "Spruce on the Kennebec and Androscoggin Rivers," 65.
[60] U.S. Forest Bureau, Report (1905): 215.
[61] On these changes in markets for Maine lumber, see David Demeritt, "Boards, Barrels, and Boxshooks: The Nineteenth Century Economics of Downeast Lumber in Cuba" Forest and Conservation History 35 (1991): 108-20; David C. Smith, "Wood Pulp Paper Comes to the Northeast, 1865-1900" Forest History 10 (1966): 12-25.
[62] Cary, "Spruce on the Kennebec and Androscoggin Rivers," 65.

Figure 6.1. Optimum Rotation Age for Various Interest Rates



Source: B.C. Ministry of Forests, Variable Density Yields for Coastal Douglas-fir (Victoria, 1982)

harvest size and the rate of its annual increase, it did not necessarily offset the cost. With higher interest rates, maximizing economic yield demands shorter rotation periods (FIGURE 6.1). If the forest were truly capital, then it had to pay the price of being left to accumulate as fiber rather than in some other, potentially more profitable form.

This problem greatly exercised German foresters, who argued passionately about whether interest costs were an appropriate consideration in determining the time of harvest.[63] Largely, however, the distinction between maximizing the yield in timber or in discounted money was lost on North Americans, whose virgin forests needed to be cut before the length of second-growth rotation periods could become more than a theoretical issue. It required sophisticated cost-accounting techniques even to calculate the marginal value of present versus future yields. Nineteenth century economic theory, such as that proffered by Pareto, had been concerned with the analysis of equilibrium conditions for given factors of production. It was ill-equipped to handle to changes in market structure, supply, and demand that amortizing the capital costs of forest growth would have demanded. Although the marginalist revolution in economics, which, in the 1880's, awakened the discipline to the law of diminishing returns and dynamic equilibrium with changing factors of production, and the development of new methods of management accounting, required by railroads and other large corporations to depreciate their fixed assets, provided some of the intellectual tools necessary to calculate the diminishing returns to capital of continued forest growth, the Great Northern Paper Company made decisions about whether to buy stumpage or liquidate its holdings based on impressionistic information rather than hard and fast calculations of capital costs.[64]

---

[63] This debate pitted the liberal capitalism of Robert Pressler and Martin Faustmann, for whom the forest was just another form of capital, managed to provide the greatest economic return, against those for whom the forest embodied other, more tradition bound values. See M. Grane, Martin Faustmann and the Evolution of Discounted Cash Flow (Oxford: Commonwealth Forestry Institute, paper no. 42, 1968); Heinrich Rubner, "Sustained-Yield Forestry in Europe and Its Crisis During the Era of Nazi Dictatorship" in History of Sustained-Yield Forestry, ed. H.K. Steen ([Durham, NC?]: Forest History Society, 1984), 170-75.

[64] John E. McLeod, The Great Northern Paper Company (1978. unpublished book mss., Univ. Maine Library), VI: ch. 21, 25-26. On the practical problems calculating the present and future values of timber holdings, see Garrett Schenck to Fred Gilbert, 10 November 1913, Boston, Box 563; Gilbert to Schenck, 2

Although conservation discourse invoked the rhetoric of forest as capital, it did not explore the profound implications of conceptualizing the forest as a commodity absolutely interchangeable with all other forms of capital. Mostly this usage was didactic. "[F]orest capital" meant only "the productive capacity of the forest" without much sense of the tensions inherent between its value as a fixed source of socially necessary materials and as a fluid financial asset.[65] As a matter of actual practice, conserving the latter tended to take precedence over the former. Working for Berlin Mills Company, Austin Cary conceded:

> In an established business of this kind, forestry could occupy at the start only a secondary place. This fact was especially clear with regard to ... the volume of the cut... [It] was determined by market and financial conditions, and it was approximately the same from year to year. All operations of the company had been accommodated to it, and this condition the forester could not expect to alter...The position of the forester in these circumstances was not an easy one. Forestry had to be recognized as secondary, and the forester's work had to be done largely in indirect ways. To carry out systematically any scheme based upon his ideas was impossible, and all that could be done was to strike for one or two things at a time and to work them out on the ground as best he might.[66]

Cary was prepared to accept that "something of the ideal must be slackened to meet their circumstances."[67]

Many other Americans at the turn-of-the-century were much less patient with lumbermen and landowners. Their understanding of the forest as a crop and fund of capital to be conserved for future generations led them to re-evaluate the tenure system and the profit motive. Ironically, private capital seemed unable to conserve the forest as if it were

---

July 1920, Bangor, Box 553 semi-processed Gilbert mss., Univ. Maine; tesimony of William Whitcomb, manufacturing manager International Paper Co., and Herbert J. Brown, treasurer, Berlin Mills Co., in U.S. Congress, Pulp and Paper Investigation Hearings (Washington, GPO, 1909), II: 1079-80, 1385-86.

[65] H.N. Whitford and Roland D. Craig, Forests of British Columbia (Ottawa: Commission of Conservation, 1918), 12.

[66] Austin Cary, "An Example in Practical Forestry" Paper Trade Journal (9 January 1908): 40-42.

[67] Austin Cary, "How to Apply Forestry to Spruce Lands," 158.

capital. "Wherever forest management has been left to private enterprise," Bernard Fernow told a Vermont audience in 1906, "it has finally ended in total or comparative failure."[68] Fernow had not been so forthright as chief of the U.S. Forest Bureau, but once out of office, he was able to give much freer expression to his preference for "government ownership and management [of the forest] based on the paternal function of government," such as in his German homeland.[69] This was a radical prescription for the problem of forest conservation.

A great number of Americans joined Fernow in urging federal and state governments to imitate the European model of government-owned forests. Calls for government forestry were underwritten by particular conceptions of both nature and society. Forests were different from other kinds of crops because they required a human lifetime to mature. "The investment is too large and the returns too slow to make it attractive as a business proposition."[70] Conserving forest crops was "an interest too general, too remote in its advantages, to be cared for by individuals whose only object is immediate gain." This was a very dim view of human nature that, as Austin Cary complained, completely discounted "how on a variety of grounds other than financial," such as, "[s]entiment, family, pride, and the general trend of public opinion, ... the interests of forestry" might be advanced. "It is expected," lamented Maine's George F. Talbot, "that individuals will act as they always do with reference to immediate profits and purely personal advantages." Self-interest, even of the enlightened variety, was not enough to guarantee the conservation of the forest. Only the state could be counted upon "to consider the welfare of the future and the good of the whole." Individuals, "with their ambitions and

---

[68] Fernow, Government Activity in Forestry, 6.
[69] B.E. Fernow, "Scientific Forestry in Europe: Its Value and in Canada" in Canadian Commission of Conservation, Report (1910): 35.
[70] "The Lumber Supply" Bangor Daily Commercial 2 January 1901, 4.

their schemes of personal advantage" were too disposed "to appropriate to themselves as much as possible of the common wealth." [71]

The clamor for reform led, in 1891, to the passage of the Forest Reserve Act, authorizing the President to reserve from sale public lands in the West for forest protection. These lands eventually formed the core of the national forest system, but for many these measures did not go far enough. In the East, there were no more public lands to reserve, and elsewhere great swaths of the once public domain were held in private hands. In calling for government take-over of the White Mountains, the Society for the Preservation of New Hampshire Forests appealed to the standard arguments against private ownership of the forest:

> By reason of the long time-element, private ownership and capital are ill-adapted to give [the forest] a more conservative and rational treatment. It is a matter for government ownership; and it is time that the empty, wordy onslaught on the lumberman should give way to an effective effort to gain possession of the land.[72]

Disenchantment with the competitive market was in air in the 1890's, but these criticisms of industrial forestry were more than just an occasion for company bashing. They articulated a far-reaching critique of individualistic, profit-maximizing capitalism. Whereas the populists focused attention on the inequality of exchange relations between individual proprietors and large corporate interests, conservationists concerned themselves with the secondary environmental effects of capitalist production. Commodities were not absolutely alienable; their production and exchange had externalities, often diffuse in both time and space, that their price did not adequately represent. This recognition, cheered the

---

[71] I have combined Talbot's remarks from two editorials: "Preserve the Forests" and "Mr. Hobb's Forestry Bill" Eastern Argus 25 January 1887, 4 and 12 February 1889, 2. The Austin Cary quotations are from Cary, "How Lumbermen in Following Their Own Interests Have Served the Public," 286.
[72] Society for the Preservation of New Hampshire Forests, Annual Report 3 (1904-05): 11.

Pennsylvania Forestry Commissioner, "marks another stage in our passage to a more rational estimate of the relations of the forest to the community at large."[73]

The timber famine was a classic example of the problem of externalities within a system of capitalist commodity production. Because the price of lumber did not reflect the cost of insuring reforestation, it was profitable for individuals to strip the forest of its standing timber without regard for future growth, despite the fact that the cumulative effect of these individually rational actions would leave everyone poorer. Foresters found themselves on the horns of a dilemma. "Profitable exploitation of our forest resources and forest conservation, or conservative forest management are at present [in 1892] more or less incompatible."[74] Although they trumpeted the important role played by forests and forest products in the nation's economy as whole, they recognized, as C.A. Schenck testified to Congress, "If stumpage is cheap, no one can afford to produce it... If we want forestry, we, as a people, through Congress, have to see to it that forestry is a good investment."[75] The great difficulties of making private forestry profitable led many people to conclude that "only state ownership can afford to exercise providential functions, can guard the interest of a distant future and wait a century for returns on its outlays."[76]

But other people insisted that the invisible hand of the market was not broken and did not need a government fix. Left to its own devices, the price mechanism would soon provide the incentive for investment in forestry. For this reason, Charles Oak, Maine's second forest commissioner, did "not anticipate exhaustion of our forest supplies for a long time period." He was confident that even if it became "certain after a few years that the total supply was being exhausted, values must necessarily be appreciated considerably, and in that case, investments in wild lands" and in forestry would improve the "rate of increase from that which comes from natural growth," such that a timber famine would be

---

[73] "Pennsylvania Forests" Paper Trade Journal 27 (26 March 1898): 265.
[74] U.S. Division of Forestry, Report (1892): 314-15.
[75] U.S. Congress, Pulp and Paper Investigation Hearings, III: 2744.
[76] B. E. Fernow, "Forestry and the War" Journal of Forestry 16 (1918): 153, 149-54.

averted.[77] Similarly, the Paper Trade Journal was not alarmed by "the probable ultimate elimination of spruce" because "nature holds such vast stores of as yet undiscovered and untried material which is judiciously revealed to or discovered by man at the time when it is needed most."[78]

A.H. Carter of the Berlin Mills Company put his faith in technical innovation. He noted:

> the cry against the exhaustion of spruce in Maine is the same as in the case of pine a few years ago. Then quantities of pine were being consumed every year, and alarmists said that it was only a question of a few years before that variety of tree would be extinct. Such was not the case, however, as may be seen to-day. When the price of pine went up on account of its scarcity, it was discovered that spruce was equally as good and pine was forgotten.
>
> In my opinion the result will be the same in the case of spruce. If the price runs up, the paper manufacturers won't raise the price of their product correspondingly, but will find something else to take the place of spruce. I wouldn't be surprised at any time to hear that wood was not required at all in the pulp and paper mills, for the reason that something better had been found."[79]

Oak, Carter, and other apologists for the market had a much more sophisticated understanding of lumber supplies than many of the timber famine alarmists advocating government take-over of the nation's forests. They recognized that although the quantity of timber may have been a physical absolute, fixed, in some sense, by the forces of nature, supply and demand for it were socially constructed, and subject to the law of diminishing returns. As the price of lumber increased, so too did the marginal utility both of producing more of it, either by going back to once prohibitively expensive sites or by using what was at hand more efficiently, and of buying less of it through thrift and physical substitution.

---

[77] Maine Forest Commissioner, Report (1896): 11

[78] Paper Trade Journal 28 (25 February 1899): 160.

[79] "Lumber Plentiful" Bangor Daily Commercial 18 February 1999, 3.

Response times were a potential problem, given the slow rate of forest growth, but in general the market was much more sensitive to price signals than many conservationists gave it credit for. Timber famine, understood simply as an economic question of future forest-products, was amenable to a market solution because supply and demand for these commodities were fully accounted for by the market. Given adequate knowledge of the consequences of their actions, profit-maximizing actors had every incentive to conserve present supplies and produce future ones.

Market signals, however, were less relevant for conserving other valuable public goods derived from permanent forest cover. By the turn-of-the-century, science had made the diffuse relationships between forests and erosion, hydrology, and climate popular gospel. "Forests," declared the Bangor Daily Commercial, "not only grow timber, but they hold the soil and conserve the streams. They abate the winds and give protection from excessive heat and cold. Woodlands make for the fiber, health, and happiness of the nation."[80] Although these were matters of grave public concern, profit maximizing individuals had no economic incentive to conserve them. As unpriced public goods, they fell outside the market, which completely discounted the effects of logging upon them. "[A]s a rule ... few of the lumbermen look to anything but the greatest amount of present income, and so cut on the clean sweep plan. No considerations of the effect upon climate or-- except as it may have to do with the stage of water in logging streams-- upon precipitation, are of much weight in his mind."[81] If flood abatement happened at all, it was only as an unanticipated by-product of conservative timber harvesting. Though valuable, its provision was not analogous to the conservation of capital in which the benefits had to be both exchangeable and excludable for market signals to register them.

By continually highlighting the importance of such uncommodified forest properties, forestry scientists cut against the grain of their own rhetoric. Describing forestry

---

[80] "Need of Saving Forests" Bangor Daily Commercial 18 February 1909, 4.
[81] "Forest Area" New York Lumber Trade Journal 1 January 1887.

as the conservation of forest capital was popular and easily understood by lumbermen, but there was more to it than that. Capital behaved very differently from the forest, and accumulating the one did not necessarily insure the conservation of the other. Whereas individual units of capital could be understood as both interchangeable and independent of one another, the forest and its properties were not. A tree was not simply a tree; its condition depended upon complex relationships with its environment. The rhetoric of capital and the market that it mirrored reduced the forest to an assemblage of exchangeable entities, commodities that could be abstracted and alienated from their surroundings, "regardless of any interest the public may have" in their conservation.[82]

Progressive-era conservationists were discovering some of the problems with these suppositions. Because of its role in climate and hydrology, "[t]he forest is more than 'a source of wealth'" It is, declared Bernard Fernow "to some extent a common property of all."[83] This was a potentially radical claim. Foresters found precedent for their belief that forests were endowed with a public character demanding government control in the extension of government authority over other public utilities such as railroads, water works, and electric companies. Like the forest, these private enterprises fulfilled essential public services, but advocates of government regulation of private land use have found this a very hard sell in the United States, where, as Fernow conceded, collective ownership and regulation have "not been germane to the spirit of the institutions of the country."[84] Still, Fernow held out hope that the old school of political economy, which "considered government as something outside ourselves," was giving way to "a wider view of our existence as a community [and] as a nation." Modern society, he argued, demanded that we

---

[82] The quotation is from John E. Hobbs, "The Depreciation of Our Forest Growth and Its Effects upon Our Various Industries" in Maine Forest Commissioner, Report (1891): 74, 61-75. But the wider point is made by David Harvey, "The Nature of Environment: The Dialectics of Social and Environmental Change" Socialist Register (1993): 6, 1-51.

[83] U.S. Division of Forestry, Report (1887): 47.

[84] U.S. Division of Forestry, Report (1892): 313. On the reconceptualization of state regulatory power in the Progressive-era, see Martin J. Sklar, The Corporate Reconstruction of American Capitalism, 1890-1916: The Market, the Law, and Politics (New York: Cambridge Univ. Press, 1988).

"recognize theoretically ... that police duties do not exhaust the proper functions of the Government."[85]

These were complex questions, and professional foresters, like other Americans, were not all of one mind. While nearly everyone agreed on the necessity of conserving the nation's forests, it was not at all clear what system of management and tenure would best accomplish this, or, as a matter of actual forest practice, which were the most effective techniques for insuring a sustained yield. Some followed Fernow and Pinchot in the belief that only public action and government ownership would guarantee the application of scientific principles to forest management. They called on government, especially the federal government, to regulate private lands it had not actually retained or acquired by purchase and eminent domain. As members of a new, professional class, they put their faith in the ability of disinterested government scientists to administer the forest fairly and efficiently so as to protect the long-term public interest. In 1920, the forest conservation committee of the American Forestry Association resolved:

> We believe that to grow the bulk of older and larger sizes of timber, public ownership of timberland--National or State-- with private cutting and marketing operations is the most feasible solution of the problem. The production of large-size timber is too long an undertaking with too great hazards and too low a rate of return to attract private capital... The State and National Governments, whose primary concern is the welfare of all citizens and industries, can best afford to engage in the long term undertakings of timber growing.[86]

Others insisted that such heavy-handed state measures were both unnecessary and unsuited to American society. Austin Cary was a proponent of this view. He opposed state regulations on logging practice as "inadvisable and burdensome" and applauded the invisible hand of the market for insuring that "lumbermen in following their own interests

---

[85] U.S. Division of Forestry, Report (1887): 47.

[86] "American Forestry Association Meets in New Hampshire" Paper Trade Journal (26 August 1920): 44.

have served the public." As a pragmatist who advocated "catch-as-catch-can forestry" adapted to local circumstances, Cary was uncomfortable with the bureaucratic inflexibility of the textbook forestry that had come to the United States from Germany, "the most autocratic country in the modern civilized world." In addition to its ecological dangers, he "had the feeling that those Germans held too tight a rein over themselves for real men to thrive under." In the long run, Cary put his faith in co-operation with lumbermen and accommodation with the market as the only system of forest conservation that "seems to fit our circumstances and people." Ultimately, he thought, "the question involved is social and governmental, not technical."[87] This was true enough, but by distinguishing between political questions on the one hand and technical or scientific ones on the other, Cary reduced forest conservation to a set of scientific practices that could be applied without reference to the social system in which they were applied. This was not a concession that Cary's opponents were prepared to make, even if many of the most ardent supporters of government forestry endorsed its corollary-- that the technical questions of forest science were not also social ones to be debated and decided in an open public sphere.

These divisions within the profession mirror, in some sense, those in the country at large. Conservation was a remarkably plastic term, and it was certainly not the case, as Pinchot polemicized, that "the lines are plainly drawn. He who is not for forestry is against it. The choice lies between the convenience of the lumbermen and the public good."[88] There were almost as many ways to define forest conservation as there were notions of the public good that it was supposed to serve. These were struggles over forest practice, but they also turned on metaphors and representations.

The objects of forestry depended fundamentally upon the ways in which the forest was framed as an object of knowledge. Different representations of nature and society provided the resources necessary to realize very different conservation programs. The

---

[87] Cary, "Forests of Maine," 424-25; Cary, "How Lumbermen in Following Their Own Interests Have Served the Public," 286.
[88] Gifford Pinchot, "The Lines Are Drawn" Journal of Forestry 17 (1919): 900, 899-900.

language of capital appealed to the interests of forest owners, but it could be put to other uses as well. Editorialists spoke of a national "forest balance sheet" and addressed the American people as "stockholders of the United States."[89] By mirroring the business practices so much in vogue, they found a legitimate way to consider communal aspects of the forest that transcended the interests of industry. Ultimately, however, representation of the forest as capital did a much better job rationalizing the conservation of forest properties that had already been commodified or indirectly accounted for by the market than it did protecting other, more intangible and less immediately commercial qualities of the forest. Although Pinchot and other forest scientists found the rhetoric of capital necessary to win the ear of lumbermen, they also came slowly to understand that the forest embodies something more than accumulating capital, discrete and absolutely interchangeable with other kinds of capital. In this respect, they shared much in common with Muir and others whose preservationist inclinations and ideas of the forest primeval forestry professionals dismissed as naive and impractical. The idea of multiple use may, in actual practice, turn out to be little different than treating the forest as capital, but it would be over-simplistic to dismiss this management goal as merely a tool of capital and to lump its adherents in with industry officials who do not recognize any properties of the forest beyond the value it realizes as a commodity.

forestry and the state

The Progressive-era conservation movement was concerned with protecting the diffuse, non-excludable public benefits derived from forests and their use. It involved re-negotiating the balance between the rights of private property holders and the community at large, usually through some form of state action. These claims were not necessarily opposed. Indeed many Progressive-era conservationists believed fervently that if organized

---

[89] "Our Forest Balance Sheet" Nation 84 (9 May 1907): 425-26; A.W. Page, "Report to the Stockholders of the United States" World's Work 17 (February 1909): 11205-13.

co-operatively and planned scientifically, corporate and communal interests in the forest, far from being antagonistic, could run in harmony. To this practical end, they considered a variety of public policy measures, ranging from encouragement and support of private conservation efforts to regulation and out-right government take-over of forest land, designed to conserve and protect the forest.

In the United States, much of the debate about forestry and the state focused on the public lands of the west and on the role of the federal government as the principle agent conserving them. While these national ideas were an important source for people in Maine to draw upon, conservation discourse cannot be theorized apart from the spaces and settings in which it was articulated. Maine was the product of a particular historical geography, and these relations, along with the traditions and identities they engendered, materially affected the ways in which forest conservation was realized locally. In Maine, there had never been any federal lands to conserve. The public domain was a state concern, and by 1878 it had been completely alienated.[90] If government were to play a role in protecting the Maine Woods, it would have to be the state, not the federal government doing it. Events in Washington were important, and some people wished to make them even more so by dramatically increasing the role of the federal government and the U.S. Forest Service in the Maine Woods, but for the most part, decisions about forest policy in Maine were decided in the state capital, or in Boston and New York where the large pulp and paper corporations that owned so much of the forest were headquartered.

In Maine, expanding the role of government was particularly controversial. Historically, the State of Maine had been slow to expand its reach beyond narrow educational, regulatory, and police functions. Unlike Massachusetts, which actively supported internal improvements and other economic development projects, Maine did not

---

[90] On the history of the public lands in Maine, see [E.E. Ring], "History of the Wild Lands of Maine" in Maine Forest Commission, Report (1908): 36-103; David C. Smith, "Maine and Its Public Domain: Land Disposal on the Northeastern Frontier" in D.M. Ellis, ed., The Frontier in American Development: Essays in Honor of Paul Wallace Gates (Ithaca: Cornell Univ. Press, 1969), 113-37.

involve itself much in the promotion of canals, railroads, and other public infrastructure, in large part because proposals were held hostage to in-state rivalries between boosters of Portland, Bath, and Bangor.[91] Forestry proved little different. Saddled with enormous Civil War debts, the legislature rejected calls in the 1860's and 1870's to support tree planting and arborculture by paying a bounty. There were laws on the books to prevent the setting of fires, but government action was restricted to the protection of private property from destruction by immediate action. The secondary social costs and collateral effects of logging lay largely beyond the reach of law in the nineteenth century; individual property owners were free to dispose of their holdings as they pleased, subject only to the stipulations of private contracts.[92]

As timber famine fears mounted, the momentum for some legislative response grew. One of the early proponents of forest conservation in Maine was George F. Talbot, a former anti-slavery activist and campaigner against child labor. Born in East Machias and educated at Bowdoin, Talbot turned his back on the family's small town lumber business to establish a lucrative legal practice in Portland. In his background, vocation, and metropolitan residence, Talbot was typical, perhaps, of the new professional class from which so many Progressive-era reformers hailed.[93] A tireless editorialist, Talbot orchestrated a conservation publicity campaign that culminated in the first meeting of the Maine Forestry Association in 1889. Lumbermen from around the state gathered in Bangor to discuss the problem of forest depletion and possible legislative remedies.

---

[91] Edward H. Potter, "Public Policy and Economic Growth in Maine, 1820-1857" (Ph.D. diss., Univ. Maine, 1974); Oscar Handlin, Commonwealth: A Study of the Role of Government in the American Economy, Massachusetts, 1774-1861 (Rev. ed. Cambridge: Harvard Univ. Press, 1969).

[92] James Willard Hurst, Law and Economic Growth: The Legal History of the Lumber Industry in Wisconsin, 1836-1915 (1964. Madison: Univ. Wisconsin Press, 1984), 455.

[93] An established tradition of scholarship, inaugurated by Richard Hofstadter, has attributed progressive reform movement to the "status" anxiety of northeastern WASP's like Talbot. There is certainly something to this claim, but as I hope to show, it considerably oversimplifies the situation. Hofstader, The Age of Reform: From Bryan to F.D.R. (New York: Knopf, 1955). On the background of Progressive-era reformers like Talbot, see James Wright, The Progressive Yankees: Republican Reformers in New Hampshire, 1906-16 (Hanover: University Press of New England, 1987).

Though hardly threatening to landowner interests, Talbot's specific proposals-- more stringent laws to prevent forest fires, the incorporation of a mutual stock company to insure timber owners against fire loss, a bounty to promote tree planting, tax exemptions for land devoted to timber production, a ban on cutting spruce below eight inches in diameter, and the collection, through the files of the tax assessors and county commissioners, of firm, quantitative estimates of remaining timber supplies in the Maine Woods as well as estimates of the amount wasted, cleared for agriculture, cut-over, and burned each year-- were gutted by the convention.[94] Henry M. Prentiss, a Bangor lawyer and forest landowner, thought Talbot's suggestions were "more adapted to the West than to the East... the bounty clause was not needed. We will never have to plant trees, except perhaps in some sandy soils, for the trees spring up of themselves."[95]

The convention endorsed fire restriction, by requiring settlers to obtain permits before burning land, tax relief, and the creation of a salaried forestry commissioner to collect forestry statistics.[96] But even this modest proposal, introduced in the House as the Hobbs bill, faced stiff opposition. Cost-conscious legislators balked at the commissioner's $1800 salary, while farmers, heavily represented on the Agriculture committee to which the bill was referred, objected to the restrictions on burning brush. Although Talbot emphasized that "neither this bill nor any other more completed system of legislation in operation in other States contemplates any interference with the landowner's rights to cut his crop of trees just when he pleases," some lumbermen feared that a forestry commissioner was the leading wedge for government interference with "the right of the owner of a tract of woodland to enter the land and strip it of its standing growth."[97] Only by striking the fire license provisions along with the stipulation that tax assessors not tax

---

[94] G.F. Talbot, "Preserve the Forests" Daily Eastern Argus 25 January 1887, 4.
[95] "Forestry Convention" Bangor Daily Whig and Courier 19 December 1888, 5.
[96] The bill is described in Bangor Daily Whig and Courier 20 December 1888.
[97] G.F. Talbot, "Forest Policy-- Other Misapprehension" Daily Eastern Argus 16 February 1889, 2; Lumberman's Review (April 1893): 10.

"the value of the growing timber" was a bill to create the Maine Forest Commissioner able to gain enough votes to make it through the legislature.

Stripped of any real authority to regulate forest practice, the forest commissioner was a conservation cheerleader and investigator. The state of Maine already boasted a Bureau of Industrial and Labor Statistics, a Board of Health, school commissioners, fish and game wardens, and state mental hospitals, so the addition of the forest to the growing list of objects of government scrutiny was hardly path-breaking. Even opponents of more aggressive state conservation measures agreed that by itself statistical information was innocuous. Once the legislature had economized on the costs of its collection, by eliminating the forest commission as a separate salaried post and adding its responsibilities to those of the state Land Agent, there was little ground for objecting to forestry statistics.[98]

But knowledge was not as inert as it seemed; it transformed the objects it represented, rendering them available to new forms of state power and regulatory control. As the New Hampshire Forest Commission was quick to emphasize the "basis of all scientific forest management is ... an accurate topographical knowledge of the forest cover."[99] By collecting information about forest supplies, growth, and causes of depletion, the Maine forest commissioner broke the forest down into its constituent parts and processes. For the first time it was possible to know about and thus to conserve the forest from annual losses due to logging, fire, and waste, phenomena that only became problems to be addressed once they could be brought into view. The very first report of the Maine forest commissioner, in 1891, listed the cause and frequency of forest fires in the state. A quarter were attributable to land clearing, another quarter to small parties of campers, and

---

[98] Interestingly, however, the legislature did scale back the range of the forest commissioner's statistical investigations into the causes and extent of forest depletion in Maine. The first version of the bill named "for the purpose of clearing lands for tillage or pasturage" as one of the problems to be investigated; this category was struck from the final bill. Compare the bill described in Bangor Daily Whig and Courier 20 December 1888 with the final version in Maine Forest Commissioner, Report (1891): 5-9.

[99] New Hampshire Forest Commission, Report (1901-02): 89.

the rest to arson, railroad sparks, lumbering, and other anthropogenic causes.[100] Yet, despite the great damage caused by forest fires, the commissioner discovered an "alarming indifference" to the problem.[101] As the size, location, and frequency of fire damage was catalogued and analyzed by cause, this attitude began to change. Forest fire, once regarded as an inevitable presence in the forest, was transformed into "Demon Fire" and the "Red Menace," an unnatural phenomenon to be identified and eradicated from the nation's forest.[102]

Such exact, detailed knowledge was the hallmark of modern disciplinary power. In contrast to older forms of state power, which were exercised by prohibition and punishment, disciplinary power operated by supervising, infiltrating, and regulating; as a result, its effects on the body politic were both more continuous and exacting and yet less spectacular and uncertain. In the forests, modern, statistical knowledge made for a very different regime of state control. Whereas previously kings and principalities had maintained forest supplies by outlawing fires and logging in royal forest reserves, an exercise subject to leakage and other inefficiencies in increasing proportions to its scale, exact knowledge of where and how the forest was growing and being depleted gave authorities the ability to adjust, co-ordinate, and increase the productive powers of the forest, an object that was only conceived as such once it could made subject to this kind of close scrutiny.

Although the Maine forest commission was not initially authorized to do much about the problems it investigated, knowledge of them created a momentum to do so. Advocates of government action used government forestry statistics as a lever to press for expanding the state role in forest protection. They found support from those in the forest

---

100 "Natural" forest fires was an oxymoron at the turn-of-century. These and other statistical analyses of the forest fire problem listed only anthropogenic causes.

101 Maine Forest Commissioner, Report (1891): 13, 18.

102 The first quotation is Maine Forest Commissioner, Report (1902): 31; the second William B. Greeley, "Meeting the Red Menace: Uncle Sam's Policy of Trying to Save Pennies on Forest Fires Is the Weak Link in National Forest Program" American Forests 34 (1928): 711-14, 748.

commissioner's office seeking to expand the role of this budding bureaucracy. In 1893 and again in 1895, the forest commissioner met with prominent land owners and legislators to discuss forestry legislation. Charles Oak sought the go-ahead for expanding Austin Cary's studies of Maine spruce, but by year's end, Charles Packard, the former forest commissioner, was advocating legal "measures to regulate the cutting of spruce." The spirit of his proposals, however, was more in tune with older forms of proscriptive state power than with the leading edge of forest management by disciplined surveillance and regulation. Packard called for a ban on cutting spruce trees below eight inches in diameter. Several prominent state legislators endorsed the prohibition as the only way to make certain "our lumber supply is ensured, " but despite this support and the endorsement of the Paper Trade Journal, the measure never came up for a vote in the house, due to opposition from the powerful lumbermen's lobby, which opposed state land use restrictions of any sort.[103] Even Austin Cary, who praised the adoption of diameter limit rules by private landowners and logging companies, opposed a state ordinance to require them as "burdensome" and ultimately counter-productive. An inflexible statutory prohibition, he argued, would cause "a great waste of lumber and really defeat its own end" because it would prevent lumbermen from culling unmerchantable individuals and harvesting small timber destined ultimately to blow down or never reach the minimum size.[104]

Promoters of state action were undeterred. George Talbot urged Maine towns and the state government to keep lands forfeited for non-payment of taxes and replant them with trees. His faith in the necessity of public forest ownership was confirmed by Cary's statistical revelations about the slow rate of forest growth.[105] In addition to securing the public benefits of permanent forest cover, such municipal forests would, Talbot

---

[103] Bangor Daily Commercial 7 January 1895, 8 and 2 December 1895, 4; Paper Trade Journal 24 (28 December 1895): 1174.
[104] Cary, "Forests of Maine," 424-25.
[105] G.F. Talbot, "Condition and Prospective Value of the Maine Forests" Daily Eastern Argus 13 January 1903, 6.

maintained, provide public revenues to "abate the burden of general taxation."[106] Pennsylvania inaugurated such a program in 1893 and by 1913 had acquired nearly one million acres of tax delinquent forest land, but Talbot's cries went largely unheeded in Maine.[107] In 1903 Talbot complained that Maine, an early leader in forest conservation, was being left "far in the rear," as states like New York and Pennsylvania along with the federal government advanced the cause of conservation by securing title to the forests.[108]

In addition to native pride, calls for the state government to establish ownership of the forest in Maine also played on the bitter memory of the public land policy. Talbot called the alienation of the state's wildlands "the most fatal mistake in our State history," while John Hobbs lamented it as "a stupid blunder."[109] Others were much more colorful in their condemnation. Muckraking journalists called the public land sales the "state steal" and a swindle perpetrated by corrupt officials bought off by powerful interests with "treacherous graft."[110] Percival Baxter cast his struggles in the 1920's to secure public forest land in Maine as part of the Progressives' battle against monopoly. He noted that the "large ownerships" in the Maine Woods "create a great monopoly, which controls prices, dictates terms to the owners of small areas, stifles competition, and at times dominates the State legislature by their arrogant lobbies."[111]

Despite the very real resentments in Maine against absentee landowners and out-of-state corporations, the movement for state ownership and management of the forest was much less effective in Maine than in many other states. In New York, an aggressive tourist

---

[106] George F. Talbot, "Forest Planting and Municipal Ownership of Forest Lands" in Maine Forest Commissioner, Report (1891): 57, 51-57.
[107] William F. Schulz Jr., Conservation Law and Administration: A Case Study of Law and Resources Use in Pennsylvania (New York: Roland Press Co., 1953), 292-93.
[108] G.F. Talbot, "Condition and Prospective Value of the Maine Forests" Daily Eastern Argus 13 January 1903, 6.
[109] Talbot, "Condition and Prospective Value of the Maine Forests" Daily Eastern Argus 13 January 1903, 6; Hobbs, "The Depreciation of Our Forest Growth," 72.
[110] Frank Putnam, "Maine: A Study in Land-Grabbing, Tax-Dodging, and Isolation" New England Magazine 36 (July 1907): 518; For similar sentiments, see Phillips, "The Passing of the Maine Wilderness" 195-98; Liberty B. Dennett, "Maine's Wildlands and Wildlanders" Pine Tree Magazine (April, May, and July 1907): 273-80, 359-67, 551-57.
[111] Baxter, Mount Katahdin State Park, 3.

industry combined with waterpower and manufacturing interests to secure the creation of Adirondack State Park.[112] Politics were different in Maine. Although the Maine Woods, much like the Adirondacks, were being transformed into a space of spiritual retreat and recreation for the urban middle classes, calls to preserve the shrinking forest for its symbolic value did not carry the same weight in Maine, where, as Charles Oak, the state's second forest commissioner observed, "an esthetic taste ... is too much lacking among the majority of our Maine people."[113] Even if the Maine legislature, which was dominated by rural representatives, had been as impressed by the cultural significance of wilderness as the New York City legislators who ran the New York Legislature Assembly, it lacked the tax base to purchase and preserve outright great swaths of forest, as was possible in New York. Still, the Adirondack example was the great bane of Maine lumbermen. When J. B. Harrison, corresponding secretary of the American Forestry Congress, told the Portland Unitarian Women's Auxiliary that the Adirondacks were "the best illustration in this country of the forestry question," he sent a chill down Exchange Street in Bangor, the symbolic center of the lumber industry in the state.[114]

The situation in neighboring New Hampshire was more similar to Maine, but there as well wealthy metropolitan tourists exercised greater influence in the forest conservation movement. The membership of the influential Society for the Protection of New Hampshire Forests was largely out-of-state.[115] In 1881, agitation by such well-connected summer people, with the support of White Mountain hotel operators, spurred the New Hampshire General Court to appoint a forestry commission to investigate "the wisdom or necessity for the adoption of forest laws," some ten years before a similar commission was established in Maine.[116] Not only did the White Mountains entertain many more summer visitors in the

---

[112] On the history of the Adirondack park, see Philip G. Terrie, Forever Wild : Environmental Aesthetics and the Adirondack Forest Preserve (Philadelphia: Temple Univ. Press, 1985).
[113] Maine Forest Commissioner, Report (1894): 6.
[114] Daily Eastern Argus 26 January 1889, 3.
[115] See the membership list in Society for the Protection of New Hampshire Forests, Report (1902): 89-98.
[116] New Hampshire Forestry Commission, Report (1885): 3.

1880's than the Maine Woods, but because of its alpine topography and thin soils the effects of logging in New Hampshire were also more immediately apparent to the untrained eye. In 1893, New Hampshire began to purchase selected forest tracts, largely at the behest of Boston summer people who donated money to the cause.[117] Logging was harder to see in the undulating Maine Woods, and the dominant tourist experience, hunting and fishing, less driven by scenery than by other sensations. Without as many hotels bringing tourists from Boston and New York, Maine lumbermen had both the woods and questions about its conservation more or less to themselves. As a result, the effects of logging on the scenic beauty and tourist value of the forest played a relatively minor part in conservation debates in Maine.

Concerns about the hydrological effects of logging, by contrast, were much more important. Watershed protection provided a broad base of support for the idea of government ownership and regulation of the forest. This was particularly true in the West where irrigation interests hammered home the connections between forest and water conservation with the motto, "Save the Forests, Store the Floods, Make Homes on the Land."[118] But these same ideas were also influential in the Northeast where hydropower, not irrigation, was king. The forest "acts as a sponge... soak[ing] up the water fall, holding it back, and insuring a more regular flow of the rivers," Congressman Littlefield told the Portland Club; its conservation "is important on account of the water power, of which this State has more than any other State in the Union."[119] The metaphor was compelling, but its authority rested upon a substantial body of government sponsored scientific research demonstrating the relationships between logging and watershed dynamics. Increasingly this was how the disciplinary power of the government would make itself felt on the forest: by constituting the very objects of its knowledge. Brought into public view, the hydrological

---

[117] Charles D. Smith, "The Mountain Lover Mourns: Origins of the Movement for a White Mountain National Forest, 1880-1903" New England Quarterly 33 (1960): 37-56.
[118] Hays, Conservation and the Gospel of Efficiency, 5-26.
[119] "Fallacy of Repealing Duty on Pulp" Paper Trade Journal (16 January 1908): 30, 32.

properties of forest cover became something for which it was possible to speak and demand protection. In Maine, textile and other manufacturing interests, already at odds with lumbermen over the flowage requirements of river driving, tended to be enthusiastic proponents of state measures to regulate forest practice in the name of water conservation.[120] The treasurer of the Amoskeag Cotton Mills in Manchester, New Hampshire, blamed the great floods of April, 1895 and March, 1896 on unrestricted logging in the headwaters of the Merrimac. He urged the New Hampshire legislature to take action to protect the forests still standing.[121] Such concerns commanded increasing public attention because, with its farms being abandoned, Maine's destiny seemed to lie, more than ever, in the industrial city, rather than in the countryside or in the uncultivated soil of its vast northern wilderness. Even lumbermen like H.M. Prentiss agreed that "the future of Maine depends on the water power and the water power depended on the preservation of the forests."[122]

Unlike timber supplies, however, which were fixed in place and thus relatively easily to subject to state jurisdiction, watersheds proved difficult for state governments, especially in the small New England states, to regulate effectively. Watersheds spanned state boundaries, so that the benefits of protecting them, like the problems affecting them, came and went out-of-state. The New Hampshire forest commission found its repeated calls for the purchase of public land to protect the headwaters of the Androscoggin, Saco, and Merrimac Rivers in the White Mountains rebuffed by "the unwillingness of the people to tax themselves" for the purpose of protecting downriver and out-of-state manufacturing interests.[123]

---

[120] On these conflicts, see "An Important Case" Bangor Daily Commercial 19 October 1883, 4; Christopher Beech, "Pulpwood Province and Paper State: Corporate Reconstruction, Underdevelopment, and Law in New Brunswick and Maine, 1890-1930" (Ph.D. diss. Univ. Maine, 1991); Smith, Lumbering in Maine, 263-66.

[121] Smith, "Mountain Lover Mourns," 41.

[122] "Forestry Convention" Bangor Daily Whig and Courier 19 December 1888, 5.

[123] New Hampshire Forest Commission, Report (1901-02): 89.

Many people argued that since watershed protection, like many of the other benefits of forest conservation, was a diffuse public good that crossed state lines, its provision was properly a federal, not a state, concern. In pressing Congress to establish a national forest reservation in the White Mountains, the Society for the Protection of New Hampshire Forests outlined four aspects of forest conservation that made it an "inter-state problem:" out-of-state interests in watershed protection; the scientific and educational value of federal forest management demonstrations; the recreational enjoyment of tourists from across the country; the supply needs of a national lumber market.[124] Gifford Pinchot and other federal officials were eager to comply, but the constitution gave the federal government no explicit authority to act in what many considered to be an area reserved to the states. Such constitutional concerns, along with the opposition of the Speaker of the House, Joseph Cannon, proved fatal to the first two federal bills extending the national forest reservation system into the Appalachians, so supporters of eastern national forests emphasized the importance of forest conservation in protecting the navigability of rivers, a recognized federal responsibility. Despite some considerable scientific controversy about the actual relationship between forest conservation and navigability, the Weeks Act, authorizing federal purchase of forest land in the White Mountains of Maine and New Hampshire, passed Congress in 1911.[125]

In Maine, meanwhile, advocates of forest conservation skillfully used these concerns about watershed protection to advance the cause of government forestry at the state level.[126] Nearly every session of the Maine legislature between 1900 and 1930 debated bills on the subject of "Forests and Water Supply," so that finally, the legislature created a special committee to hear them. Most of these bills would have banned

---

[124] Society for the Protection of New Hampshire Forests, Report (1903): 10-11.

[125] On these constitutional and scientific debates, see Pinkett, Gifford Pinchot, 96-101. Although the state of Maine authorized the federal government to purchase land for a White Mountain national forest in 1903, the first federal purchases in Maine did not occur until 1917, when the government acquired 24,994 acres. Coolidge, History of the Maine Woods, 191, 639.

[126] See, for example, "Forest Protection and Water Storage" Bangor Daily Commercial 21 January 1904, 4.

landowners from harvesting timber below mandated diameter limits of some kind. Such measures had also been advocated as the remedy to timber famine fears, but they were vulnerable to the argument that the free market would soon bring supplies into equilibrium with demand. Flooding, by contrast, was more immediate in its effects, and with a body of scientific literature to support the idea that it was exacerbated by unrestricted logging, flooding rallied a broader and more influential cross-section of the electorate behind the idea of state regulations on logging. Women's groups became particularly active in forest conservation, and advocates of government action, like Gifford Pinchot, appealed specifically to them by presenting the question of government ownership and regulation of the forest as "a moral one ... aimed to help the children."[127]

State control of the forest raised questions about American identity. Edgar E. Ring, Maine forest commissioner from 1901 to 1910, played subtly on the German origins of forest science to indict government forestry as unamerican: "What the State of Maine needs is an American system of forestry, adapted to American conditions, which in many cases will radically differ from any practiced in Europe." The Maine Woods was undeniably different from its German counterparts, but Ring was less concerned with these ecological differences than with traditional American exceptionalism. Like Austin Cary, another Mainer suspicious of the idealism of European forestry, Ring distinguished, almost instinctively, between the practical, common sense know-how he thought characteristic of hard-nosed American lumbermen and the fanciful notions of amateur conservationists, taken in by esoteric European theories. The forest commission's report on Maine spruce, he emphasized, would be "a practical book for practical men."[128] In addition to these gendered aspersions about the practicality of European-style government control of forest

---

[127] Gifford Pinchot, Fight for Conservation, 106-08. One journalist thought the "missionary work" of the Maine Federation of Women's Club deserved "no mean share" of the credit for forestry reforms in Maine. "Forestry in Maine" Paper Trade Journal (19 October 1911): 54. On women's involvement in the conservation movement, see Daily Eastern Argus 26 January 1889, 3; "Forestry Preservation" Paper Trade Journal 27 (31 December 1898): 1076; Society for the Preservation of New Hampshire Forests, Report (1903): 60-61; Pinchot, Fight for Conservation, 101-109.

[128] "Land Agent Ring on Spruce Supply" Bangor Daily News 15 November 1901, 8.

use, state restrictions on logging raised other questions. Austin Cary was hardly the last to object that a "centralized" and "socialistic" system of government management was inappropriate to a dynamic capitalist society.[129] In Maine, opponents objected that government restrictions on logging infringed on individual property rights. Supporters responded that state regulation was a perfectly regular exercise of police power and that property rights were not absolute, being subject both to torts and to "such general regulations which are necessary for the common good and general welfare."[130]

In Maine, the constitutionality of logging restrictions ceased to be an issue in 1908, when the Supreme Court of Maine held that state regulation, "[w]hile it might restrict the owner of wild and uncultivated lands in his use of them," did not constitute an unconstitutional "taking." The court justified state regulation of forest use by distinguishing the unique nature of property rights in the forest land:

> First, such property is not the result of productive labor, but is derived solely from the state itself, the original owner; second, the amount of land being incapable of increase, if the owners of large tracts can waste them at will without state regulation, the state and its people may be helplessly impoverished and one great purpose of government defeated.[131]

Energized by this local victory and by the national conservation campaign orchestrated by Pinchot and the U.S. Forest Service, D.H. Darling, treasurer of the Bradstreet Lumber Company, proposed a sweeping plan for state forestry in Maine. In

---

[129] See, for example, Richard W. Behan, "Political Popularity and Conceptual Nonsense: The Strange Case of Sustained-Yield Forestry" Environmental Law 8 (1978): 209-342. This neo-conservative critique of sustained yield forestry has also opened up a vigorous debate in the forestry profession about whether the Progressive-era reforms of Gifford Pinchot and other American advocates of conservation were indigenous or imported from an "autocratic" Germany. See, Ben W. Twight, "Bernard Fernow and Prussian Forestry in America" Journal of Forestry 88 (2) (1990): 21-25; Char Miller, "The Prussians Are Coming! The Prussians Are Coming! Bernard Fernow and the Roots of the USDA Forest Service" Journal of Forestry 89 (3) (1991): 22-27.

[130] Commonwealth of Massachusetts v. Alger, 7 Cush. 53, quoted in Maine Forest Commission, Report (1908): 33.

[131] The court's opinion, delivered at the request of the State Senate, is printed in Maine Forest Commission, Report (1908): 30-35.

eight pamphlets he printed privately and distributed throughout the state in 1908, he advocated state purchase and reforestation of cut-over lands; the subsumption of all private forest land into "auxiliary" state forests in which logging would be licensed and inspected by the state forestry commission; a state forest fire protection force; a logging code specifying twelve inch minimum diameter limits, low stumps, slash removal, and seed tree requirements; and property tax reform.[132]

Victory in court did not assure victory in the legislature. Although the court's decision was widely applauded, the bills that followed immediately on its heels were defeated.[133] Darling's bill was never introduced, but two scaled down versions calling simply for state-mandated diameter limits were defeated in the 1909 session, despite the enthusiastic endorsement of governor Bert Fernald, leader of the progressive wing of the Maine Republican Party.[134] Proponents failed again in 1911, 1913, and 1915. In 1917 and 1919, a state diameter limit applying only to pine was defeated. Finally, in 1921, the state authorized the creation of "auxiliary" state forests, privately held lands in municipalities, where in exchange for observing a state logging code specifying minimum diameter limits and specific seed tree goals, land owners would be exempted from property taxes.[135] It was Phyrric victory. To get even this modest measure through the legislature, advocates of government forestry had to exclude the unorganized townships of northern Maine, where most of the forest land in the state was located.

---

[132] D.H. Darling, Rough Draft of a Bill for the Preservation and Perpetuation of Our Timber Supply (n.p., n.d.); copy available in D.H. Darling file, Box 481, Peirce family papers, Univ. Maine Library. Darling's seven other pamphlets were entitled: Wild Lands: Their Condition and Taxes-- A Constructive Policy; Timberland Taxes: Land vs. Income Tax; Wild Land Taxes: Pennsylvania's Fight; Timber Property Taxes: The Facts; Timber Property Taxes: Stripped Land and Its Consequences; A Stable State Forest Policy Essential to the Preservation of Our Timber Supply; Timberland Taxes: An Investment.

[133] See, for example, "Important Question of Forest Law in Maine" Paper Trade Journal 46 (25 June 1908): 35.

[134] Innaugural Address of Bert M. Fernald, in Maine Public Documents (1909), II: 6-8. On Fernald and the Maine Republican party, see Elizabeth Ring, The Progressive Movement of 1912 and Third Party Movement of 1924 in Maine (Orono: Univ. Maine Press, 1933).

[135] The legislative history of these conservation measures is described in Smith, Lumbering in Maine, 370-74.

Efforts to regulate private forest practice in Maine came up against a confusing tangle of interests: landowners, lumbermen, and, increasingly, large pulp and paper corporations. Most of the key votes in the legislature were voice votes, so it is difficult to chart precisely how the various interests were aligned, but it is possible to make a few generalizations. Most of the support for state-mandated diameter limits came from southern Maine, particularly from rural York County where portable saw mills were making quick work of old-field pine forests.[136] Lumbermen and logging contractors generally opposed centralized regulation of forest practice, though the increasingly widespread adoption by landowners of diameter limits and other cutting regulations made the question of government regulation somewhat moot for jobbers dependent upon purchasing stumpage and then selling their logs to the mills. Sawmill operators faced different problems, but they too opposed state regulation, although one old-time lumberman hoped somehow to protect the sawmills from pulp and paper manufacturers bidding up the price of logs by mandating that "[p]ulpwood should be made a by-product of the mills, as any refuse, even sawdust, would make pulp."[137]

Restructuring of the forest industry meant that substantial fractions of the industry did not oppose, if indeed they did not actually endorse, government involvement in forestry, particularly as it was necessary to protect the water power potential. The huge energy demands of grinding pulpwood meant that pulp and paper manufacturers were as much electrical generation companies as they were manufacturers of forest products.[138] This interest, and enormous investments in mills, dams, and hydro-electric generation facilities, made pulp and paper companies much more concerned with hydrology and

---

[136] On this problem, see "Portable Saw Mill" Lewiston Evening Journal 13 March 1909, 6.

[137] New Brunswick Yearbook (1907): 96, quoted in Smith, Lumbering in Maine, 368. In New Brunswick, where lumber interests controlled crown timber licences, they staved off the pulp and paper industry until the 1920's Bill Parenteau, "The Woods Transformed: The Emergence of the Pulp and Paper Industry in New Brunswick, 1918-1931" Acadiensis 22 (1992): 5-43.

[138] In fact, by 1927, over 54% of the revenues of the International Paper Company came from its power and electrical utility assets. A.D. Watts, Analysis of the International Paper and Power Company: History and Prospects (Montreal: privately printed, 1929), 3. I examined a copy of this rare investment prospectus in the New York Public Library.

watershed protection than lumbermen, who saw the rivers chiefly as highways for the spring drive. Low water also plagued sawmill owners, but higher fixed capital costs made production slowdowns much more costly for pulp and paper companies. Fearing a repeat of 1888 and 1894, when many water-powered paper mills had to shut down for weeks at a time, the Paper Trade Journal warned manufacturers that the "water supply of New England has already decreased to an alarming extent, and promises to be yet further impoverished by the loss of the forests."[139] The 1899 meeting of the American Pulp and Paper Association was devoted entirely to the question of water conservation and its connections to forestry. George Sherman, president of the News Division, went so far as to endorse German-style "State control" of all forest management "because the preservation of our water powers, with their millions of dollars of invested capital, is in the balance."[140]

Sherman's desire for a system of government owned and managed forests was far from unique in the industry. In 1897, Warner Miller, president both of Herkimer Paper and the Hudson River Pulp and Paper Company, granted the Paper Trade Journal an extensive interview in which he endorsed the "German Government forestry system as being the best." A government buy-out of the forest would have provided welcome relief for relatively small companies such as his, straining under the enormous cost of paper making machinery and unable to secure large enough forest land holdings to guarantee a thirty year fiber supply necessary to amortize investments in fixed capital. But Miller said nothing about the functionality of state forestry to corporate pulp and paper manufacturers. Instead, he emphasized the importance of public ownership and supervision of the forest for curbing the short-sighted selfishness of profit-maximizing individuals:

> The various State governments should appropriate sums of money as New York is now doing, to buy the timber lands and rent out the timber

---

[139] Paper Trade Journal 25 (28 November 1896): 980. On the droughts of 1888 and 1894, see Paper Trade Journal 17 (15 September 1888): 649; 24 (5 January 1895): 1.

[140] Paper Trade Journal 28 (18 February 1899): 124. The papers given at the annual meeting are printed on pp 131-44.

> rights. That is how the German system is worked. Under it the Government has control of all timber lands. It never gives them up. It rents out the timber rights, and these may be transferred an infinite number of times. The Government inspectors alone have the right to say when cutting may begin. No trees under 10 inches in diameter are cut down... I have long advocated this system of forestry, having had unusual opportunities to study its successful working abroad. Under such a system it is possible to recut the timber lands every ten or fifteen years.
>
> The main trouble in this country has been with quite a number of pulp men whose only object has been to obtain quick results. In their haste to make money quickly and get out they have cut down trees only 5 or 6 inches in diameter.[141]

Consolidation of the pulp and paper industry dulled the sharp distinction that supporters of state and federal forest reserves drew between far-sighted and public-minded government management of the forest and short-sighted and narrow-minded private management of the forest. When the International Paper Company was incorporated in 1898, it brought together seventeen mills with a combined capacity of 1,363 tons of paper per day and assets valued at nearly $56 million.[142] With such enormous fixed capital investments to protect and a long-term need to supply them with fiber, large pulp and paper corporations, assured International Paper president Hugh Chisholm, "can safely be trusted" to manage the forest so as to insure a sustainable yield. "The scientific forester," he insisted, "has no warmer ally than the paper maker."[143]

Even advocates of public ownership of the forest were impressed. Bernard Fernow believed that advent of the modern corporation had eclipsed the wasteful individualism of "pioneering days," when the nation's rich resources were "exploited for their cream." Since

---

141 "Need of Spruce Farming" Paper Trade Journal 26 (14 August 1897): 645, 647.
142 "International Paper Co." Paper Trade Journal 27 (1 January 1898): 1; International Paper Company, Annual Report (1900): n.p.
143 "A Defense of the Paper Trust" Bangor Daily Commerical 12 April 1902, reprinted (without attribution) from Brooklyn Eagle 2 April 1902.

large, vertically integrated pulp and paper corporations "look[ed] upon their plants not as speculations, but as permanent investments," Fernow hoped these stable institutions would pursue "a conservative policy," and, if only from economic self-interest, guard the forest for the future, just as the state had long done in Europe.[144] Austin Cary took this analysis a step further. In his professional opinion, "the interests of the manufacturers of pulp and paper run in harmony with those of the community... [T]hey dictate a conservative cutting policy, the management of land for steady and permanent return."[145]

The critical issue for Cary was not public versus private forest ownership, but rather, vertically integrated ownership and management versus disorganized individual ownership and operation. He attributed much of the waste of the Maine Woods to "the system of absentee landlordlism" in which "the interests of the man who cuts the lumber are divorced from the interests of the land."[146] In his studies of Maine spruce, Cary found that logging was much more conservative and efficient on the Androscoggin, where large pulp and paper concerns logged their own lands, taking 85% of the merchantable stems, than on the Penobscot, where logging was alienated from landownership and so jobbers wasted 50% of the merchantable timber by leaving high stumps, long tops, and undersized trees in the woods to rot rather than paying the stumpage on them.[147] On the Penobscot, he recalled:

> The land was owned by men who neither logged nor ran mills, but held the land as an investment and sold stumpage. This was bought in the main by loggers who sold in turn to the saw mill operators. These, driving the loggers up on the *quality* of his logs while the land owner in turn ground him on the price of *stumpage* ... All he could do was to get

---

144 Fernow, "Forestry and Wood Pulp Supplies" Paper Trade Journal 27 (11 February 1898): 157-62.
145 Cary, "Forests of Maine," 424-25.
146 Cary, "Spruce on the Kennebec and Androscoggin Rivers," 82, 81.
147 The estimates of waste are from Cary, "Maine Forestry in Retrospect and Prospect, address to the Maine Forestry Association, Bar Harbor, ME, 24 August 1922," Box 1663, addresses file, Austin Cary Mss., Univ. Maine.

> out as best he could, using the advantage of his position, butchering the timber as the first and most evident measure of relief presented.[148]

Cary celebrated the consolidation of forest landownership into the hands of the paper companies. "There is none," he told the American Pulp and Paper Association, "whose interest lies so close to that of the forest [as] ... the paper mill men." Whether the forest itself would have been as interested in a "[s]teady and cheap supply of wood ... [and] the assurance of it for the future" as the paper companies, there was little doubt that the enormous size of corporate investments in paper mills and machinery demanded a long term forest management strategy.[149]

Many of those who favored public ownership of the forest shared this same faith that institutional size would guarantee better forest management. In a widely reprinted address to the Maine State Board of Trade, Francis Wiggin urged the state to protect the Maine Woods by establishing large public forest reservations, by eminent domain if necessary, around the Rangeley Lakes, Moosehead Lake, and on the West Branch of the Penobscot River. But the force of his argument was undercut by his admission that:

> The danger to our forests does not come so much from the extensive land owners and the large companies as from the small owners ... [who] have no particular interest in their lands except to realize as much money as possible from them at once. The large owners are more conservative and many of them draw their contracts for the sale of stumpage with great care and strictness.[150]

The Great Northern Paper Company owned much of the land on the West Branch, while the Berlin Mills Company, the International Paper Company, and Hollingsworth & Whitney were some of the largest landowners in the areas around Moosehead and the Rangeley Lakes.

---

[148] Austin Cary to Harris A. Reynolds, secretary, Massachusetts Forestry Association, 23 February 1919, Brunswick, ME, misc. letters file, Box 1663 Austin Cary mss., Univ. Maine Library.
[149] Austin Cary, "How to Apply Forestry to Spruce Lands" Paper Trade Journal 27 (11 February 1898): 157.
[150] Francis Wiggin, "Preservation of Maine's Forests Is Imperative" Bangor Daily Commercial 16 October 1902, 2.

These companies were also among the pioneers in applying the techniques of forest science to the American forest. While the U.S. Forest Service was struggling simply to gain control over the national forests in the West, in the Northeast, pulp and paper companies, with the cooperation of federal officials, were already instituting sustained-yield forest management plans. Upon its organization in 1899, the Great Northern Paper Company immediately contacted the U.S. Forest Service to arrange for federal foresters, co-operating under Gifford Pinchot's famous offer of Practical Assistance to Farmers, Lumbermen, and Other Owners of Forest Land, to prepare a working plan for its 350,000 acres on the West Branch. The company had "already shown appreciation of the advantages of conservative forest management by incorporating in its logging contracts several of the more important rules which govern logging now carried on under the supervision of the Division of Forestry in the Adirondacks," but the working plan, based on over 2600 sample plots taken over two years of intensive field work, made much more detailed recommendations, tailored specifically to the company's lands.[151] It projected yield figures for eight, ten, twelve, or fourteen inch diameter breast height harvests and recommended specific harvest minimums for various forest types: "Being cut to these limits, the forest will yield but little less than if lower limits were used, and will be left in far better condition." If harvested according to the plan, at an average annual rate of 6338 acres per year, the company's 365,787 acres would yield 13,347,603 feet per year, with a rotation time of fifty-three years.[152] Forced to purchase anywhere from a third to half of its fiber on the open market, the Great Northern Paper Company often exceeded the harvest size recommended by the scientific working plan, but many of its other recommendations

---

[151] U.S. Division of Forestry, Report (1901): 328; U.S. Division of Forestry, Practical Assistance to Farmers, Lumbermen, and Other Owners of Forest Land (Washington, circular 21, 1898). On this federal program, see William G. Robbins, American Forestry: A History of National, State, and Private Cooperation (Lincoln: Univ. Nebraska Press, 1985), 50-84; Harold K. Steen, The U.S. Forest Service: A History (Seattle: Univ. Washington Press, 1976).

[152] William C. Hodge, "A Working Plan for the Penobscot Timberlands of the Great Northern Paper Company" quoted in Smith, Lumbering in Maine, 363.

became policy of the Spruce Wood Department.[153] The company employed professional foresters to visit the logging camps and inspect the cutting to make sure that its diameter limits as well as other rules designed to minimize waste felling trees, limbing, and yarding logs, and swamping roads were strictly observed.[154]

The Berlin Mills Company was taking similar steps to reduce waste, increase efficiency, and conserve future forest growth. In 1898, it hired Austin Cary to plan and supervise its logging operations. In addition to instituting diameter limit cutting and professional inspections to reduce waste by chopping crews, by 1900, both standard conservation doctrine, Cary recommended two other steps to protect and foster the growth of young spruce: girdling hardwoods to eliminate troublesome competition and one rather than two horse hauling to reduce collateral logging damage.[155] Other large pulp and paper companies soon followed suit in "trying to carry out forestry principles."[156] By 1909, diameter limit cuts were the rule in the Maine Woods.[157] Although critics of private forest practice like Gifford Pinchot still held that logging in the United States "was destructive rather than conservative," the pulp and paper companies were already applying most of the conservation measures techniques that Pinchot thought only government ownership would afford.[158] The International Paper Company bragged that its woodlands operations were "being sedulously conducted according to the best forestry methods." Questioned by Congress, its Woodlands Department manager C.H. Griffey went into great detail about the silvicultural science underwriting its harvest strategy and guaranteeing that "we are not stripping it [the land]." Diameter limit cuts of eight inches were the norm, "so that the

---

[153] Company harvest and purchase data come from "TIMBERLANDS: Original Data from Auditing Dept." looseleaf binder in Box 851, Great Northern Paper Company mss., Univ. Maine.
[154] George T. Carlisle and T. Frank Shatney, "Report on a Logging Operation in Northern Maine" unpublished mss., Univ. Maine. For other descriptions of the Great Northern's logging operations and conservati
[155] Cary, "Maine Forestry in Retrospect and Prospect, address to the Maine Forestry Association, Bar Harbor, ME, 24 August 1922," Box 1663, addresses file, Austin Cary Mss., Univ. Maine.
[156] Cary to Pinchot, 29 November 1898, Indian Rock, ME, U.S. Forest Service. Correspondence with Austin Cary, RG 95. U.S. National Archives microfilm, Washington, DC.
[157] U.S. Congress, Pulp and Paper Investigation Hearings, II: 1136, III: 2036-37.
[158] U.S. Congress, Pulp and Paper Investigation Hearings, II: 1368.

growth of the smaller trees may be promoted to provide a later yield," but on steep slopes where windthrow was a problem, these rules were relaxed and the company took "all that is worth cutting at all."[159] Contemporary silvicultural textbooks could find little to fault in this practice, which insured that trees destined to blow over and die went to good use. Indeed, even Pinchot had to complement the northeastern pulp and paper companies for their progress adopting the conservative "methods of forestry in dealing with their lands."[160]

Other observers were much less sparing in their praise of paper company forestry. As far as applying the principles of scientific conservation to the actual management of forest land, "private enterprise," cheered the Bangor Daily Commercial, "goes ahead of and outstrips public and official authority."[161] Corporate executives like International Paper president Hugh Chisholm could not have agreed more. They insisted over and over again that government ownership and regulation were unnecessary because "the leading paper manufacturers of this country are practicing the most essential rules of forestry."[162]

With landowners moving independently to conserve their forest capital, Maine paper companies argued that the most important role for the state was to make the long-term investment in forestry safe and secure for private enterprise. Since the forest itself could be understood as a kind of capital, it followed that the "two great enemies of forestry, of our woodland growth, are forest fires and unwise taxation."[163] "Forest conservation," claimed a company public relations pamphlet, "largely depends on fire prevention." Concern with

---

[159] The first and third quotations are International Paper Company, Report (1920): 16-17; the second is Pulp and Paper Investigation Hearings, II: 1053-54.

[160] U.S. Congress, Pulp and Paper Investigation Hearings, II: 1368. Five years previously, Pinchot singled out the conservation efforts of Maine landowners, saying, "Maine is alive to the subject." "Speaks of Work in Maine Woods" Bangor Daily Commercial 9 January 1904, 11.

[161] "Forest Economy" Bangor Daily Commercial 26 March 1898, 4.

[162] "A Defense of the Paper Trust" Bangor Daily Commercial 12 April 1902, 2.

[163] "Midsummer Forestry Meeting" Paper Trade Journal (16 July 1914): 8-9.

Figure 6.2 Great Northern Paper Co. View of Forest Conservation

Saving at the Spigot, Wasting at the Bung Hole

Reforestation is the growing of new forests on forest land. Unless interfered with Nature will continue this work in the future as it has in the past. All over the country more attention is being paid to the protection of the forests. The problem has been set forth pertinently by the State Forester of Oregon in the annual report he submitted for the year 1926. He wrote in that report:

"Fire is the greatest menace to reforestation. It kills the young trees, the hope of the future. Therefore, fire prevention through adequate patrol, law enforcement and education is the principal means to the end. Ninety per cent of forestry in Oregon is fire prevention. Because of the importance of this work, the attention of protection agencies of the state has been directed mainly to the prevention and suppression of fires. Granted that all other requirements of good forestry practice are met, such as proper cutting of timber, slash disposal and encouraging tax legislation, it would all come to naught if the fruits of such progressive work were left a prey to the forest fire. Hence the primary function of the State Forestry Department is the control of the forest fire evil."

What is true in Oregon is true in Maine and in every other State in the Union. The reduction of the forest fire loss is the main essential to reforestation. It is of little use to expect new forests in the country as a whole while burning an average of 27,000,000 acres annually. The burned area is nearly one and a half times the total area of Maine.

Source: Great Northern Paper Company, Timberland Protection: Prepared in the Interest of Protecting the Timberlands of Maine (n.p.: G.N.P. Co., 1927), 17

any other issues, such as the destruction caused by logging, was what the Great Northern Paper Company called, "Saving at the spigot, wasting at the bung hole (FIGURE 6.2)."[164]

The state needed little encouragement to prevent forest fires, which along with waste and destructive logging, were already a major target of conservation discourse. The very first report of the Maine Forest Commissioner declared, "The greatest enemy that our forests have to contend with is 'Fire.' It is regarded by all that have interested themselves in the question of forestry that the protection of our forests from fire is the first great and important duty of the State towards our wild lands."[165] But with no fire fighting budget and only a meager force of already busy county commissioners and game wardens at its disposal, the forest Commissioner was unable to do much. The 1895 report complained:

> As the law now stands, the commissioner is powerless to act in cases of emergency-- having no men at his command or means to employ them, excepting the fish and game wardens and they are so few and their beats so long, they cannot be depended upon unless the fire is in their immediate vicinity.[166]

Despite its well recognized importance in conservation circles, state organized fire protection came about in Maine almost by accident. In February, 1903, the legislature appropriated $10,000 to provide fire patrols and enable the forest commissioner to appoint fire wardens in the unincorporated townships. The bill was a sop, designed as much to quiet landowner opposition to property tax reform, as to provide increased fire protection, but the timing could not have been better. The spring of 1903 was very dry, and despite the fire patrols, 269,451 acres of land burned in forest fires that state forest commissioner E.E. Ring thought have "never been equaled." Official estimates put the damage at $953,243,

---

[164] Great Northern Paper Company, Timberland Information Put Out in the Season of 1926 in the Interest of Protection (n.p.: G.N.P. Co., 1927), 17; Great Northern Paper Company, Timberland Protection: Prepared in the Interest of Protecting the Timberlands of Maine (n.p.: G.N.P. Co., 1927), 17, both in woodland #2 file, Box 845, Great Northern Paper Co. Mss., Univ. Maine Library.

[165] Maine Forest Commission, Report (1891): 12.

[166] Quoted in Austin H. Wilkins, Ten Million Acres of Timber; The Remarkable Story of Forest Protection in the Maine Forestry District (1909-1972) (Woolwich, ME: TBW Books, 1978), 31.

but, as editorialists noted, this figure represented only the present stumpage value of the burnt-over land and failed to account for the damage both to the young growth and to the growing capacity of the soil.[167] Still, landowners were thankful, because the destruction was even greater in nearby states without public fire patrols. Commissioner Ring was pleased too. He thought it was public money well spent because, "the money loss to the State by forest fires is much greater by land becoming useless and untaxable than need ever be expended by the state in preventing these fires."[168] In 1909, after another year of disastrous forest fires, the system of state fire patrols and lookout towers was vastly expanded by the creation of the Maine Forestry District. It authorized a special tax on land in the unorganized townships of northern Maine to fund fire (and later insect) suppression. With $63,945 raised by the tax in the first year alone, the state forest commissioner hired 367 fire wardens, built more watch towers and phone lines, and organized a centrally co-ordinated system of regular patrols and fire fighting teams.[169] With the passage of the Weeks Act in 1911, these state funds were matched by federal funds, substantially reducing the number and extent of forest fires in the Maine Woods.

Efforts to allocate more public resources to protecting the privately owned Maine Woods from fire become embroiled in the debate over property taxes. Because the town was such an important unit of government in Maine, property in incorporated cities and towns bore a much greater share of the tax burden than property in the unorganized townships without schools and other municipal services to provide. As a result, the nearly nine million acres of wild lands in the unorganized townships, which in 1889 comprised about 10% of the state's total taxable property, paid a state tax of only 2.75 mills, whereas the average rate for municipalities was 17.75 mills.[170] With the boom in the pulp and paper

---

[167] Maine Forest Commission, Report (1904): 7, 26; "Forest Values and Fires" Bangor Daily Commercial 7 October 1904, 4.

[168] Maine Forest Commission, Report (1904): 54.

[169] The number of fire wardens comes from Maine Forest Commissioner, Report (1910): 15-26. On the history of the Maine Forestry District, see Wilkins, Ten Million Acres of Timber.

[170] Special Tax Commission of Maine, Report (1889): 38. On the history of the property tax in Maine, see Fred E. Jewett, A Financial History of Maine (New York: Columbia Univ. Press, 1937), 107-37.

industry, the tax burden became even more unequal. Between 1892, the year of the first state-wide valuation by the state board of assessors, and 1902, the valuation of forest land in the unorganized townships increased by 120%, while all other property in the state increased in valuation by only 15%.[171]

The Maine State Grange was particularly unhappy with the tax burden on farmland, which it blamed for "the southern half of Maine ... all growing up to forest."[172] Grangers spearheaded an unsuccessful effort to reform the tax system and increase the share of the public burden borne by the wildlands. In 1901, they endorsed a bill nearly tripling the state tax on wildlands to 7 mills. Undeterred by defeat, Liberty Dennett, a Cumberland County Granger, came back in the next session with a bill to tax property in the unincorporated townships at 15 mills. The measure went down to defeat after the state attorney general issued an opinion suggesting that a differential state property tax was unconstitutional.[173] Thereafter, Grange efforts focused on changing the constitution to provide for a state tax on the wildlands equal to the state-wide average municipal tax rate. The measure enjoyed considerable support in the legislature; the chair of the taxation committee was unabashed in his desire "to get at" the timberland owners, who were "not paying a fair, just, and equitable share of the public burdens."[174] Landowners responded that because of its unique role in "making Maine a sportsman's paradise" forest property bore "a larger portion of the public burdens than is borne by any other class of property." Some went so far as to suggest that since the general public enjoyed free access to private lands that in

---

171 Clement F. Robinson, "State Taxation and Forest Lands" Political Science Quarterly 24 (1909): 616, 615-22. No doubt this greatly understates the increasing market value of Maine forest land, as property tax assessments were notoriously low. See "Assessing the Timber Lands of Maine" Paper Trade Journal 24 (2 March 1895): 207; Pulp and Paper Investigation Hearings, II: 1276-77.

172 The quotation is G. Morgan, "Forestry and Taxation" Daily Eastern Argus 17 February 1887, 3. The tax reform efforts of the Maine State Grange can be followed in the Proceedings of the Maine State Grange.

173 Dennett described his crusade in a serialized article "Maine's Wildlands and Wildlanders" Pine Tree Magazine 7 (April, May, and July 1907): 273-80, 359-67, 551-57.

174 "Bill to Get After the Wildland Owners Pummelled" Bangor Daily Commercial 19 February 1909, 2, 8.

some sense "[o]ur forest wealth is mainly community wealth."[175] The Bangor Daily Commercial, edited by the timber baron J.P. Bass, figured that stumpage owners received a scant 20% of the "direct benefit" provided by the forest, with "the remaining 80 per cent going to the benefit of the vital interests of the state." [176] That was pushing the case; there were substantial differences between the enormous profits enjoyed by forest landowners and the benefits of hunting, fishing, and camping available to everybody else. Even Austin Cary scoffed at the "wild-land men who talk as if they ... ought to be pensioned for the public service they render in holding and administering their properties."[177]

However, constitutional change required a two-thirds majority, and with the powerful landowners organized in opposition to any property tax increase, this proved too high a hurdle. Formed in 1896 to lobby the legislature on behalf of forest land interests, the Maine Lumbermen and Land Owners Association came into its own during these battles against wildland taxes. Its president, wildland owner J.P. Bass, who was also editor of the Bangor Daily Commercial, cheered that "never before" had he seen the land owners "so united" as they were in the campaign against the Grangers' constitutional amendment. Landowners from across the state as well as all the paper companies pledged 1/8¢ per acre "to defray the necessary expenses of meeting this proposed class of legislation." Although the Association was prepared to accept "a small tax in addition to regular state tax on timberlands for the purpose of extinguishing forest fires...as a last resort ... to defeat the other measure," the issue was never really in doubt. Having "secure[d] the services of some of the very best of the legal fraternity," Bass was "confident that if the land owners come forward we will be able to defeat the measure."[178]

---

[175] The first quotation is "Another Word to the Committee" Bangor Daily Commercial 26 February 1901, 4; the second is Maine Forest Commission, Report (1910): 71.

[176] "Before the Taxation Committee" Bangor Daily Commercial 25 February 1901, 4.

[177] Cary, "Maine Forests, Their Preservation, Taxation, and Value" in Bureau of Industrial and Labor Statistics for the State of Maine, Report (1906): 190, 180-93.

[178] J.P. Bass to H.E. Prentiss, 31 December 1904, Bangor, Prentiss & Carlisle clippings ledger, Univ. Maine Library.

The ease with which lumbering and corporate interests defeated a tax bill that even opponents granted "the people would vote [for] ... should the constitutional amendment be referred to them" fed public cynicism about the "tyranny of the wildlanders."[179] Muckrackers complained that "the railroads and wildland owners work together to control the state government in Maine."[180] Historical critics have echoed their charges, arguing that the embrace of private interests and the political machines, which in Maine is to say the Republican Party, was so intimate as to make Maine a virtual "client state."[181] There is no denying that the grip of the paper companies was strong, or that it was common for newly elected governors in Maine to schedule "an appointment" with company executives "to talk over matters of legislation of interest to the Great Northern Paper Company."[182] As the intensive lobbying campaign over wildland property taxes demonstrated, the gloves came off and the checks came out whenever vital interests were at stake in the Maine legislature. But the victory of forest landowners rested on more than just money and political influence peddling.

A considerable body of scientific opinion held that high property taxes were a significant cause of destructive logging. U.S. Forest Service chief Gifford Pinchot waded into the property tax controversy, appealing personally to the Maine legislature. Urging legislators to reject popular calls for a property tax increase, he explained:

---

[179] The first quotation is Bass to Prentiss 31 December 1904; the second is Dennett, "Maine's Wildlands and Wildlanders," 365. For similar sentiments, see Frank Putnam, "Maine: A Study in Land-Grabbing, Tax-Dodging, and Isolation" New England Magazine 36 (July 1907): 515-40.

[180] Putnam, "Maine: A Study in Land-Grabbing, Tax-Dodging, and Isolation," 534.

[181] Beech, "Pulpwood Province and Paper State." Similar, though less theoretically explicit claims about the client state are made by Smith, Lumbering in Maine, 372 and Parenteau, "Woods Transformed," 43.

[182] Fred Gilbert to Garret Schenck, 8 July 1920, Box 553 Gilbert Mss., Univ. Maine Library. Other evidence for cloakroom dealing by the Great Northern Paper Company can be found in Parks, National and State File, Box 842 Great Northern Paper Co. Mss., Univ. Maine Library. The company's role as the leading buyer of land, logs, and stumpage in the state gave it indirect leverage in the legislature. As Fred Gilbert remembered of the 1901 battle for control of the West Branch Driving Company, which operated the Penobscot River drive, Great Northern had the famous lumberman-legislator John Ross over a barrel: "while he was identified with the other side, we were able to get from him more or less the benefit, and the reason was we were neogiating with him the sale of his logs and the leasing of his property." Gilbert to Garret Schenck, 16 December 1911, Box 563 Gilbert Mss., Univ. Maine Library. On this famous episode, see Smith, Lumbering in Maine, 267-94.

> An increase in the rate of taxation in Maine would mean that the forest owner must realize the greatest immediate profit from his land at the sacrifice of its productive capacity... [T]o increase the rate of taxation upon forest land in Maine would seriously affect the permanent production of spruce and other timber in the State, and thus react directly not only upon the lumber industry, but upon all industries dependent upon wood and water....
>
> The tax problem does not only affect the forest problem. It is a part of it. For unless the application of conservative lumbering to private land can be made to pay, the condition of cut-over land will not improve. And conservative lumbering will not pay, except under a reasonable rate of taxation on forest land.[183]

Although Pinchot cast the conservation movement as a struggle, "[i]n the teeth of the bitterest opposition of private special interests," to safeguard "the right of the public to first consideration in the protection and development of the forest and all the resources it contains," conservation discourse proved vulnerable to subversion by the very special interests to which it was opposed.[184] Forest landowners cited the compelling public interest in forest conservation as a rationale for exempting their forest property from bearing its fair share of the tax burden. Fire protection was another case in point. The public paid to protect private property in the belief that forest wealth was a kind of communal property. There was certainly something to this claim. The conservation movement was founded upon the realization that protecting private forest land served vital public interests, but it also mystified the relationships involved. Despite the fervent hope of Progressive-era conservationists that if organized co-operatively and planned scientifically, corporate and communal interests in the forest could run in harmony, in Maine, the economic and political power of the paper companies has been such that state co-operation in forestry has usually meant that the public pays and the companies profit. Defined, in

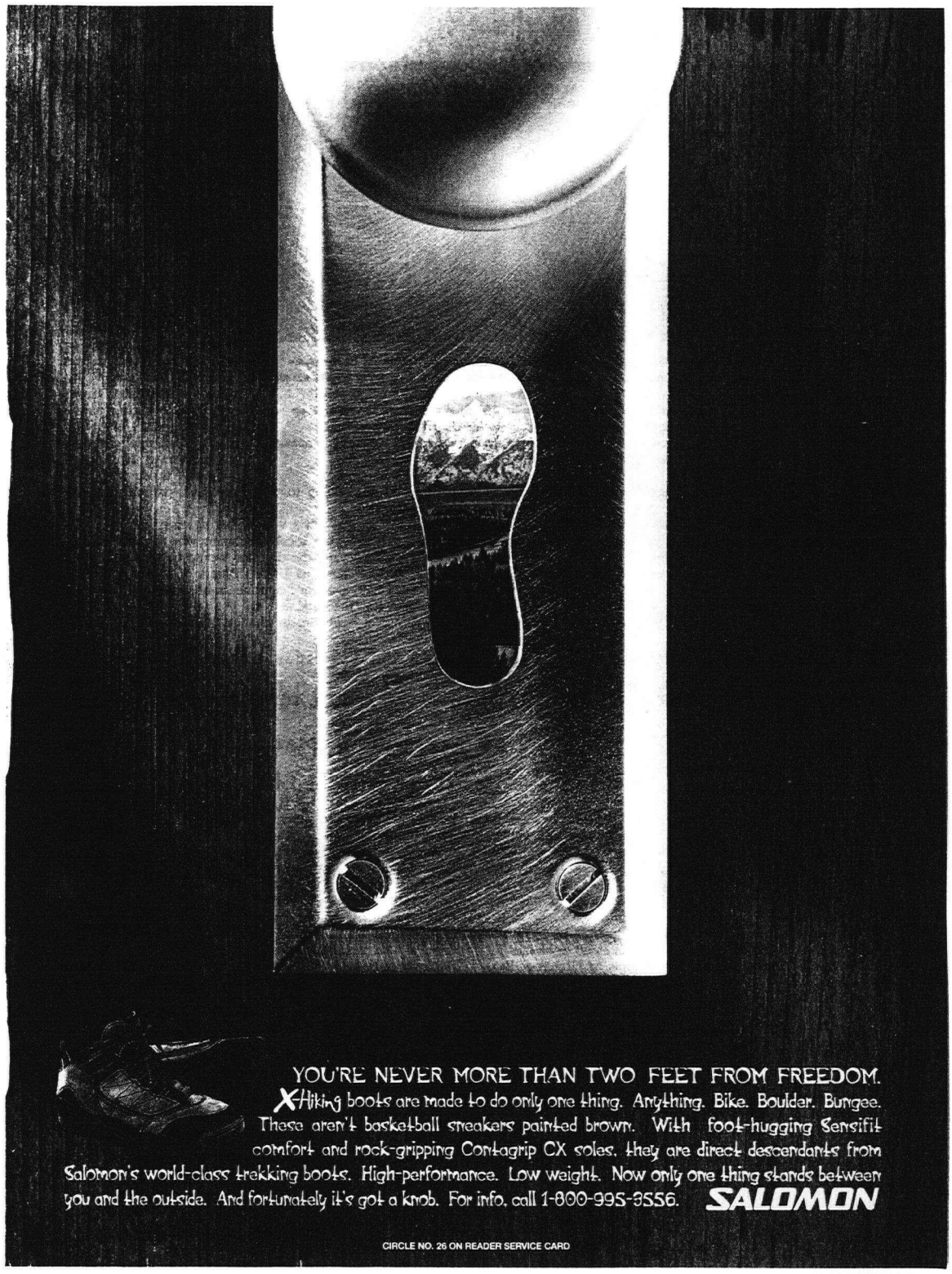
---

[183] Gifford Pinchot to Samuel W. Philbrook, 12 January 1905, Washington, printed leaflet in Prentiss & Carlisle clippings ledger, Univ. Maine Library.
[184] Pinchot, Training of a Forester, 28.

Pinchot's words, as a problem of making "conservative lumbering ... pay," forest conservation almost had to serve the interests of corporate capital. With the forest itself understood as a kind of capital, there was no other way to evaluate the success of conserving it.

III. THE WILDLIFE AND THE RE-CREATION OF MAN

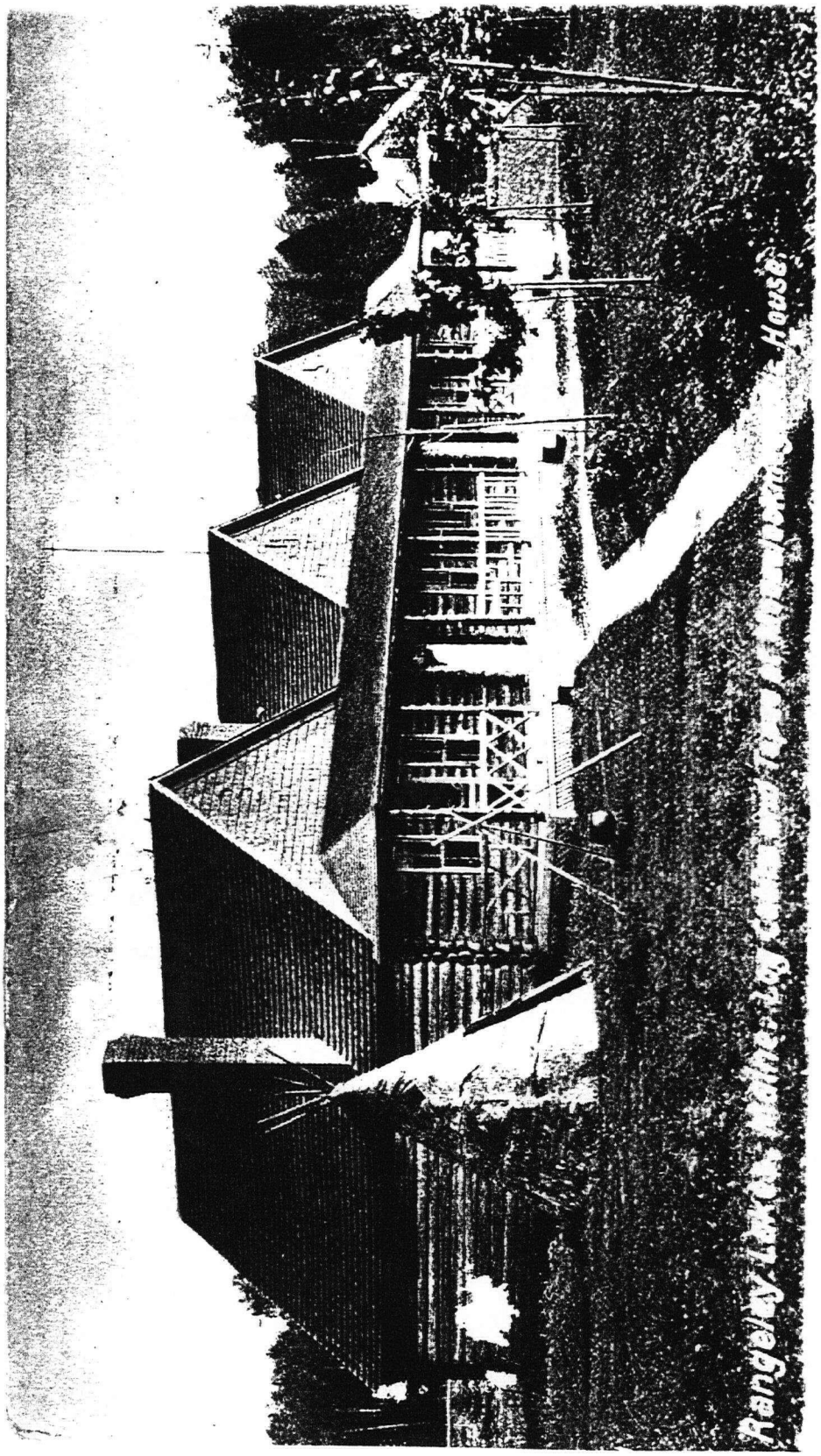
Nature has long been seen as a place opposed to the norms of civilization, but there is nothing natural about this ascription. Indeed, the values we attribute to wilderness and the wildlife reflect deeply held beliefs about society and personal identity. The following portfolio of images explores some of the ways, both past and present, in which the forest and especially the Maine Woods have been constructed as wild spaces of adventure in which to shake off the deadening routines of everyday life and re-create an essential primitive self.



Source: Backpacker: The Magazine of Wilderness Travel (September 1996): 57

Source: EcoTraveler (January/February 1995): 18-19

At the turn-of-the-century, wealthy urbanites, like the young Theodore Roosevelt, tried to recreate the primitive, "manly" virtues of the pioneers by going hunting in the wilds. Herman Hagedorn, Roosevelt in the Bad Lands (Boston, 1921), frontspiece

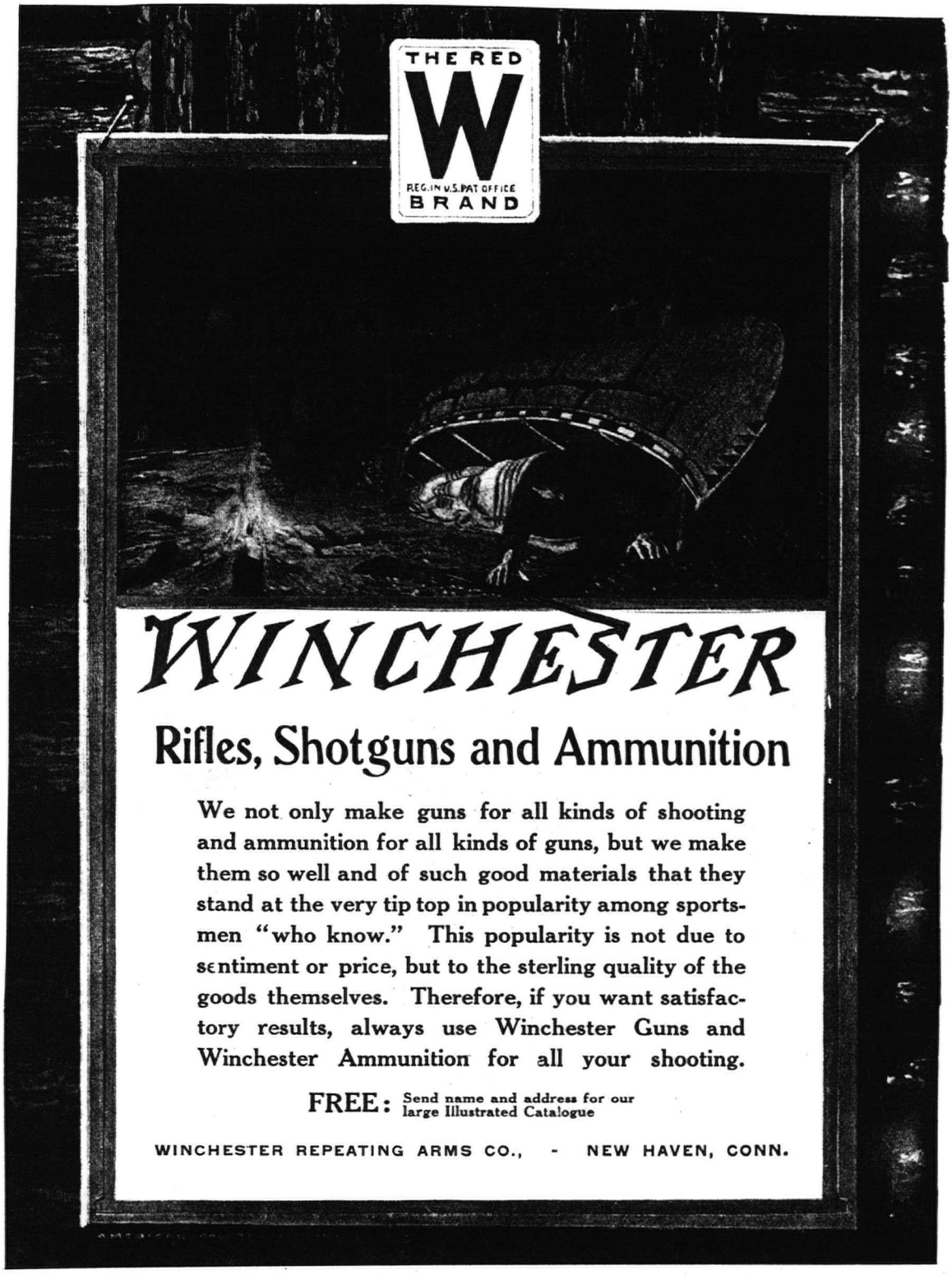


Vacationers longed for the authenticity of nature and the simple life. They participated in elaborately staged spectacles of rusticity, which freely and incongrously mixed symbols of the pioneer and the noble savage. Source: Collection of Dwight B. Demeritt

BEFORE GOING TO THE ADIRONDACKS.

AFTER GOING TO THE ADIRONDACKS.

Vigorous outdoor sport revitalized worn-out and office-bound male bodies. Harpers' New Monthly Magazine 40 (August 1870).



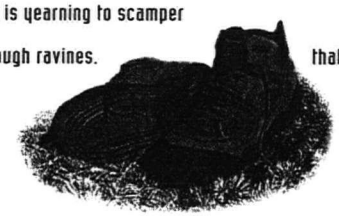
Merchandizers and other businesses have made an entire industry out of the desire to escape the routines of everyday life. Source: In the Maine Woods (1908): backcover

BREATHE DEEP.

RELEASE THE SQUIRREL WITHIN YOU.

The animal inside you is yearning to scamper up trees. To romp through ravines. To hop over rocks.

So please, let that animal out. But first make sure it's wearing Vasque® Exodus™ boots.



Exodus

Their soles are made with tackified rubber, a miracle of chemistry that has a grip like tree-dwelling creatures on espresso.

They also have strange treads that help you cling to rock and bark. And they have dozens of ways to protect and support you while you hop, scramble, or just plain hike.

For the Vasque dealer nearest you, call 1-800-224-HIKE. Feel it. Chant it. Dial it.

Vasque®

FOR OVER 30 YEARS

Backpacker: The Magazine of Wilderness Travel (September 1996): 77

KENNEBEC ASSOCIATION

FOR THE

Protection of Fish & Game.

NOTICE!

NOTICE!

This Association has appointed Wardens to prosecute all violations of the Fish and Game Laws in this Town and vicinity.

Public Laws of Maine, 1878.

SEC. 13. There shall be an annual close-time for Land-Locked Salmon, commonly so called, Trout, Togue, Black Bass, Oswego Bass, and White Perch, in the waters of this State, as follows, viz: For Land-Locked Salmon, Trout and Togue, from the *twenty-first day of September to the first day of February following*, * * and for Black Bass, Oswego Bass and White Perch, from the *first day of April to the first day of July following*.

SEC. 14. No person shall at any time catch, take, kill, or fish, * * * in any other way than by the ordinary mode of angling with a single baited hook and line, or with artificial flies, under a penalty of not less than ten nor more than thirty dollars for each offence, and a further fine of one dollar for each fish so caught, taken or killed. And all set lines, grapnels, spears, trawls, weirs, nets, seines, traps, spoons, and devices other than fair angling as aforesaid, are hereby prohibited on the fresh water lakes, ponds and streams of this State; and when found in use or operation on said lakes, ponds or streams, they are hereby declared forfeit and contraband, and any person finding them in use in said waters is hereby authorized to destroy the same.

SEC. 16. No person shall sell, or expose for sale, or have in possession with intent to sell, or transport from place to place in this State, any Land-Locked Salmon, Trout or Togue, between the *twenty-third day of September and the first day of May following*, or any Black Bass, Oswego Bass or White Peach, between the *first day of April and the first day of July following*, under a penalty of not less than ten dollars nor more than fifty dollars for each offence. Provided, however, that persons having fish legally in their possession under the provisions of section thirteen, may convey them to their own homes in this State, but not otherwise.

The close-time for Salmon if from July 15th to the April 1st following.

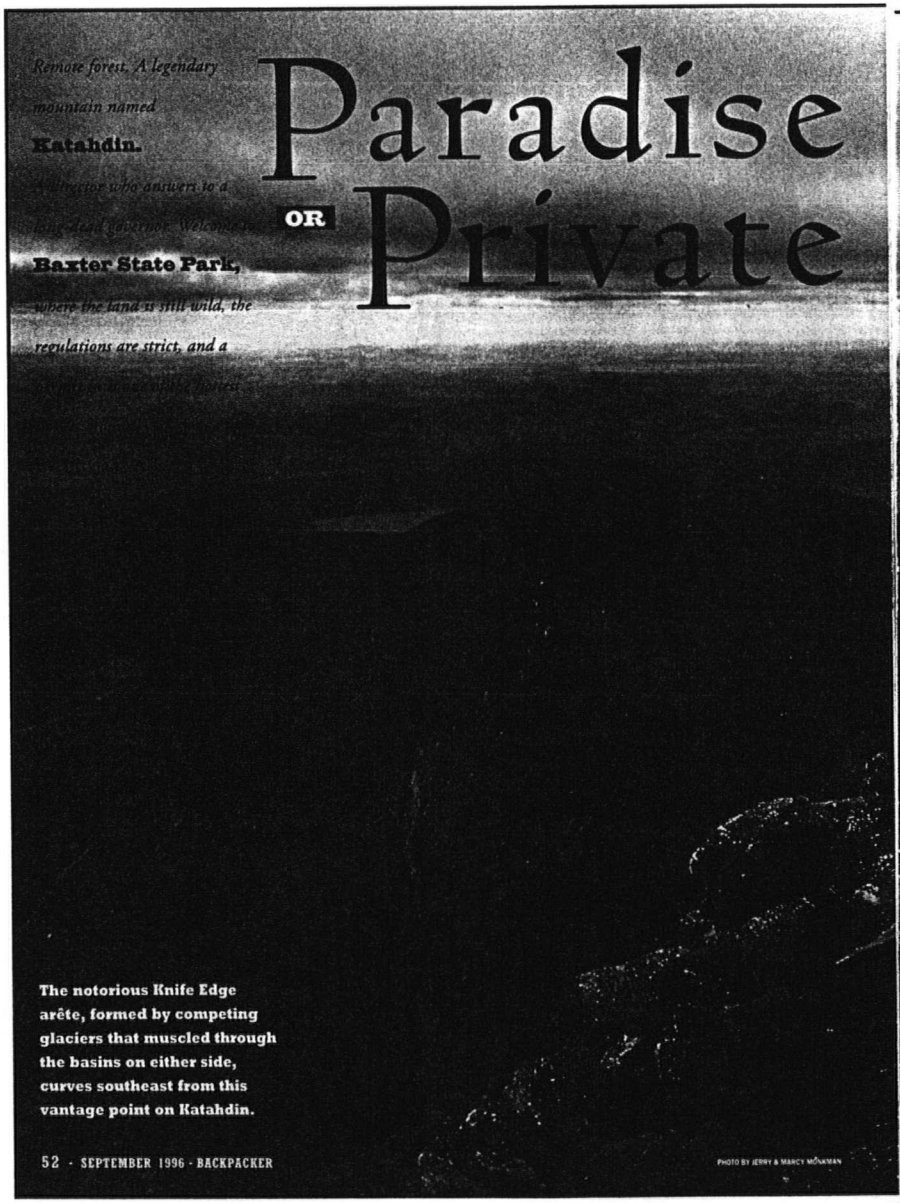
The Game Laws, Chap. 50, forbid the killing, under severe penalty, of Partridge or Woodcock from December 1st to September 1st; Ducks or Plover from May 1st to September 1st; Mink, Beaver, Sable, Otter, or Fisher, from May 1st to October 15th of each year. The killing of Moose is prohibited until 1880, and then from January 1st to October 1st; Deer or Caribou from January 1st to October 1st, of each year.

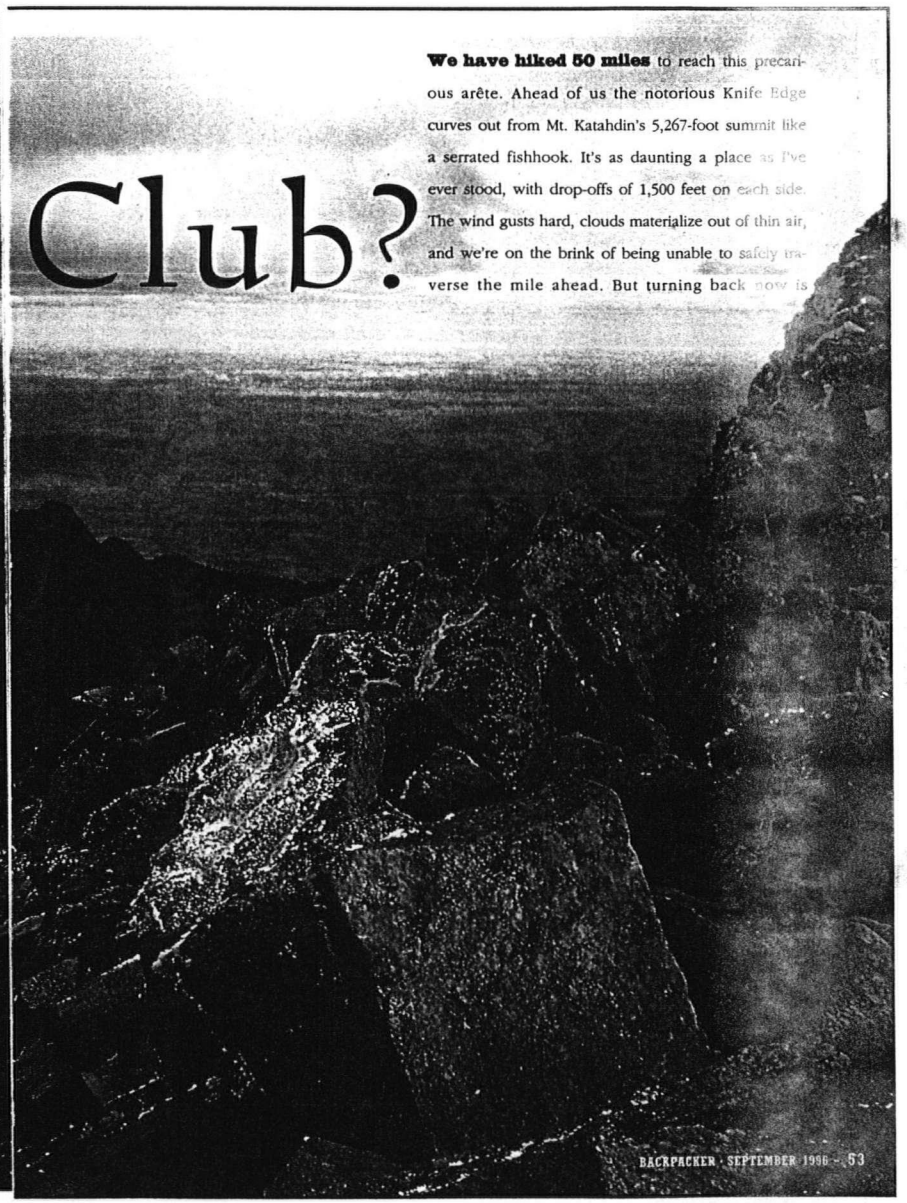
The law also prohibits the killing of Robbins, Larks, Swallows, Sparrows, Orioles, or other insectivorous birds, Crows and Hawks excepted.

The Fish and Game Laws of this State will be vigorously enforced and all violations punished.

Geo. E. Nason, Job Printer, one door north Post Office, Augusta.

Although turn-of-the-century exponents of sport hunting extolled it for recreating the pioneer values of freedom and equality, access to the wildlife and an authentic experience of them was far from free and equal. Source: Collection of Dwight B. Demeritt





Source: Backpacker: The Magazine of Wilderness Travel (September 1996)

Maine Woods

Proposed National Park & Preserve
A Vision Of What Could Be

Looking north at Katahdin from the West Branch Penobscot River. Abol Deadwater

An American Crown Jewel

Kevin Bubie

The legendary Maine Woods

Maine Woods National Park captures the essence of the legendary North Woods. This is a place of towering white pines, mossy spruces, and delicate orchids; of free-flowing rivers and clear lakes; and of rugged mountains and spectacular canyons. It is a place where bald eagles, wolves, Atlantic salmon, and other wildlife thrive in a healthy natural environment. It is a remote wildland that offers solitude and spiritual renewal to civilization-weary people. And the Park is an immense "time capsule" that preserves irreplaceable parts of our cultural heritage. It is truly an American "crown jewel."

"Primeval, untamed, and forever untameable Nature" was how Henry David Thoreau described the Maine Woods after exploring it in 1846. Maine Woods National Park is a place worthy of Thoreau's vision. The Park covers 3.2-million acres, an area larger than the state of Connecticut. Baxter State Park lies entirely within the National Park boundary, and continues to be owned and managed by the people of Maine as a "forever wild" state park.

Among the treasures of Maine Woods National Park are:

- The headwaters of the Allagash, Aroostook, Kennebec, Penobscot, and St. John Rivers;
- Moosehead Lake and hundreds of backcountry lakes and ponds;
- Old-growth forest stands and immense tracts of second-growth forest;
- Habitat for endangered, threatened, and sensitive wildlife species;
- A landscape shaped by glaciers, water, and volcanic activity;
- Native American, Colonial, and logging-era sites and travel routes;
- The area explored and immortalized in writing by Henry David Thoreau and Justice William O. Douglas; and
- The Appalachian National Scenic Trail and a wide variety of other recreational opportunities.

Maine Woods National Park lies within the 26-million-acre Northern Forest Ecosystem, the largest expanse of wildland in the eastern United States. As a major anchor for a region-wide system of nature reserves, the Park has importance that extends far beyond its boundaries.

Stephen Gorman (above and right)

Onawa Lake as seen from Barren Mountain

North Woods Wildlife

William Reiss | George Wuerthner | Robert Erickson | Gary Bausch

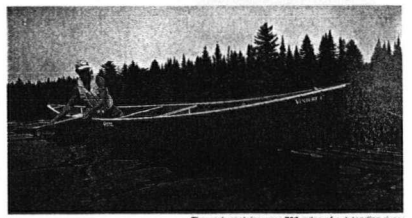
Most of Maine Woods National Park is covered with rich spruce-fir and northern hardwood forests. These, along with innumerable rivers and lakes, wetlands, mountains, and mead-

"...in the middle of the night... we heard the voice of the loon, loud and distinct, from far over the lake. It is a very wild sound ...unlike the voice of a bird. I could lie awake for hours listening to it, it is so thrilling. When camping in such a wilderness as this, you are prepared to hear

logging, pesticide use, and other industrial activities. Numerous species of wildlife, including the eastern timber wolf, cougar, wolverine, and woodland caribou were

Recreation: Enjoying the Park

Visitor Centers:
We hope you will stop at one of the Visitor Centers. Park rangers can provide information, assistance, and hunting and camping permits. Services include displays, activity schedules, trip planning, maps, publications, and first aid. Nature walks and campfire programs are offered regularly during the main visitor season.



The park contains over 700 miles of outstanding rivers

Stephen Gorman

Backcountry camping

Hiking & Camping:
There are more than 1,250 miles of trails through the Park. For overnight camping in the backcountry, you will need to obtain a camping permit at one of the Visitor Centers. Trails are usually

the Park. Be sure to check on motor boat and motor size regulations before you embark on a fishing trip. Excursion boat cruises originating in Greenville and Rockwood are offered on Moosehead Lake.

Hunting & Snowmobiling:
Hunting and snowmobiling are permitted within designated National Preserve areas. Check with a Visitor Center for maps of the snowmobile trail system and information regarding hunting, guide services, and traditional hunting camps.

Guide Services:
Visitor Centers post lists of Registered Maine Guides. Make

Lodging:
A number of traditional sporting camps are available which provide meals and lodging. Space is limited and reservations should be made well in advance.

Winter Activities:
Winter is a season when nature is in control, so approach a winter trip with respect and preparation. The season usually runs from late November to March. Always check with a ranger before setting out and check in again upon your return. Unless you are an experienced winter camper, you are urged to plan a trip with a Registered Maine Guide.

Source: RESTORE, Maine Woods: Proposed National Park & Preserve. A Vision of What Could Be (1994).

7. Call of the Wild

Wilbur Day began serving his twelve year sentence for arson on the same spring day in 1887 that another Washington County man, Calvin Graves, entered the Maine State Prison for murder. Though convicted of separate incidents of violence, they were in a sense both casualties of the same struggle. Day was associated with the shakers, a band of young toughs in Wesley, Maine, who hunted in brazen disregard of the new game laws designed to conserve the moose and deer for sport. He went to prison for burning the barn of a neighbor who had signed up as a game warden and informed the county prosecutor about violations of these new rules of the game. Graves killed two game wardens who cornered him and tried to shoot his dog for being out in the woods during the new closed season mandated by the legislature. Today, both men are remembered in the same breath as symbols of local resistance to the restructuring of the Maine Woods as a vacationland, a natural place of resort for the amusement and recreation of wealthy sportsmen and tourists from away.[1]

This idea that the Maine Woods represented "primeval, untamed, and forever untamable Nature" was hardly new. Leaving behind the more domesticated haunts of Walden Pond, Henry David Thoreau ascended Mount Katahdin to confront "pure Nature" and cultivate those intense feelings of dreadful delight associated with the realization of his own mortality. In gazing out on what he described as "the virgin forest of the New World," Thoreau overlooked the logging roads and other, more substantial traces left by nearly fifty years of extensive lumbering as well as the activities of the Penobscot Indians who guided

[1] On Day, Graves and their remembrance, see Edward D. Ives, George Magoon and the Down East Game War: History, Folklore and the Law (Urbana: Univ. of Illinois Press, 1988).

him to Katahdin.[2] A century later, Americans seeking to experience the wild life in the Maine Woods required a different kind of erasure to produce and preserve the effect of wildest nature. The inroads of industry and the progress of settlement seemed to imperil the very existence of wilderness itself. In calling for the conservation of Mount Katahdin as a wilderness park to "bring health and recreation to those who journey there," Governor Percival Baxter demanded the appropriation of forest land from paper companies and the prohibition of all human activity that might affect it being "forever wild."[3]

These spectacular productions of wilderness and wildlife were underwritten by the powerful and productive fiction that nature and Maine's natural treasures exist as things completely apart from the elaborately organized exhibitions by which they have been staged for our benefit. This consequential difference has been built into the physical landscape itself, often at great cost. To create the desired effect of nature itself on display, roads and carriage ways were laid out, or in Baxter State Park, actually removed; people were relocated and traditional ways of life criminalized; game laws instituted and fish hatcheries built; predators and poachers were ruthlessly hunted down; and forests logged so as to conserve them better. Preserving wildest nature required the systematic displacement and rearticulation of previous modes of knowledge, experience, and existence, but it depended as well upon suppressing all trace of the foundational acts of construction, enframing, and erasure by which it was constructed and represented.

Day and Graves were among those displaced by these new productions of the Maine Woods. Starting in the late nineteenth century, large numbers of wealthy, urban sportsmen flocked to the forests to hunt big game and re-create the vigorous manliness

---

[2] Henry David Thoreau, The Maine Woods, ed. J.J. Moldenhauer (Princeton: Princeton U.P., 1972), 69, 70, 81. For different readings of Thoreau's wilderness vision, see Roderick Nash, Wilderness and the American Mind (New Haven: Yale Univ. Press, 1967); Max Oelschlaeger, The Idea of Wilderness: From Prehistory to the Age of Ecology (New Haven: Yale Univ. Press, 1991); Jane Bennett, Thoreau's Nature" Ethics, Politics, and the Wild (Thousand Oaks, CA: Sage Publications, 1994).

[3] Percival P. Baxter, Mount Katahdin State Park, An Address Given ... at the Annual Meeting of the Maine Sportsmen's Fish and Game Association (Augusta: Maine Senate, 1921), 9. On the creation of Baxter State Park and Baxter's stricture that the land be kept "forever wild," see John W. Hakola, Legacy of a Lifetime: The Story of Baxter State Park (Woolwich, ME: TBW Books, 1981).

threatened by the debilitating embrace of modern life. Day and Graves had also been avid hunters, but the recreation of man depended upon conserving the wildlife for sport, and the interests of local residents in hunting were represented as opposing interests. The closeness of their relationship to the wildlife, with whom *together* they had forged the nineteenth-century Maine Woods, seemed to disqualify local people like Wilbur Day from speaking objectivity for nature and the wildlife. Instead, conserving the wildlife "for the general good" became a matter for the state and its cadre of trained scientists to decide.[4] But representing nature and speaking for it had a dual sense in that it was also simultaneously a speaking of nature and a construction, or enframing of it. Visitors to the Maine Woods could not escape the uncomfortable feeling that what they were experiencing was not the wildlife itself, but merely some cheapened recreation of the real thing.

masculine anxieties

Though long the object of other sorts of appropriation, the Maine Woods first became the object of an avowedly therapeutic usage in the second half of the nineteenth-century. In the face of rapid immigration, urban growth, and economic change, late nineteenth-century Americans confronted new feelings of spiritual and cultural anxiety. The nation was changing. No longer the Jeffersonian republic of small farmers and independent proprietors, the United States was becoming an urban-industrial behemoth, a mass society governed by new impersonal institutions whose vast scale demanded the co-ordination of many interdependent parts. As settlers raced across the continent and factories poured out an ever-widening stream of commodities and mechanical conveniences, American cities burgeoned with strangers in a strange land, Europe's masses yearning to be free. Most people chalked all this up to progress, but progress had its price, and a growing sense of unease about alienation from nature became a regular lament.

---

[4] Lucius L. Hubbard, "Does Game Protection Pay?" (Bangor) Industrial Journal 19 May 1882.

In this climate of cultural uncertainty, the natural landscape became the site for new tensions over national and personal identity. In 1873, Charles Hallock, editor of the newly established Forest and Stream magazine, predicted that "as life driven by steam, electricity, and stimulants becomes more complex, ... men ...[will] turn... to the rest Mother Earth still gives."[5] His prescription of nature as the cure for modern ills echoed a classical tradition of pastoral poetry and nearly a century of European romanticism about the idylls of nature, but when Hallock spoke of resort to nature, he had something more completely dehumanized in mind than Constable's cultivated countryside and the bucolic Arcadia of the English picturesque. Mixed with a home-grown tradition of venerating agrarian landscapes as the very embodiment of progress and republican virtue, arcadian celebration of rural pleasure enjoyed great influence among American elites and the urban middle classes, particularly in New England.[6] It underwrote Olmsted's urban parks, garden city suburbs, and the construction of coastal resorts, like Mount Desert Island, from whose salubrious confines American patricians like Harvard University President Charles Eliot preached against "the evils which attend the growth of modern cities and the factory system." Like Eliot and the arcadians, Hallock feared that the deadening routine of the machine age was "too great for the human body to endure."[7] Like them also, he sought solace in the face of nature, but whereas Eliot's natural remedy for modern ills was the restful prospect of quiet beauty and peaceful simplicity in a carefully cultivated pastoral landscape, Hallock urged his readers to seek personal recreation by donning "the rustic garb of the woods" and

---

[5] "Open Air Stimulants" Forest and Stream 1 (18 December 1873): 296.

[6] On Arcadianism, see my "Visions of Agriculture in British Columbia" B.C. Studies 108 (1995): 29-59; John Marsh, Back to the Land: The Pastoral Impluse in Victorian England from 1880 to 1914 (London: Quartet Books, 1982); Leo Marx, The Machine in the Garden: Technology and the Pastoral Ideal in America (New York: Oxford Univ. Press,1964); Peter J. Schmidt, Back to Nature: The Arcadian Myth in Urban America (1969. reprint. Baltimore: Johns Hopkins Univ. Press, 1989); Raymond Williams, The Country and the City (London: Chatto & Windus Ltd., 1973).

[7] Charles Eliot, "The Need of Conserving the Beauty and Freedom of Nature in Modern Life" National Geographic 24 (July 1914): 67, quoted in Schmidt, Back to Nature, 73. On Eliot and the development of Mount Desert Island as a resort area, see Stephen Hornsby, "The Gilded Age and the Making of Bar Harbor" Geographical Review 83 (1993): 455-68; Dona Brown, Inventing New England: Regional Tourism in the Nineteenth Century (Washington: Smithsonian Institution Press, 1995), 169-200.

striking out for new, untamed territories and "the free atmosphere of the wild wood." The experience of wildest nature "would teach [them] those secrets which necessity compelled the savages to learn." It would take them "back to first principles," now forgotten, but "absolutely essential to our manhood and our well-being, both as individual men and as a nation."[8]

Though certainly wrapped up with broader currents of romantic, primitivist, and anti-modern thought, Hallock's call to the woods expressed specific class and sexual anxieties that were projected onto and articulated in terms of wilderness and the wildlife. New industrial means of production may have de-skilled workers, but the rapid pace of urban life was widely thought to "enslave men of wealth and men of talent more than any other class."[9] Masculinity, and in particular middle class masculinity, seemed to be in crisis.[10] With vertical and horizontal integration, merchants, professionals, and small businessmen lost the "economic and moral independence of former days" when they owned their own independent operations. The middle class was becoming a "salaried class," and social critics worried about the "fate of the salaried man" cut off from the autonomy that had been a hallmark of masculine identity.[11] Frederick Jackson Turner was

---

[8] Charles Hallock, "Announcement" Forest and Stream 1 (14 August 1873): 8; "Open Air Stimulants" Forest and Stream 1 (18 December 1873): 296.

[9] "Recreation and the Business Habit" Forest and Stream 46 (22 February 1896): 149.

[10] John Higham was the first to identity a crisis of middle class masculinity, which he attributed to status anxiety. Hingham, "The Re-Orientation of American Culture in the 1890's" in his Writing American History (Bloomington, Univ. Indiana Press, 1973): 73-102. The antimony of public hand-wringing over middle-class virility was what Margaret Marsh calls masculine domesticity: "a contented suburban father, who enjoyed the security of a regular salary, a predictable rise through the company hierarchy, and greater leisure." Marsh, "Suburban Men and Masculine Domesticity, 1870-1915" American Quarterly 40 (1988): 165-86. For an introduction to the growing literature on masculinity in this period see, Gail Bederman, Manliness and Civilization: A Cultural History of Gender and Race in the United States (Chicago: Univ. Chicago Press, 1995); Joe L. Dubbert, "Progressivism and the Masculinity Crisis" in The American Man, eds. E. Pleck and J.H. Pleck (Englewood Cliffs NJ: Prentice Hall, 1980), 305-20; Manliness and Morality: Middle Class Masculinity in Britain and America, 1800-1940, eds. J.A. Mangan and J. Walvin (Manchester: Manchester Univ. Press, 1987); Meanings for Manhood: Constructions of Masculinity in Victorian America, eds. M.C. Carnes and C. Griffen (Chicago: Univ. Chicago Press, 1990); R.W. Connell, "The Big Picture: Masculinities in Recent World History" Theory and Society 22 (1993): 597-623; Manful Assertions: Masculinity in Britain since 1800, eds. M. Roper and J. Tosh (London: Routledge, 1991); Anthony E. Rotundo, American Manhood: Transformations in Masculinity from the Revolution to the Modern Era (New York: Basic Books, 1993).

[11] "The Fate of the Salaried Man" Independent 60 (20 August 1903): 2002-3, cited in Olivier Zunz, Making America Corporate, 1870-1920 (Chicago: Univ. Chicago Press, 1990), 12.

hardly the first to remark that progress was removing "from the face of a country those natural obstacles which call forth energy and readiness of resource" and were a natural crucible of character and of masculinity. Still possessed of the firm muscles and callused hands that marked a truly masculine body, only the laboring classes seemed immune from "the tendency ... of a high civilization to dwarf the physical powers and energies of men." Trapped behind their desks, middle class men and white collar professionals grew fat and flaccid. The routines of modern life that made them economically secure also made them feel "helpless out of [their] routine."[12]

New corporate institutions demanded a degree of mental concentration and a sublimation of individuality that many felt to be emasculating and unhealthy. Insulated from the physical exertion that had been a source of masculine identity, professional men like Hartford, Connecticut insurance executive Thomas Sedgewick Steele felt disoriented. "In the good old days," Steele recalled, "the requirements of business kept one out in the open air," and physically active. "But now all is changed, and within a hand's grasp at our offices we can communicate by the strange wires of the telephone or telegraph" and crowd "the work of week ... into a single day." Recreation out in the Maine Woods, Steele intoned, was absolutely "indispensable" for men suffering "[i]n this fast world of ours" under the near constant strain of business responsibilities.[13] By the late nineteenth-century, the work ethic, once the guarantee of material wealth and moral health, appeared in a new, unfavorable light. The "average American man," Thomas Higginson cautioned, "leaves his place of business at nightfall with his head a mere furnace of red-hot brains and his body a pile of burnt-out cinders, utterly exhausted in the daily effort to put ten dollars more of distance between his posterity and the poorhouse."[14] In his 1881 best seller, American

---

[12] "Springer's *Forest Life and Forest Trees*" The Spectator (London) 24 (22 November 1851): 1120. For similar commentary, see Thomas Wentworth Higginson, "Saints and Their Bodies" Atlantic Monthly 1 (1858): 582-95.

[13] Thomas Steele Sedgewick, Canoe and Camera: A Two Hundred Mile Tour Through the Maine Forests (Boston, 1882), 19-20.

[14] Thomas Wentworth Higginson, "Gymnastics" Atlantic Monthly 7 (1861): 283, 283-302.

Nervousness, George Beard diagnosed "neurasthenia" as a serious health threat to middle class men preoccupied by excessive "brain work" at the office.[15] The connection between new economic practices and declining physical health was reinforced by the fact that the body itself was "a physical bank-deposit" on which many business men "had been drawing" so heavily that "the account was overdrawn" completely.[16]

The corollary of these wrenching economic changes was both a growth in middle-class leisure time and a new respectability accorded to sport and other pastimes. Increasingly, late nineteenth-century men looked to their leisure time activity and recreation rather than to work and the status of family breadwinner to anchor their identity.[17] Whereas antebellum sports had been the preserve of a rough bachelor subculture based in the saloon and associated with the vices of intemperance, gambling, and violence, indulgence in sport gradually became a mark "which characterizes the accomplished gentleman."[18] The near constant refrain that "the sportsman and the gentlemen are ... synonymous terms" dispelled any lingering stigma attached to the pursuit of leisure.[19] Perhaps nothing better represented the change of heart about the propriety of masculine leisure than the 1850 warning that gentlemen should "wear gloves when shooting as nothing to our eyes looks more *outré*, if not vulgar, than a coarse, scratched and scarred hand."[20] Twenty-five years later, middle class men wore physical scars from hunting as badges of honor and masculine distinction.

---

[15] On neurasthenia, see F. G. Gosling, Before Freud: Neurasthenia and the American Medical Community (Urbana: Univ. Illinois Press, 1987); Tom Lutz, American Nervousness, 1903: An Anecdotal History (Ithaca: Cornell Univ. Press, 1991); Bederman, Manliness and Civilization, 84-94.

[16] Bangor & Aroostook Railroad, In the Maine Woods (1910): 7. On the work ethic, see Daniel T. Rodgers, The Work Ethic in Industrial America, 1850-1920 (Chicago: Univ. Chicago Press, 1978).

[17] Steven A. Riess, "Sport and the Redefinition of American Middle-Class Masculinity" International Journal of the History of Sport 8 (1991): 5-27.

[18] Ubique [Parker Gilmore], Gun, Rod and Saddle: Personal Experiences (New York, 1869), 3. On antebellum attitudes to vicious amusements, see Stephen Hardy, How Boston Played: Sport, Recreation, and Community 1865-1915 (Boston: Northeastern Univ. Press, 1982), 41-62; Elliott J. Gorn, The Manly Art: Bare-Knuckled Prize Fighting in America (Ithaca: Cornell Univ. Press, 1986), 129-47.

[19] "What Constitutes a True Sportsman" American Sportsman 2 (November 1872): 24, quoted in John F. Reiger, American Sportsmen and the Origins of Conservation (2d ed. Norman: Univ. Oklahoma Press, 1986), 29.

[20] E.J. Lewis, Hints to Sportsmen (Philadelphia, 1851), 246 quoted in James A. Tober, Who Owns the Wildlife? The Political Economy of Conservation in Nineteenth Century America (Westport, CT: Greenwood Press, 1981), 47.

Still, these new constructions of masculine identity did not come without some anxiety. The apparent decline of middle class masculinity posed disturbing questions about the moral health of the race and the progress of the nation at large. Disgusted by the "stiff-jointed, soft-muscled, paste-complexioned youth as we can boast in our American cities," Oliver Wendell Holmes predicted the rapid decline of the "Anglo-Saxon lineage."[21] By the late nineteenth-century the Darwinian revolution gave these fears both a new urgency and a scientific legitimacy. Theodore Roosevelt worried that in these "softer times" American men had grown weak and lost touch with the "iron quality which made our forefathers fit to do the deeds they did." Taking his cue from Britain where Arthurian romance and the cult of Spartan virtue were more fully developed, he warned that "a peaceful and commercial civilization is always in danger of suffering the loss of the virile fighting qualities without which no nation, however cultured, however refined, however thrifty and prosperous can ever amount to anything."[22] Others also worried about the "Miss Nancyishness ... of the young men of our Atlantic cities."[23] Questions of bodily health and masculine character were necessarily national ones because, as the renowned conservationist George Perkins Marsh explained, the martial spirit and "hardy physical habits" of the nation's leadership class were "important elements of prosperity and strength in the bodily and mental constitution of a people." The nation itself would be at risk if "the dexterity in the arts of pursuit and destruction ... the courage and self-reliance, [and] the half-military spirit" of its men were allowed to deteriorate.[24]

The impulse towards class and sexual revitalization took on a decidedly racist tincture in this age of empire. Charging up San Juan Hill (after the largely African-

---

[21] Oliver Wendell Holmes, "The Autocrat of the Breakfast Table" Atlantic Monthly 1 (May 1858): 881, quoted in Riess, "Sport and the Redefinition of American Middle-Class Masculinity," 8.
[22] Theodore Roosevelt, The Strenuous Life (1900) in The Works of Theodore Roosevelt (New York: Scribners, 1926), XIII: 456; Roosevelt, American Ideals (1897), XIII: 32. For a similar reading of Roosevelt, see Bederman, Manliness and Civilization, 170-215.
[23] Forester, Complete Manual for Young Sportsmen, 32-33.
[24] George Perkins Marsh, Report Made Under Authority of the Legislature of Vermont on the Artificial Propogation of Fish (Burlington, 1857), 8-9 quoted in Reiger, Sportsmen and the Origins of Conservation, 44.

American Buffalo soldiers had cleared the way), Roosevelt and the Rough Riders won for the United States the white man's burden of colonial rule in the Caribbean. American imperialists celebrating the Anglo-Saxon heritage responsible for their new found global mastery sounded much the same as their counterparts in Britain, but massive immigration from Asia and southern and eastern Europe made social darwinist rhetoric and the fears of racial and cultural degeneration to which it gave voice much more visceral in the United States. More than just polite parlor talk, social darwinism was also about lynchings and Jim Crow that became a part of everyday life in gilded age America. It paved the way for colonial domination just as the romanticization of medieval violence readied English men to go over the top to slaughter on the Somme in the name of God, King, and Country.[25]

As a prophylaxis against martial and masculine impotence, late nineteenth-century Americans enthusiastically prescribed a healthy dose of vigorous sport and outdoor exercise hunting wildlife. The "wild forests" of Maine "contain[ed] a vast fund for man to draw on, a fund of all that is precious to health and recreation" to balance and replenish overdrawn physical assets.[26] For gilded age Americans, all too familiar with the dislocations of bankruptcy and economic depression, the capital fund metaphor seemed to capture perfectly the dangers of physical exhaustion in a modern age. An outpouring of travel writing, adventure fiction, and new periodicals like Forest and Stream, Maine Sportsman, Maine Outing, and In the Maine Woods, specially devoted to the outdoors and the Maine Woods, preached the new dogma of wilderness recreation.[27] Hunting and other manly sports provided the perfect antidote to what Theodore Roosevelt diagnosed as the debilitating "effeminacy and luxury of young Americans who were born of rich parents."

---

[25] Mark Girouard, The Return to Camelot: Chivalry and the English Gentleman (New Haven: Yale Univ. Press, 1981).

[26] Lucius L. Hubbard, Woods and Lakes of Maine (1883. Somersworth: New Hampshire Publishing Co., 1971), [9].

[27] On this adventure fiction, see David C. Smith, "Virgin Timber: The Maine Woods as a Locale for Juvenile Fiction" in Handfull of Spice: Essays in Maine Literature, ed. R.S. Sprague (Orono: Univ. Maine Press, 1968), 187-205; Richard Phillips, "A Geography of Adventure" (Ph.D. thesis, Univ. British Columbia, 1994); Amy Kaplan, "Romancing the Empire: The Embodiment of American Masculinity in the Popular Historical Novel of the 1890's" American Literary History 3 (1990): 659-90.

Sport developed a boy's "body-- and therefore to a certain extent his character."[28] American colleges, academies, and elite boarding schools instituted disciplined regimes of physical culture and outdoor activity to transform "pale, petted, and pampered objects of maternal solicitude" and Victorian stultification into hale and hearty men, "bronzed and ruddy with insatiable appetites."[29]

Victory on the playing field drilled boys for victory on the battlefield, but of all the sporting pursuits, hunting and fishing most clearly embodied the racial, class, and sexual values of the strenuous life. "[H]unting big game in the wilderness," offered George Bird Grinnell, is truly "a sport for a vigorous and masterful people." It demanded and developed those qualities of "energy, resolution, manliness, [and] self-reliance ... without which no race can do its life work well."[30] At the turn-of-the-century the work of the Anglo-Saxon race seemed to be colonialism. The sun never set on the British Empire, while Americans, fresh from the conquest of a continent, were embarking on an overseas empire of their own: Hawaii, Cuba, Puerto Rico, and the Philippines. "It is a fact in history," asserted the Maine historian John Francis Sprague, "that there has never been a dominant race whose most cultivated classes have not loved outdoor sports."[31] Anglo-Saxon prowess on the hunt proved their fitness to rule other races. By 1916, the Boy Scouts of America, modeled after Baden-Powell's colonial boy scout troop, had introduced the secrets of woods craft and wilderness knowledge to over 245,000 American boys. Armed with these primitive skills and what its Congressional charter called the "virile virtues," chivalry, honor, self-

---

[28] Theodore Roosevelt, The Strenuous Life (1900) in Works, XIII: 401-402.

[29] American Sportsman 8 (5 August 1876): 298-99, quoted in Tober, Who Owns the Wildlife?, 48; Hardy, How Boston Played, 107-23. On the British origins of these school reforms, see J.A. Mangan, Athleticism in the Victorian and Edwardian Public Schools (Cambridge: Cambridge Univ. Press, 1981); Cecil D. Ely, The Road to Armageddon: The Martial Spirit in English Popular Literature (Durham: Duke Univ. Press, 1988).

[30] George Bird Grinnell, "The Boone and Crockett Club" in American Big Game Hunting: The Book of the Boone and Crockett Club, eds. T. Roosevelt and G.B. Grinnell (Edinburgh, 1893), 14-15, quoted in Nash, Wilderness and the American Mind, 153.

[31] John F. Sprague, Backwoods Sketches (Augusta: Kennebec Journal, 1912), 100.

reliance and obedience, American boys were ready to do battle in life, in business, and, if necessary, in war.[32]

Though heavily gendered to be sure, the sporting life in the Maine Woods was not an exclusively masculine one. The "artificiality of city life" also exacted its toll on women's health, and many thought that they too could benefit from the refreshing tonic of sport, outdoor exercise, and wilderness recreation.[33] Men were urged to "take the ladies" along on their sporting jaunts into the Maine Woods.[34] The rugged conditions of the forest seemed just the thing to "put new strength and vigor into [the] tired bodies" of modern women.[35] It was "a favorite diversion" of "lady guests" at Packard's Camps on Sebec Lake "to walk to the Willimantic Store in order to weigh themselves to find out how much they were gaining!" While all male parties remained the norm at woods resorts and sporting camps during the spring and fall, increasing numbers of women and even whole families repaired to woods for the summer. July and August brought a dramatic change to Packard's Camps as parties of local lumbermen and river drivers gave way to entire families, "all from out of state ... [who] came with their trunks, prepared to stay 'put'" for a summer of tramping in the woods, fishing and boating on the lake.[36]

A regular women's column in Forest and Stream became an important forum for discussion and debate, but precisely what the "place in the true sporting field for women" should actually be remained somewhat uncertain. Possessed of a "skillful hand and supple wrist," women seemed naturally suited to fly-fishing.[37] As constructed by Izaak Walton and those influenced by his 1653 Compleat Angler, fly-fishing was a quiet and

---

[32] Boy Scouts of America, Handbook for Boys (rev. ed. New York, 1927), 617-19. On the Boy Scouts and imperialism, see Allen Warren, "Popular Manliness: Baden-Powell, Scouting and the Development of Manly Character" in Manliness and Morality, 199-217; Helen Kanitkar, "'Real True Boys': Moulding the Cadets of Imperialism" in Dislocating Masculinity: Comparative Ethnographies, eds. A. Cornwall and N. Lindisfarne (London: Routledge, 1994), 184-96.

[33] Robert van Court, "Vacation Homes in the Woods" Independent 72 (6 June 1912): 1239, quoted in Schmitt, Back to Nature, 3.

[34] A BENEDICT, "Take the Ladies" Forest and Stream 3 (13 August 1874): 6.

[35] Fred H. Clifford, Haunts of the Hunted (Bangor: Bangor & Aroostook Railroad, 1903), 9

[36] Marlborough Packard, A History of Packard's Camps, 1894-1916 (n..p, 1974), 16, 18.

[37] "Women in Arcadia" Forest and Stream 12 (8 May 1879): 270.

contemplative pursuit, demanding skill, patience, and dexterity-- noble attributes to be sure, but as easily masculine as feminine.[38] Women could fish without rocking the boat or Victorian notions of female propriety and passivity, because it was possible to fly cast while seated demurely in the restrictive hooped skirts and corsets that were the fashion of the day. Nothing, declared Cornelia "Fly-Rod" Crosby, was as "graceful and healthful for our sex" as angling. Crosby worked tirelessly to promote the Maine Woods as "the Nation's Playground" and women's outdoor recreation in it.[39] Firearms and female participation in blood sports, however, created considerably more anxiety. At the turn-of-the-century, the "huntswoman" was still "of comparatively recent origin."[40] Mary Alden Hopkins tried to naturalize the female hunter by citing the example of "our great-grandmothers" who, when "follow[ing] their husbands into the Maine woods to find new homes, ... learned of necessity how to handle the clumsy musket and bring down the prowling wild-cats and bears." She recognized, however, that many women do "not care for hunting" and tried to suggest other ways women might still find the "Maine forest ... a place where sick women grow well and well women accumulate muscle and happiness."[41] Others remained convinced it was unladylike and "vulgar to use firearms." In describing the pleasures of the hunt, one sportswoman explained that she felt differently about shooting than her husband: "It's not so much the killing of birds I enjoy as it is the pleasure

---

[38] On Walton, see Jonquil Bevan, Izaak Walton's *The Compleat Angler:* The Art of Recreation (Brighton, UK: Harvester Press, 1988).

[39] "Miss 'Fly Rod': A Noted Maine Women Whose Life Work Is Fly-Fishing," clipping, 1897, Crosby Collection, Phillips Historical Society, Phillips, ME, quoted in March O. McCubrey "The Cultural Construction of the Maine Sporting Camps" Maine History 34 (1995): 120. Like Martha Maxwell, another pioneering female sporting enthusiast, Crosby was renown throughout New England for her skills as a hunter and as a taxidermist, able to mount realistic exhibitions of the Maine Woods for sportsmen's shows. "Sportsman's Exhibition" Forest and Stream 46 (28 March 1896): 252-57; Maxine Benson, Martha Maxwell: Rocky Mountain Naturalist (Lincoln: Univ. Nebrasaka Press, 1984).

[40] Clifford, Haunts of the Hunted, 9.

[41] Mary Alden Hopkins, "Women in the Woods" in Fred H. Clifford, In Pine-Tree Jungles: A Handbook for Sportsmen and Campers in the Great Maine Woods (Bangor: Bangor & Aroostook Railroad, 1902), 123, 125. Sounding the same fears that the National Rifle Association exploits today, another gun enthusiast thought it "the duty of every woman to become familiar with the handling of firearms, not only for the pleasure and health-giving exercise of field and trap shooting, but as a means of encouraging self-reliance and personal protection ... when alone in the house." Of course then as now, violence against women was most often perpetrated by male family members. "Value of Shooting" Bangor Daily Commercial 19 January 1909, 8.

I give my husband by going with him and taking an interest in his sports."[42] Like most advocates of gun play, this champion of women's sport restricted their recreation to trap shooting and bird hunting. Big game remained nearly an exclusive preserve of man the hunter.[43]

With more women hunting and fishing in the Maine Woods, such distinctions became increasingly necessary to preserve the distinctive recreational values of manly sport. Military metaphors surrounding fishing expeditions to do "battle with the finny habitants" of the Maine Woods reassured men that despite the presence of their fly-fishing wives and daughters, "there is nothing tame about fishing here."[44] Just to make sure, the Oquossoc Angling Association explicitly banned women and children from their grounds for the first month and last three weeks of the fishing season, when the fishing was at its peak.[45] While angling for the widest possible market, commercial resort proprietors also took special measures to create and protect exclusively masculine spaces for manly sport. Though they insisted that "the home camp is entirely 'suitable for ladies'," many camp owners also boasted "branch or back camps" less "luxuriously fitted out" where it was possible to escape the company of women for an exclusively masculine experience of the Maine Woods.[46]

While American sport hunting and fishing borrowed heavily from European traditions of aristocratic leisure, these activities resonated differently in the United States with its particular national history. The English gentleman William Henry Herbert, who

---

[42] J.M. "A Michigan Sportswoman" Forest and Stream 14 (5 February 1880): 17. Vera Norwood makes this same point about the contrast between male and female experiences of the hunt. Norwood, Made from this Earth: American Women and Nature (Chapel Hill: Univ. North Carolina Press, 1992), 223-24.

[43] K.B. Wamsley, "Cultural Signification and National Ideologies: Rifle-Shooting in Late Nineteenth Century Canada" Social History 20 (1995): 63-72.

[44] Bangor & Aroostook Railroad, In the Maine Woods (1905): 10.

[45] Edward Seymour, "Trout-Fishing in the Rangeley Lakes" in Sport with Rod and Gun, 351-78.

[46] Herbert L. Jillson, "The Maine Guide and the Maine Camp" Outing 38 (1901): 655. On Maine sporting camps, see McCubrey "Cultural Construction of Maine Sporting Camps," 116-35; Mia Boynton, "A Gift of Native Knowledge: The History of Russell's Motor Camps in Rangeley, Maine" in Motor Camps and Maine Guides: Two Studies, ed. E.D. Ives (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVIII, 1989), 1-65.

popularized sport hunting in the United States under the name Frank Forester, lamented that even cavalier southern planters, who otherwise styled themselves as the true American aristocrats, pursued "a tamer and far less exciting" hunt than the British practice of hunting with horses and hounds so "magnificent both as a spectacle and a sport."[47] Divided into many small private properties the American landscape, particularly in the North, was unsuitable for the sort of mounted fox and stag hunting parties that were possible on European estates where tradition and non-allodial tenure allowed landlords to trample the fields and fences of rentiers while in pursuit of their quarry. Harking back to lost traditions of masculine honor, fortitude, and courage, Americans fancied themselves more as cowboys and Indians than as knights and courtiers. This difference demanded not only a change in sporting practice, but a different setting as well.

Americans domesticated some of the elitist and anti-democratic overtones of the aristocratic hunt by refiguring it in terms of the national drama of individuals pioneering in the wilderness. The solitary wilderness hunter recreated what Theodore Roosevelt extolled as the "free, self-reliant, adventurous life, with its rugged and stalwart democracy" of the American frontier. The ideal sportsman combined the chivalrous virtue and courage of the medieval knight in armor, with the innate knowledge and wilderness skills of the Indian, and the independence and self-reliance of the pioneer. As John Mackenzie has noted, Roosevelt's fundamental frontier virtues of individualism and self-reliance also helped set the British imperial male apart from his colonial charges, but democracy and the other egalitarian associations of the pioneer were much harder to reconcile with colonial practices in India and Africa that kept big game hunting restricted to "the upper echelon of a white

---

[47] Frank Forester, Complete Manual for Young Sportsmen (New York, 1856), 34-35. On the traditions of hunting in the South, see Stuart A. Marks, Southern Hunting in Black and White: Nature, History, and Ritual in a Carolina Community (Princeton: Princeton Univ. Press, 1991). After his marriage to Sarah Barker of Bangor, Herbert took a number of hunting trips into the Maine Woods with Stephen Longfellow, Isaac McLellan, Sargent Prentiss and other prominent Bowdoin graduates. Isaac McLellan,"Reminiscences of a Veteran" Forest and Stream 40 (25 May 1893): 446.

imperial elite."[48] The exclusiveness of Europe's royal parklands and private game preserves offended American sensibilities. Indeed, shooting under these rarefied conditions defeated its entire purpose as a masculine recreation. Without the liberal equality of opportunity "of the life of the wilderness" where "every man stands for what he actually is and can show himself to be," Roosevelt maintained that all of "the manliest and healthiest features of the sport are lost."[49]

But equality of access to unsettled forest lands could not resolve the contradictions between the supposed universalism of wilderness hunting and aristocratic airs of the sporting life. The Boone and Crockett Club, organized in 1888 to promote "manly sport with the rifle," was named for two archetypal figures of the egalitarian American frontier. Yet club members were considerably more privileged than this bow to the common man might suggest. Its membership rolls read like a Who's Who in America and included Henry Cabot Lodge, Gifford Pinchot, Henry Stimpson, and Elihu Root, among other patricians and captains of industry who had proven their mettle by having "killed with the rifle in fair chase ... at least one individual of one of the various kinds of American large game."[50] Nor was it easy to square the spartan simplicity of Daniel Boone and Davy Crockett with the plush leather armchairs of the University Club in Manhattan, where Boone and Crockett members exchanged "opinions and ideas on hunting, travel, and exploration" over cigars and port.[51] Such luxury made a healthy dose of manly recreation all the more vital to overcivilized elites deprived by progress of those natural obstacles of frontier life that, as Frederick Jackson Turner, among others, emphasized, made Americans American. Still, celebration of the heritage of frontier

---

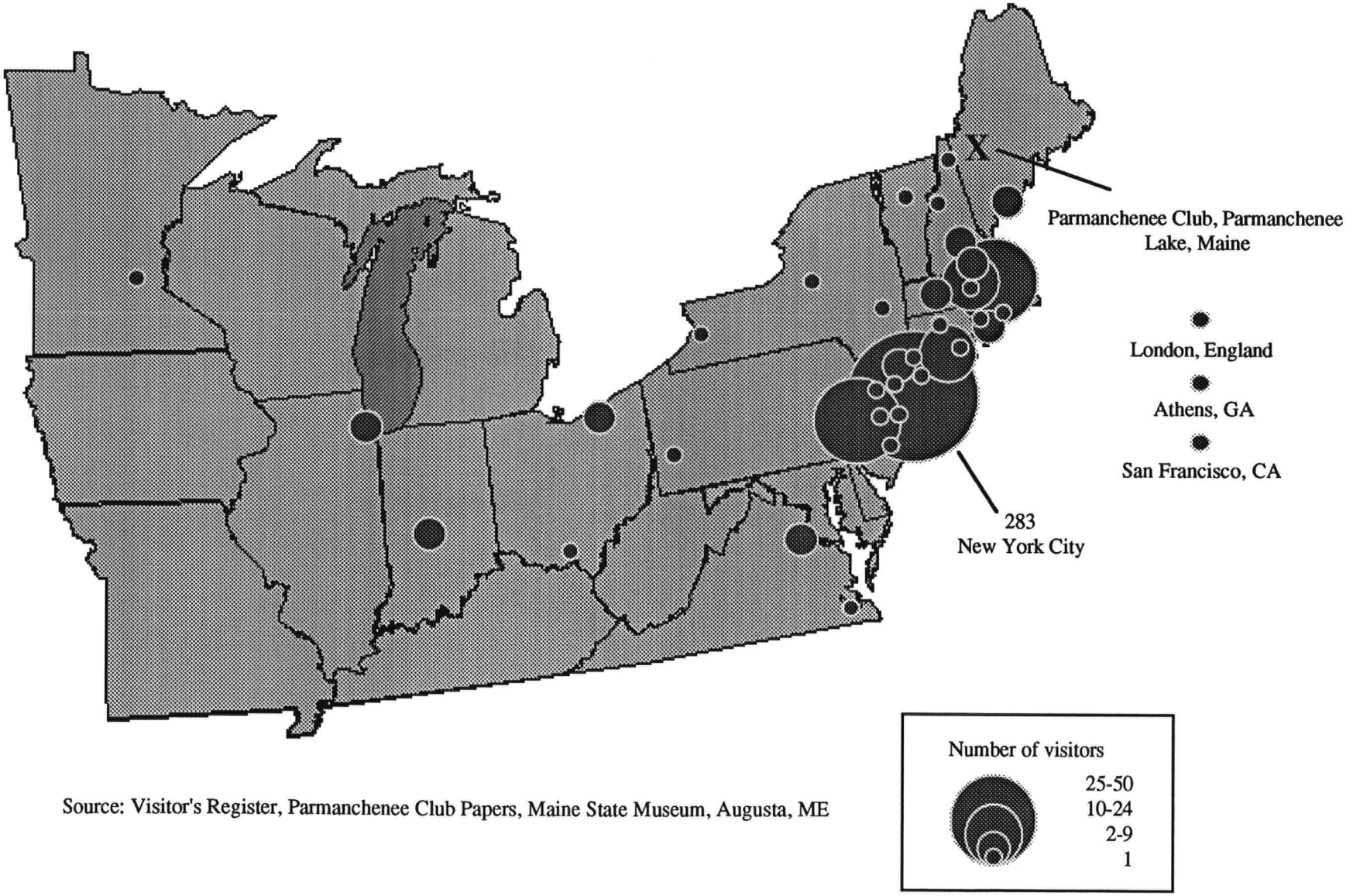
[48] John M. MacKenzie, "The Imperial Pioneer and Hunter and the British Masculine Stereotype in Late Victorian and Edwardian Times" in Manliness and Morality, 183, 176-98. Also see his Empire of Nature: Hunting, Conservation, and British Imperialism (Manchester: Manchester Univ. Press, 1988).

[49] Theodore Roosevelt, The Wilderness Hunter (1893) in Works, II: xxix, 353-54, xxix.

[50] Roosevelt and Grinnell, American Big Game Hunting, 338. By 1904, the eligibility requirements had become more demanding. Trophies from no less than "one individual of each of *three* of the various kinds of American large game" were required for membership. George B. Grinnell, ed., American Big Game Hunting: The Book of the Boone and Crocket Club (1904. New York: Harper & Brothers, 1914), 486.

[51] "The Boone and Crockett Club" Forest and Stream 30 (8 March 1888): 124.

Figure 7.1 Residence of Visitors to Parmanchenee Club, Parmanchenee Lake, Maine, 1896-1905



Source: Visitor's Register, Parmanchenee Club Papers, Maine State Museum, Augusta, ME

equality did nothing to make the actual experience of the Maine Woods and of the wild life more generally any less exclusive. In their wealth and their overwhelmingly urban and out-of-state residence, the guests of the Parmanchenee Club were typical of those coming to Maine for manly sport and wilderness recreation (FIGURE 7.1). Organized in New York City in 1890 by Henry W. Poor, Henry Wells, and other Wall Street executives, the Parmanchenee Club leased exclusive hunting and fishing rights to 120,000 acres of forest land from large corporate landowners. With the full run of twenty rustic camps in northwestern Maine, its seventy-five members and their guests enjoyed one of the most celebrated experiences of the wildlife in the Maine Woods.[52]

primitive resorts

Its expansive forests made the Maine Woods an ideal setting for manly sport and wilderness recreation. An established romantic tradition had already coded the woods as raw, primitive, and wild, but urban sports reworked these configurations with a new, desanctified eye. Schooled on the inevitability of agrarian settlement of the continent, nineteenth-century Americans saw wilderness wherever agriculture ended and forests began, but wilderness reflected different things at the end of the century than it had before. Antebellum tourists cultivated a sense of the wild so as to "look through nature up to nature's God" and experience the sublime, that uncanny feeling of awe and dreadful delight evoked by the painful prospect of personal annihilation in the sight of untamed nature and divine creation.[53] Transcendentalists like Thoreau reveled in the vertiginous feeling that "[s]ome part of the beholder, even some vital part seems to escape through the loose

---

[52] Guest register, Parmanchenee Club Collection, Maine State Museum, Augusta, Maine.

[53] Charles A. Humphreys, "Nature and Man" Harvard Magazine 5 (January 1859): 22, quoted in William A. Koelsch, "Antebellum Harvard Students and the Recreational Exploration of the New England Landscape" Journal of Historical Geography 8 (1982): 364, 362-72. For more on antebellum attitudes to landscape, see Jane Kamensky, "In These Changed Climes, How Chang'd the Scene? Progress, Declension, and Balance in the Landscapes of Timothy Dwight" NEQ 63 (1990): 880-108; Angela Miller, Empire of the Eye: Landscape, Representation, and American Cultural Politics (Ithaca: Cornell Univ. Press, 1993); Nash, Wilderness and the American Mind; Barbara Novak, Nature and Culture: American Landscape and Painting, 1825-75 (New York: Oxford Univ. Press, 1980).

grating of his ribs" upon entering "something savage and awful, though beautiful" as "a region uninhabited by man." Urban sports, by contrast, came to the Maine Woods to assert their true self, not to lose it. They reasserted their fragile masculinity by hunting wildlife and recreating the painful process of national self-birthing in the forest cradle of America. The experience of the Maine Woods was still made to be everything that civilized life was not, but in a modern age this opposition between nature and society meant some new things. In a more steadfastly secular era, sportmen's encounters with wildest nature had less of the religious and spiritual overtones of the romantics. Instead, turn-of-the-century sportsmen came to the woods to shake off the comforts of modern civilization and seek personal and physical regeneration in the discomforts of the wilds.

All these constructions of wilderness depended in some sense upon feminizing the body of nature and possessing it sexually, but there were important differences both in how this feminization was registered and in what it connoted.[54] While Thoreau and the romantics took pleasure in losing themselves "beholding the form of a mountain in the horizon," the prospect of nature and its visual appropriation depended upon maintaining a distance, "as if by retiring to this distance we had then first conquered it by our vision, and were made privy to the design of the architect." Visual distance not only made psychosexual reunion with "Mother Earth" agonizingly unachievable, it also led to the systematic occlusion of other cultural presences in the Maine Woods, which were thereby transformed into "primeval, untamed, and forever untamable Nature."[55] Turn-of-the-century sportsmen also felt "the magic beckoning of old Mother Nature," but their experience depended less upon the voyeur's gaze than upon other sensations, such as "the

---

[54] As Annette Kolodny, Carolyn Merchant, and other feminists have argued, visions of a feminized nature are gendered and sexually charged. Kolodny, The Lay of the Land: Metaphor as Experience and History in American Life and Letters (Chapel Hill: Univ. North Carolina Press, 1975); Merchant, Ecological Revolutions: Nature, Gender and Science in New England (Chapel Hill: University of North Carolina Press, 1989).

[55] Thoreau, The Journal of Henry D. Thoreau, ed. B. Torrey (Boston: Houghton, Mifflin, 1906), I: 270; Thoreau, Maine Woods, 70, 69.

invigorating breath of pine and spruce."[56] This is not to say that vision was irrelevant to the sporting experience. Physically immersed in the enveloping forest, hunters came face to face with palpable traces of "the lumberman's axe."[57] It would have been hard not to. By 1880, the Maine Woods had been so relentlessly logged that the U.S. Census concluded only the most inaccessible stands remained as yet uncut. Many began to worry about a timber famine as the enormity of the cut-over began to sink in.[58] This realization helped make urban sports like Roosevelt much more energetic advocates of active conservation measures than the pious romantics of two generations before, whose elegiac pleasure in gazing at the virgin forest depended upon the inevitability of its despoliation by axe and plow.

Though less voyeuristic than romantic prospectors of nature, turn-of-the-century sportsmen also tasted "Nature in all her beauty" by "penetrat[ing] ... almost inaccessible forests."[59] They reveled in the rough conditions "of the camp where ways of living are as primitive as comfort will allow."[60] "[B]odily discomforts,-- coarse food and rough bed, the wet and cold," told city sports that they had shaken off the debilitating "comforts of civilized life" for the "happy life in the midst of uncivilized nature."[61] Such sensations of delightful horror and pain were also crucial to an older sense of Kantian sublime by which we "become conscious of our superiority over nature within and thus also over nature without us." Psychoanalytically inclined readers see the sublime as an experience of masculine individuation, in which the masculine subject of the sublime renews his fragile ego by violently plunging himself into and visually devouring the feminized body of

---

[56] Bangor & Aroostook Railroad, In the Maine Woods (1911): 7.
[57] Thomas Sedgewick Steele, "The East Brach of the Penobscot" Forest and Stream 14 (5 February 1880): 3-4. This is excerpted from his Canoe and Camera.
[58] See chapter 4.
[59] In the Maine Woods (1909): 8.
[60] Clifford, Haunts of the Hunted, 8.
[61] Alfred Mayer, "Preface" in Sport with Gun and Rod in American Woods and Waters, ed. A. Mayer (New York, 1883), 11.

nature.[62] There is certainly a strong element of this aggressive masculinity in the sportsmen who took pleasure inundating themselves in and overcoming the physical challenges of the Maine Woods, but their masculinity was not constructed through the simple opposition of a masculine culture to a feminine nature. The Maine Woods entered cultural circulation in a variety of guises, many of them feminized, but not all of them. Thoreau, for one, was fascinated by the phallic form of the mushroom:

> The whole height six and three quarters inches, two thirds of it being buried in the sphagnum. It may be divided into three parts, pileus, stem, and base,-- or scrotum, for it is a perfect phallus. One of those fungi named *impudicus*, I think. In all respects a most disgusting object, yet very suggestive ... The color of the outside white excepting the pileus, which is olive-colored and somewhat coarsely corrugated... The cap is thin and white within, about one and three eighths inches high by one and a half wide. The stem (bare portion) is three inches long ... Longest diameter at base one and a half inches, at top (on edge of pileus) fifteen sixteenths of an inch ... The base, or scrotum, is of an irregular bag form, about one inch by two in the extremes, consisting of a thick trembling gelatinous mass surrounding the bottom of the stem and covered with a tough white skin of a darker tint than the stem. The whole plant rather frail and trembling ... It was as offensive to the eye as to the scent, the cap rapidly melting and defiling what it touched with a fetid, olivaceous, semiliquid matter ... Pray what was Nature thinking of when she made this? She almost puts herself on a level with those who draw in privies.[63]

Sportsmen infused the Maine Woods with racial and colonial overtones as well sexual ones. Racial anxieties, of course, had been at the heart of the masculine crisis, and tourist promoters played on the manly daring-do of colonial conquest. In Pine-Tree

---

[62] Immanuel Kant, The Critique of Judgement, trans. J.C. Meredith (Oxford: Clarendon Press, 1952), 114 quoted in Rod Giblett "Philosophy (and sociology) in the Wetlands: The S(ub)lime and the Uncanny" New Formations 18 (1992): 145, 142-59; Terry Eagleton, The Ideology of the Aesthetic (Oxford: Basil Blackwell, 1990), 53-54, 89-93.

[63] Journal of Henry D. Thoreau, IX: 115-17. He expressed similarly eroticized feelings for the shrub oak. Journal of Henry D. Thoreau, IX: 146.

Jungles, a 1902 promotional pamphlet put out by the Bangor & Aroostook Railroad, promised prospective "sportsmen and campers in the Great Maine Woods" that they could emulate the adventures of Kipling and Stanley in "Darkest Africa" by taking a journey into "jungles nearer home ... the greatest sporting and recreation ground in all America."[64] In this classically colonial trope, time and history were displaced over space. A trip into Maine forests was a trip back though time into a mythical realm of the primitive. "You have only to travel for a few days into the interior," Thoreau assured those retracing his tour of the Maine Woods, "to come to that very America which the Northmen, and Cabot, and Gosnold, and Smith and Raleigh visited."[65] With every step back into the forest, the tourist grew "hardy and tough as an Indian, l[ying] down at night on his fir-strewn couch ... sleep[ing] the sleep of tired happy childhood."[66] The presence of Indian guides, who, for a modest price, would lead tourists back into the depths of the forest primeval, only enhanced the intoxicating feeling of days gone-by. Tourist handbooks advised that "the services of a trustworthy Indian guide are indispensable" to an enjoyable and authentic experience of the Maine Woods.[67] Of course, the noble savage created some identity problems for sportsmen trying to get in touch with the wilderness experiences of their Indian-fighting ancestors, but for the most part, such historical differences melted away into an idealization of rugged, frontier characters like Cooper's Natty Bumpo who seemed to combine the very best of everything that was not modern. In these woodland spectacles, it seemed perfectly natural to juxtapose the log cabins at Mooselookmeguntic House on Rangeley Lake with a teepee fashioned after those of the Plains Indians. Both were pure and primitive, and thus in some sense the same, or at least equally different from the artificiality of modern urban life from which tourists sought respite in the Maine Woods.

---

[64] Clifford, In Pine-Tree Jungles, 7.
[65] Thoreau, Maine Woods, 81.
[66] Fur, Fin and Feather: A Compilation of the Game Laws... (New York, 1871), 194 quoted in Tober, Who Owns the Wildlife, 48
[67] Charles C. Ward, "Moose-Hunting" in Sport with Gun and Rod, 165, 154-81.

Living the simple life "in the midst of uncivilized nature," the tourist "became[s] a civilized savage" for whom "time will seem of as little value ... as to the savage."[68]

This sense of regressing back to a primitive time was built into the landscape itself. The map was dotted with lakes whose "euphonious ... and unpronounceable names" announced to tourists that they were going back to a time when America was as yet wild and unconquered by civilization.[69] In the wake of the massacres at Wounded Knee, when the last remnants of the continent had been wrested from native peoples, fraternal lodges "whose members call themselves unpronounceable titles supposed to have belonged to the aboriginal braves" were rendered safely ironic.[70] Now that "the deep mosses of Maine shall no more be imprinted with the moccasin of its ancient master," urban sports could enjoy the bittersweet of elegiac regret in the toponymic traces of the noble savage.[71]

The New York and Philadelphia sportsmen who organized the Oquossoc Angling Association named their club after what they had been told was the original Abenaki name for Rangeley Lake. Their compound was a peculiar mix of American primitivism and European Gothic revival. The main lodge, called Camp Kennebago modestly enough, was executed in the log vernacular of the Maine lumbermen who undoubtedly performed the actual labor. The interior, however, was more King Arthur than Davy Crockett. Modeled on St. George's Chapel in Windsor Castle, this great hall boasted a huge stone fireplace and sleeping alcoves festooned with banners, "like the stalls of the Knights of the Garter," in which the all-male members of the association slept together in the manly fellowship of the Knights of the Round Table.[72] The guides who, like gallant squires of old, led urban sports around the Maine Woods, slept out back in the garrets with the horses and other servants. Sometime in the 1880's, the Association supplemented its Gothic dormitory with

---

[68] Alfred Mayer, "Preface" in Sport with Gun and Rod, 11.
[69] Charles Hallock, The Fishing Tourist (New York, 1873), 92.
[70] Bangor Daily Commercial 18 December 1888, 4.
[71] Rev. Eugene Vertromille, The Abenakis and Their History (New York, 1866), 17.
[72] "A Tour of Rangeley Lakes" Phillips (ME) Phonograph 21 and 28 September 1878. On the architecture of sporting camps and their connections to the lumber industry vernacular, see Boynton, "Gift of Native Knowledge" in Motor Camps and Maine Guides, 5-6.

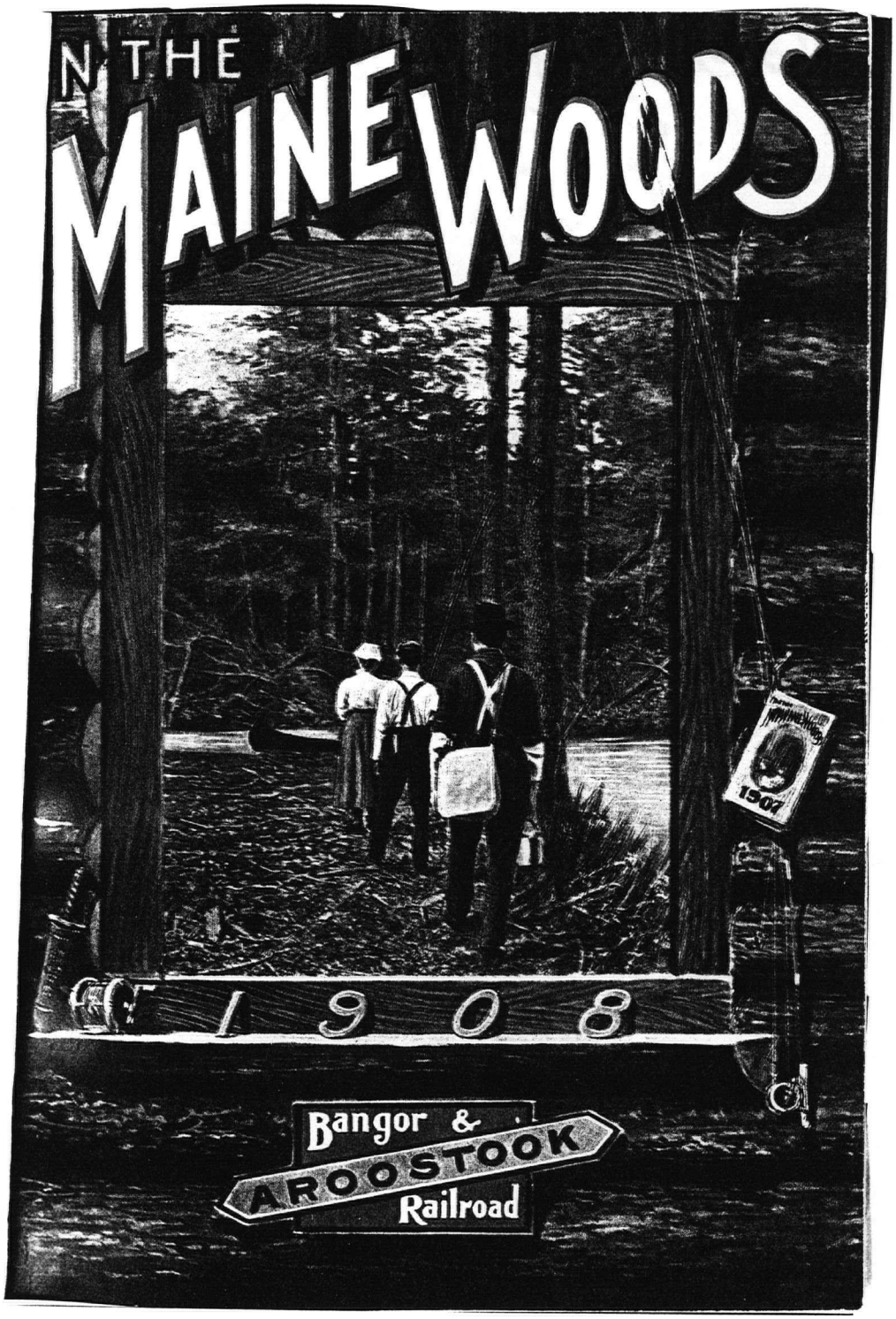
a set of free standing cottages to accommodate members who wished to bring their families on holiday into the Maine Woods. Arrayed in rows on the lake front, these low, gable-to-the-fore cabins suggested more of the rustic simplicity of the American frontier than the vaulting, sublime of the Gothic cathedral. Both, of course, stirred the passions of middle class men who felt stultified by modern society, but the shift from Gothic to rustic marked the same aggressive assertion of American heritage as the reconfiguration of the aristocratic hunt in terms of the wilderness hunter.

Like the Oquossoc Association, the Parmanchenee Club took a primitive, Indian-sounding name, but its rustic, log cabin facilities were self-consciously American in form. Its twenty log-built sporting camps were fashioned in the practical vernacular of the Maine lumberman, but to urban sports and their guests, the cabins called up images of hardy pioneers colonizing the wilderness.[73] Nothing shone brighter as a symbol of American frontier democracy, equality, and manly virtue than the log cabins that pioneers fashioned in the forest. Log cabin birth had set Andrew Jackson apart as the champion of the common man. Two generations later, as the sway of trusts, corporations, and political machines made the heritage of Jacksonian democracy seem more ephemeral than ever, sportsmen and recreationalists could still get away from it all by returning to the simple, yet solid log cabin surroundings of their pioneering ancestors. In these log cabins, "one could be accommodated with all the lack of civilization that greeted the first voyagers to these shores."[74] Tourist promoters artfully played on these associations of forest, log cabin, and pioneer virtue by picturing the Maine Woods through the unfinished frame of an unframed log cabin (FIGURE 7.2). Even as tourism relentlessly remade the Maine Woods in the image of all that could be rustic, primitive, and wild, it suggested that some essential Maine Woods remained out there all along, waiting to be discovered and experienced.

---

[73] The Parmanchenee Club (n.p., 1924), pamphlets in the Parmanchenee Club Collection at Maine State Museum, Augusta, ME.
[74] Rev. Charles E. Brugler, "Vacation Life at Scoodic Lake" In the Maine Woods (1905): 13-16.

Figure 7.2 Promoting the Backwoods Experience



Source: In the Maine Woods (1908): cover

The primitive conditions of the Maine Woods not only harked back to the heritage of the nation, they also recreated the tourist's individual experience of childhood. Social refinement and adult responsibility demanded the repression of primal energies and instincts, but "our acquaintance with Nature as we found it up the Megalloway" helped men discover the boy buried deep within them.[75] By "bidding farewell to the conventional restraints of society" in the freedom of the woods, sportsmen "become boys again, forgetful of worldly trials and living only in the sunshine of merry retrospection and a care-free present."[76] Just as a healthy dose of primitivism and social regression was good medicine for a feminine and over-civilized society, so it also seemed therapeutic for the male psyche. The rough experience of camp life "renew[ed] our youth" and worked off repressed masculine drives so that sportsmen returned from acting out "our boyhood dreams" in the forest feeling refreshed and restored, full of "health and happiness."[77] In fact, many psychologists, influenced by German romanticism, believed that individual development was analogous to that of the nation at large, much as late nineteenth-century evolutionary biologists insisted that ontogeny recapitulates phylogeny.[78] Since "the development of each individual repeats the evolutionary history of the race," sporting enthusiasts like Aldo Leopold concluded, "[t]he trophy hunter is the caveman reborn. Trophy-hunting is the prerogative of youth, racial or individual, and has nothing to apologize for."[79] Upholders of recapitulation theory, like G. Stanley Hall, founder of Clark University, believed that what ailed the individual must also afflict society, and vice

---

[75] WEBB, "The Megalloway and Diamond Rivers" Forest and Stream 12 (12 June 1879): 363-64.
[76] Millard, "Camping Out" Forest and Stream 14 (24 June 1880): 414.
[77] Brugler, "Vacation Life at Scoodic Lake" in Bangor & Aroostook Railroad, In the Maine Woods (1905): 13-16.
[78] T. Jackson Lears, No Place of Grace: Antimodernism and the Transformation of American Culture, 1880-1920 (New York: Pantheon Books, 1981), 147-49; Donna Haraway, Crystals, Fabrics, and Fields: Metaphors of Organicism in Twentieth-Century Developmental Biology (New Haven: Yale Univ. Press, 1976). The organic tradition of romantic thought was also crucial to development of ecological science. See Donald Worster, Nature's Economy: A History of Ecological Ideas (1977. New York: Cambridge Univ. Press, 1985); Ronald C. Tobey, Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895-1955 (Berkeley: Univ. California Press, 1981).
[79] Aldo Leopold, A Sand County Almanac and Sketches Here and There (New York: Oxford University Press, 1949), 175-76.

versa.[80] This seemed doubly so of wildest nature whose alienation led to the repression of primal energies within individuals and the loss of martial virtues within the population as a whole.

At the same time that psychologists provided this picture of the primal and unconscious that men might discover within their own hearts, professional anthropologists and ethnographers were setting out into the colonies, the metaphorical heart of darkness, to search for man's primitive social identity.[81] "The love of the chase," asserted Alfred Mayer, "is deeply embedded in man's nature."[82] This was a fact that Mayer and other sport hunting enthusiasts already knew; the science of anthropology simply confirmed it and gave the imprimatur of science to the naturalization of gender and sex role differences. It confirmed their sense that the primal and the primitive or uncivilized were really the same thing: essentially masculine and repressed by the feminine force of civilization and maternal upbringing. Sportsman celebrated hunting because it demanded a "return to the primal competitive habits" of the savage. Unconscious savagery, of course, was no better than repressive gentility; it was a question of degrees. Ruthless competition was a feature of capitalism as well as the jungle, and so the wild life was doubly necessary "for the refreshment of men" in the modern age. "Nothing," declared wild life conservationist Gordon Hewitt, "can ever equal our wild life as a means of increasing human efficiency ... under the high pressure of city conditions."[83]

---

[80] On Hall and the recapitulation theory of psychological development, see Bederman, Manliness and Civilization, 75-120.

[81] George Stocking, Victorian Anthropology (New York: Free Press, 1987).

[82] Alfred Mayer, "Preface" in Sport with Gun and Rod, 11. Lucius Hubbard also noted man's "inborn love of killing," though he feared that if overindulged, it might lead men, "no matter how refined or delicate his education and previous surroundings ... to take the life of wild animals, whether the dangerous wildcat or the defenseless deer, with an eagerness that is at times ferocious and a recklessness that is appalling." Savagery, it would seem, no less than civilization, could destroy the Maine Woods and deprive future generations of the wilderness experience they would need to cope with the challenges of modern life. Hubbard, Woods and Lakes of Maine, 80, 85.

[83] C. Gordon Hewitt, The Conservation of the Wild Life of Canada (New York: Scribner's, 1923), 15.

class and sexual tensions

The experience of the Maine Woods became "a test, a measuring of strength, a proving of his essential pluck and resourcefulness and manhood, an assurance of man's highest potency." Hunting, stalking, and killing large game animals were in every sense, then, a masculine re-creation. Urban sports went off to the Maine Woods to shoot deer and moose so as "to become men again in the wilds."[84] Being masculine involved certain essential character traits, martial skills, primal instincts and bodily qualities. Hunting re-created all of them. Only by "match[ing] himself against the forces of nature" could man find his essential masculine self. [85] A healthy dose of wildest nature inoculated men against the creeping effeminacy of American culture by recreating the old-fashioned, manly virtues of "hardihood, self-reliance, and resolution needed for effectively grappling with his wild surroundings."[86] But there was a deep paradox here. Being manly was about being independent and self-reliant, skillful, savage, and physically powerful in confrontations with wildlife. Yet, sportsmen could not prove any of these things about themselves without some help. Having lost touch with the primitive ways of the woods, urban sports relied upon hired guides to lead them into the Maine Woods, where they could recreate the primitive masculinity within them.

The relationship between guides and the sports who hired them was fraught with tension.[87] While the primitive equality of the forest was one of the principal attractions of the experience, tourists were extremely conscious of social and class distinctions. Even as he made light of the cramped conditions within their tent -- "we being arranged somewhat similar to sardines in a box" -- Thomas Sedgewick Steele called attention to the "*imaginary*

---

[84] [George Hallock], "An Admirable Scheme" Forest and Stream 14 (26 February 1880): 70.
[85] Stewart E. White, The Forest (New York, 1903), 5, quoted in Nash, wilderness, 154. could have gotten this mixed up with hallock in fn 77
[86] Theodore Roosevelt, The Wilderness Hunter (1893) in Works, II: 17.
[87] For discussions of the relationship between guides and the sports who hired them, see Patricia Jasen, Wild Things: Nature, Culture and Tourism in Ontario, 1790-1914 (Toronto: Univ. Toronto Press, 1995); Nathan S. Lowrey, "A Historical Perspective on the Northern Maine Guide" MeHS Quarterly 26 (1986): 2-21.

line... dividing off the guides." But the lines were more than imaginary. While Steele and his gentleman companion sketched and smoked at the picturesque rapids on the Penobscot, "the guides were 'sacking' the camp kit across 'Indian Carry', three quarters of a mile."[88] The labor of the guide included that of servant as well as forest pathfinder. Typically, they were paid several dollars a day to paddle, portage, cook, and care for the parties they led to the best sites for fish and game. On hunting trips, guides often left their clients back in camp while they searched the forest for quarry to provide their clients with sport.[89] For the wilderness hunting purist, "deer killed under the tutelage of a licensed guide will never have the same value as that killed by the sportsman himself in a country which he discovers for himself," but most commentators recognized that, but for the guides, the wildlife had little to worry about: "There is not one [sportsman] in a hundred who can catch a deer without the aid of his guide."[90] Sportsmen depended on their guides to lead them to the wildlife whose conquest allowed them to feel independent and self-reliant again. The guides, in turn, were economically dependent on the wages they earned catering to wealthy tourists. All this dependence made for an uncomfortable situation all the way around. Upon learning that the record-setting moose trophy belonging to the artist Albert Bierstadt had actually been shot by his Indian guide, Theodore Roosevelt was concerned enough for his friend's honor to conceal this embarrassing fact.[91]

The independence of character that endowed guides with their manly wilderness skills also made it difficult for them to show the deference expected of servants. Thomas Sedgewick Steele forbad his Indian guides from indulging in "ardent spirits." Though unhappy about this stipulation, they needed the work and could only grumble "that the only

---

[88] Steele, Canoe and Camera, 53, 101.

[89] See, for example, Forest and Stream 46 (4 January 1896): 11; Charles C. Ward, "Moose-Hunting" in Sport with Gun and Rod, 154-81;

[90] E. Hough, "Chicago and the West" Forest and Stream 51 (6 August 1898): 107; "Deer Slaughter in the Adirondacks" Forest and Stream 3 (26 November 1874): 249.

[91] Eric Nye and Sheri I. Hoem, "Big Game on the Editor's Desk: Roosevelt and Bierstadt's Tale of the Hunt" NEQ 60 (1987): 454-65.

'dry' part [of their trip] this year, was *the temperate way in which they were treated.*"[92] Tourists were warned that for three dollars a day guides would "keep their places" and do menial work without protest, but that as "men of a certain independence of character ... they value their self-respect to the point of sensitiveness."[93] Guides were proud, even prickly, about their skills. Wilderness knowledge was their stock and trade of course, but more than that, their prowess with rod and gun was one area, at least, where they were more than equal to the wealthy men who bossed them around. The legendary guide and poacher Wilbur Day remembered one run-in he had with a banker from New York City who questioned his guiding skills and "methods of hunting":

> He started in and told us just all about how to do it. After a while I said to him, 'Where did you learn all about hunting deer?' And he said that he had learned it from a book, just the same as he had got his other education. I told him that I had read quite a number of books and asked him what he would think of me if I were to come into his place of business in New York and go to telling him how to run his bank. He said that he did not think that I knew very much about running a bank. I told him that I did not, but that I considered that I knew about as much about running a bank as he did about hunting deer. This seemed to displease him very much at first, but in after years when guiding him, he told me that had been one of his good little stories to tell his friends.[94]

Others guides burned with similar resentments, though their stories were perhaps not as funny.[95]

---

[92] Steele, Canoe and Camera, 58-61.

[93] "Maines Guides" in Bangor & Aroostook Railroad, In the Maine Woods (1910): 41.

[94] Edward D. Ives, ed., Wilbur Day (1864-1924), Hunter, Guide, and Poacher: An Autobiography (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVI, 1985), 72-73. Like most of the "Bert and I" variety of Maine humor, this tale about taciturn Mainers began as a story told by people from away to other people from away. On this genre of humor, see Edward D. Ives, "Maine Folklore and the Folklore of Maine: Some Reflections on the Maine Character and Down East Humor" MeHS Quarterly 23 (1984): 111-32.

[95] Almon Holmes, another Maine guide, tells a very similar story. Nathan S. Lowrey, "Tales of the Northern Maine Woods: The History and Traditions of the Maine Guide" in Motor Camps and Maine Guides, 73.

While their superior hunting and wilderness skills marked guides out as more manly than the urban sports who hired them, their work cooking, cleaning, and making camp feminized them. At home, middle class men depended upon their wives to provide for their "comfort, ease, and delight," but in camp these wifely duties fell to the guide. Such servile work and feminine associations made guides feel insecure and all the more defensive about their hunting prowess and skills in the manly arts. Tourist handbooks emphasized the importance of hiring a guide with an eye to domestic skills whose provision was as vital to creating "pleasant memories of sport" as hunting success. Vacationers particularly appreciated the little touches: carefully made spruce bough beds; spring water fetched on command; food delicately prepared to suit the individual palate. L.F. Brown's guide was so caring that "he was sure to inspect our clothing and put damp garments where they would dry."[96] The "thorough" guide, concluded one authority, "cares for your health and does the work of a valet in a motherly fashion. He carves out the fuel while you admire him as an athlete and a sculptor."[97]

This is a telling description of the pyscho-sexual tensions and pleasures underlying the experience of the Maine Woods. The masculine gaze at the body of nature may have been eroticized, as some feminist geographers have claimed, but as this image of the sportsman leering at his male companion's athletic body would suggest, its erotically charged pleasures were not unambiguously heterosexual. The conflation of masculinist and heterosexual, common, but by no means unique to ecofeminist writings about nature, suggests that dominating nature was *necessarily* about the sexual domination of women.[98] The sexual valences of the hunt were considerably more complex. Hunting was fraught

---

[96] L.F. Brown, "Lobster Lake" in Bangor & Aroostook Railraod, In the Maine Woods (1905): 18.
[97] William Boardman, The Lovers of the Woods (New York: McClure & Phillips, 1901), 21, quoted in Schmitt, Back to Nature, 11.
[98] See, for example, Jodi Emel, "Are You Man Enough, Big and Bad Enough? Ecofeminism and Wolf Eradication in the USA" Environment and Planning D: Society and Space 13 (1995): 707-34; Catherine Nash, "Remapping and Renaming: New Cartographies of Identity, Gender, and Landscape" Feminist Review 44 (1993): 39-57; Joni Seager, Earth Follies: Coming to Feminist Terms with the Global Environmental Crisis (New York: Routledge, 1993).

with so much anxiety precisely because of the ambiguity of the relationships between masculinity, sexuality, and the wildlife.

While sportsmen took pleasure in the motherly care of their hunting guides, they were also gratified by watching the guide's manly and athletic body in action. Class difference and the dependence of the guide upon his more powerful employer helped to license such homoerotic voyeurism. In the late nineteenth-century, middle class men became fascinated with the manly bodies of woods guides, lumbermen, and other manual laborers. The raw physicality of the working-class male body, often depicted artistically in a state of provocative undress, provided an ideal picture of the firm and physically hardened form that urban sports came to the Maine Woods to recreate in themselves.[99] However, the male body was not an appropriate object of male erotic pleasure in an aggressively patriarchal and heterosexual society. Homoerotic desire for the male body could only be acknowledged insofar as it could be displaced as something other than self-evident homosexuality.[100]

The description of the "thorough" guide as a sculptor as well as an athlete is particularly noteworthy because public sculpture was one of the most important media for constructing and managing the homosocial gaze in the gilded age. "The sculpted body," argues Michael Hatt, "was an essential means of exposing and classifying the male form without at the same time exposing the flesh, its weaknesses and pleasures."[101] Just as public art created the opportunity for male pleasure in a male body to be safely sublimated beneath a veil of aesthetic disinterest, so too the sporting life allowed for the indulgence of forbidden desires while simultaneously displacing and denying them.

---

[99] On the eroticization of working class male bodies, see Melissa Dabakis, "Douglas Tilden's *Mechanics Fountain:* Labor and the 'Crisis of Masculinity' in the 1890's" American Quarterly 47 (1995): 204-235.
[100] Such displacements are explored in Christopher Craft, Another Kind of Love: Male Homosexual Desire in English Discourse, 1850-1920 (Berkeley: Univ. California Press, 1994); Richard Dellamora, Masculine Desire: The Politics of Victorian Aestheticism (Chapel Hill: Univ. North Carolina Press, 1990).
[101] Michael Hatt, "Making a Man of Him: Masculinity and the Black Body in Mid-Nineteenth Century American Sculpture" Oxford Art Journal 15 (1992): 31.

Rough sport off in the woods with the boys presented agonizing prospects for masculine fellowship and intimate bodily contact. In other circumstances, the image of "lusty men ... gaz[ing] with full unflinching eye into each other's ruddy faces" and "feel[ing] the mettle of their manhood" might not have seemed so "purifying and ennobling." Certainly, the homoerotic possibilities disturbed Charles Hallock enough to deny them explicitly: "Vileness and depravity can scarcely exist in the free atmosphere of the wild wood."[102] Dressed up in the reassuring context of healthy outdoor recreation, men could give "care a cross-buttock" and let "the conventional restraints of society" become "demoralized." Camping out allowed them to take pleasure in beholding the invigorated male form: "cheeks glow[ing] with the stimulus begotten by the almost intoxicating air ... hands and face attain[ing] from sun and storm the bronze and brisk color that tell of health and vigor."[103] Such physical invigoration was the entire point of strenuous, outdoor exercise hunting wildlife, so it should be no surprise that descriptions of tanned and muscled male bodies are so ubiquitous in writings about the sporting life. But revelry in the rejuvenated male form opened a legitimate space for the expression of other desires as well.

Boys would be boys, but many worried about the possibilities for corruption in such all male company. If even upstanding citizens like the Reverend Charles C. Earle of the Harvard Street Baptist Church in Boston found himself yielding to the "flowing toddy" in camp, then what might be expected of men made of less stern stuff?[104] The problems of gambling, profanity, and intemperance were well known, but even more unspeakable dangers lurked in the forest. In noting the conspicuous absence of woman in accounts of the sporting life, one correspondent to Forest and Stream concluded that the magazine's contributors must either be "bachelors or widowers (or they are a selfish lot)."[105]

---

[102] "Open Air Stimulants" Forest and Stream 1 (18 December 1873): 296.
[103] Millard, "Camping Out" Forest and Stream 14 (24 June 1880): 414.
[104] Camp Caribou Journal 16 August 1897, 51, unpublished diary in my possession.
[105] A Benedict, "Take the Ladies" Forest and Stream 3 (13 August 1874): 6.

Selfishness, of course, was also the charge leveled at that confirmed bachelor Henry David Thoreau. Thoreau preferred punctuating his solitude at Walden Pond with the pleasurable company of men and boys to the life of heterosexual respectability.[106] While the explicitly homosexual elements of Thoreau's Maine Woods experience had been systematically suppressed by the late nineteenth-century, the intimacy of masculine contact in the woods remained a concern. Just as anti-drug campaigns preach today that marijuana is a stepping stone to a life of crime, so social critics warned that revelry in the all-male company of the forest could lead to social demoralization. Without the "tempering influence" of women, young men were prone to all sorts of sexual temptations that "sadly warped" a healthy wilderness experience: "it is a disgraceful fact that many young men have been known to abuse their privileges in a disgraceful manner while ostensibly camping for health and recreation."[107]

Sometimes these sexual longings were displaced onto the male self. After a trip into the Maine Woods, Charles Stevens enjoyed seeing a reflection of his new masculine potency in the mirror: "As I disrobe myself to-night ... [I] feel the renewed strength and elasticity of youth, and the mirror reflects the bronzed countenance, the arms browned and strengthened ... not only the arms but the accompaniments."[108] More often, the sexual pleasures of the hunt were sublimated onto the actual objects of pursuit: the wildlife. Killing the male of the species provided the sportsman with a true test of his prowess. After the physical pain and exertion of stalking a big buck, squeezing the trigger was "a moment of the sublimest physical pleasure to the sportsman."[109] It was the climactic event in an

---

[106] Henry Abelove, "From Thoreau to Queer Politics" Yale Journal of Criticism 6 (1993): 17-27. For other readings of Thoreau and sexuality, see Richard Bridgman, Dark Thoreau (Lincoln: Univ. Nebraska Press, 1982); Leigh Kirkland, "Sexual Chaos in Walden Pond" Isle: Interdisciplinary Studies in Literature and Environment 1 (1993): 131-46; Robert Milder, Reimagining Thoreau (New York: Cambridge Univ. Pres, 1995), 35-38; Gregory M. Pfitzer, "Thoreau and Mother Nature: 'Ktaadn' as an Oedipal Tale" American Transcendental Quarterly 2 (1987): 301-11. Not surprisingly, those who celebrate Thoreau as an ecocentric thinker make no mention of the ways in which he inscribed sex into the body of nature. See, for example, Oelschlaeger, Idea of Wilderness, 133-71.

[107] "Women in Arcadia" Forest and Stream 12 (8 May 1879): 270.

[108] Charles W. Stevens, Fly-Fishing in Maine Lakes, or Camp-Life in the Wilderness (Boston, 1884), 80.

[109] C.J. "The Pleasures of Gunning" Forest and Stream 12 (20 February 1879): 50-51.

eroticized experience of the Maine Woods. As a rite of passage, perhaps not unlike the loss of his virginity, "the killing of his first deer," explained another sportsman, "marks an epoch in a man's life." Though he had felt the thrill of victory riding "out in front of a crack cavalry regiment ... never, never have I known that supreme ecstasy that comes from achievement to such a degree as I did when I showed my gentle mother and kind old uncle my first deer."[110]

Fishing was also potentially "pregnant with strangely peculiar sensations" of violence and sexual ecstasy. Casting his rod, George Dawson felt as "the raw recruit feels when he first hears the rattle of the enemy's musketry." When the fish struck his fly, Dawson did battle:

> It was my duty, of course, to accept the challenge ... and take the chances for the mastery... every limb and nerve and muscle was paralyzed ... My nerves thrilled and every muscle assumed the tension of well tempered steel, but I realized the full sublimity of the occasion and a sort of majestic calmness took the place of the stupid inaction which followed the first apparition. My untested rod bent under the pressure in a graceful curve ... the tensioned line emitted aeolian music as it stretched and stiffened under the strain to which it was subjected; and for fifty minutes, there was such giving and taking, such sulking and rushing, such leaping and tearing, such hoping and fearing, as would have injected life into the ribs of death, made an anchorite dance in very ecstasy, and caused every true angler to believe that his heart was a kettle drum, every sinew a jews-harp, and the whole framework of his excited nerves a full band of music... Toward the end of the fight, when it was evident that the jig was up and I felt myself master of the situation, I took my stand upon a projecting point in the river where the water was shallow and where the most favorable opportunity possible was afforded the gaffer to give the struggling fish the final death thrust and so end the battle. It was skillfully done. The first plunge of the gaff brought him to the green sward, and there lay out before me in all his silvery beauty and magnificent proportions my first salmon... It is said

[110] Mississippi Lowlands, "My First Deer" Forest and Stream 25 (22 October 1885): 243-44.

> that when the good old Dr. Bethune landed *his* first salmon he caressed it as fondly as ever he ever caressed his first born. I could only stand over mine in speechless admiration and delight-- panting with fatigue, trembling in very ecstasy.[111]

Even by the often suggestive standards of sports writing, this description of the wild life is remarkable for its indulgence in libidinous violence and rough sex.

Questions of sexual dominance and male potency were never far from the surface in the experience of the Maine Woods, but they were not the only thing that hunting wildlife was about. There were, of course, the wildlife, and their presence is difficult to ignore. Just as the significance of hunting so obviously exceeded the simple terms of recreation and healthy exercise in which it was celebrated at the time, so too the call of the wild cannot be reduced to the class and sexual anxieties that were projected onto and articulated in terms of wildlife and wilderness. Surrounded by trees, chasing after wild animals, sportsmen experienced something undeniably different from their daily lives in the cities. The woods and the wildlife made it that way. They excited sensations of fear, anticipation, and wonder. They stimulated the heart and gave unfamiliar muscles a work-out. This is what continues to attract tourists to Maine. Boasting the largest tracts of undivided forest land in the eastern United States, the state offers an unparalleled encounter with "nature's unspoiled beauties."[112] Going to the Maine Woods was about getting back to nature, and yet, as the story of hunting wildlife and recreating man also demonstrates, nature may be something that we want but it is also something we can never truly "have." While the activity of wildlife is undeniable, its meaning is always culturally saturated. The idea of wilderness and of the wildlife depends upon the city and domestic life to give them shape. Civilization and the city are the unnamed exteriors whose displacement defined the nature that turn-of-the-century sportsmen dreamed of getting back to. They called on associations of domesticity and civilization with femininity to figure the Maine Woods as a wild,

---

[111] George Dawson, "Letter" Forest and Stream 3 (17 September 1874): 92.
[112] Maine Publicity Bureau, Maine Invites You (Portland: Publicity Bureau, 1990), 17.

uncivilized space appropriate for masculine adventure and recreation. Native peoples and guides fit rather awkwardly into this construction. At home in the woods, they were at once more and less masculine than the city sports who hired them. Other contradictions lurked in the primitivists' forest as well. The pleasures of hunting and of returning to Mother Nature were erotically charged, yet their sexual valences were not as aggressively heterosexual as Theodore Roosevelt, and ironically enough, some contemporary feminist critiques, have liked to believe.

8. Rules of the Game

The Maine Woods imagined by urban sports and middle class tourists was a very different place from that known and used by most native-born Mainers. Far from being a place to escape the routines of everyday life, the Maine Woods was closely imbricated in the rhythms of rural life. Maine people depended upon the forest to sustain themselves and their families. While fewer native-born men worked in the lumber camps at the turn of the century than a generation before, the woods remained a familiar place associated more with the world of work than with leisure and the intangible values so prized by tourists. Even rural families not directly supported by wage labor in the woods or trade with the camps relied upon a tradition of relatively unrestricted public access to privately owned forest land. Maine's lumbermen and forest landowners had learned to tolerate what they were powerless to prevent. Title bought them the right to profits from the sale of merchantable logs (though timber trespass remained a chronic problem), but common law dating back to the early colonial period guaranteed public rights to hunt, fish, and fowl on unimproved lands.[1] As long as public use did not visibly affect income from the sale of stumpage every twenty years or so, landowners were little bothered. Despite the growing clamor from foresters concerned by the risk from fire, Maine's corporate landowners have been loath to

[1] In 1882, the rights of public access in Maine to so called "great ponds," defined by a 1641 statute as ponds of more than ten acres in extent, were tested and confirmed in a court case pitting William Barrows of Connecticut against John McDermott and other Monson residents whom Barrows tried to exclude from fishing on Grindstone Pond. The Supreme Court of Maine held that the "common right of free fishing and fowling on the great ponds ... lying in common, has been so long and so uniformly accepted and acted upon in this State that it constitutes in all its parts a portion of the common law of the whole State." Barrows v. McDermott quoted in Commissioner of Fisheries and Game of the State of Maine, Report (1882): 26. For a very similar case in Vermont, see Philip Johnson, "Fish Free or Die: The Marlboro South Pond Case of 1896" Vermont History News 43 (May-June 1992): 43-46.

restrict traditional public access, for they recognize that it helps legitimate a very profitable system of concentrated private ownership.

moral economies

While accountants tallied landowners' profits from this system of land use, rural people counted upon the forest to supply them with a variety of useful goods. In the summer, whole families turned out to harvest berries that grew prodigiously in meadows and barrens, especially when encouraged by a healthy spring burn. Hardwood trees passed over by lumbermen provided fuel to heat homes. Young spruce trees made for excellent poles, while their boughs banked houses, bedded livestock, and insulated garden beds from frost. Most of these useful forest products could be found close to home, often in a farm woodlot, but other errands took rural Mainers far into the working woods. For centuries, native peoples had ranged widely through the Maine Woods harvesting its diffuse plant and animal resources as they became seasonally available, but in the nineteenth-century they faced stiff competition from backcountry settlers chasing after the same resources. In the 1850's, Rufus Philbrook spent six months a year in the woods trapping for furs and hunting for moose and caribou, whose meat he sold in the lumber camps where he stopped while checking his lines. Together with the furs and hides he sold in Bangor and what he made from farming a small clearing twelve miles into the woods on the Brownsville to Nahmakanta Lake tote road, Philbrook was able to support his widowed mother and three siblings, but it was not easy. Returning after the spring hunt to "what folks call civilized society," Philbrook told a friend, "if you had stayed in the woods till this time you would care very little about going a hunting soon again, as I cannot think of returning with any degree of pleasure now but may be very anxious to get back by fall."[2]

---

[2] Philbrook to Jonathan Manly 16 June 1860, Brownsville, ME, in Ralph S. Palmer, "Rufus Philbrook, Trapper" New England Quarterly 22 (1949): 464, 452-74.

For other Mainers, fish, fur, and game provided a seasonal supplement to more regular employments on the farm, in the workshop, and in the logging camps. Winter ice brought two Machias men to the ponds of Mount Desert Island where they pickled nearly 600 pounds of trout.[3] Growing up on his uncle's farm in Andover, F.C. Barker strung together a variety of woods employments in between his chores on the farm and periodic bouts of wage labor. He fished and tended a trap line on the Rangeley Lakes; hired on as a chopper; worked in a Lynn, Massachusetts shoe factory; worked as a cookee on the Magalloway drive; guided tourists; hunted professionally; ran a boat hauling supplies for tourists and lumbermen.[4] Unrestricted access to the common property resources of the forest offered young men like Barker a welcome relief from the demands, to say nothing of the low pay, of dependent wage labor.

Rural Mainers prized the cash value of common property resources above all else. Especially in the backcountry where lives were already close to the edge, the sale of fur, fish, and game often made the difference between modest competency and abject poverty. Growing up on the poor soils of central Washington County, Wilbur Day believed that his "father would not have been able to have supported a family and buil[t] up a home" without the added income from trapping bears.[5] In the interior of the state, local people from miles around gathered each winter on the ice of Moosehead, Sebec, and other large lakes. The tents and shacks they set up were social places for drinking and visiting, but ice-fishing was work too, and people made "a regular business" of it. Selling their catch to jobbers with railroad access to urban markets in Portland and Boston, they were able to earn valuable income during a slack season on the farm.[6] New tastes for the primitive among urban sophisticates made these off-season labors more remunerative than ever; specialized

---

[3] "Trout Fishing" Machias Union 14 March 1854.
[4] Captain F.C. Barker, Lake and Forest as I Have Known Them (Boston: Lothrop, Lee, & Shepard Co., 1903).
[5] Edward D. Ives, ed., Wilbur Day (1864-1924), Hunter, Guide, and Poacher: An Autobiography (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVI, 1985), 28.
[6] Oxford Democrat 26 February 1850.

dealers paid top dollar for the wildlife that rural Mainers were able to gather freely in the forests. In 1882, the Ellsworth American estimated that Maine wholesalers exported 2000 deer carcasses, while the Machias Union figured that sales of deer meat brought nearly $5000 into Washington County alone.[7]

The people of rural Maine may have practiced a moral economy of sorts, but it was not founded upon "the survival of precapitalist use-rights over the land" that might meaningfully be contrasted with a capitalist money economy of absolute and alienable property rights.[8] In Maine, the "tradition" of free access to the wildlife was less than two generations old. This forest economy, so often romanticized by historians concerned with the transition to modern capitalism, was built upon the forcible expropriation of native lands and the erasure of native peoples. Before the wildlife could be considered common property, "which at common law belong to the man who reduces it to his possession," a system of native family hunting territories and a regime for producing and conserving the resources in them had to be violently displaced.[9] Having driven native peoples off the land, Samuel Ely and his backcountry neighbors fought with absentee proprietors to define the nature of these new properties, but their struggles were not underwritten by a time-out-of-mind tradition of inalienable use-rights and non-monetised exchange. Whatever its other

---

[7] Machias Union 26 December 1882, 27 February 1883.

[8] E.P. Thompson, Whigs and Hunters (1975. Harmondsworth: Penguin, 1985), 240. Maine historians Neil S. Forkey and Richard W. Judd have explicitly invoked Thompson's moral economy to contrast the traditional bonds linking rural Mainers to each other and to the land with the impersonal relations of an enchroaching modern capitalism. Forkey, "Anglers, Fishers, and the St. Croix River: Conflict in a Canadian-American Borderland, 1867-1900" Forest and Conservation History 37 (1993): 185-86; Judd, "Reshaping Maine's Landscape: Rural Culture, Tourism, and Conservation, 1890-1929" Journal of Forest History 33 (1988): 180-90; Judd, "Grass-Roots Conservation in Eastern Coastal Maine: Monopoly and the Moral Economy of Weir Fishing, 1893-1911" Environmental Review 12 (1988): 81-103. David P. Thelen makes a similar case for Missouri. Thelen, Paths of Resistance: Tradition and Dignity in Industrializing Missouri (New York: Oxford Univ. Press, 1986). I am troubled both by the erasures that lie behind the construction of a "traditional" Maine and by the singular historicity said to characterize the great transition from traditional pre-capitalist Maine to modern, urban-industrial, capitalist Maine.

[9] G.F. Talbot, "Some Features of the Forestry Bill-- the Commissioner" Daily Eastern Argus 13 February 1889, 12. On native hunting territories, see Frank G. Speck, Penobscot Man: The Life History of a Forest Tribe (1940. New York: Octagon Books, 1970), 206-208; Fanny Hardy Eckstorm, "History of the Chadwick Survey from Fort Pownal in the District of Maine to the Province of Quebec in Canada in 1764" Sprague's Journal of Maine History 14 (1926): 77.

uses, the most valuable good that the Maine Woods provided colonial settlers was easy money. Settlers had always stood squarely behind the appropriation and commodification of common property resources. For them, the value of forest was already represented by the sign of the dollar, long before the corporate take-over of the Maine Woods made cash more important than ever for daily reproduction.

Hunting was all business, and rural people went after the wildlife in a workman-like fashion. Market hunters employed dogs to drive deer into the water where they could be shot in the head without damaging their hides. Hunters used snowshoes to chase down moose slowed by crusty spring snows. They trolled for fish with long lines of baited and multiply barbed hooks; used weirs and nets; speared fish by torch light; dynamited ponds; and did whatever was necessary to bring as many fish as possible to market. Lanterns also provided an advantage against deer, which made easier targets when captivated by the light. Migrating birds were baited, netted, and poisoned. Hunters even used boat-mounted cannon to spray shot at swimming waterfowl. Rural Mainers thought nothing of shooting at sitting ducks since that was the easiest way to bring them to the dinner table or the butcher's shop. Hunting was an instrumental practice: the whole point was to kill and capture the wildlife as quickly, efficiently, and profitably as possible.

code of the sportsmen

All this was anathema to the growing class of urban sportsmen who looked to the experience of hunting as a crucible of manly character. Although they longed for the physical challenges of life in the woods, sportsmen showed little interest in the economic conditions of poor rural Mainers and even less sympathy for backcountry dependence upon the exploitation of wildlife. Tourists came to the Maine Woods to escape the commercialism that the city represented for them. That the Maine Woods was also being relentlessly remade in commodity form was difficult for them to accept. It challenged those ruling oppositions between modern and primitive, city and country, manly and unmanly, by

which urban sportsmen identified themselves as distinct from others. If the Maine Woods had always been commodified, if it were already exploited and perverted by civilization, then it could not be a pure wilderness where middle class men might experience the original trials of the pioneers and thereby recreate the vigorous manliness and primitive virtues lost to them in the modern city. If hunting the wildlife were an instrumental pursuit, if it served no higher purpose than "multiplying the almighty dollar," then urban sports were really no different from backcountry bumpkins, who also chased after wildlife. That was unthinkable. Just as urban sports constructed a checklist of sensations to distinguish the experience of wildest nature from the sights and sounds of everyday urban life, so they also counted upon a code of conduct to discriminate genteel sportsmen from professional market hunters chasing game for personal gain and plebeian pot-hunters looking to fill the family larder.

The code of the sportsman was founded upon a new attitude to wildlife. Urban sportsmen prided themselves on their knowledge of wild, untamed nature. In addition to his ability "to knock over his birds dexterously right and left," the true sportsman, offered Forest and Stream, also possessed a "practical knowledge of natural history." Appreciation for nature was a mark of social distinction that set the noble sportsman apart from less refined pursuers of the wildlife. But more than social ornamentation, knowledge played an vital role in the successful experience of hunting, for if the hunter "depends altogether upon his dog's nose or upon his henchmen, he will some day have to retire from the field in mortification and disgrace."[10] In contrast to "[t]he average Yankee [who] has an utter contempt for things natural, as compared with things artificial," sportsmen like Dr. Atwood Crosby of the Kennebec Association for the Protection of Fish & Game celebrated "the world which the Creator looked upon and pronounced 'good.'" Taking direct aim at the central tenets of agrarianism linking agricultural labor, agricultural landscapes, and civic virtue, Crosby decried the pioneer's urge to have the landscape "entirely remodeled." For

[10] Charles Hallock, "Announcement" Forest and Stream 1 (14 August 1873): 8.

Crosby, the pinnacle of agrarian folly was the farmer who declared that Maine would be "better-off" once the fish in the Sebasticook had been destroyed because their natural abundance encouraged idleness and distracted attention from the farm.[11] Nature had long been opposed to industry, but now that Maine farmers had internalized the critique once aimed at them by the likes of Henry Knox and the great proprietors, urban sophisticates found value in the wilderness that their ancestors had feared as a cause of social atavism. They put a new twist on an old dualism by suggesting that cultivation was not cultivated, and that the highest and most refined tastes were for nature in all its primitive splendor.

The apparent contrast between the sportsman's appreciation for nature and the average farmer's callous disregard for wildlife paralleled a second essential distinction between the way sportsmen and the common sort approached wildlife. Though they spoke of wildlife as a resource for spiritual refreshment and "as a means of increasing human efficiency," sporting enthusiasts denied that their relationship with the wildlife was instrumental or appropriative.[12] Unlike poachers and pothunters, who profited from hunting, the true sportsman was merely an amateur seeking recreation. His interest in the wildlife was uniquely disinterested. The wildlife, properly speaking, were game. Their pursuit was a pastime, an enjoyable interlude from the real business of modern life. Game provided amusement and pleasure, not advantage and material recompense. The experience of the hunt was the main thing:

> It is not the mere killing of numbers, much less in the mere killing at all; it is not in the value of the things killed ...; it is not in the inevitable certainty of success-- for success destroys the excitement which is the soul of sport-- but it is in the vigor, science, and manhood displayed, in the difficulties to be overcome, in the pleasurable anxiety for success, and the uncertainty of it, and lastly in the true spirit, the style, the dash,

---

[11] "A Plea for Fishing" Aroostook Times 24 April 1879.

[12] C. Gordon Hewitt, The Conservation of the Wild Life of Canada (New York: Scribner's, 1923), 15.

> the handsome way of doing what is to be done, and, above all, in the unalterable love of fair play ... that true sportsmanship consists.[13]

The game could only be game if their pursuit were merely a game and not a business, whose worldly pressures sportsmen sought to escape in their confrontations with the wildlife. True sport was blissfully free from "the mercenary element" and "sordid clutching after purses," commodities, and anything "convertible into cash."[14] This suspicion of commercialism and commodification registered a deep ambivalence about the price of progress. Noting the incredible slaughter of "the deer, the buffalo, the salmon, and the feathered game ... [that] were once plentiful," Wilbur Parker, editor of the American Sportsman, wondered what there was to celebrate at the U.S. Centennial:

> Shall we take credit for our predatory instinct that as individuals we have wasted natural gifts not exceeded in any other part of the world, and that as a nation we have been so intent on multiplying the almighty dollar that we have given over our streams to pollution, our fish to destruction, and our land and water to the poacher and exterminator?[15]

Twenty years later, sportsmen were still grumbling about the depletion of wildlife populations that came with "the material advancement of the country." Comparing the super-abundance of wildlife known to the pioneer and the Indian living in unspoiled wilderness with the tamed and productive landscapes of modern industry and capitalist agriculture, they wondered, "Is it better or is it worse?"[16]

The sportsman's lament articulated a critique of unrestrained capitalism, but by denying their own complicity with these transformations, sportsmen mystified the problem. Urban sports only denounced the relentless process of commodification when it came to wildlife; the toil of the working class, forced to sell its labor for subsistence, like most of

---

[13] "What Constitutes a True Sportsman" American Sportsman 2 (November 1872): 24.
[14] "The Corruption of Sport" Forest and Stream 14 (12 February 1880): 31.
[15] American Sportsman 5 (20 February 1875): 328 quoted in John F. Reiger, American Sportsmen and the Origins of Conservation (2d ed. Norman: Univ. Oklahoma Press, 1986), 37-38.
[16] "Settlement, Savagery, Self" Forest and Stream 46 (29 February 1896): 169.

the other business of modern life, passed without comment. Although life in the city was sustained by production in the Maine Woods, its problems seemed far removed. The source of the roof beams over their heads or the newspaper in their hands was beside the point. Tourists insisted that their only connection to this place was as innocent sightseers who left no trace on the land. Sport hunters may have killed their quarry, but as Forest and Stream magazine editorialized, "The work of the sportsman, who hunts for the sake of hunting has had an effect so trivial that in comparison with the market hunter it need not be taken into consideration."[17] Henry Stanley and Elias Stilwell, Maine Commissioners of Fisheries and Game, echoed this assessment. They insisted that "it is what is killed for transportation and market" that "lessens the stock of our forests and streams." Tourism and sport hunting were blameless.[18] By treating the problems of wildlife extinction in isolation from the other relations connecting wealthy urban professionals to poor rural Mainers and the wildlife they exploited to make their living, advocates of conservation framed poaching as a narrowly rural problem caused by individual greed and selfishness rather than a wider social one caused by the production of rural poverty through a system of uneven development and capitalist exchange. Instead of scrutinizing the ways in which rural and urban people were implicated together in a wider social system that produced urban wealth along with rural poverty and environmental degredation, sporting magazines directed their ire against the few greedy individuals said to be responsible for the over-exploitation of wildlife. They railed against game hogs who took more than they could use, stripped carcasses for their horns, or left meat in the woods to rot. They held out the catch and release practices of the Oquossoc Angling Association as true sport fishing.[19] Of course, actual practice diverged considerably from these ideals. Still, the notion of a knowledgeable, disinterested, and essentially non-consumptive relationship with the

---

[17] "A Plank" Forest and Stream 42 (3 February 1894): 89.

[18] Commissioners of Fisheries of the State of Maine Report (1878): 17.

[19] Boats at the club were fitted with special tanks beneath the seats into which fish could be placed and released at day's end if the club house were well enough stocked for lunch and dinner. Seymour, "Trout-Fishing in the Rangeley Lakes" in Sport with Rod and Gun, 351-78.

wildlife was the chief way that sportsmen identified their gentlemanly experience of the wildlife as distinct from plebeian disregard for wildlife and the dishonorable pursuit of its profitable slaughter.

In addition to a refined appreciation for the wildlife, the code of the sportsman demanded new hunting practices as well. The object of sport hunting was not "to kill for the sake of destruction" but to recreate and refine manly qualities for which the pursuit of wildlife was simply a means. To this end, the methods of pursuit had to be challenging enough to test the hunter's essential masculinity. The "brave and accomplished sportsman" pledged to "kill no bird unless it has a chance for its life on the win, and no four-footed game except in its season of health and possessed of all the advantages which God has given it for escape."[20] Hunting the females of the species would never do, so the by-laws of the Parmanchenee Club included the chivalrous provision that no member "intentionally kill or molest any female animal."[21] Anything that assured success or gave the hunter an unfair advantage could not be sporting, because the sport was in the challenge, in the pleasurable feeling of "discomfort and danger" and the "display of resolution, hardihood, and wisdom."[22] Good sportsmanship, however, was not always that clear cut. Even a patently illegal practice might have something to recommend it. Theodore Roosevelt concluded that out-of-season hunting for moose on the spring's thick snowcrusts could be "if not a legitimate, yet a most exciting and manly sport, only to be followed by men of tried courage, hardihood, and skill."[23] Sport fishermen debated whether fly-fishing was "the only method of trout fishing which may be legitimately pursued by a gentleman."[24]

---

[20] "Killing Game Out of Season" Forest and Stream 1 (21 August 1873): 24.

[21] Constitution, By-Laws and Rules of the Parmanchenee Club (New York, 1898). Fish, evidently, were sexless, at least as far as sportsmen were concerned.

[22] Roosevelt, Wilderness Hunter (1893) in The Works of Theodore Roosevelt, Hagerdorn, H., editor (New York: Scribners, 1926), II: 355-56.

[23] Roosevelt, Wilderness Hunter (1893) in Works, II: 178.

[24] "Editorial Angling Ethics" Forest and Stream 12 (31 July 1879): 510.

Old practices died hard, and even the most rabid fly-fishing enthusiasts conceded the bait-fisher's "claim to a high rank in the angling fraternity."[25]

Other practices were much easier to characterize. Sitting ducks provided no uplifting sport; shooting them amounted to nothing more than "wholesale, cruel, indiscriminate, and unmanly slaughter."[26] Though hunting deer with dogs had a long aristocratic tradition in Europe, American sportsmen dismissed it as unsporting. The "true way to kill the noble beast," they insisted, "is by fair still hunting."[27] That in actual practice guides often drove frightened deer towards their waiting clients was beside the point. The idea of a solitary hunter matching wits against large game animals called up all of the pioneer virtues of individualism, self-reliance, and manly fortitude that hunting was supposed to recreate. Hunting with dogs, by contrast, seemed cruel, inhumane, destructive, and unfair. "[B]utchering calves in a pen is soul-stirring sport by comparison."[28] The sporting press described deer dogging in the most scathing terms:

> The deer is driven until it takes to the water, and when so far from shore that it cannot return, the hunters row out after it, and having approached within a few feet, one of them blows out its brains. when the deer are thin they sink immediately after being shot, and *it is customary for the guides ... to hold the struggling brute by the tail while the other shoots it,* thus saving the carcass. Comment is unnecessary.[29]

Many Mainers disputed this characterization of deer dogging and those who pursued it. A northern Oxford County man rejected the suggestion so common in Forest and Stream "that any boy that could row a boat or shoot a gun could get deer by the ton" by chasing them to water with dogs. With so many lakes and ponds available to throw the

---

[25] Charles Hallock, The Fishing Tourist (New York, 1873), 21.
[26] W. Waddle Jr., "The Game Water-Fowl of America" Harper's New Monthly Magazine 40 (February 1870): 437, 433-37.
[27] Roosevelt, Wilderness Hunter (1893) in Works, II: 173.
[28] Commissioner of Fisheries and Game of the State of Maine, Report (1882): 15.
[29] Charles Hallock, The Sportsman's Gazeteer and General Guide (5th ed. New York, 1879), 82. See also Maine Sportsmen's Fish and Game Association, Report for the Year 1893 (Augusta, 1894), 60-61; Commissioner of Fisheries and Game of the State of Maine, Report (1886): 20-21.

dogs off the scent, it "require[d] skill, practice, and good judgment to be successful with dogs and canoes."[30] These, of course, were precisely the manly qualities that were supposed to define good sport, but few sportsmen agreed, at least publicly, with this favorable assessment of the practice. Wilbur Day, the renowned hunter, poacher, and guide, went so far as to suggest that dogging deer "was the most humane and least destructive way in which a deer could be hunted." Unlike the still hunter who "destroys about one third of the meat he kills and gets, besides wounding a great many that he don't get" the deer dogger does not let "one pound of his meat go to waste."[31]

It was this efficiency in fact that had sportsmen so worried. Day's impassioned defense of this traditional hunting practice was drowned out by howls of protest from urban sports who feared that professional deer doggers would inevitably destroy deer populations. Sport hunting and recreation in the Maine Woods placed fresh demands upon the supply of fish and game at the same time that new and expanding markets made the common property resources of the forests more valuable than ever to local residents. With locals and tourists competing for the game, many feared that moose and other game species were "in danger of extermination." In 1875, a group of prominent Bangor business and civic leaders petitioned the state for a five-year moratorium on hunting moose whose hides were the object of an active and energetic trade.[32] The extinction of the passenger pigeon and the decimation of the buffalo provided late nineteenth-century Americans with compelling examples of the creative destruction that often followed the commodification of wildlife. Sportsmen, in particular, worried that without more government controls, the relentless commodification of game species would lead inevitably to a tragedy of the commons and to the "utter destruction" of the wildlife.[33]

---

[30] J. Darling, "Boy and Guide" Forest and Stream 14 (5 February 1880): 13.

[31] Ives, Wilbur Day, 56, 58.

[32] "Protection of Moose" Machias Union 5 January 1875. The moratorium was enacted 16 February 1875. Public Laws of Maine (1875): ch. 12.

[33] "The Evils of Common Property" Forest and Stream 5 (13 January 1876): 376. For a critique of this formulation of environmental crises, see Rebecca Roberts and Jodie Emel, "Uneven Development and the

To protect the wildlife from extinction, urban sports led the charge for stricter game laws. Statutory restrictions on hunting and fishing had long been a dead letter for want of enforcement.[34] In the 1870's, however, this began to change as sporting enthusiasts organized themselves and the government to protect game species. Sportsmen had lost their faith in the ability of the market's invisible hand to preserve future supplies of wildlife. Their calls for government regulation reversed traditional laissez faire attitudes embodied in the common law. The 1805 Pierson v. Post decision presumed limitless natural resources, unfettered competition, and an adversarial legal system in which legal remedy was only possible for environmental problems directly attributable to individual actors.[35] In calling for limits on the power of individuals to appropriate and freely alienate wildlife, sportsmen did not sound dissimilar from Progressive-era reformers, who were also concerned with protecting the non-market values of nature from the often short-sighted and destructive logic of the market. In other ways, however, the sporting lobby was quite distinct from the forestry movement and Progressive-era conservation more generally. Sportsmen were merely interested in conserving the supply of game species. To this narrow end, they were enthusiastic about the possibilities of government and science, but sportsmen had no broad agenda for social transformation and modernization. The Progressives, by contrast, planned to rationalize all natural resource use through centralized scientific management, federal regulation, and public ownership.[36]

Tragedy of the Commons: Competing Images for Nature-Society Analysis" Economic Geography 68 (1992): 249-71.

[34] In 1760, the preamble to a new law restricting deer hunting in Massachusetts acknowledged that laws "for the preservation and increase of moose and deer ... have not ensured that valuable end." Massachusetts Archives ([Boston: Commonwealth of Massachusetts, Archives Division, microfilm edition, 1977), I: 396-98. On 13 February 1807, the open season on deer was reduced to 1 August-31 December. Laws of the Commonwealth of Massachusetts, ch. XLV: 57-58. These older regulations carried over when Maine became an independent state in 1820.

[35] Arthur McEvoy, "Toward an Interactive Theory of Nature and Culture: Ecology, Production, and Cognition in the California Fishing Industry" Environmental Review 11 (1987): 289-305. McEvoy expands his legal arguments and analysis in The Fisherman's Problem: Ecology and the Law in the History of California's Fisheries, 1850-1980 (New York: Cambridge Univ. Press, 1986).

[36] The relationships between sportsmen and the Progressive conservation movement are debated in Reiger, Sportsmen and the Origins of Conservation; Thomas R. Dunlap, "Sport Hunting and Environmental

Though these metropolitan ideas about sportsmanship and conservation came from out-of-state, they were taking hold among urban elites in cities and town throughout Maine. In 1873, sixty Portland residents organized a fish and game club, which the newly inaugurated Forest and Stream magazine celebrated as "true supporters" of the game laws. A decade later, Kennebec, Washington, Sagadahoc, Piscataquis, Penobscot, and York counties all boasted at least one fish and game protection society organized to enforce the game laws and promote wildlife conservation.[37] The founding members of the Kennebec Association included many of the leading gentlemen of Augusta, Gardiner, and Hallowell. With an unlimited membership and annual dues of only twenty-five cents, the Association was organized to popularize manly sport. Members pledged to live up to the exacting code of sportsmanship and to report any violations of the game laws.[38] Bangor's Norumbega Sportsmen's Club embodied similar values. In addition to "aiding in the enforcement of the laws ... for the protection of game," it was chartered to promote "the study of natural history" and to conduct "experiments ... in the effectiveness of fire-arms and proficiency in their use."[39] Civic leaders hoped to inculcate the new gospel of recreation in their neighbors, but beyond the undisputed "social benefits" of healthy outdoor exercise, they were also wide awake to what the President of the Piscataquis Game and Fish Protection Society called the "vast business advantages" of protecting the game. With Maine "rapidly becoming famous in the sporting world," vigorous measures to conserve the game

---

Conservation" Environmental Review 12 (spring, 1988): 51-60; John F. Reiger, "Commentary" Environmental Review 12 (fall 1988): 94-96.

[37] Forest and Stream 1 (23 October 1873): 171. Acts and Resolves of the State of Maine (1878): ch 83; (1880): ch. 202; (1881): ch. 24; "Washington County Game Association" Machias Union 11 April 1876; Forest and Stream 12 (12 June 1879): 371; Aroostook Times 24 December 1874.

[38] James A. Tober, Who Owns the Wildlife? The Political Economy of Conservation in Nineteenth Century America (Westport, CT: Greenwood Press, 1981), 50-51. Tober was able to examine the records of the Kennebec Association for the Protection of Fish and Game at the Yale University Beinecke Rare-Book Library. Unfortunately, librarians there were unable to find this material when I inquired of them. However, by checking the city directories, I have been able to determine the occupations of the founding members listed in the act of incorporation. They included five merchants, one doctor, two publishers, two bankers, a lawyer and two hoteliers.

[39] Acts and Resolves of the State of Maine (1881): ch. 18.

promised to "repay them[selves] a thousand fold" in receipts from tourists and "lovers of nature."[40]

With so many prominent gentlemen behind them, the county fish and game protection societies were an influential voice in the legislature. In 1878, the legislature authorized the governor and council to appoint fish wardens in addition to the county and town moose wardens already charged with enforcing the game laws. In the next biennium, it created the Fish and Game Commission and appointed two salaried officials to oversee the state's efforts at fish and game protection and propagation.[41] Soon, state fish hatcheries were seeding the waterways with fish fry, but the Maine Fish and Game Commission was far from the professionalized bureaucracy extolled by Progressives. Hatchery superintendents had little scientific training, and game wardens were political appointees, drawn from the same rural communities they policed. Their salaries were paltry. But with encouragement from above and a fifty percent share of the fines they assessed, they became much more aggressive enforcing the game laws on the books. Whereas Somerset County moose warden C.M. Wormwell had prosecuted only four violators between 1873 and 1876, Washington County warden Alvin G. Crocker arrested twenty violators in 1883 alone.[42] The twelve indictments for poaching handed down at the May 1878 session of the Washington County Superior Court represented half the entire case load for the court's spring docket.[43]

Still, many sportsmen and conservationists were not satisfied that these measures were having the desired effect. Although transportation of game during the closed season had been banned by the state in 1878, the trade in venison and moose hides continued to

---

[40] "Give Us More of the Same Sort" Industrial Journal 30 June 1882. On the connections between tourism and wildlife conservation, see Richard R. Wescott, "Early Conservation Programs and the Development of the Vacation Industry in Maine" Maine Historical Society Quarterly 27 (1987): 2-13.

[41] Commissioner of Fisheries and Game of the State of Maine, Report (1880): 3.

[42] Reports of C.M. Wormwell and Alvin G. Crocker, Commissioner of Fish and Game, Moose warden returns, 2112-0203, Maine State Archives, Augusta, Maine.

[43] Edward D. Ives, George Magoon and the Down East Game War: History, Folklore and the Law (Urbana: Univ. Illinois Press, 1988), 64.

flourish.[44] Deer dogging had also been banned, but convictions were difficult to obtain because as the law was written, "the warden has to catch the poacher in the act-- an almost impossible requirement."[45] In 1882, the Bangor Industrial Journal concluded that "unless checked at once," the "wanton destruction of nearly all kinds of game... must soon result in its entire extermination."[46] Conditions that winter seemed to bear out this prediction. Early autumn snows and thick spring crusts made for a hunting bonanza. Unprecedented quantities of venison, hides, and moose meat were shipped out-of-state for sale on the Boston and New York markets. While many rural families celebrated the unexpected windfall, sportsmen like Machias doctor Samuel B. Hunter bemoaned the year's hunt as "the most destructive of game of any for years."[47] They gathered in the state capital to lobby the legislature for more sweeping public policy reforms. Many agreed with the analysis of a Bucksport "lover of game and its sports" who argued that the problem was not so much the absence of game laws as the lack of money to enforce them vigorously enough.[48]

The legislature responded in 1883 by overhauling the game laws. It substantially increased the appropriation "for the propagation and protection of fish and game." With a $7500 annual budget, the Maine State Fish and Game Commissioners finally had the funds to press prosecutions of game law violators to the fullest. This aggressive state bureaucracy usurped regulatory and fiduciary responsibilities that had formerly been the province of local governments. While half of the fines recovered in these legal actions still went to the complainants, almost invariably the game warden, the legislature re-apportioned the other half, taking it away from the town where the offense had been committed and granting it instead to "any fish and game protective society or other sportsmen's association" for use

---

[44] Public Laws of Maine (1878): 50.

[45] Commissioner of Fisheries and Game of the State of Maine, Report (1882): 6. On the campaign to ban deer dogging in New York state, see Tober, Who Owns the Wildlife?, 192-99.

[46] "Fish and Game Preservation" Industrial Journal 19 May 1882.

[47] Commissioner of Fisheries and Game of the State of Maine, Report (1883): 18, quoted in Ives, Downeast Game War, 66.

[48] A Lover of Game and Its Sports, "Our Game Laws" Bangor Daily Commercial 20 January 1883.

in propagating trout and salmon. This redistribution symbolized the new alignment of urban sportsmen with state government against rural Mainers and backcountry towns in struggles over the rules of the game. The 1883 legislation also outlawed Sunday hunting and reformed the anti-dog laws by authorizing wardens to kill dogs "found hunting deer or moose" during the closed season.[49] Armed with these new powers, state game wardens inaugurated what Forest and Stream cheered as "a war to the death" with the dogs of rural Maine. Wardens set traps, laid out poison, and shot dogs suspected of hounding deer. Though applauded in the sporting press and in the cities of Maine as a measure necessary to save the deer from extinction, the "nefarious work of dog-poisoning" was bitterly resented in rural Maine where it heightened resentment both of game wardens and of the urban sportsmen whose interests the new game laws were widely seen as representing.[50]

Of all the game law reforms of 1883, the bag limit was the most far-reaching in its effects. Hunters were restricted from taking more than one moose, two caribou, and three deer. While closed seasons and tighter gear restrictions complicated backcountry efforts to supplement meager earnings with the sale of fish, deer meat, and moose hides, the institution of bag limits dealt the heaviest blow to those who supplemented their living by hunting. A three deer limit provided ample sport for tourists, but it allowed locals only a meager harvest of credits at the store. The convenient marketing of wildlife was further hindered because possession of more than the legal limit, even by butchers and venison dealers, was considered *prima facie* evidence of violation. Furthermore, under a new and more expansive interpretation of the ban on transporting game during the closed season, wardens began "seiz[ing] partridges, ducks or saddles of venison" being sent through to

---

[49] Ives, Downeast Game Wars, 66-67.

[50] See letters in "Maine Deer Law" Forest and Stream 23 (8 January 1885): 467-69; "A Protest" Machias Union 22 April 1884. On the dog poisoning controversy, see Daisy, "Wesley" Machias Union 18 March 1884 ; Warden, "About Poachers and Poisons" Machias Union 1, 15 April 1884; Fannie P. Hardy, "Six Years Under Maine Game Laws: VI Poisoning" and her "Six Years Under Maine Game Laws: VII On Killing Dogs" in Forest and Stream 36 (21 and 28 May 1891): 349, 372; Ives, Downeast Game Wars, 69-70.

Boston and New York from Bangor, Calais, and other "large shipping points in Maine."[51] Through confiscations wardens garnered for themselves not only half the fine money paid by the violators but their meat as well, a double indemnity that was not lost on rural Mainers who resented these seizures bitterly.

State efforts to suppress the trade in venison and wild fowl received further impetus in 1884 when the Maine Central Railroad began refusing to ship game on the grounds that to convey it was to take it into possession and thus to be in violation of the bag limit law. The other railroad and express companies quickly followed suit so that it became impossible to ship game on a common carrier except as personal luggage. The result, it was widely hoped, would break "the backbone of Maine market-hunting."[52] But since the wardens simply sold the confiscated meat themselves, many complained that seizures did little actually "to protect the game alive."[53] Although the courts soon ruled that there were no grounds for banning the transportation of deer meat or hides "if the deer was killed at a time when it was lawful to do so," seizures conducted under the cloak of conservation and legal authority continued sporadically through the 1880's and 1890's.[54] The result was that the non-transportation law "came to be ... merely a question of whether the owner was present to prevent himself being robbed."[55]

These restrictions institutionalized the forest experience of the sportsman. They served, a Rangeley tourist promoter explained, to leave "the sport largely to those who come from a distance and so liberally put out their chink among us."[56] As Forest and Stream magazine declared, the "basic principle" behind the game laws was the idea that "the game of this country belongs to the sportsman ... It is his and he shall have it."[57] New

---

[51] Special of Boston, MA, "Letter" Forest and Stream 23 (11 December 1884): 387.
[52] Special of Boston, MA, "Increase of Maine Large Game" Forest and Stream 22 (24 April 1884): 246.
[53] "Bangor Law Breaking" Bangor Daily Commercial 7 January 1895, 7.
[54] *Young* v. *Allen*, 76 Maine, 83.
[55] Fannie P. Hardy "Six Years Under Maine Game Laws: VI On Non-Transportation in Open Season" Forest and Stream 36 (7 May 1891): 309.
[56] Samuel Farmer, "The Rangeley Lakes" Phillips Phonograph 19 October 1878.
[57] "The Basic Principle" Forest and Stream 57 (23 November 1901): 401.

game laws criminalized long standing patterns of common property resource use in the Maine Woods. Traditional practices of hunting and fishing were redefined as poaching and subject to suppression by the state. In "appealing for co-operation to every lover of the gun and rod," the organizers of the Washington County Game Association touched on the essential distinctions and practical rules that would henceforth define the Maine Woods of their desires:

> the distinction between reckless butchery and a fair matching of 'skill against skill', between wholesale slaughter of deer, with dogs and during unseasonable months; or the occasional shooting of a single deer, within the few weeks, which natural and civil laws designate as 'a proper season'; between the 'pot-hunter' who greedily 'bags his pound of flesh' or the man who delights in the health-giving air of wooded hill and balsamic lowland, who appreciates the charm of forest and lake, not voiceless and deserted but, as the Great Giver intended, the habitat of active life and harmless increase.[58]

The wildlife, once a source of food, fiber, and financial gain to local residents, was now to become game, the object of a very different metropolitan appropriation. The game were simply too important to be for sale. They had to be saved for middle class men to give them the spiritual recreation they needed to go on transforming the rest of creation into an endless stream of commodities. Many rural Mainers neither saw the value in this hierarchy of hunting experience nor understood why the wildlife should not be for sale when everything else, including their own labor, seemed to go to the highest bidder.

They questioned the legitimacy of the new game laws. "Subjecting himself to the privations of a life in the wilderness," the farmer and backwoodsman felt he "ought to be allowed all its privileges" and to "utilize for food or for merchandise the wild game which at common law belongs to the man who reduces it to his possession." Rural Mainers complained bitterly that the game laws "are made for foreign sportsmen who come into the

---

58 "Washington County Game Association" Machias Union 11 April 1876, quoted in Ives, Downeast Game War, 63.

State to enjoy themselves."[59] They felt put upon by city folk and those from away, but their feelings reflected a nascent class consciousness as well. They understood that "the shifting of the game from rural to aristocratic hands is the final and main object" of the game laws.[60] Though conservation advocates insisted that the "laws are enacted for the general good," the uneven enforcement and unequal effects of the game laws were unmistakable.[61] Many complained that wardens could scarcely be found in the woods during the summer when wealthy sportsmen were about but instead concentrated their efforts against the winter hunting of backcountry residents. Partly this reflected the meager finances of the fish and game commission. Paid only $1.50 a day plus costs, game wardens were tied to their farms and businesses during the summer tourist season, just like the rural people they were paid to watch over and regulate. But Fanny Hardy claimed it was also matter of explicit government policy.[62] Whatever the reason for the policy, it allowed summer sportsmen to ignore the game laws with near impunity, while it severely restricted the hunting and fishing activities of rural Mainers. Even when caught red-handed, city sports possessed the cultural where-with-all, the legal counsel, and, if necessary, the bribe or fine money to ignore the wardens and do as they pleased, whereas poor Mainers like Wilbur Day ended up serving the thirty-day sentence for poaching because they could not

---

[59] G.F. Talbot, "Some Features of the Forestry Bill-- the Commissioner" Daily Eastern Argus 13 February 1889, 12.

[60] "The Aristocratic Way" Bangor Daily News 12 February 1891, quoted in Fannie P. Hardy, "Six Years Under Maine Game Laws: III This, That and the Other Charge" Forest and Stream 36 (9 April 1891): 227.

[61] Machias Union 8 January 1884.

[62] She wrote: "[T]here is no mistake about the fact of partiality in the administration of the laws, and the only way in which this can be accounted for ... is that the Commissioners know it, the visitors wish it, and the object is to save the game for those who pay cash for it... [D]id any one ... ever see a warden in the woods anywhere over the whole Moosehead, East Branch, West Branch, and Allegash country-- the greatest hunting ground in the State-- before the first of October? It would be strange if one did, for not only have we never heard of it, but on the 31st of March of this year, when my father asked Mr. Stilwell [Maine Commissioner of Fish and Game] personally if he ever had sent a warden into the woods during the summer months, Mr. Stilwell did not mention a single case. And yet this is the time and this is the region, when and where the majority of visitors from outside the State go to hunt, and it is well known that they kill large quantities of game illegally... But wardens are active in winter, and the same visitors who broke the law in the summer with utter disregard, are urging them to exterminate the race of 'crust hunters'. Is it strange that this having been the case year after year, the people here should declare that all the visitors wish is to be allowed to do as they please, and that they hire the wardens to let them alone?" Fannie P. Hardy, "Six Years Under Maine Game Laws: III This, That and the Other Charge" Forest and Stream 36 (9 April 1891): 227.

afford the fines and legal fees of a defense. Rural bitterness was further fed by the extraordinary court costs frequently charged to defendants. Day later complained that "whenever any of them [wardens] felt that they wanted a little extra money, all they had to do was to take their pencil and ... make up a bill of costs for chasing Wilbur Day."[63] These disparities contributed to the growing suspicion that there were two sets of rules, one for wealthy, urban sportsmen from away and another, more restrictive and prejudicial one for poor, rural Mainers. As an Aroostook county trapper noted, "though the fines are equal, the effects are opposite," and as a result, "the desired effect," giving "the city chap ... entire possession of the hunting grounds ... is consummated."[64]

law and the game wars

The stage was set for a battle between sportsmen who cast themselves as saviors of the wildlife and rural Mainers defending traditional patterns of access to the common property resources of the forest.[65] Conservationists demonized those who stood in their way. If following the exacting code of sportsmanship developed manly character, then those who broke the law and resorted to unsporting methods must be unmanly, or worse. While the noble savagery of the sporting hunt felt uplifting and rejuvenating, the slaughter perpetrated by poachers seemed barbaric and dehumanizing. Charles Hallock suggested that men who used dogs to hunt deer "are but a grade higher than the creatures they train to amuse them."[66] Such a classification was no trivial slur, for the problems of poaching were most often blamed on native peoples, French-Canadians, and those "idle, vagabond" folks of the backcountry already said to be racially or genetically inferior.[67] The Maine state

---

[63] Ives, Wilbur Day, 41.

[64] "The Aristocratic Way" Bangor Daily News 12 February 1891.

[65] For a similar struggle, see Steven Hahn, "Hunting, Fishing, and Foraging: Common Rights and Class Relations in the Postbellum South" Radical History Review 26 (1982): 37-64.

[66] Hallock, "Announcement" Forest and Stream 1 (14 August 1873): 8.

[67] Commissioner of Fisheries and Game of the State of Maine, Report (1886): 22. See also Commissioner of Fisheries and Game of the State of Maine, Report (1882): 16; (1884): 21, 23; (1891-92): 14; "Protection of Moose" Machias Union 5 January 1875; A.J. Darling, "Fish and Game Protection" Industrial Journal 9 June 1882; J.A. Thompson, "Our Forests and Our Game" Bangor Daily Commercial 26 February 1901, 2;

game commissioners compared backwoods poachers to an "expensive blight" on society and to "so many thieving cats" whom "if they could be taken out and killed... the State would be the richer".[68] Such rhetorical excess might be dismissed as so much froth if it were not associated with state efforts to suppress the feeble-minded and stamp out rural degeneracy. Wildlife conservationists like New York Zoological Society director William Hornaday, who condemned Italian immigrant bird hunters as "human mongoose," were also leaders of the eugenics movement. The President of the Washington County Game Association, Machias doctor Sam Hunter, argued that much of the unrest over the game laws in interior Washington County stemmed from nearly fifty years of outmigration by the best and the brightest. Those who stayed behind in rural Maine included unnaturally high numbers of the degenerate and mentally insane. These people took the traditional, "turbulent spirit" of eastern Maine to new and criminal extremes.[69]

Backcountry settlers were not the only ones unhappy about the new rules of the game. The aggressive regime of hunting and fishing regulations hit native peoples especially hard. Native subsistence had always relied upon the fish and animal resources of the forest. While settlement exposed native peoples to new competition from white settlers, it also provided opportunities to capitalize on traditional skills. Native peoples were among the best market hunters, supplying Brewer fur trader Manly Hardy with much of his peltrie. Their success made them a special target for the game wardens who singled out native peoples, especially the so-called Canadian Indians, as one of the most serious threats

---

Hallock, Fishing Tourist, 38; Hewitt, Conservation of the Wild Life, 12-13; William Hornaday, Our Vanishing Wildlife: Its Extermination and Preservation (New York: NY Zoological Society, 1913), 94-113; Lucius L. Hubbard, Woods and Lakes of Maine (1883. Somersworth: New Hampshire Publishing Co., 1971), 83.

[68] Commissioner of Fisheries and Game of the State of Maine, Report (1882): 16; Report (1878): 17.

[69] Hornaday, Our Vanishing Wildlife, 101; Sam B. Hunt, "The Shacker Band" Forest and Stream 26 (17 June 1886): 408-409. On the connections between the conservation and the eugenics movements, see Thomas R. Dunlap, Saving America's Wildlife (Princeton: Princeton Univ. Press, 1988), 11-15; Donna Haraway, Primate Visions: Gender, Race and Nature in the World of Modern Science (New York: Routledge, 1989), 54-58.

to the wildlife in the Maine Woods.[70] While white settlers claimed the common law right to appropriate the common property resources of the forest, native peoples believed their hunting rights were protected by treaty. These differences had been of little moment until the state began trying to restrict access to the wildlife. When Warden Albert French arrested Passamaquoddy Indian Lewy Mitchell for hunting with dogs, Mitchell hired a lawyer and sued for damages. Forest and Stream made light of the controversy, describing Mitchell "on the warpath after Warden French," but the case raised serious questions about the basis for the new regulatory regime in the Maine Woods.[71]

The game laws were founded upon the sovereign power of the state to restrict the access of its citizens to the wildlife. Mitchell questioned this legal authority on several fronts. He argued that in their treaties with Maine and Massachusetts, the Passamaquoddy Nation had reserved specific hunting and fishing rights, thereby placing "a constitutional restraint upon the power of the legislature to limit the freedom of the Passamaquoddy Indians in hunting and fishing." Mitchell's insistence upon special aboriginal rights challenged the liberal presumption that all citizens were equal and universally subject to the same laws. It suggested that in joining the political union native peoples had surrendered fewer of their original liberties than had their white neighbors. Of course, different rules had always been applied to native peoples, but for once, they were able to exploit this discourse of legal inequality to their advantage. The courts, however, would hear nothing of it, and Mitchell was convicted (though the judge imposed the lightest fine allowable under the law). But among the members of the Passamaquoddy Nation, the question of aboriginal hunting rights was far from settled. In 1892, another Passamaquoddy, Peter Newell, appealed his poaching conviction to the Supreme Judicial Court of Maine. In defending the game laws and the sovereign power of the state to uphold them, the court

---

[70] Commissioner of Fisheries and Game of the State of Maine, Report (1882): 16; (1884): 23-24; (1886): 22; (1891-92): 14.

[71] "Moose and Deer in Maine" Forest and Stream 25 (22 October 1885): 245.

completed the great refusal begun nearly three centuries before. In a sweeping ruling, it declared:

> But whatever may have been the original force and obligation of these treaties, they are now *functus officio.* One party to them, the Indians, have wholly lost their political organization and their political existence...Though these Indians are still spoken of as the "Passamaquoddy Tribe," and perhaps consider themselves a tribe, they have for many years been without a tribal organization in any political sense. They cannot make war or peace; cannot make treaties; cannot make laws; cannot punish crime; cannot administer even civil justice among themselves. Their political and civil rights can only be enforced in the courts of the state... They are as completely subject to the state as any other inhabitants can be... Clearly the defendant gains no right to hunt under that grant [the treaty of 1794].[72]

Though ostensibly about the wildlife, much more was at stake in these debates about conservation than the protection of fish and game. Normalizing nature had always meant normalizing society as well. Restrictions on hunting demanded the erasure of native treaty rights and other obstacles to the state's regulatory powers. To conserve the wildlife for sport, an entire way of life in rural Maine had to be eradicated. The state commissioners of fish and game made this intention abundantly clear:

> The present evil of a large and worthless class of semi-outlaws who live entirely in the woods mainly by poaching, occasionally acting as guides, stealing hoop poles or juniper knees or anything that will sell, should be suppressed at once. With them and by them is the greatest danger of fire. Sometimes the fires are set intentionally to favor the blueberry crop

---

[72] State v. Newell 84 Me. 465, 24 A. 943 (1893). The Passamaquoddy Nation tried to appeal the case to the U.S. Supreme Court, and a bill was even introduced before the Massachusetts legislature in support of their appeal, but the court refused to review the decision. "The Passamaquoddy Indian Treaty" Forest and Stream 40 (16 February 1893): 138. For an analysis of this landmark case, see Francis J. O'Toole and Thomas N. Tureen, "State Power and the Passamaquoddy Tribe: 'A Gross National Hypocrisy?'" Maine Law Review 23 (1971): 1-39.

or afford favorite browsing of young shoots for the deer; at others revenge; at others from the drunken saturnalia of irresponsible parties.[73]

Rural Mainers understood these stakes as well as the sportsmen. With such strident rhetoric in the air, violence was not long in coming. Powerless to keep the new regime of sporting recreation out of the Maine Woods, backcountry people lashed out at the wardens, who personified the unwelcome intrusion of state power into daily lives already close to the edge. Despised as "a very low class of beings" and as "blackmailer[s] of the lowest type," game wardens were ostracized and faced harassment and intimidation for carrying out their duties.[74] Almost immediately after he took up a three-year commission as game warden in the spring of 1885, Fred Munson was "knocked senseless" by a dead fall trap set for him by a neighbor.[75] Sentiments against the game laws were running high in Wesley, Maine that spring, particularly after Washington County deputy sheriff Fred Pettingall and a game warden burst into the annual town meeting with guns drawn and dragged Wilbur Day away to stand trial for poaching deer. Many people blamed Munson for informing on Day and other local residents; others were sore about the on-going campaign of dog-poisoning that fish and game officials were conducting in the area. That summer Munson became the direct object of local frustrations over the changing rules of the game. His potato field was dug up, his newly set apple orchard girdled, and his house and barn burned down just after the hay was in. Ruined, Munson and his family moved in with his father-in-law who was threatened with similar treatment "if you kept that damd black fred munson at your house."

---

[73] Commissioner of Fisheries and Game of the State of Maine, Report (1888): 8-9. This hysterical rhetoric *predated* the first violent protests against the game laws. In their 1882 report, the commissioners fumed, "The poacher has become a dangerous criminal, whom the lumberman ... fears to offend. The safety of the public demands his speedy punishment and suppression. He is but the deserter, the bounty-jumper of the late war, back again in the haunts from whence he sprung. He picks a few cranberries before they are ripe, for fear the honest farmer may fairly obtain them... His arrest and conviction and punishment will rid society of an expensive blight, the cause of burdensome taxation for the punishment of crime."

[74] Ives, Wilbur Day, 41; Machais Union 20 February 1912, quoted in Ives, Downeast Game War, 209.

[75] Machais Union 2 June 1885, quoted in Ives, Downeast Game War, 87

Fearing for their lives and property, Munson and his father-in-law eventually moved their families to Machias where game wardens were more welcome.[76]

Government officials responded with what state fish and game commissioners termed "war measures."[77] In this they had the full support of out-of-state sportsmen and Washington County elites who were uncompromising in their call for "the strong arm of the law" as the only possible response to villains who were "capable of perpetrating any crime ... unless checked or restrained."[78] No one knew exactly who was responsible for the vandalism and the threatening letters, but suspicions focused on a band of young toughs in Wesley who went by the colloquial name for deer, the "shakers." After Wilbur Day was dragged out of the town meeting, many of the shakers threatened Munson with retribution. More direct evidence for arson was harder to come by. Still, the state was determined that someone would pay: "The dignity of the State demanded" as much.[79] Two days after serving his sentence for poaching, Wilbur Day was back in jail again, arrested and indicted along with three other Wesley men for arson. The Bangor Daily Commercial applauded prosecutors for pursuing "the only adequate policy of dealing with these characters."[80] The trials did not go as smoothly. Charges against two of the men were dropped for lack of evidence, so the state concentrated its efforts against Wilbur Day. The prosecutor threatened the twenty-two year-old Devereaux Fenlason "if I did not turn State's evidence I would have to go to State's Prison for life," but at Day's trial, Fenlason recanted the incriminating testimony he had given before the Grand Jury. Prosecutors were still able to secure a conviction from the Machias jury, largely on the strength of a handwriting expert who swore that the threatening letters sent to Munson's father-in-law had been

---

[76] Except where noted my account of this incident and the subsequent trial of Wilbur Day is based upon Ives, Downeast Game War, 203-21 and Ives, Wilbur Day, 37-48, 100-16. The original note to Munson's father-in-law was written in block letters with full stops between each word.
[77] Commissioner of Fisheries and Game of the State of Maine, Report 1883): 11.
[78] "Washington County Fish and Game Association" Machias Union 3 April 1883.
[79] Commissioner of Fisheries and Game of the State of Maine, Report (1886): 8.
[80] "Outlaw Poachers" Bangor Daily Commercial 8 February 1886, 4.

"written by Wilbur Day," but their underhanded tactics simply confirmed the feeling that the laws were unfair.[81]

This created a potentially explosive situation. Effective legal authority depended upon maintaining at least the appearance of impartiality and justice. Yet the game laws seemed to be anything but. Without legitimacy to back them, the game laws required ever more spectacular displays of power to enforce. Repression lent legitimacy to the acts of outlaws. Though no one in Wesley condoned arson, many could sympathize with and even endorse the motives behind it. Wilbur Day was transformed from a pariah to a folk hero. His case became a *cause célèbre*, in large part because it seemed to represent a wider pattern of tyranny. Rural Mainers also spoke in embittered tones about the Hammond and Jock Darling cases, two other poachers persecuted by game wardens. Together, these stories "spread the denial of the moral authority of those [game] laws until at present it is frequently asserted that it is not wrong to break a law which was not made by one's representatives."[82] In 1887, when wardens built a weir on the Crooked River to trap spawning Sebago Lake salmon for the state fish hatchery, they were attacked "by a party of disguised roughs who demoralized our guard of one man and his boy" and smashed the storage tanks, releasing "such fish as they could not carry away with them."[83] Resort to vigilantism was an old Maine remedy for authorities who overstepped their bounds, but resistance to the game laws took less overt forms as well. The commissioners of fish and game complained that rural juries were "at best unsympathetic" to poaching prosecutions, while elected county prosecutors were loath to offend voters with the kind of energetic

---

[81] "The Wesley Arson Case" Machias Republican 25 January 1886, quoted in Ives, Wilbur Day, 107, 108. Day's own account of the trial is in Ives, Wilbur Day, 37-46.

[82] Fannie P. Hardy, "Six Years Under Maine Game Laws: IV. On the Waste of Game by Sportsmen" Forest and Stream 36 (16 April 1891): 249. Western outlaws were the subject of similar ambivalent feelings. See Richard White, "Outlaw Gangs of the Middle Border: American Social Bandits" Western Historical Quarterly 12 (1981): 387-408.

[83] Commissioner of Fisheries and Game of the State of Maine, Report (1888): 7.

prosecutions required to enforce unpopular laws. Such resistance made the enforcement of the game laws "as precarious as a venture by lottery."[84]

Government coercion fueled rural alienation and led to further acts of resistance, calling forth more repressive counter-measures in a rapidly escalating cycle of violence. When confronted by two game wardens who threatened to shoot his dog for being out in the woods during hunting season, Calvin Graves responded with gunfire. He had sworn that "he'd shoot any man that shot his dog." Others had no doubt said the same. They had also been angered by the sportsmen's crusade against deer dogging and by the wardens' campaign against the dogs, but Graves had been the first to act on it. His response was individual, but in others ways his action had been in the making for years. It took the sportsmen's self-righteous appropriation of the wildlife as game, a repressive regime of new game laws, and aggressive wardens to bring it about. These, in turn, were conditioned by masculine anxieties and urban expansion, rural poverty and underdevelopment. While these larger social forces cannot explain what happened on 8 November 1886 when Calvin Graves shot and killed two Maine state game wardens in the forest near Fletcher Brook, they do provide a context in which to understand the significance of that event.[85]

In a hail of bullets, Graves changed the Maine Woods forever. The outburst of violence at Fletcher Brook shocked even those who opposed the game laws. Their resistance had been underwritten by a sense that they stood for true justice against the injustice of the wardens, the sportsmen, and the game laws. Murder took away this moral highground and made it harder to equate defiance of the wardens with any higher purpose. It changed the conversation in Maine from a question about the justice of particular laws to one of law and order more generally. That was an argument that Wilbur Day, Calvin Graves, and their neighbors in rural Maine could never win. After a nationwide manhunt,

---

[84] Commissioner of Fisheries and Game of the State of Maine, Report (1884): 23. For similar complaints, see New York Times 16 March 1890, 17.

[85] My account of Calvin Graves is based upon Ives, Downeast Game Laws, 255-78.

Graves was brought to trial and convicted of double murder. His case marked the high tide of overt resistance to the game laws.

In this sense, Graves accomplished what years of rhetoric and persuasion could not. Though many continued to feel put upon by the new rules of the game, it became difficult to be so brazen about ignoring them. Arson and murder upset the delicate balance of rural communities and could no more be tolerated by the people of Wesley, Maine, than by sportsmen from Boston or state officials in Augusta. The cold-blooded murder of two game wardens seemed to confirm that the rural people

> who complain bitterly of the hardships of game laws...are not good citizens, they are not hardy frontiersmen, they are not poverty stricken woods dwellers, eking out a bare subsistence by tilling the unfruitful soil and killing deer now and then to save themselves from starvation. They are, on the contrary, shiftless ruffians, too lazy to earn an honest living: outlaws who defy righteous statutes and who want only occasion to become firebugs and murderers.[86]

Sportsmen and the officials of the Maine State Fish and Game Commission had been saying this for years, but to no avail. They had always represented themselves as defenders of the defenseless wildlife and their opponents as special interests-- poachers, market hunters, butchers, and commission merchants who profited from the destruction of wildlife. ["T]he true friends of the fish," explained G.W Drisko, the Machias newspaper editor and game law advocate, "are the *intelligent* sportsmen who visit our lakes and rivers each season from the city." He sharply contrasted their knowledgeable, disinterested, and essentially non-consumptive relationship with the wildlife against the ignorance, greed, and violence of "the selfish residents of our [rural] towns" who were the "real enemies of fish."[87] The Graves case gave this contrast more purchase, even among those pilloried by the comparison. Because sport hunting was only a game, a mere pastime, blissfully free

---

[86] "The Maine Tragedy" Forest and Stream 27 (11 November 1886): 301.
[87] "Wild Game and Fish" Machias Union 25 April 1876 quoted in Ives, 63.

from "the mercenary element" and the influence of "[t]he mighty dollar" that "is the controlling agency in every branch of social and political life," sporting enthusiasts could speak for and represent the wildlife objectively. Rather than serving the particular interests of urban sportsmen in one construction of the wildlife and their therapeutic experience, game laws were supposed to serve "the general good" by "not allow[ing wildlife] to be selfishly destroyed for the benefit of a *few*."[88] But the uneven and often downright inept enforcement of the game laws had called this into question. Fannie Hardy warned that "murder has been historically much more common than most suppose" and that it would recur in the Maine Woods without serious reform of a "strained and distorted condition where officers of justice have been unjust and rights have been made wrong... in game matters."[89]

The violent protests in Wesley and at Fletcher Brook awakened state officials to the realization that the "fate of the game in this State depends largely upon the good will of the rural classes." As Fannie Hardy explained, "The people here will have some kind of winter fishing, and if it isn't trout it shall be pickerel." The state could restrict local hunting and fishing in the name of conservation, but if these rules alienated rural people, the state risked destroying the very wildlife it meant to save, for local "residents would destroy the major part of the game in a few years," if they felt deprived of their rightful share of the game.[90] Arson and murder were acts of desperation, driven by a sense that there was nothing left to lose in the face of a distant and unresponsive state apparatus controlled by urban sports and powerful forces from away. By moderating conservation policy just enough to keep local interests involved with the discussion, government officials were able to preserve the fleeting sense that the game laws were free from the kind of "gross manipulation" that E.P.

---

[88] Lucius L. Hubbard, "Does Game Protection Pay?" Industrial Journal 19 May 1882.

[89] Fannie P. Hardy, "Six Years Under Maine Game Laws: VIII. An Aspect of the Graves Case" Forest and Stream 36 (11 June 1891): 412

[90] Fannie P. Hardy, "Six Years Under Maine Game Laws: XI. In Conclusion" Forest and Stream 37 (6 August 1891): 46. On the problems of introduced species like pickerel displacing game fish from Maine lakes, see J.G. Rich, "Pickerel in Lake Umbagog" Forest and Stream 12 (17 April 1879): 216.

Thompson argues is the "essential precondition for the effectiveness of law in its function as ideology."[91] Increasingly, when sportsmen and rural Mainers collided over the nature of the wildlife, as they did in the 1905 controversy about bait fishing and bag limits on Rangeley Lake, the state took up a compromise position.[92] The provocative campaign of dog poisoning was quietly ended. Though game wardens continued to suppress deer dogging, they focused their attention on the hunters instead of their dogs. They recognized:

> The slaughter of dogs has caused deer dogging to thrive in this State. Doing it in the name of the law has merely brought the law into disrepute; for it is now and long will be considered a worse offense to kill a dog than to use him in running deer. To arrest the man brings credit to the law and little or no danger to the officer; to kill the dog has just the opposite effect.[93]

In response to complaints and threats of legal action, fish and game commissioners also clamped down on controversial seizures of deer meat on railroads and other public carriers. They clamored for more funds so as to pay wardens regular salaries that would enable them "to leave their farms and go into the woods any time the commissioners may want them," thereby ending the uneven pattern of enforcement that had so many rural people convinced that there were two sets of game laws, one for native Mainers and another for the summer sportsmen.[94] In 1903, the legislature imposed a license fee for out-of-state hunters, raising $30,000 annually for fish and game protection. Wardens were put on regular salaries and the notorious half-fee system whereby wardens were paid a commission on each violation they prosecuted was abolished. These measures enabled the fish and game commission to attract a cadre of better trained and more professional wardens who improved the reputation of the agency and its mission.[95] Minor as they were in altering the overall reconfiguration

---

[91] Thompson, Whigs and Hunters, 263.

[92] This controversy is described in Judd, "Reshaping Maine's Landscape," 185.

[93] Fannie P. Hardy, "Six Years Under Maine Game Laws: VII. On Killing Dogs" Forest and Stream 36 (28 May 1891): 372.

[94] Bangor Daily Commercial 26 November 1888, p.4.

[95] Eric Wright, Maine Game Wardens (Freeport: DeLorme Publishing Co., 1985), 12-15. The commissioners hoped to improve the image of the warden service even further by bringing wardens under

of the Maine Woods as a space for masculine adventure and the redefinition of its common property resources as game for the recreation of the urban middle classes, these reforms succeeded in creating the appearance of a fair and open process, thereby winning rural Mainers to an outcome that was heavily stacked against them. They helped preserve the equation of legal restrictions on hunting with the "general good," on which the legitimacy and thus the effectiveness of the game laws ultimately rested.[96]

the values of wildlife

While certainly backed by powerful economic and social interests, the equation of the sportsmen's interest with the general good also rested upon the idea that the game were a kind of "crop, already planted, needing no cultivation but protection and from which many thousand dollars can be harvested annually for the benefit of the State." By placing a quantitative measure on the public benefits achieved from conserving the game for sport, the comparison of wildlife to a crop made this public good visible. In a sense, this process of visualization created the object it enframed and represented. Without the crop metaphor and the quantitative measure that it put on the value of conservation, it was impossible to speak of the public benefits flowing from conservation. This visibility enabled the state commissioners of fisheries and game to figure that "a deer killed at the proper season at any of our sporting centres is worth at least one hundred dollars to the State while if destroyed and sold by the poacher, its net return is almost valueless."[97] Though critical of the commodification of wildlife, the commissioners were no less certain that what counted were dollars and cents, what Marx called the great solvent, reducing all difference to a

---

the civil service laws and thereby freeing the profession from "the odium of a political job doled out in payment for political services." Commissioner of Fisheries and Game of the State of Maine, Report (1916): 20. For the reminiscences of a professional warden, see William S. Warner, An Honest Woodsman: The Life and Opinions of Dave Priest-- Maine Trapper, Guide and Game Warden (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXII, 1981).

[96] Machias Union 8 January 1884.

[97] Commissioner of Fisheries and Game of the State of Maine, Report (1888): 5; Report (1891-92): 14. On the creative powers of representation, see Susan Buck-Morss, "Envisioning Capital: Political Economy on Display" Critical Inquiry 21 (1995): 434-67.

common measure of universally exchangeable value. All that mattered was that the value added by the tourist's sporting experience exceeded the poacher's price for moose meat on the open market. It was enough to see that each moose captured by a sportsman brought another $2000 into the state; the distribution of these spoils did not concern game law advocates like Lucius Hubbard because the net benefits of conservation so obviously exceeded those of unrestricted hunting.[98]

As more and more Mainers made their living by harvesting summer visitors rather than the wildlife itself, they too could see the value of conserving the game. In 1895, E.C. Farrington, secretary of the Maine Sportsmen's Fish and Game Association calculated that if capitalized at six percent Maine's stock of game resources would be worth $50,000,000, or $33,000,000 more than the assessed value of the state's 9,000,000 acres of industrial wildlands.[99] This was just one measure of the growing influence of the new tourist industry standing behind new rules of the game in the Maine Woods. Hotel owners, railroad companies, and resort promoters lobbied continuously throughout the 1880's and 1890's to pass the September Law permitting hunting in September so that visiting sportsmen could "combine both the pleasures of the gun and the rod on their annual trips to Maine." The bill finally passed in 1899, only to be repealed in 1901 at the behest of landowners concerned with fire risk and wardens who worried about the added drain on game populations.[100] In general, however, the tourist industry worked hand in hand with sportsmen and the state's growing conservation bureaucracy. Even if it was not always happy with the way conservation measures worked in practice, the industry helped press the legislature for tighter restrictions on hunting, larger hatcheries, more energetic wildlife

---

[98] Hubbard's $2000 figure was given in testimony to the legislature's Committee on Fisheries and Game. Daily Eastern Argus 14 February 1889, 1. Also, Hubbard, "Does Game Protection Pay?" Forest and Stream reprinted in Industrial Journal 19 May 1882.

[99] F.C. Farrington, "The Value of Fish and Game" Forest and Stream 44 (9 February 1895): 112.

[100] "That Maine Tax Proposition" Forest and Stream 40 (19 January 1893): 52. On the September law controversy, see "Maine Deer Law" Forest and Stream 23 (4 December 1884): 368; "The Maine Game Laws" Forest and Stream 27 (20 January 1887): 505; "Bangor Man's Views" Bangor Daily Commercial 4 January 1898, 6; "Lumbermen Unite" Bangor Daily Commercial 21 January 1901, 7; J.A. Thompson, "Our Forests and Game" Bangor Daily Commercial 26 February 1901, 2.

protection programs, and the large budgets necessary to carry them out. Members of the Maine State Board of Trade saw their "salvation as a state" in the image of Maine as a vacationland. They enthusiastically supported the institution of game laws and other aggressive regulatory measures necessary "to develop and preserve the vast resources of our state as a vacation state."[101]

This re-evaluation of the resources of the Maine Woods was pretty good for sportsmen, and, as it turned out, for the deer as well. They prospered under the new game laws. Deer populations rose steadily during the last quarter of the nineteenth-century, reaching levels not seen in Maine since the mid-Holocene.[102] Conservationists credited their stringent program of game protection and law enforcement for "the steady increase of the game of the State."[103] Restrictions on hunting certainly had their effect, but the supply of deer was not a simple function of hunting demand as advocates bag limits and closed seasons imagined. Other forces were at work as well. While deer had been uncommon in eastern and northern Maine during the late eighteenth- and early nineteenth- centuries, this scarcity was not the result of unrestricted hunting and over-exploitation by settlers and loggers. In fact, the abundant deer that tourists took as a sure sign they were penetrating "a wilderness unfettered and untouched" had been produced by the very settlers whom sportsmen vilified as the chief nemesis of the game.[104] Prior to the onset of widespread land clearing, lumbering, and the fires that went with them, the spruce-fir forests of the interior and eastern coast of Maine provided poor deer habitat; the Maine Woods known by the Abenakis and the early colonists had been the realm of moose and caribou, not white-tailed deer.[105] But the activities of settlers opened space in the dense forest canopy,

---

[101] "State Board of Trade Session Closed Tuesday" Bangor Daily Commercial 26 March 1902, 3. On the promotion of Maine as vacationland, see George H. Lewis, "The Maine That Never Was: The Construction of Popular Myth in Regional Culture" Journal of American Culture 16 (summer 1993): 91-100.

[102] Don C. Stanton, A History of the White-Tailed Deer in Maine (Augusta: Dept. of Inland Fisheries and Game, game division bulletin no. 8, 1963).

[103] Commissioner of Fisheries and Game of the State of Maine, Report (1884): 21.

[104] Bangor & Aroostook Railroad, In the Maine Woods (1908): 106.

[105] On the scarcity of deer in early nineteenth century Maine, see James Sullivan, "History of the Penobscot Indians" Collections of the Massachusetts Historical Society 9 (1804): 228; William D.

creating more of the edge habitats favored by browsing deer, and they followed the path of settlement into the Maine Woods.[106] Though unknown in the Penobscot River valley in the 1820's and 1830's, deer became quite plentiful by mid-century. The same was true farther east in interior Washington and Hancock counties where one man remembered, "The deer in my young days were not very plenty. They increased so that about 1845 they were quite plenty and kept so for about 20 years."[107]

Such changes in the abundance of one species often have effects on others as well. The success of deer came at expense of moose and forest caribou. Attributing all wildlife population decreases to hunting, Maine state fish and game officials responded by tightening the game laws. Hunting moose cows and calves was banned in 1891, and the open season shortened in 1897 and again in 1913, against heavy opposition from camp owners, guides, and sporting promoters. Caribou hunting was banned in 1898, and the commissioners lobbied to close the season on moose as well, finally succeeding in 1915.[108] But none of these measures succeeded in saving shrinking moose and caribou populations. Caribou are extinct in Maine, and moose nearly became so, their numbers recovering only recently. Hunting was certainly a factor, but others were important as well. Interspecific competition between deer, moose, and caribou is poorly understood, but in winter, moose and deer compete for some of the same browse, while caribou graze on mosses and lichens that flourished in the rapidly shrinking old-growth of the Maine

---

Williamson, The History of the State of Maine (Hallowell, 1839), I: 135-36; Joseph Whipple, A Geographic View of the District of Maine (Bangor, 1816), 17; Stanton, White-Tailed Deer in Maine, 9-36.

[106] The situation in Maine was very different from that described by William Cronon for southern New England where colonial settlement destroyed white-tailed deer habitat while roaming livestock competed for the same browse and mast. Cronon, Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983). On the habitat requirements of deer, see White-tailed Deer Ecology and Management, ed. L.K. Hallis (Harrisburg, PA: Stackpole, 1984).

[107] L., "Old Days in Maine" Forest and Stream 39 (11 August 1898): 6. A Bridgton, Maine resident traced a very similar history of deer fluctuations in the Rangeley area. "Maine Deer Law" Forest and Stream 23 (4 December 1884): 368.

[108] Ives, Downeast Game War, 76. These changes can be charted in various editions of Maine Department of Inland Fisheries and Game, Inland Fish and Game Laws, first published in 1893 and updated semi-annually thereafter. On the opposition of sporting interests to these changes, see, for example, "Shy of More Law" Bangor Daily Commercial 11 January 1899, p.3.

Woods. As white-tailed deer expanded into the cut-over, they brought with them a brain worm parasite that decimated caribou populations. Moose were also stricken by a disease that helped make room in the forest for more deer.[109] Without a wider vision of these other agencies, fish and game officials were poorly equipped to explain what was happening to the moose and caribou. They could only conclude that like the spectacular dinosaurs and mega-fauna of the late Pleistocene then being unearthed and mounted in museums, the large mammals of the Maine Woods were doomed "to extinction from certain inherent qualities in [their] structure."[110]

This was a disturbing conclusion. The scientific discovery of "natural" extinctions posed fundamental questions about the difference between the "natural" and the unnatural and artificial. The conservation movement was founded on the idea that environmental devastation was caused by greedy, unplanned, unscientific, and inefficient exploitation of natural resources.[111] To save nature, conservationists had to represent it and fix its boundaries. Deer and moose were called natural; poaching was not. This process of enframing and making nature visible was also one of concealing and constructing.[112] The discovery that wildlife extinctions also happened "naturally," that is, without direct human intervention, pointed to the artifice of fixed distinctions between nature and society. It

---

[109] C.M. Aldous and H.L. Mendall, The Status of Big Game and Fur Animals in Maine (Orono: Maine Cooperative Wildlife Research Unit, 1941), 4-8. On the relations between deer and moose grazing, see Hewlette S. Crawford, R.A. Lautenschlager, Martin R. Stokes and Timothy L. Stone, Effects of Forest Disturbance and Soil Depth on Digestible Energy for Moose and White-Tailed Deer (Radnor, PA: Northeastern Forest Experiment Station, Res. Paper NE-682, 1993). The controls on white tailed deer populations are poorly understood. See R. Terry Bowyer, Martin E. Shea, and Sean A. McKenna, "The Role of Winter Severity and Population Density in Regulating Northern Populations of Deer" in Is Good Forestry Good Wildlife Management?, ed. J.A. Bissonette (Orono: Maine Agricultural Experiment Station, Misc. publication 689, 1986), 193-204.

[110] Bangor Daily News, quoted in Commissioner of Fisheries and Game of the State of Maine, Report (1904): 19.

[111] The Germans had a word for this devastation: *Raubwirtschaft* or the predatory economy. J. Raumolin, "L'homme et la destruction des ressources naturells: la *Raubwirtschaft* au tournant du siècle" Annales: E.S.C. 39 (1984): 798-819; François Walter, "Attitudes Towards the Environment in Switzerland, 1880-1914" Journal of Historical Geography 15 (1989): 287-99.

[112] Judith Butler makes this point in Bodies That Matter (New York: Routledge, 1993) It is also one emphasized by Donna Haraway in Primate Visions and "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others" in Cultural Studies, (eds.) L. Grossberg et al. (New York: Routledge, 1992), 295-337.

confounded the equation of extinction with human disturbance and made it harder to condemn as unnatural the wildlife extirpations caused by poachers.[113] It suggested something else as well. If humans were like "races of animals," civilizations might also "have their periods of growth and of decline." Certainly the "American Indian [wa]s following the steps of the dodo and the great auk," but this was cold comfort for sportsmen who feared that with its flaccid middle classes, the United States might be headed down the same road to oblivion.[114] So while the discovery of natural extinctions posed certain problems for conservationists condemning the indiscriminate slaughter of game, paradoxically, it also invigorated their efforts to save the wildlife from extinction.

Increasing deer populations in Maine improved the fortunes of its leading predator, the wolf. Aggressive bounty hunting had eliminated the wolf from southwestern Maine by 1830, but as deer became common on the Union, Narraguagus, and Machias watersheds in the 1840's and 1850's, the wolf made a comeback in eastern Maine.[115] Scourge of livestock as well as deer, wolves also preyed on moose, caribou, and other wildlife, but there is some evidence to suggest that predator-prey relations between wolves and deer were close enough to tie the two populations together into a cyclical pattern of deer increase followed by wolf increase, over-predation, and decline in the herd, resulting in a reduction of the wolf population and a subsequent rebound of deer numbers, starting another cycle of boom and bust.[116] One Mainer remembered, "In 1844 or '45 the first wolf was seen on this river [Machias]. They seemed to come from the north, appearing at the head of the river. They increased very rapidly, thinning out the deer. They reigned for some twenty or

---

[113] The same problem haunts modern environmentalists. See chapter 2.

[114] Commissioner of Fisheries and Game of the State of Maine, Report (1904): 23.

[115] In 1764, the province of Massachusetts paid bounties on 11 wolves killed in York and Cumberland counties (Massachusetts Archives, I: 406-40). The last recorded wolf bounty paid in Cumberland County was in Otisfield in 1833. Arthur H. Norton, "Mammals of Portland, Maine, and Vicinity" Proceedings of the Portland Society of Natural History 4 (1930): 45, 1-145.

[116] Stanton, White-Tailed Deer in Maine, 25-27. Wolves also reappeared in Coos County, New Hampshire during the 1830's after deer became numerous for the first time. Helenette Silver, New Hampshire Game and Furbearers: A History (Concord: New Hampshire Fish and Game Department, 1957), 71-72.

twenty-five years and then left and there has not been one seen or heard since."[117] But wolves did not simply "leave," as this man remembered. Like other predators, they were aggressively driven out of the Maine Woods by a program of state bounties paid on each hide.

With the wolves gone, only hunting kept deer populations in check in the thinly settled cut-over of eastern and central Maine. Rising deer numbers, conditioned by anthropogenic habitat changes and wolf bounties, made extensive market hunting for deer a possibility, but even the crust-hunters could not keep pace with growing deer populations, which soared until crashing over much of their range during the hard winter of 1864 and 1865. Like the boom that it ended, this collapse was produced by agencies that are difficult to describe as either purely natural or absolutely artificial. After the huge logging slash fires of 1825 and 1837, great swaths of eastern and central Maine sprouted young birch and spruce favored by deer. By the 1860's, this post-fire cohort had matured enough to be out-of-reach of browsing deer. Restricted by heavy snows to overtaxed deer yards, deer died in huge numbers.[118]

As deer populations began to recover again in the 1870's, many backcountry farmers howled in protest. Worried that "[w]olves always follow a plenty of deer," they opposed conservation measures to protect wild deer because of the potential threat to sheep and other domestic livestock from wolves and other predators. Sportsmen and officials at the state fish and game commission dismissed these fears as "the sheerest nonsense in the world ... [without] a particle of foundation in fact." Though contemptuous of rural superstitions, conservationists were wary of the rural vote in the legislature. They "checkmated" this argument against the game laws by offering five dollars on each wolf pelt in addition to that already paid by the State Board of Agriculture.[119] Farmers and

---

[117] "Old Days in Maine" Forest and Stream 39 (11 August 1898): 117.
[118] Stanton, White-Tailed Deer in Maine, 25-27. On these historical fires, see Charles B. Fobes, "Historic Forest Fires in Maine" Economic Geography 24 (1948): 269-73.
[119] "A Wolf Cry in Maine" Machias Union 26 February 1884; "The Wolf Cry" Machias Union 25 March 1884.

sportsmen alike agreed that wolves were undesirable and had to go. Foxes raided chicken coops as well as the nests of game birds, and so farmers fully endorsed the sentiments of the Sagadahoc Association for the Protection of Fish and Game, "The fox should be treated as the inveterate poacher and outlaw that he is, and especial means be taken to eliminate him." Anthropomorphizing predators made them seem unnatural and helped legitimate the bounties that the state paid for the eradication of fox, cougar, wolves, coyotes, and other predators.[120]

Bounties to encourage the destruction of wolves, predators, and noxious pests dated back to the colonial period. They were predicated upon a sharp distinction between creatures that were "useful and profitable to the citizens" and those that were "prejudicial or destructive to vegetation, fruits, and grain."[121] While sportsmen and conservationists imagined their interest in the wildlife as peculiarly disinterested, they upheld the same principal that wildlife would live or die depending upon its utility to society. Their appropriation of the wildlife was different than farmers and backwoodsmen, but it was no less instrumental or domineering. Wildlife that were good for sport would be protected, while poachers, predators, and other threats to the game would be eliminated. Turn-of-the-century scientists also believed that saving America's wildlife meant killing America's predators "to prevent such an increase in numbers as would affect the abundance of the non-predatory species." They were confident in their abilities to manage wildlife populations through a "rational system of wild-life protection" based on predator control.[122]

Ultimately, however, these efforts to save the game did almost as much harm as good. The large deer populations that made Maine "the sportsman's paradise" proved

---

[120] Everitt Smith, "Destroy the Vermin" Forest and Stream 14 (5 February 1880): 17. Predator control was also supported by late nineteenth-century humanitarians who objected to the apparent cruelty of preying on innocent deer. Though a minor voice in conservation debates in Maine, they were influential elsewhere in the U.S. Lisa Mighetto, Wild Animals and American Environmental Ethics (Tuscon: Univ. Arizona Press, 1991), 75-83.

[121] Laws of the Commonwealth of Massachusetts (1816/18): ch. 103.

[122] Hewitt, Conservation of the Wild Life, 193. See also Dunlap, Saving America's Wildlife, 38-59.

neither stable nor sustainable.[123] Hunting helped control the deer herd, but without predators to prey on the weak, particularly in winter, deer yards became chronically overstocked and degraded. The problem was most severe in the American West, but the first scientifically recorded deer irruption in North America took place on Mount Desert Island in 1886. The deer population exploded, over-browsed, and crashed after a severe ice storm.[124] These and other turn-of-the-century fluctuations in Maine deer populations were more restricted in areal extent than the great irruption and die-off of 1864-65. This was encouraged by the intensive silviculture of pulp and paper companies. Unlike the scattered high grading operations of the lumber-era, pulpwood operations were both larger in scale and heavier, removing everything of merchantable size. They left in their wake a patchy forest landscape of large blocks of even-aged vegetation that provided good deer habitat initially, but became much less hospitable to deer as they matured. Since deer do not migrate long distances, local deer populations were subject to dramatic changes over the course of a decade.[125] People in Maine argued vociferously about whether the deer herd was increasing or decreasing, but the diversity of conditions made it difficult to get a sense of the health of the herd state-wide.[126] Old woods hands declared that their practical experience made their "opinion on the game and forest question ... outweigh the theories of

---

123 "Bangor Man's Views" Bangor Daily Commercial 4 January 1896, p. 6.

124 The deer population on the island recovered slowly, only to crash again in the 1920's and again in 1937. Lawrie Holmes, Mount Desert Deer: Past and Present (Mount Desert, ME: Privately printed, 1944); Aldo Leopold, Lyle K. Sowls, and David L. Spencer, "A Survey of Over-Populated Deer Ranges in the United States" Journal of Wildlife Management 11 (1947): 166; George B. Kolensky, "Wolf Predation on Wintering Deer in East-Central Ontario" Journal of Wildlife Management 36 (1972): 357-68. The crash of the deer herd in Grand Canyon National Park became the textbook example of the importance of predation for maintaining the stability of wildlife populations and ecosystems. Thomas R. Dunlap, "That Kaibab Myth" Journal of Forest History 32 (1988): 60-69.

125 Stanton, White-Tailed Deer in Maine, 45. On the effects of forest practice on succession and wildlife habitat in Maine, see Hewlette Crawford, "Wildlife Habitat Management and Changing Forest Practices in the Northeast" Northern Journal of Applied Forestry 1 (1984): 12-14; Robert S. Seymour, "The Red Spruce-Balsam Fir Forest of Maine: Evolution of Silvicultural Practice in Response to Stand Development Patterns and Disturbances" in The Ecology and Silviculture of Mixed-Species Forests, eds. M.J. Kelty, B.C. Larson, and C.D. Oliver (Dordecht: Kluwer, 1992), 217-44.

126 See, for example, "The Maine Deer Supply" Forest and Stream 40 (12 January 1893): 30; "Crosby Writes About Game" Bangor Daily Commercial 31 January 1899, 3; "Deer in Maine" Forest and Stream 78 (27 January 1913): 129.

many men who only by hearsay form their opinion," but without good survey methods and the other techniques of modern population ecology, it was difficult to hazard more than a guess, or to place much authority in conjectures about the health of the game.[127]

After 1900, it became harder to deny that there were problems in the woods. The caribou were extinct and the moose nearly so. While the deer herd was larger and its range more extensive than ever before, its numbers fluctuated considerably from year to year. As evidence of deer irruptions, die-offs, and the over-browsed cedar, hemlock, and hardwood tips they left in their wake mounted, a growing chorus of people like Oxbow guide Will Atkins insisted, "I don't think any more game laws to protect the deer are necessary... They will starve to death long before they are killed off by hunters... According to my way of thinking the deer are in a good deal more danger from themselves and their appetites than they are from hunters."[128] Still, many refused to believe it. Mount Desert Island game warden Jones Tracy "blamed the sudden drops in deer population, actually caused by mass starvation, on the Hall's Quarry poachers."[129] Officials at the Maine State Fish and Game Commission agreed. Viewing hunting as the only agent powerful enough to reduce deer populations, they had already reduced the bag limit from three to two in 1895. They responded to the die-offs by calling for stricter enforcement of the game laws, but these measures did nothing to dampen fluctuations in the deer harvest of more than twenty-five per cent (FIGURE 8.1).[130]

---

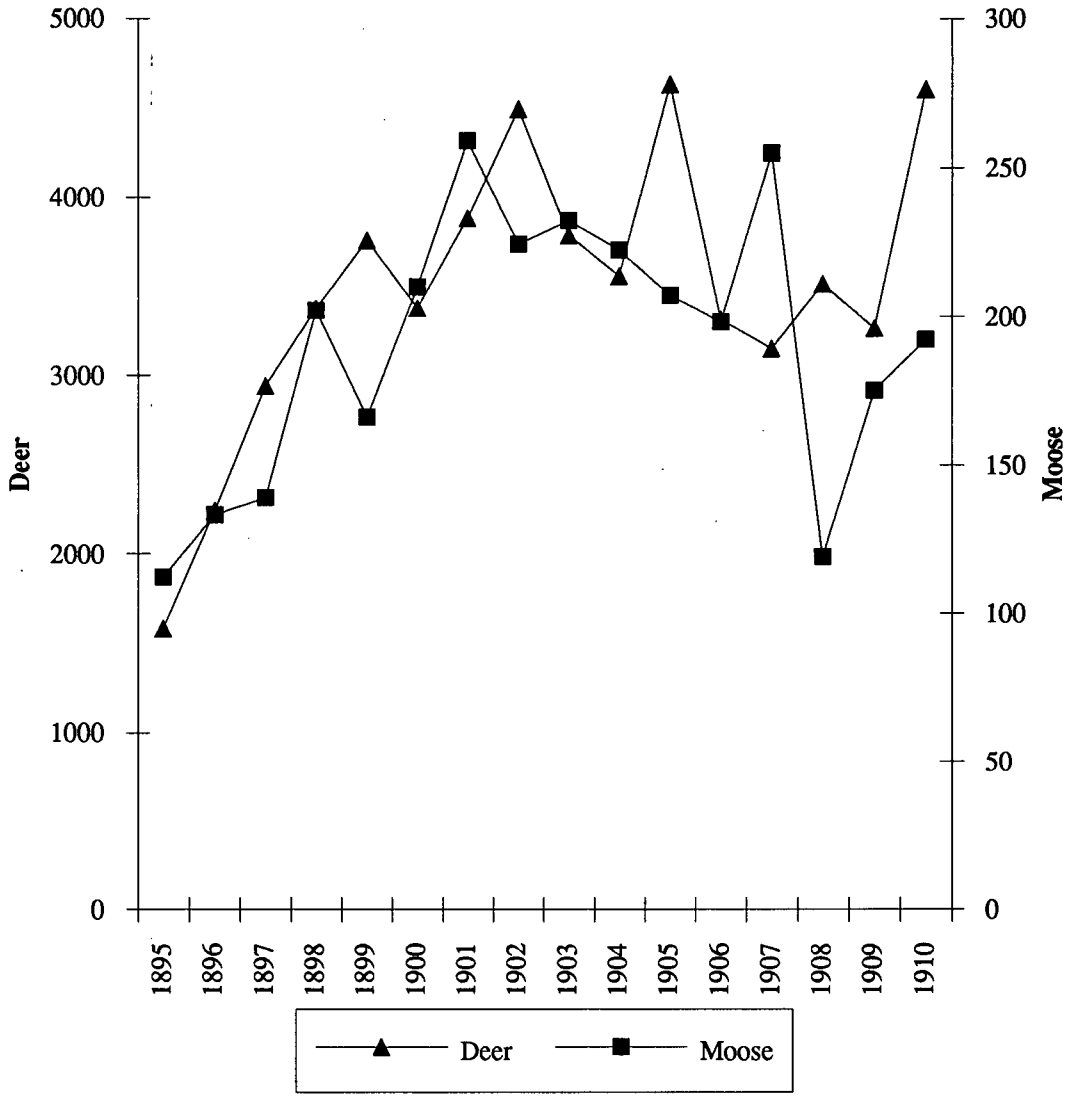
[127] J.A. Thompson, "Our Forests and Our Game" Bangor Daily Commercial 26 February 1901, 2.

[128] Will Atkins, "Letter" Maine Sportsman 14 (1906): 160. Also see, Harry B. Garrison, "Letter" Maine Sportsman 14 (1906): 160; "More Dead Deer" Maine Sportsman 12 (1905): 40; D.E. Haywood, "A Rangeley View" Maine Sportsman 14 (1907): 161, all quoted in Stanton, White-Tailed Deer in Maine, 50-52.

[129] Richard C. Lunt, Jones Tracey: Tall Tale Hero from Mount Desert Island (Orono: Northeast Folklore Society, Northeast Folklore, vol. X, 1968), 8-9.

[130] Prior to 1910 when the Commissioner of Fisheries and Game of the State of Maine began collecting annual statistics, estimates of the deer harvest, and by extension, the size of the deer herd itself, are approximate at best. Shipments of deer through Bangor declined nearly 35% between 1902 and 1904, despite the expansion of the deer into northern Aroostook county. "The Warden's Figures" The Maine Sportsman 12 (1905): 137.

Figure 8.1 Moose and Deer Shipped by Bangor & Aroostook Railroad, 1895-1910



Tourist promoters, railroad companies, and the state fish and game commissioners monitored this harvest closely. They kept their eyes fixed on the numbers of game shipped out-of-state as an indicator of the tourist dollars flowing into the state. But the expansion of deer populations in agricultural areas of southern Maine raised questions about where the wealth of the state should come from. Farmers believed that far from being an endangered asset, deer were a troublesome agricultural pest. Game laws challenged the farmer's "eminent domain powers over his lands." Farmers complained bitterly that they had been "[d]eaconed clean through" by game laws that protected deer at the expense of crops and the agricultural interests of Maine.[131] To make matters worse, an extravagant state government was charging them higher taxes to fund a conservation bureaucracy bent upon preserving the wilderness rather than civilizing it through agriculture and settlement. In 1903, the Maine State Grange resolved that "the State laws be so amended as to give farmers the right to defend their own property by killing wild animals trespassing on the same."[132] Obadiah Gardner, master of the Maine State Grange, explained:

> We claim that the State has no right to make game preserves of our farms and then rent them out to city sports over which to hunt at $15.00 per head. We believe that every man has a right to his own property and that all that grows or walks on it. If the State wishes to go into the wild animal business and keep a menagerie, let it confine them to its own wild lands. It has no right to make game preserves of our farms.[133]

With over fifty-five thousand members, the Grange was able to secure state compensation for fields damaged by marauding deer, but this was a rearguard action against the

---

[131] D.F. Hodges, "Deaconed Clean Through" Maine Farmer 8 December 1898. See also "Meeting of Waldo County Grange" Maine Farmer 10 November 1898. On this debate about private property rights and the game laws, see Tober, Who Owns the Wildlife, 119-33.

[132] Journal of Proceedings of the Maine State Grange (1903): 125.

[133] Lewiston Daily Journal quoted in Commissioner of Fisheries and Game of the State of Maine, Report (1904): 15. Maine's industrial land owners deployed similar arguments to resist higher property taxes. Louis C. Stearns, counsel for Great Northern Paper, complained that in addition to taxes, wildland owners were "subject to a present servitude that permits the whole pleasure loving and health seeking world to trespass upon [their land], as well as those who would gratify their savage instincts by the slaughter of the gentle creatures of God." "Bill to Get After Wild Land Owners Pummelled" Bangor Daily Commercial 19 February 1909, p. 2, 8.

advancing wave. Farmers had to share their lands with the wildlife, what E.M. Stilwell, Maine Fish and Game Commissioner, called the "seed corn" of the state's growing tourist industry.[134]

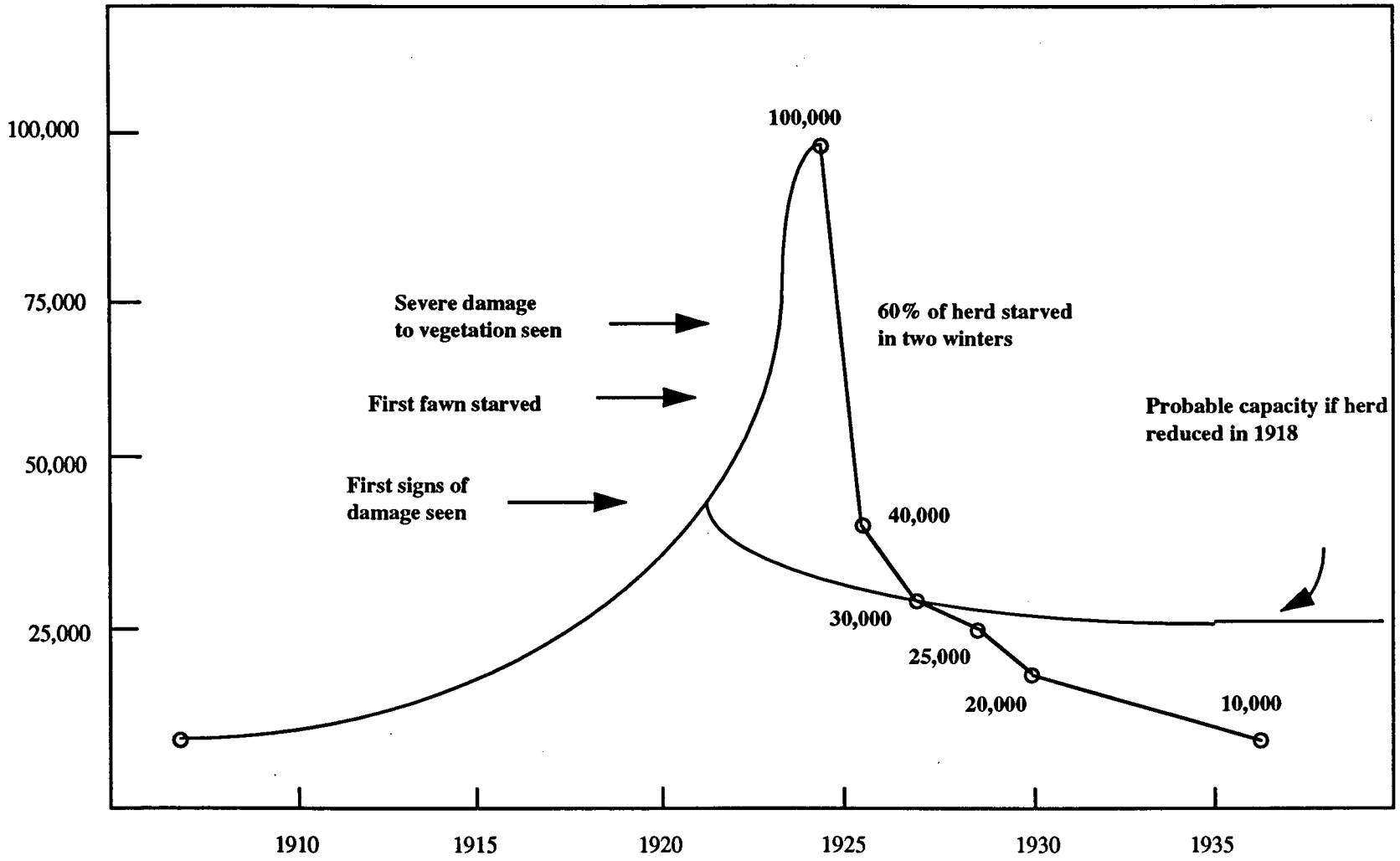
Facing rural resistance tourist promoters tried to prove the general value of the wildlife and of the new tourist economy. Appeals to aesthetics were important, but ultimately money provided the most compelling way to express the value of the game. Speakers from the railroad companies reminded Grange hall listeners that they owed good passenger service to the tourist traffic.[135] By order of the legislature, the Maine Bureau of Industrial and Labor Statistics studied the tourist industry. It estimated that summer visitors put twenty million dollars into circulation in the state, above and beyond what they paid in property taxes for their summer homes. Calling tourism "our greatest industry," the report concluded, "there is not a person in the State but who feels the effect in a financial way of the summer business of Maine. Everyone gets a share in the added prosperity whether he receives the money first hand or second."[136]

While this kind of appeal made for good politics, the language of money did not represent very well the interdependent relationships between different species and other actors in the Maine Woods. It was possible to put a price on the damage done to orchards by the deer desired by sportsmen, but fixing a dollar value on the other effects of game protection was much more difficult. If, as the Maine State Fish and Game Commissioners estimated, each deer were worth one hundred dollars, then how could the opportunity cost to the even more coveted caribou and moose be figured?[137] The price system presupposed

---

[134] "The Maine Deer Supply" Forest and Stream 40 (12 January 1893): 30. Grange membership numbers are from Journal of the Proceedings of the Maine State Grange (1907): 12. On the Grange in Maine, see S. Carleton Guptill, "The Grange in Maine from 1874-1940" (Ph.D. diss., Univ. Maine, 1972).
[135] Judd, "Reshaping Maine's Landscape," 186.
[136] Maine Bureau of Industrial and Labor Statistics, Report (1909): 222-23. This was also the conclusion of William MacDonald, "A State of Summer Resorts" The Nation 65 (19 August 1897): 146. Also see Maine Bureau of Industrial and Labor Statistics, Report (1893): 64-100.
[137] Commissioner of Fisheries and Game of the State of Maine, Report (1888): 5.

Figure 8.2 Effect of Removal of Predators on Deer Populations on Kaibab Plateau, Arizona



Source: W.C. Allee et al., Principles of Animal Ecology (1949): 706

exchangeable entities that could be abstracted and alienated from their surroundings.[138] Turn-of-the-century conservation policy in Maine was founded upon a similarly atomistic view of the wildlife and their environment. Game commissioners focused their efforts on protecting the deer without much thought to how larger deer populations would affect the relationships between deer, moose, caribou, predators, diseases, vegetation, settlers, and other actors in the Maine Woods. They soon discovered that the game could not easily be abstracted from these other actors on which their existence depended. Unless placated and co-opted, rural Mainers threatened to destroy the game. Caribou were done in by a brain worm parasite harbored by expanding white-tailed deer populations. Without predators, the deer herd and the forest undergrowth that sustained it seemed to become chronically unstable.

Faced with these fluctuations, mid-twentieth-century wildlife biologists began to wonder if "fewer wolves meant more deer" and if "no wolves would mean hunters' paradise." Seeing "every edible tree defoliated to the height of a saddlehorn," the ecologist Aldo Leopold "sensed that neither the wolf nor the mountain agreed with such a view." Armed with graphs such as FIGURE 8.2, showing the new scientific understanding of population dynamics, Leopold and his colleagues argued that predators were members of an ecosystem, a natural community from which they could not be abstracted without violent disruption to the entire community. Scientists urged a truce in the war on the wolves. Leopold wrote:

> I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades.

---

[138] This point is made by David Harvey, "The Nature of Environment: The Dialectics of Social and Environmental Change" Socialist Register (1993): 6.

> So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea.[139]

Such criticisms of environmental mismanagement shared much with the Progressives, who also worried about the effects of rampant commodification and commercialization. Saving the game for sport and manly recreation, like conserving the forests for watershed protection, had been about preserving devalued natural assets in the public interest. Leopold contended that predators, though reviled, actually served the public good.[140] But in other ways, he articulated a much more sweeping criticism of the narrow economism of American environmental practice and its tendency "to ignore, and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning." Leopold called for a new "land ethic" that "enlarges the boundaries of the community to include soils, waters, plants, and animals." Only by "thinking like a mountain" and taking into account "what is ethically and esthetically right, as well as what is economically expedient" would it be possible "to listen objectively to the howl of a wolf" and to know best how "to preserve the integrity, stability, and beauty of the biotic community."[141]

Recently, Leopold's call for a profound re-evaluation of nature has been taken up by environmentalists who see in his land ethic the possibility for spiritual and environmental redemption. Rejecting the shallow ecology of Progressive conservationists, anthropocentrics only concerned with nature insofar as it served "the health and affluence

---

[139] Leopold, A Sand County Almanac, 130-32. In the more measured prose of the Journal of Wildlife Management, Leopold concluded, "Since irruptions coincide both in time and space with greatly reduced predation ... and since they are not known to have occurred in the presence of these predators, there is a strong presumption that over-control of these predators is a pre-disposing cause." Leopold et al., "Over-Populated Deer Ranges," 176.

[140] On Leopold's struggle to promote the value predators in maintaining the deer herd in Wisconsin, see Susan L. Flader, Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests (Columbia: Univ. Missouri Press, 1974), 209-17.

[141] Leopold, A Sand County Almanac, 214, 204, 224, 129, 224-25.

of people in the developed countries," Arne Naess and other so-called deep ecologists celebrate the potential for a new way of life founded on "biospherical egalitarianism" and an ecocentric respect for the rights, interests, and intrinsic values of the entire biospheric community.[142]

But the story of the sportsmen and the forests of their desires suggests the impossibility of this noble dream of "thinking like a mountain." Like Leopold and today's deep ecologists, turn-of-the-century sportsmen also imagined themselves leaving behind a degraded civilization and striking out for the heart of wildest nature. Like them also, sportsmen decried the commodification of the wildlife that was degrading and destroying wilderness and the wildlife. But try as they may, they found it impossible to reach a realm of pure nature. To protect the "wild forests" of Maine, sportsmen represented its value as "a vast fund for man to draw on, a fund of all that is precious to health and recreation."[143] Its dollar value offered one of the most powerful arguments for its preservation. This should come as no surprise. Money is the language both of everyday reproduction and of power in capitalist society. For all of the problems presented by the commodification of wildlife and of what we call nature, money offers the only widely accepted means of reducing the world's many different products, uses, desires, and needs to a single common denominator of value. Pricing the public benefits of saving the game for sport made those benefits visible and galvanized support for conservation, but it also abstracted the deer from all of the relationships that sustained them. It radically discounted the stakes of other actors in productions of the Maine Woods. And so while the colonizing power of the commodity was the chief nemesis of conservationists, the sign of the dollar they found so objectionable proved indispensable to their work. To reject the language of money was to eschew the language of political power. To give their representations of the Maine Woods any purchase at all, conservationists had to figure them in terms of dollars and cents. As a

---

[142] Arne Naess, "The Shallow and the Deep, Long-Range Ecology Movement" Inquiry 16 (1973): 95, 96.
[143] Hubbard, Woods and Lakes of Maine, 9.

result, this natural resort from the cares of business quickly became a business in itself, as Maine was restructured and represented to be Vacationland

These dilemmas are not unique to the Maine Woods of a century ago. Even that celebrated ecocentric thinker Aldo Leopold found it difficult to represent the value of nature without appealing to the metaphorics of money and the comparison of nature to "a slowly augmented fund of life."[144] Leopold, at least, acknowledged the necessity of working within that which he opposed. Recognizing the impossibility and violence of an imagined return to the primitive ("liv[ing] on locusts in the wilderness"), he counseled:

> The other [choice] is surreptitiously to set up within the economic juggernaut certain new cogs and wheels whereby residual love of nature, inherent even in 'Rotarians,' may be made to recreate at least a fraction of those values which their love of 'progress' is destroying. A briefer way to put it is: if we want Mr. Babbitt to rebuild outdoor America, we must let him use the same tools wherewith he destroyed it. He knows no other.[145]

Contemporary deep ecologists are more confident in their ability to slip free from the bonds of cultural and economic practice to represent the intrinsic value nature "ecocentrically," without regard to the bottom line. Roderick Nash, for instance, insists human societies must recognize and respect the "rights of nature."[146] Other deep ecologists dispute exactly how far and in what manner these rights should be extended so as to encompass the entire biospheric community, but they firmly uphold the possibility, indeed

---

[144] Leopold, A Sand County Almanac, 216. Elsewhere his reliance on economic metaphors is even more explicit: "Artificialized management has, in effect, bought fishing at the expense of another and perhaps higher recreation; it has paid dividends to one citizen out of capital stock belonging to all. The same kind of biological wildcatting prevails in game management. In Europe, where wild-crop statistics are available for long periods, we know the 'rate of exchange' of game for predators. Thus, in Saxony one hawk is killed for each seven game birds bagged, and one predator of some kind for each three head of small game." Leopold, A Sand County Almanac, 170.

[145] Aldo Leopold, "Game and Wild Life Conservation" in River and Other Essays, 165-66 quoted in Oelschlaeger, Idea of Wilderness, 217.

[146] Roderick Nash, The Rights of Nature: A History of Environmental Ethics (Madison: Univ. Wisconsin Press, 1989).

the necessity, of ecocentric ethics.[147] Yet their reliance upon the liberal discourse of political rights suggests that their values of nature are social constructions, not inherent "properties of the system."[148] The emphasis in deep ecology on diversity and harmony in the biospheric community echoes the Founding Fathers' dream for the United States as an organic body politic: *e pluribus unum.* Such values are no more natural or any less artificial than the violent savagery and essential masculinity that turn-of-the-century sportsmen hoped to recreate through their encounters with wilderness. Even that most sacred of deep ecology icons, the biosphere, is the view from orbit of an endangered Mother Earth, made possible, like the metaphor of eco-system itself, by the military-industrial complex and the greatest technological triumphs of Cold War science.[149] Far from speaking ecocentrically of something purely natural, deep ecologists have produced the biosphere as a material abstraction that displaces other productions of what we call nature and society.

Representing nature and speaking for it is necessarily also a speaking of nature and an enframing, or construction of it. Nature, as Donna Haraway insists, is a boundary project, made in both fact and fiction, not a pre-existing entity "with boundaries already established and awaiting the right kind of instrument to note [it] correctly."[150] This is not to say that people are free to make "Nature" any way they choose. Marx's observation, "people make their own history but not in conditions of their own choosing," surely applies now as it did a century and a half ago. Conservationists struggling to save the game for sport had to contend with other, independent agencies: deer, moose, caribou, predators, diseases, vegetation, fires, settlers, and so on. The Maine Woods was a co-construction, produced by many different actors, not all of them human, or even organic. Though its properties are difficult to deny, they are always framed and brought into presence

---

147 For an introduction to deep ecology, see Alan Drengson and Yuichi Inoue, eds., The Deep Ecology Movement: An Introductory Anthology (Berkeley: North Atlantic Books, 1995).
148 Holmes Rolston III, "Is There an Ecological Ethic?" in Philosophy Gone Wild: Essays in Environmental Ethics (Buffalo: Prometheus Books, 1986), 20, 12-29.
149 On the connections between this rise of ecology and the Cold War, see J.B. Hagen, An Entangled Bank: The Origins of Ecosystem Ecology (New Brunswick: Rutgers Univ. Press, 1992).
150 Haraway, "Promises of Monsters," 298.

culturally. Such constructions matter, because representing nature has also always been about representing society and policing *its* boundaries. The deep ecologists' "intrinsic" properties of the biosphere justify drastic reductions in human populations. The Native Americans who complained in the 1720's to colonial authorities about the scarcity of fish and game in the Maine Woods would undoubtedly have attributed the problems of wildlife depletion to a very different set of actors than those named by the Maine State Commissioners of Fish and Game in the 1920's.[151] To save the game from extinction, conservationists called for the institution of game laws and the criminalization of traditional lifeways in the Maine Woods. The sportsman's Maine Woods served as mirror for defining the masculine self and articulating racial, class, and sexual anxieties that left little space in gilded age America for others. While this was never the only thing that Maine Woods was about, responsible representation requires coming to terms with the violence of these displacements.

---

[151] See, for example, Augaummowett at "Conference with the Eastern Indians at the Further Ratification of Peace... Casco Bay, July 1727" Collections of the Maine Historical Society 3 (1853): 430; "Conference with Polin & Indians of Presumscott, 10 August 1739," in J.P. Baxter, editor Documentary History of the State of Maine (Portland: Maine Historical Society, 1916), XXIII: 259-60.

Postscript

At the turn of the last century, the Maine Woods was re-constructed and represented as an object of scientific conservation. The image of the forest as a finite and rapidly depleting *quantity* provided the grounds for the institution of scientific forestry to conserve it as a natural resource for human exploitation. At the same time, however, the rapid pace of urbanization and industrial development gave rise to fears about alienation from nature and to an understanding of the Maine Woods as a primeval wilderness and a place of recreation and spiritual renewal to be preserved and protected. In this thesis, I have tried to explore these representations of the Maine Woods and the stakes in their construction.

These older images of the forest, as renewable natural resource and as wilderness refuge, continue to organize the ways in which the Maine Woods is framed as an object and thus the range of practices that can be applied to conserve it. The clothing may now be Gore-tex rather canvas and the controversies clear-cutting and biodiversity rather than, as a century ago, timber famine and game laws, but in many ways the picture of the forest remains much as it was before. It is not my purpose here to chart the contours of contemporary environmental thinking in any detail-- that is a subject for future research-- but it does seem appropriate to conclude this thesis by indicating, in at least a cursory way, some of these continuities.

Endorsing the proposed ban on clear-cutting so as to put "the forest in balance as a natural system" and insure we "will be living off the growth, not undermining the capital," Ban ClearCuts spokesperson Jonathan Carter invokes a metaphor familiar to turn-of-the-century foresters like Austin Cary and Gifford Pinchot, whose practice of forestry Carter

and the Maine Greens otherwise condemn as shallow ecology.[1] The paper companies dispute this dim assessment of their forest practice and thus the necessity of government regulation of private property. They appeal, as before, to the numbers and to science as proof of the sustainability of their multiple-use forest management. But their critics are unmoved. RESTORE, an environmental group leading the charge for a Maine Woods National Park, argues that only government ownership and a federal buy-out of the forest will "safeguard the land for the public benefit."[2] Fernow and other turn-of-the-century critics of private forestry would have applauded a government take-over of the Maine Woods, even if their vision of the public interests endangered by the institution of private property was somewhat different from that of RESTORE and most contemporary environmentalists.

Still, the RESTORE proposal for a Maine Woods National Park to protect the wilderness value of the Maine Woods is not unprecedented. It relies upon many of the same tropes used by late nineteenth-century game law proponents to justify the criminalization of traditional lifeways in order to save the wildlife for sport:

> The Maine Woods National Park captures the essence of the legendary North Woods. This is a place of towering white pines, mossy spruces, and delicate orchids; of free-flowing rivers and clear lakes and of rugged mountains and spectacular canyons. It is a place where bald eagles, wolves, Atlantic salmon, and other wildlife thrive in a healthy natural environment. It is a remote wildland that offers solitude and spiritual renewal to civilization-weary people. And the Park is an immense 'time capsule' that preserves irreplaceable parts of our cultural heritage. It is truly an American 'crown jewel.'[3]

---

[1] Quoted in Andrew Kekacs, "Vote to Ban Clear-Cutting Sought" Bangor Daily News 16 November 1995.
[2] Jym St. Pierre and Michael Kellet, "Maine Woods National Park: Questions and Answers" RESTORE: The North Woods 4 (April 1996): 5.
[3] RESTORE, Maine Woods: Proposed National Park & Preserve, A Vision of What Could Be (Augusta, 1994), n.p.

National park opponents reject state, and especially federal, intervention in the Maine Woods. Many local people complain that the park initiative, like the proposed clear-cutting ban, will destroy their livelihood in the woods, turning the forest into a playground for out-of-staters and leaving them with nothing to do but cater to the tourists in low-paying, seasonal, service sector jobs.

Familiar as these controversies may seem from the long history of conservation debate in Maine, it is important to recognize there are also some significant differences between past and present. Although metropolitan elites continue to appropriate the Maine Woods as a wilderness space in which to find and recreate some essential part of themselves, they now seek this therapeutic experience through hiking and climbing, activities much less heavily freighted with masculine and sexual overtones than the hunting and fishing of two generations ago. Still, traces remain. Those who prescribe wilderness therapy as a way for women to develop independence, self-reliance, and self-esteem must remember the historically masculinist valences of these values in American gun culture.[4]

Science and scientific knowledge also play a different role now. The scientific language of ecology -- sustainability, carrying capacity, and ecosystem-- has seeped out into the public sphere to become part of popular understandings of the environment and its conservation. Though certainly changed in the process, this scientific terminology lends some of the cultural authority of science to an older, romantic instinct to conserve the forest primeval. As a result, it is much more difficult for foresters to dismiss as irrational or unscientific the complaints of environmental activists and ordinary citizens who claim that the technical practices of forestry, once the domain of a few certified experts, are ecologically unsound. At the same time, however, criticism of scientific objectivity claims has complicated efforts to determine who and what qualify as real knowledge about the environment. Many of these ideas are academic, and there are serious tensions between the

---

[4] Such historical sensitivity is remarkably in absent in Ellen Cole, Eve Erdman, and Esther D. Rothblum, Wilderness Therapy for Women: The Power of Adventure (Binghampton: Haworth Press Inc., 1994).

abstraction of social theory and the demands of everyday practice and politics. But they tap a widespread and deep-seated unease about modern science and technology. They lend support to those who reject altogether the over-arching ambition of science to know and thus to control the natural world. Deep ecologists and many of the environmentalists supporting the present clear-cutting ban hope to break free from this sordid past. Yet their dreams of an essential wilderness, like the debate about whether the object of forest conservation should be protecting ecological or economic values, are internal to the discourse of conservation itself. They take place within the clearing first exposed a century ago as the rapid pace of economic development created anxieties about the depletion of resources and the disappearance of nature.

Bibliography

I. ARCHIVAL

Camp Caribou Journal. Unpublished diary in my possession.

Carlisle, George T. and Shatney, T. Frank. Report on a Logging Operation in Northern Maine. Unpublished mss., University of Maine Library, Orono, Maine.

Cary, Austin. Papers. University of Maine Library, Orono, Maine.

Commissioner of Fish and Game. Moose warden returns. 2112-0203, Maine State Archives, Augusta, Maine.

Gilbert, Fred. Papers. University of Maine Library, Orono, Maine.

Great Northern Paper Company. Papers. University of Maine Library, Orono, Maine.

Massachusetts Archives. Archives Division, microfilm, Boston, Massachusetts, reel I.

Parmanchenee Club. Papers. Maine State Museum. Augusta, Maine.

Peirce Family. Papers. Papers. University of Maine Library, Orono, Maine.

Prentiss and Carlisle Company. Papers. University of Maine Library, Orono, Maine.

U.S. Forest Service. Correspondence with Austin Cary, RG 95. U.S. National Archives microfilm, Washington, DC.

U.S. Forest Service. Correspondence with W.C. Hodge, RG 95. U.S. National Archives microfilm, Washington, DC.

II. NEWSPAPERS AND PERIODICALS

American Forests

Aroostook Times

Backpacker: The Magazine of Wilderness Travel

Bangor Daily Commercial

Bangor Daily News

Bangor Daily Whig and Courier

Bangor Industrial Journal (various titles)

Eastern Argus (Portland, ME)

EcoTraveler

Forest and Stream

Forestry and Irrigation

In the Maine Woods

Journal of Forestry

Journal of Proceedings of the Maine State Grange

The Lumberman's Review

Machias Union

Maine Farmer

Maine Sportsman

New York Lumber Trade Journal

New York Times

Oxford Democrat

Paper Trade Journal

Phillips Phonograph

III. ANNUAL REPORTS

Acts and Resolves of the State of Maine

Commissioner of Fisheries and Game of the State of Maine, Report

International Paper Company, Annual Report

Maine Board of Agriclture, Report

Maine Bureau of Industrial and Labor Statistics, Report

Maine Forest Commissioner, Report

Maine Sportsmen's Fish and Game Association, Report

New Hampshire Forest Commission, Report

Society for the Protection of New Hampshire Forests, Report

U.S. Department of Agriculture, Report

U.S. Forest Service, Report

U.S. Secretary of the Interior, Annual Report

IV. PUBLISHED REFERENCES

Abelove, Henry. From Thoreau to Queer Politics Yale Journal of Criticism 6 (1993): 17-27.

Akrich, Madeleine and Latour, Bruno. A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies. In Bejker, W. E. and Law, J., editors, Shaping Technology/Building Society: Studies in Sociotechnical Change (Cambridge: MIT Press, 1992), 259-64.

Aldous, C.M. and Mendall, H.L. The Status of Big Game and Fur Animals in Maine (Orono: Maine Cooperative Wildlife Research Unit, 1941).

Allee, W.C., Emerson, Alfred E., Park, Orlando, Park, Thomas, and Schmidt, Karl P. Principles of Animal Ecology (Philadelphia: W.B. Saunders Co., 1949).

Allen, David E. The Naturalist in Britain: A Social History (London: Allen Lane, 1976).

Alphandéry, Pierre, Bitoun, Pierre, and Yves Dupont, L'équivoque écologique (Paris: La Decouverte, 1991).

Anonymous. American Forestry The Nation 28 (30 January 1879): 87-88.

----- Notice of Walker's Statistical Atlas of the United States American Journal of Science and Arts 3d ser 9 (January 1875): 74-75.

----- The Proposed Reform in Our Land and Scientific Surveys The Nation 28 (9 January 1879): 27-28.

----- Our Forest Balance Sheet Nation 84 (9 May 1907): 425-26.

Anderson, Kay and Gale, Faye. Introduction. In Anderson, K. and Gale, F., editors, Inventing Places: Studies in Cultural Geography (Melbourne: Longman Chesire, 1992).

Anderson, Margo J. The American Census: A Social History (New Haven: Yale University Press, 1988)

Ashmore, Malcolm. The Reflexive Thesis: Wrighting Sociology of Scientific Knowledge (Chicago: Chicago University Press, 1989).

Barker, Captain F.C. Lake and Forest as I Have Known Them (Boston: Lothrop, Lee, & Shepard Co., 1903).

Barnes, Barry. Scientific Knowledge and Sociological Theory (London: Routledge and Kegan Paul, 1974).

----- Interests and the Growth of Knowledge (London: Routledge and Kegan Paul, 1977).

----- T.S. Kuhn and Social Science (London: Macmillan, 1982).

----- Social Life as Bootstrapped Induction Sociology 17 (1983): 524-45.

Barnes, Trevor. Whatever Happened to the Philosophy of Science? Environment and Planning A 25 (1993): 301-304.

----- Five Ways to Leave Your Critic: A Sociological Scientific Experiment in Replying. Environment and Planning A 26 (1994): 1653-58.

----- Probable Writing: Derrida, Deconstruction, and the Quantitative Revolution in Human Geography Environment and Planning A 26 (1994): 1021-40.

----- Logics of Dislocation: Fragmented Stories for Economic Geographers (New York: Guilford, 1995).

Barnes, Trevor J. and Duncan, James S. Introduction: Writing Worlds. In Barnes, T.J. and Duncan, J.S., editors, Writing Worlds: Discourse, Text, and Metaphor in the Representation of Landscape New York: Routledge, 1992), 1-17.

Bassett, Keith. Whatever Happened to the Philosophy of Science?: Some Comments on Barnes Environment and Planning A 26 (1994): 337-42.

Baudrillard, Jean. In the Shadow of the Silent Majorities or, the End of the Social, trans. Foss, P., Johnston, J., and Patton, P. (New York: Semiotext(e), New York, 1983).

Baxter, Percival P. Mount Katahdin State Park, An Address Given ... at the Annual Meeting of the Maine Sportsmen's Fish and Game Association (Augusta: Maine Senate, 1921).

Balfour, J.H. Botany and Religion (Edinburgh, 1859).

Beck, Lewis C. On the Geographical Botany of the United States Transactions of the Albany Institute 1 (1830): 10-21.

Bederman, Gail. Manliness and Civilization: A Cultural History of Gender and Race in the United States (Chicago: University of Chicago Press, 1995).

Beech, Christopher. Pulpwood Province and Paper State: Corporate Reconstruction, Underdevelopment, and Law in New Brunswick and Maine, 1890-1930 (Ph.D. diss. University of Maine, 1991).

Behan, Richard W. Political Popularity and Conceptual Nonsense: The Strange Case of Sustained-Yield Forestry Environmental Law 8 (1978): 209-342.

Bennett, Jane. Thoreau's Nature: Ethics, Politics, and the Wild (Thousand Oaks, CA: Sage Publications, 1994).

Benson, Maxine. Martha Maxwell: Rocky Mountain Naturalist (Lincoln: University of Nebraska Press, 1984).

Berger, Carl Science, God, and Nature in Victorian Canada (Toronto: University Toronto Press, 1983).

Bernstein, Richard J. Beyond Objectivism and Relativism: Science, Hermeneutics, and Praxis (Philadelphia: University of Pennsylvania Press, 1983).

Bevan, Jonquil. Izaak Walton's *The Compleat Angler:* The Art of Recreation (Brighton, UK: Harvester Press, 1988).

Bigelow, Jacob Inaugural Address, delivered in the Chapel at Cambridge North American Review 4 (1816-17): 273.

Bird, Elizabeth Ann R. The Social Construction of Nature: Theoretical Approaches to the History of Environmental Problems Environmental Review 11 (1987): 255-64.

Bix, Herbert P. Peasant Protest in Japan, 1590-1884 (New Haven: Yale University Press, 1986).

Blakemore, Michael. Choropleth Map. In Johnston, R.J., Gregory, D. and D.M. Smith, editors, Dictionary of Human Geography (3rd ed. Oxford: Blackwell, 1994), 65-66.

Bloor, David. Knowledge and Social Imagery (London: Routledge and Kegan Paul, 1976).

----- Wittgenstein: A Social Theory of Knowledge (New York: Columbia University Press, 1983).

Boardman, William. The Lovers of the Woods (New York: McClure & Phillips, 1901).

Bondi, Liz. Gender Symbols and Urban Landscapes. Progress in Human Geography 16 (1992): 157-70.

Bonnifield, Paul. The Dust Bowl: Men, Dirt, and Depression (Albuquerque: University of New Mexico Press, 1979).

Botkin, Daniel B. Discordant Harmonies: A New Ecology for the Twenty-First Century (New York: Oxford University Press, 1990).

Bowden, Martyn J. The Great American Desert and the American Frontier, 1800-1880: Popular Images of the Plains and Places in the Westward Movement. In Hareven, T. K., editor, Anonymous Americans: Explorations in Nineteenth Century Social History (Englewood Cliffs, NJ: Prentice-Hall, 1971), 48-79.

Bowler, Peter J. The Norton History of the Environmental Sciences (New York: Norton, 1993).

Bowyer, R. Terry, Shea, Martin E. and McKenna, Sean A. The Role of Winter Severity and Population Density in Regulating Northern Populataions of Deer. In, J.A. Bissonette, J.A., editor, Is Good Forestry Good Wildlife Management? (Orono: Maine Agricultural Experiment Station, Misc. publication 689, 1986), 193-204.

Boynton, Mia. A Gift of Native Knowledge: The History of Russell's Motor Camps in Rangeley, Maine. In Ives, E.D., editor, Motor Camps and Maine Guides: Two Studies (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVIII, 1989), 1-65.

Bramwell, Anna. Ecology in the 20th Century: A History (New Haven: Yale University Press, 1989).

Brewer, William H. The Woodland and Forest Systems of the United States. In Walker, F.A., editor, A Statistical Atlas of the United States, Based on Results of the Ninth Census (Washington, 1874).

Bridgman, Richard. Dark Thoreau (Lincoln: University of Nebraska Press, 1982).

British Columbia Ministry of Forests. Variable Density Yields for Coastal Douglas Fir (Victoria, 1982).

Brown, Dona. Inventing New England: Regional Tourism in the Nineteenth Century (Washington: Smithsonian Institution Press, 1995).

Browne, Janet. The Secular Ark: Studies in the History of Biogeography (New Haven: Yale University Press, 1983).

Brown, Michael. Ironies of Distance: An Ongoing Critique of the Geographies of AIDS Environment & Planning D: Society and Space 13 (1995): 159-83.

Boy Scouts of America. Handbook for Boys (Rev. ed. New York, 1927).

Buck-Morss, Susan. Envisioning Capital: Political Economy on Display Critical Inquiry 21 (1995): 434-67.

Butler, Judith. Bodies That Matter (New York: Routledge, 1993).

Callon, Michel. Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieux Bay. In Law, J., editor, Power, Action, and Belief: A New Sociology of Knowledge? (London: Routledge, 1986), 196-229.

Cannon, Susan Faye. Science in Culture: The Early Victorian Period (New York: Science History Publications, 1978).

Carnes, Mark C. and Griffen, Clyde, editors. Meanings for Manhood: Constructions of Masculinity in Victorian America (Chicago: University of Chicago Press, 1990).

Cary, Austin. On the Growth of Spruce. In Maine Forest Commissioner, Report (1894): 20-36.

----- The Forests of Maine Paper Trade Journal 25 (25 April 1896): 364-65.

----- Spruce on the Kennebec and Androscoggin Rivers. In Maine Forest Commissioner, Report (1896): 15-203.

----- How to Apply Forestry to Spruce Lands Paper Trade Journal 27 (11 February 1898): 157-62

----- Topographical and Timber Maps. In Maine Forest Commissioner, Report (1902): 142-49.

----- Management of Pulp Wood Forests: The System of Forestry Practiced by the Berlin Mills Company. In Maine Forest Commissioner, Report (1902): 127-30.

----- An Example in Practical Forestry Paper Trade Journal 45 (9 January 1908): 40-46.

----- A Manual for Northern Woodsman (2nd ed. Cambridge: Harvard University Press, 1911).

----- How Lumbermen in Following Their Own Interests Have Served the Public Journal of Forestry 15 (1917): 271-89.

----- Forty Years of Forest Use in Maine Journal of Forestry 33 (1935): 366-72.

Cassedy, James. Demography in Early America: Beginnings of the Statistical Mind (Cambridge: Harvard University Press, 1969).

-----, American Medicine and Statistical Thinking, 1800-1860 (Cambridge: Harvard University Press, 1984).

Castree, Noel. Monstrous Promises for Geography? Power and the Production of the Genetic Body (Paper presented at the annual conference of the American Association of Geographers, Chicago, IL, 1995).

----- . The Nature of Produced Nature: Materiality and Knowledge Construction in Marxism Antipode 27 (1995): 12-48.

Cherret, J.M., editors, Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World (Boston: Blackwell, 1989).

Chisholm, Hugh J. History of Papermaking in Maine and the Future of the Industry. In Bureau of Industrial and Labor Statistics for the State of Maine, Report (1906): 161-69.

Citizens for a Healthy Forest and Economy. Information About The Green Party's Drastic Forestry Ban (n.p., 1996).

Clark, Christopher. The Roots of Rural Capitalism: Western Massachusetts, 1780-1860 (Ithaca: Cornell University Press, 1990).

Clawson, Marion. Forests in the Long Sweep of American History Science 204 (15 June 1979): 1168-74.

Clements, Frederick E. Plant Succession: An Analysis of the Development of Vegetation (Washington: Carnegie Institution, 1916).

Clifford, Fred H. 1902. In Pine-Tree Jungles: A Handbook for Sportsmen and Campers in the Great Maine Woods Bangor: Bangor & Aroostook Railroad, 1902.

----- 1903. Haunts of the Hunted Bangor: Bangor & Aroostook Railroad.

Clifford, James. The Predicament of Culture: Twentieth-Century Ethnography, Literature, and Art (Cambridge: Harvard University Press, 1988).

Cohen, Patricia C. Calculating People: The Spread of Numeracy in Early America (Chicago: University of Chicago Press, 1982).

Cole, Ellen, Erdman, Eve, and Rothblum, Esther D. Wilderness Therapy for Women: The Power of Adventure (Binghampton: Haworth Press Inc., 1994).

Collins, Harry M. The Sociology of Scientific Knowledge: Studies of Contemporary Science. Annual Review of Sociology 9 (1983): 265-85.

----- Changing Order: Replication and Induction in Scientific Practice (London: Sage Publications, 1985).

Collins, Harry M. and Pinch, Trevor. The Golem: What Everybody Should Know About Science (Cambridge: Cambridge University Press, 1993).

Collins, Harry M. and Yearley Steven. Epistemological Chicken. In Pickering A., editor, Science as Culture and Practice (Chicago: University of Chicago Press, 1992), 301-26.

Collins, Harry M. and Yearley Steven. Journey into Space. In Pickering A., editor, Science as Culture and Practice Chicago: University of Chicago Press, 1992), 369-89.

Colwell, Robert K. What's New? Community Ecology Discovers Biology. In Price, P.W., Slobodchikoff, C.N., and W.S. Gaud, editors, A New Ecology: Novel Approaches to Interactive Systems (New York: Wiley, 1984), 387-96.

Conference with the Eastern Indians at the Further Ratification of Peace... Casco Bay, July 1727. Collections of the Maine Historical Society 3 (1853): 407-47.

Conference with Polin & Indians of Presumscott, 10 August 1739. In Baxter, J.P., editor Documentary History of the State of Maine (Portland: Maine Historical Society, 1916), XXIII: 259-60.

Connell, R.W. The Big Picture: Masculinities in Recent World History Theory and Society 22 (1993): 597-623.

Coolidge, Philip T. History of the Maine Woods (Bangor: Furbish-Roberts Printing Co., 1963).

Cooper, J.G. On the Distribution of the Forests and Trees of North America Annual Report of the Board of Regents of the Smithsonian Institution (1858): 246-80.

Cosgrove, Denis. Place, Landscape, and the Dialectics of Cultural Geography Canadian Geographer 22 (1978): 66-72.

----- Social Formation and Symbolic Landscape (London: Croom Helm, 1984).

----- Prospect, Perspective and the Evolution of the Landscape Idea Transactions of the Institute of British Geographers 10 (1985): 45-62.

----- Environmental Thought and Action: Pre-Modern and Post-Modern Transactions of the Institute of British Geographers 15 (1990): 344-58.

----- Commentary Annals of the Association of American Geographers 83 (1993): 515-16.

----- The Palladian Landscape: Geographical Change and Its Cultural Representations in Sixteenth Century Italy (Leicester: Leicester University Press, 1993).

Cosgrove, Denis and Daniels, Stephen. Fieldwork as Theatre Journal of Geography in Higher Education 13 (1989): 169-83.

Cosgrove, Denis and Domosh, Mona. Author and Authority: Writing the New Cultural Geography. In Duncan, J. and Ley, D., editors, Place/culture/representation (London: Routledge, 1993), 25-38.

Cosgrove, Denis and Jackson, Peter. New Directions in Cultural Geography. Area 19 (1987): 95-101.

Craft, Christopher. Another Kind of Love: Male Homosexual Desire in English Discourse, 1850-1920 (Berkeley: University California Press, 1994)

Crapanzano, Vincent. Hermes' Dilemma: The Masking of Subversion in Ethnographic Description. In Clifford, J. and Marcus, G.E., editors, Writing Culture: The Poetics of Ethnography Berkeley: University of California Press, 1986), 51-76.

Crawford, Hewlette. Wildlife Habitat Management and Changing Forest Practices in the Northeast Northern Journal of Applied Forestry 1 (1984): 12-14.

Crawford, Hewlette S., Lautenschlager, R.A., Stokes, Martin R. and Stone,Timothy L. Effects of Forest Disturbance and Soil Depth on Digestible Energy for Moose and White-Tailed Deer (Radnor, PA: Northeastern Forest Experiment Station, Res. Paper NE-682, 1993).

Cronon, William. Changes in the Land: Indians, Colonists, and the Ecology of New England (New York: Hill and Wang, 1983).

----- Modes of Prophecy and Production: Placing Nature in History. Journal of American History 76 (1990): 1122-31.

----- Nature's Metropolis: Chicago and the Great West (New York: Norton, 1991).

----- A Place for Stories: Nature, History, and Narrative. Journal of American History 78 (1992): 1347-76.

----- Cutting Loose or Running Aground Journal of Historical Geography 20 (1994): 38-43.

----- The Trouble with Wilderness; or, Getting Back to the Wrong Nature. In Cronon, W., editor, Uncommon Ground: Toward Reinventing Nature (New York: W.W. Norton, 1995), 69-90.

Crosby, Alfred W. The Columbian Exchange: Biological and Cultural Consequences of 1492. (Westport, CT: Greenwood Publishing Co. 1972).

----- Ecological Imperialism: The Biological Expansion of Europe, 900-1900 (New York: Cambridge University Press, 1986).

----- An Enthusiastic Second. Journal of American History 76 (1990): 1107-10.

Cullen, Michael F. The Statistical Movement in Early Victorian Britain: The Foundations of Empirical Social Research (New York: Barnes & Noble, 1975).

Culotta, C. A. German Biophysics, Objective Knowledge, and Romanticism Historical Studies in the Physical Sciences 4 (1975): 3-38

Dabakis, Melissa. Douglas Tilden's *Mechanics Fountain:* Labor and the 'Crisis of Masculinity' in the 1890's American Quarterly 47 (1995): 204-235

Daniels, Stephen. The Political Iconography of Woodland in Later Georgian England. In Cosgrove, D. and Daniels, S., editors, The Iconography of Landscape (New York: Cambridge University Press, 1988), 43-82.

----- Marxism, Culture, and the Duplicity of Landscape. In Peet, R. and Thrift, N., editors, New Models in Geography: The Political Economy Perspective (London: Unwin Hyman, 1989), II: 196-220.

----- Fields of Vision: Landscape Imagery and National Identity in England and the United States (Cambridge: Polity Press, 1993).

Daniels, Stephen and Cosgrove, Denis. Introduction: Iconography and Landscape. In Cosgrove, D. and Daniels, S., editors, The Iconography of Landscape. (New York: Cambridge University Press, 1988), 1-10.

Daniels, Stephen and Cosgrove, Denis. Spectacle and Text: Landscape Metaphors in Cultural Geography. In Duncan, J. and Ley, D., editors, Place/culture/ representation (London: Routledge, 1993), 57-77.

Darby, H.C. On the Relations of Geography and History Transactions of the Institute of British Geographers 19 (1953): 1-11.

Day, Holman. King Spruce: A Novel (New York: A.L. Burt & Co., 1908).

----- The Rider of the King Log (New York: A.L. Burt & Co., 1919).

Dean, Warren. Brazil and the Struggle for Rubber: A Study in Environmental History (New York: Cambridge University Press, 1987).

Dear, Michael. The Post-Modern Challenge: Reconstructing Human Geography Transactions of the Institute of British Geographers 13 (1988): 262-74.

Defebaugh, James E. History of the Lumber Industry of America (Chicago: American Lumberman, 1906), 2 vols.

Dellamora, Richard. Masculine Desire: The Politics of Victorian Aestheticism (Chapel Hill: University North Carolina Press, 1990).

Demeritt, David. The Effects of Volcanic Eruptions on Surface Temperatures in Northeastern North America, 1800-1978 (unpubl. M.Sc. thesis, Institute for Quaternary Studies, University of Maine, 1990).

----- Agriculture, Climate, and Cultural Adaptation in the Prehistoric Northeast. Archaeology of Eastern North America 19 (1991): 183-202.

-----Boards, Barrels, and Boxshooks: The Nineteenth Century Economics of Downeast Lumber in Cuba Forest and Conservation History 35 (1991): 108-20.

----- Climate, Cropping, and Society in Vermont, 1820-1850. Vermont History 50 (1991): 133-65.

----- Ecology, Objectivity and Critique in Writings on Nature and Human Societies Journal of Historical Geography 20 (1994): 22-37.

----- The Nature of Metaphors in Cultural Geography and Environmental History" Progress in Human Geography 18 (1994): 163-85.

----- Visions of Agriculture in British Columbia. B.C. Studies 108 (1995): 29-59.

----- Social Theory and the Reconstruction of Science and Geography Transactions of the Institute of British Geographers 21 (1996): 484-503.

Dennett, Liberty B. Maine's Wildlands and Wildlanders Pine Tree Magazine (April, May, and July 1907): 273-80, 359-67, 551-57.

Derrida, Jacques. Of Grammatology, trans. G. Spivak (Baltimore: Johns Hopkins University Press, 1976).

Dewey, John. The Later Works, Boydston, J.A., editor (Carbondale: Southern Illinois University Press, 1984), vol. II.

Diggins, John P. The Promise of Pragmatism: Modernism and the Crisis of Authority (Chicago: University of Chicago Press, 1994).

Dijksterhuis, E.J. The Mechanization of the World Picture: From Pythagoras to Newton, trans. C. Dikshoorn (1950. Princeton: Princeton University Press, 1986.

Doel, Marcus. Proverbs for Paranoids: Writing Geography on Hollowed Ground Transactions of the Institute of British Geographers 18 (1993): 377-94.

Domosh, Mona. Toward a Feminist Historiography of Geography Transactions Institute of British Geographers 16 (1991): 95-104.

Drengson, Alan and Inoue, Yuichi, editors. The Deep Ecology Movement: An Introductory Anthology (Berkeley: North Atlantic Books, 1995).

Dreyfuss, Hubert L. Being-in-the-World: A Commentary on Heidegger's *Being and Time*, Division I (Cambridge: MIT Press, 1991).

Driver, Felix. Geography's Empire: Histories of Geographical Knowledge Environment and Planning D: Society and Space 10 (1992): 23-40.

Dubbert, Joe L. Progressivism and the Masculinity Crisis In Pleck, E. and Pleck, J.H., editors, The American Man (Englewood Cliffs, NJ: Prentice Hall, 1980), 305-20.

Duhem, Pierre. The Aim and Structure of Physical Theory, trans. P.P. Wiener (1906. Princeton: Princeton University Press, 1954).

Duncan, James S. The Superorganic in American Cultural Geography. Annals of the Association of American Geographers 70 (1980): 181-98.

----- The City as Text: The Politics of Landscape Interpretation in the Kandyan Kingdom (Cambridge: Cambridge University Press, 1990).

----- Commentary. Annals of the Association of American Geographers 83 (1993): 517-19.

Duncan, James S. and Duncan, Nancy. (Re)-Reading the Landscape. Environment and Planning D: Society and Space 6 (1988): 117-26.

Duncan, James S. and Ley, David. Introduction: Representing the Place of Culture. In, Duncan, J. and Ley, D., editors, Place/culture/representation (London: Routledge, 1993) 1-21.

Dunlap, Thomas R. DDT: Scientists, Citizens, and Public Policy (Princeton: Princeton University Press, 1981).

----- Sport Hunting and Environmental Conservation Environmental Review 12 (spring, 1988): 51-60.

----- That Kaibab Myth Journal of Forest History 32 (1988): 60-69.

----- Saving America's Wildlife (Princeton: Princeton University Press, 1988).

Dupree, A. Hunter. Science in the Federal Government: A History of Policies and Activities to 1940 (Cambridge: Harvard University Press, 1957).

----- Asa Gray, 1810-1888 (Cambridge: Harvard University Press, 1959).

Eagleton, Terry. The Ideology of the Aesthetic (Oxford: Basil Blackwell, 1990).

Eckler, Ross. The Bureau of the Census (New York: Praeger Publishers, 1972).

Eckstorm, Fanny Hardy. David Libbey: Penobscot Woodsman and River-Driver (Boston: American Unitarian Association, vol. IV of True American Types, 1907).

----- The Penobscot Man (Bangor: Jordan-Frost, 1924).

----- History of the Chadwick Survey from Fort Pownal in the District of Maine to the Province of Quebec in Canada in 1764 Sprague's Journal of Maine History 14 (1926): 62-89.

Eckstorm, Fannie Hardy and Smyth, Mary Winslow. Minstrelsy of Maine: Folksongs and Ballads of the Woods and the Coast (1927. Ann Arbor: Gryphon Books, 1971).

Egerton, Frank N. Changing Concepts in the Balance of Nature Quarterly Review of Biology 48 (1973): 322-50.

Eisenach, Eldon J. The Lost Promise of Progressivism (Lawrence: University Press of Kansas 1994).

Ekirch, Arthur A. The Idea of Progress in America, 1815-1860 (New York: Columbia University Press, 1944)

Eliot, Charles. The Need of Conserving the Beauty and Freedom of Nature in Modern Life National Geographic 24 (July 1914): 67-74.

Ely, Cecil D. The Road to Armageddon: The Martial Spirit in English Popular Literature (Durham: Duke University Press, 1988).

Emel, Jodi. Are You Man Enough, Big and Bad Enough? Ecofeminism and Wolf Eradication in the USA Environment and Planning D: Society and Space 13 (1995): 707-34.

Emery, George. Facts of Life: The Social Construction of Vital Statistics, Ontario 1869-1952 (Montreal: McGill-Queen's University Press, 1993).

Entrikin, J. Nicholas. The Betweenness of Place: Towards a Geography of Modernity (Baltimore: Johns Hopkins University Press, 1991).

Eves, Jamie H. 'The Valley White with Mist': A Cape Cod Colony in Maine Maine Historical Society Quarterly 32 (1992): 74-107.

Eyles, John and Peace, Walter. Signs and Symbols in Hamilton: An Iconology of Steeltown.Geografiska Annaler 72B (1990): 73-88.

Fernow, Bernhard E. Forestry and Wood Pulp Supplies Paper Trade Journal 27 (11 February 1898): 157-62.

----- Government Activity in Forestry: An Address Delivered in Burlington, Vt., January 24th 1906 (Pittsford, VT: Vermont State Forestry Commission, bulletin 2, 1906

----- Scientific Forestry in Europe: Its Value and Applicability in Canada. In Canadian Commission of Conservation, Report (1910): 29-41.

----- Forestry and the War Journal of Forestry 16 (1918): 149-54.

Ficken, Robert E. Gifford Pinchot Men: Pacific Northwest Lumbermen and the Conservation Movement, 1902-1910 Western Historical Quarterly 13 (1982): 165-78.

Fitzsimmons, Margaret. The Matter of Nature Antipode 21 (1989): 106-20.

----- Reconstructing Nature Environment and Planning D: Society and Space 7 (1989): 1-3.

Flader, Susan L. Thinking Life a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests (Columbia: University of Missouri Press, 1974),

Fobes, Charles B. Historic Forest Fires in Maine Economic Geography 24 (1948): 269-73.

Forman, R.T.T and Russell, E.W.B. Evaluation of Historical Data in Ecology Bulletin of the Ecological Society of America 64 (1983): 4-5.

Forester, Frank Complete Manual for Young Sportsmen (New York, 1856).

Forkey, Neil S. Anglers, Fishers, and the St. Croix River: Conflict in a Canadian-American Borderland, 1867-1900" Forest and Conservation History 37 (1993): 185-86

Foucault, M. The Order of Things: An Archaeology of the Human Sciences (New York: Random House, 1970).

----- The Archaeology of Knowledge, trans. A.M. Sheridan. (1969. New York: Pantheon, 1972).

----- The History of Sexuality: An Introduction, trans. R. Hurley. (1976. New York: Vintage Books, 1990).

----- Politics, Philosophy, Culture: Interviews, L. Kritzman, editor, (New York: Routledge, 1988).

----- The Politics and the Study of Discourse. In Burchell, G., Gordon, C. and P. Miller, editors, The Foucault Effect: Studies in Governmentality, (Chicago: Univ Chicago Press, 1991), 53-72.

----- Governmentality. In Burchell, G., Gordon, C. and P. Miller, editors, The Foucault Effect: Studies in Governmentality, (Chicago: Univ Chicago Press, 1991), 87-104.

Frängsmyr, Tore, J.L. Heilbron, and Robin E. Rider, editors. The Quantifying Spirit in the 18th Century (Berkeley: University of California Press, 1990).

Friedman, Michael. Kant and the Exact Sciences (Cambridge: Harvard University Press, 1992)

Freidman, Robert M. Appropriating the Weather: Vilhelm Bjerknes and the Construction of a Modern Meteorology (Ithaca: Cornell University Press, 1989).

Funkhouser, H. Gray Historical Development of the Graphical Representation of Statistical Data Osiris 3 (1938): 269-404.

Gadgil, Madhav and Guha, Ramachandra. This Fissured Land: An Ecological History of India (paperback ed. Berkeley: University of California Press, 1992).

Galois, Robert. The Burning of Kitsegukla B.C. Studies 94 (1992): 59-81.

Geertz, Clifford. Negara: The Theatre State in Nineteenth Century Bali (Princeton: University Press, 1980).

Giblett, Rod. Philosophy (and sociology) in the Wetlands: The S(ub)lime and the Uncanny" New Formations 18 (1992): 142-59.

Giddens, Anthony. The Consequences of Modernity (Stanford: Stanford University Press, 1990).

Gilbert, G. Nigel and Mulkay, Michael. Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse (Cambridge: Cambridge University Press, 1984).

Gillis, R. Peter and Roach, Thomas R. Lost Initiatives: Canada's Forest Industries, Forest Policy and Forest Conservation (Westport, CT: Greenwood Press, 1986).

Girouard, Mark. The Return to Camelot: Chivalry and the English Gentleman (New Haven: Yale University Press, 1981).

Gleason, Herbert. Vegetational History of the Middle West Annals of the Association of American Geographers 12 (1922): 78-85.

Goetzmann, William. Exploration and Empire: The Explorer and Scientist in the Winning of the American West (New York: Alfred A. Knopf, 1966).

Goldman, Lawrence. The Origins of British 'Social Science': Political Economy, Natural Science, and Statistics, 1830-1835 Historical Journal 26 (1983): 587-616.

Gorn, Elliott J. The Manly Art: Bare-Knuckled Prize Fighting in America (Ithaca: Cornell University Press, 1986).

Gosling, Francis G. Before Freud: Neurasthenia and the American Medical Community (Urbana: University of Illinois Press, 1987).

Gould, Peter. Sharing a Tradition: Geographies from the Englightenment Canadian Geographer 38 (1994): 194-202.

Graham, Ada. Kate Furbish and the Flora of Maine (Gardiner: Tilbury House, 1995).

Grainger, M.A. Woodsmen of the West (1908. Toronto: McClelland & Stewart, 1964).

Grane, M. Martin Faustmann and the Evolution of Discounted Cash Flow (Oxford: Commonwealth Forestry Institute, paper no. 42, 1968).

Gray, Asa. Statistics of the Flora of the Northern United States American Journal of Science and Arts 12 (1856): 204-32; 13 (1857): 62-84, 369-403.

Great Northern Paper Company. Timberland Information Put Out in the Season of 1926 in the Interest of Protection (n.p.: G.N.P. Co., 1927).

----- Timberland Protection: Prepared in the Interest of Protecting the Timberlands of Maine (n.p.: G.N.P. Co., 1927).

Greeley, William B. The Relation of Geography to Timber Supply Economic Geography 1 (1925): 1-14.

----- Meeting the Red Menace: Uncle Sam's Policy of Trying to Save Pennies on Forest Fires Is the Weak Link in National Forest Program American Forests 34 (1928): 711-14, 748.

----- Forests and Men (Garden City: Doubleday, 1951).

Greene, John C. American Science in the Age of Jefferson (Ames: Iowa State University Press, 1984).

Greenleaf, Moses. A Statistical View of the District of Maine (Boston, 1816).

----- A Survey of the State of Maine, in Reference to Its Geographical Features, Statistics and Political Economy (Portland, 1829).

Gregory, Derek. Geographical Imaginations (Cambridge, MA: Blackwell, 1994).

----- Response Annals of the Association of American Geographers 85 (1995): 175-86.

Gregory, Derek and Ley, David. Culture's Geographies. Environment and Planning D: Society and Space 6 (1988): 155-56.

Grinnell, George B., editor. American Big Game Hunting: The Book of the Boone and Crocket Club (1904. New York: Harper & Brothers, 1914).

Gross, Paul R. and Levitt, Norman. Higher Superstition: The Academic Left and Its Quarrels with Science (Baltimore: Johns Hopkins University Press, 1994).

Grosz, Elizabeth. Jacques Lacan: A Feminist Introduction (New York: Routledge, 1990).

Guha, Ramachandra. Radical American Environmentalism: A Third World Critique.Environmental Ethics 11 (1989): 71-89.

Guptill, Carleton. The Grange in Maine from 1874-1940. (Ph.D. thesis, University of Maine, 1972).

Hacking, Ian. Biopower and the Avalanche of Printed Numbers Humanities in Society 5 (1982): 279-95.

----- Representing and Intervening: Introductory Topics in the Philosophy of Natural Science (Cambridge: Cambridge University Press, 1983).

----- Prussian Numbers 1860-1882. In Kruger, L., editor, Probabilistic Revolution (Cambridge, MA: MIT Press, 1987), I: 377-94.

----- The Taming of Chance (New York: Cambridge University Press, 1990).

Hagen, Joel B. An Entangled Bank: The Origins of Ecosystem Ecology (New Brunswick: Rutgers University Press, 1992).

Hahn, Steven. Hunting, Fishing, and Foraging: Common Rights and Class Relations in the Postbellum South Radical History Review 26 (1982): 37-64.

Hakola, John W. Legacy of a Lifetime: The Story of Baxter State Park (Woolwich, ME: TBW Books, 1981).

Hamilton, Thomas. Men and Manners in America (1833 reprint. New York: A.M. Kelley, 1968

Hall, G. Stanley. The Graphic Method The Nation 29 (1879): 238-39.

Hallis, Lowell K., editor, White-tailed Deer Ecology and Management, (Harrisburg, PA: Stackpole, 1984).

Hallock, Charles The Fishing Tourist (New York, 1873).

----- The Sportsman's Gazeteer and General Guide (5th ed. New York, 1879).

Handlin, Oscar. Commonwealth: A Study of the Role of Government in the American Economy, Massachusetts, 1774-1861 (Rev. ed. Cambridge: Harvard University Press, 1969).

Haraway, Donna. Crystals, Fabrics, and Fields: Metaphors of Organicism in Twentieth-Century Developmental Biology (New Haven: Yale University Press, 1976).

----- Primate Visions: Gender, Race, and Nature in the World of Modern Science (Routledge, New York, 1989).

----- Simians, Cyborgs, and Women: The Reinvention of Nature (New York: Routledge, 1991).

----- The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others. In Grossberg, L., Nelson, C., and P.A. Treichler, editors, Cultural Studies (New York: Routledge, 1992), 295-337.

Harding, Sandra. The Science Question in Feminism (Ithaca: Cornell University Press, 1986).

----- Whose Science? Whose Knowledge? (Ithaca: Cornell University Press, 1991).

----- Rethinking Standpoint Epistemology: What Is 'Strong Objectivity'? In Alcoff, L. and Potter, E., editors, Feminist Epistemologies, (New York: Routledge, 1993), 49-82.

Hardy, Stephen How Boston Played: Sport, Recreation, and Community 1865-1915 (Boston: Northeastern University Press, 1982).

Harley, J.B. Deconstructing the Map Cartographica 26 (1989): 1-20.

Harstock, Nancy. Rethinking Modernism: Minority Versus Majority Theories Cultural Critique 7 (1987): 187-206.

Hartshorne, Richard. The Concept of Geography as a Science of Space: From Kant and Humboldt to Hettner Annals of the Association of American Geographers 48 (1958): 97-108.

Harvey, David. Explanation in Geography (London: Edward Arnold, 1969).

----- Population, Resources, and the Ideology of Science Economic Geography 50 (1974): 256-77.

----- The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change (Cambridge, MA: Blackwell, 1989).

----- Postmodern Morality Plays Antipode 24 (1992): 300-26.

----- The Nature of Environment: The Dialectics of Social and Environmental Change Socialist Register (1993): 1-51.

Harvey, F.L. Preservation of Our Forests. In Maine Forest Commissioner, Report (1891): 29-41.

Hatt, Michael. Making a Man of Him: Masculinity and the Black Body in Mid-Nineteenth Century American Sculpture Oxford Art Journal 15 (1992): 21-35.

Haupt, Lewis M. On the Graphic Presentation of Statistics Journal of the Franklin Institute 148 (1899): 384-90.

Hays, Samuel P. Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920 (1959. reprint with new preface. New York: Atheneum, 1975).

----- Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985 (New York: Cambridge University Press, 1987).

Heburn, J.W. Reaping Where We Have Not Sown American Magazine 62 (July 1906): 247-58.

Hecht, Susanna and Cockburn, Alexander. The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon (1989. New York: HarperCollins, 1990).

Heidegger, Martin. The Age of World Picture. In Heidegger, M., The Question Concerning Technology and Other Essays, trans. W. Lovitt (New York: Harper & Row, 1977).

----- The Origin of the Work of Art. In Heidegger, M., Poetry, Language, Thought, trans. A. Hofstadter (New York: Harper & Row, 1971), 17-78.

Heinselman, M.L. Fire in the Virgin Forests of the Boundary Waters Canoe Area, Minnesota Quaternary Research 3 (1973) 329-82.

Hendrickson, Walter B. Nineteenth Century State Geological Surveys: Early Government Support of Science Isis 52 (1961): 357-91.

Henry, Joseph Meteorology and Its Connection with Agriculture. In U.S. Patent Office Report, Agriculture (1858): 429-549.

Hewitt, C. Gordon The Conservation of the Wild Life of Canada (New York: Scribner's, 1923).

Hibbs, David E. Gap Dynamics in a Hemlock-Hardwood Forest Canadian Journal of Forest Research 12 (1982): 522-27.

Higginson, Thomas Wentworth. Saints and Their Bodies Atlantic Monthly 1 (1858): 582-95.

----- Gymnastics Atlantic Monthly 7 (1861): 283-302.

Himmelfarb, Gertrude. The New History and the Old (Cambridge, MA: Harvard University Press, 1987).

Hingham, John. The Re-Orientation of American Culture in the 1890's. In J. Higham, Writing American History (Bloomington, University of Indiana Press, 1973), 73-102.

Hilton, Rodney H. Class Conflict and the Crisis of Feudalism: Essays in Medieval Social History (2nd ed. London: Verso, 1990).

Hobbs, John E. The Depreciation of Our Forest Growth and Its Effects upon Our Various Industries. In Maine Forest Commissioner, Report (1891): 61-75.

Hofstader, Richard. The Age of Reform: From Bryan to F.D.R. (New York: Knopf, 1955).

Holling, C.S. Resilience and Stability of Natural Ecosystems Annual Review of Ecology and Systematics 4 (1973): 1-23.

Holmes, Ezekiel, editor, Reports upon the Natural History and Geology of the State of Maine (Augusta, 1861-62), 2 vols.

Holmes, Lawrie. Mount Desert Deer: Past and Present (Mount Desert, ME: Privately printed, 1944);

Horkheimer, Max and Theodor W. Adorno, Dialectic of Englightenment, trans. J. Cumming (1944. New York: Herder & Herder, 1969).

Hornaday, William. Our Vanishing Wildlife: Its Extermination and Preservation (New York: NY Zoological Society, 1913).

Hornsby, Stephen. The Gilded Age and the Making of Bar Harbor Geographical Review 83 (1993): 455-68.

Hosmer, Ralph S. A Study of the Maine Spruce. In Maine Forest Commissioner, Report (1902): 65-108.

Hough, Franklin B. On the Duty of Governments in the Preservation of Forests Proceedings of the American Association for the Advancement of Science 12 (Salem, 1874): B1-10.

----- Report Upon Forestry (Washington, 1878), 4 vols.

----- Decrease of Woodlands in Ohio. In Egleston, N.H., editor, Report Upon Forestry (Washington, 1880), IV: 174-80.

Hubbard, Lucius L. Woods and Lakes of Maine (1883. Somersworth: New Hampshire Publishing Co., 1971).

Hurst, James Willard. Law and Economic Growth: The Legal History of the Lumber Industry in Wisconsin, 1836-1915 (1964. Madison: University of Wisconsin Press, 1984).

Hurt, R.Douglas. Dust Bowl: An Agricultural and Social History (Chicago: Nelson Hall, 1981).

Irland, Lloyd C. Rufus Putnam's Ghost: An Essay on Maine's Public Lands, 1783-1820 Journal of Forest History 30 (1986): 60-69.

Ives, Edward D. Maine Folklore and the Folklore of Maine: Some Reflections on the Maine Character and Down East Humor Maine Historical Society Quarterly 23 (1984): 111-32.

----- editor, Wilbur Day (1864-1924), Hunter, Guide, and Poacher: An Autobiography (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVI, 1985).

----- George Magoon and the Down East Game War: History, Folklore and the Law (Urbana: University of Illinois Press, 1988).

Jackson, Charles T. Report on the Geology of the State of Maine (Augusta, 1837-39), 3 vols.

Jackson, Peter. Maps of Meaning: An Introduction to Cultural Geography (London: Unwin Hyman, 1989).

----- Berkeley and Beyond: Broadening the Horizons of Cultural Geography. Annals of the Association of American Geographers 83 (1993): 519-20.

Jacobson, George L., Webb, Thom III, and Eric C. Grimm. Patterns and Rates of Vegetation Change During the Deglaciation of Eastern North America. In Ruddiman, W.F. and Wright, H.E., Jr., editors, North America and Sdjacent Oceans During the Last Deglaciation (Boulder, CO: Geological Society of America, The Geology of North America, vol k-3, 1987), 277-88.

Jasen, Patricia Wild Things: Nature, Culture and Tourism in Ontario, 1790-1914 (Toronto: University of Toronto Press, 1995).

Jay, Martin. The Textual Approach to Intellectual History Strategies 4/5: (1991): 7-18.

Jewett, Fred E A Financial History of Maine (New York: Columbia University Press, 1937).

Jillson, Herbert L. The Maine Guide and the Maine Camp Outing 38 (1901): 655.

Johnson, Jim [Bruno Latour]. Mixing Humans with Non-humans: Sociology of a Door-Opener Social Problems 35 (1988): 298-310.

Johnson, Louise. (Un)Realist Perspectives: Patriarchy and Feminist Challenges in Geography. Antipode 19 (1987): 210-15.

Johnson, Philip. Fish Free or Die: The Marlboro South Pond Case of 1896 Vermont History News 43 (May-June 1992): 43-46.

Jordan, Terry G. Preadaptation and European Colonization in Rural North America Annals of the Association of American Geographers 79 (1989): 489-500.

Judd, Richard W. Reshaping Maine's Landscape: Rural Culture, Tourism, and Conservation, 1890-1929 Journal of Forest History 33 (1988): 180-90.

----- Grass-Roots Conservation in Eastern Coastal Maine: Monopoly and the Moral Economy of Weir Fishing, 1893-1911 Environmental Review 12 (1988): 81-103.

-----Aroostook: A Century of Logging in Northern Maine (Orono: University of Maine Press, 1989).

Kamensky, Jane. 'In These Changed Climes, How Chang'd the Scene?' Progress, Declension, and Balance in the Landscapes of Timothy Dwight New England Quarterly 63 (1990): 880-108.

Kanitkar, Helen. 'Real True Boys': Moulding the Cadets of Imperialism. In Cornwall, A. and Lindisfarne, N., editors, Dislocating Masculinity: Comparative Ethnographies (London: Routledge, 1994), 184-96.

Kaplan, Amy. Romancing the Empire: The Embodiment of American Masculinity in the Popular Historical Novel of the 1890's American Literary History 3 (1990): 659-90.

Kates, Robert W. The Human Environment: The Road Not Taken, the Road Still Beckoning Annals of the Association of American Geographers 77 (1987) 525-34.

Katz, Cindy and Kirby, Andrew. In the Nature of Things: The Environment and Everyday Life. Transactions of the British Institute of Geographers 16 (1991): 259-71.

Keller, Evelyn Fox. Reflections on Gender and Science (New Haven: Yale University Press, 1985).

----- Demarcating Public from Private Values in Evolutionary Discourse" Journal of the History of Biology 21 (1988): 195-211.

----- Secrets of Life, Secrets of Death: Essays on Language, Gender, and Science (New York: Routledge, 1992).

Kephart, George S. Campfires Rekindled: A Forester Recalss Life in the Maine Woods of the Twenties (Marion, MA: Channing Books, 1977).

Kimmins, Hamish. Balancing Act: Environmental Issues in Forestry (Vancouver: UBC Press, 1992).

Kingsland, Sharon E. Modelling Nature: Episodes in the History of Population Ecology (Chicago: University of Chicago Press, 1985).

Kirkland, Leigh. Sexual Chaos in Walden Pond Isle: Interdisciplinary Studies in Literature and Environment 1 (1993): 131-46.

Kloppenberg Jack R., Jr 1988 First the Seed: The Political Economy of Plant Biotechnology, 1492-2000 (New York: Cambridge University Press).

Knight, David M. The Physical Sciences and the Romantic Movement History of Science 9 (1970): 54-75.

Knorr-Cetina, Karin The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science (Oxford: Pergamon Press, 1981).

----- Towards a Constructivist Interpretation of Science. In Knorr-Cetina, K. and Mulkay, M., editors, Science Observed: Perspectives on the Social Study of Science (Beverly Hills: Sage Publications, 1983), 115-40.

----- The Couch, the Cathedral, and the Laboratory: On the Relationship between Experiment and Laboratory in Science. In Pickering, A., editor, Science as Culture and Practice (Chicago: University of Chicago Press, 1992), 113-38.

----- Strong Constructivism-- From a Sociologist's Point of View: A Personal Addendum to Sismondo's Paper Social Studies of Science 23 (1993): 555-63.

Knorr-Cetina, Karin and Mulkay, Michael. Introduction: Emerging Principles in Social Studies of Science. In Knorr-Cetina, K. and Mulkay, M., editors, Science Observed: Perspectives on the Social Study of Science (Beverly Hill: Sage Publications, 1983), 1-17.

Knorr-Cetina, Karin and Mulkay, Michael, editors. Science Observed: Perspectives on the Social Study of Science (Beverly Hills: Sage Publications, 1983).

Koelsch,William A. Antebellum Harvard Students and the Recreational Exploration of the New England Landscape Journal of Historical Geography 8 (1982): 362-72.

Kolensky, George B. Wolf Predation on Wintering Deer in East-Central Ontario Journal of Wildlife Management 36 (1972): 357-68.

Kolodny, Annette. The Lay of the Land: Metaphor as Experience and History in American Life and Letters (Chapel Hill: University of North Carolina Press, 1975).

Kuhn, Thomas. The Essential Tension: Selected Studies in Scientific Tradition and Change (Chicago: University Chicago Press, 1977).

Larson, James. Not Without a Plan: Geography and Natural History in the Late Eighteenth Century Journal of the History of Biology 19 (1986): 447-88.

Latour, Bruno. Give Me a Laboratory and I Will Raise the World. In Knorr-Cetina, K. D. and Mulkay, M., editors, Science Observed: Perspectives on the Sociology of Science (London: Sage, 1983), 141-70.

----- Science in Action: How to Follow Scientists and Engineers through Society (Cambridge: Harvard University Press, 1987).

----- The Pasteurization of France, trans. Sheridan, A. and Law, J. (Cambridge: Harvard University Press, 1988).

-----Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts. In, Bijker, W.E. and Law, J., editors, Shaping Technology/Building Society: Studies in Socitechnical Change (Cambridge: MIT Press, 1992), 225-58.

----- We Have Never Been Modern, trans. C. Porter. (Cambridge: Harvard University Press, 1993).

Latour, Bruno and Woolgar, Steve. Laboratory Life: The Social Construction of Scientific Facts London: Sage Publications, 1979).

Lears, T. Jackson No Place of Grace: Antimodernism and the Transformation of American Culture, 1880-1920 New York: Pantheon Books, 1981).

Leibhardt, Barbara. Interpretation and Causal Analysis: Theories in Environmental History Environmental Review 12 (spring 1988): 23-36.

Leopold, Aldo. A Sand County Almanac and Sketches Here and There (New York: Oxford University Press, 1949), 175-76.

Leopold, Aldo, Sowls, Lyle K. and Spencer, David L. A Survey of Over-Populated Deer Ranges in the United States Journal of Wildlife Management 11 (1947): 162-77.

Levins, Richard and Lewontin, Richard. The Dialectical Biologist (Cambridge: Harvard University Press, 1985).

Lewis, E.J. Hints to Sportsmen (Philadelphia, 1851).

Lewis, George H. The Maine That Never Was: The Construction of Popular Myth in Regional Culture Journal of American Culture 16 (summer 1993): 91-100.

Lewis, Lloyd Sherman: Fighting Prophet (New York: Harcourt Brace, 1932).

Lewis, Martin W. Wagering the Land: Ritual, Capital and Environmental Degredation in the Cordillera of Northern Luzon, 1900-1986 (Berkeley; University of California Press, 1992).

Lewontin, Richard, Rose, Steven, and Kamin, Leon J. Not in Our Genes: Biology, Ideology and Human Nature (New York: Pantheon, 1984).

Ley, David. Liberal Ideology and the Postindustrial City Annals of the Association of American Geographers 70 (1980): 238-58.

----- Styles of the Times: Liberal and Neo-Conservative Landscapes in Inner Vancouver, 1968-1986. Journal of Historical Geography 13 (1987): 40-56.

Lindley, John The Vegetable Kingdom (3rd ed. London, 1853)

Lindley, Keith. Fenland Riots and the English Revolution (London: Heinemann Educational Books, 1982).

Livingston, Eric. The Ethnomethodological Foundations of Mathematics Boston: Routledge and Kegan Paul, 1986).

Livingstone, David N. The Idea of Design: The Vicissitudes of a Key Concept in the Princeton Response to Darwin Scottish Journal of Theology 37 (1984): 329-57.

----- The Geographical Tradition: Episodes in the History of a Contested Enterprise (Cambridge: Blackwell, 1991).

Lloyd, Genevieve. The Man of Reason: 'Male' and 'Female' in Western Philosophy (London: Methuen, 1984).

Locke, John. An Essay on Human Understanding, P.H. Nidditch, editor (Oxford: Clarendon Press, 1979).

Longhurst, Robyn. Reflections on and a Vision for Feminist Geography New Zealand Geographer 50 (1994): 14-19.

Lough, J. M. and Fritts, H. C. An Assessment of the Possible Effects of Volcanic Eruptions on North American Climate Using Tree-Ring Data, 1602 to 1900 A.D Climatic Change 10 (1987): 219-39.

Lowood, Henry E. The Calculating Forester: Quantification, Cameral Science, and the Emergence of Scientific Forestry Management in Germany. In Frängsmyr, T., Heilbron, J.L., and R. E. Rider, editors, The Quantifying Spirit in the 18th Century (Berkeley: University of California Press, 1990), 315-42.

Lowrey, Nathan S. A Historical Perspective on the Northern Maine Guide Maine Historical Society Quarterly 26 (1986): 2-21.

----- Tales of the Northern Maine Woods: The History and Traditions of the Maine Guide. In Ives, E.D., editor, Motor Camps and Maine Guides: Two Studies Orono: Northeast Folklore Society, Northeast Folklore, vol. XXVIII, 69-110.

Luke, Timothy. The Dreams of Deep Ecology Telos 76 (1988): 65-92.

Lunt, Richard C. Jones Tracey: Tall Tale Hero from Mount Desert Island (Orono: Northeast Folklore Society, Northeast Folklore, vol. X, 1968), 8-9

Lutz, Tom. American Nervousness, 1903: An Anecdotal History (Ithaca: Cornell University Press, 1991).

Lynch, Michael E., Livingston, Eric, and Garfinkel, Harold. Temporal Order in Laboratory Work in Knorr-Cetina K and Mulkay M eds Science Observed: Perspectives on the Social Study of Science (Beverly Hills: Sage Publications, 1983), 205-38.

Lynch, Michael E. Art and Artifact in Laborator Science: A Atudy of Shop Work and Shop Talk in a Research Laboratory (London: Routledge and Kegan Paul, 1985).

McAndrews, John H. Human Disturbance of North American Forests and Grasslands: The Fossil Pollen Record. In B. Huntley, B. and Webb, T., III, editors, Vegetation History (Dordecht: Kluwer Academic Publishers, 1988), 673-98.

McClellan, James E. Science Reorganized: Scientific Societies in the 18th Century (New York: Columbia University Press, 1985).

McCormick, John. Reclaiming Paradise: The Global Environmental Movement (Bloomington: University of Indiana Press, 1989).

McCubrey, March O. The Cultural Construction of the Maine Sporting Camps Maine History 34 (1995): 116-35.

MacDonald, Glen M and Edwards, Kevin J. Holocene Palynology: I Principles, Population, and Community Ecology Progress in Physical Geography 15 (1991): 261-89

MacDonald, Glen M and Edwards, Kevin J. Holocene Palynology: II Human Influence and Vegetation Change Progress in Physical Geography 15 (1991): 364-91.

MacDonald, William. A State of Summer Resorts The Nation 65 (19 August 1897): 146.

McEvoy, Arthur. Toward an Interactive Theory of Nature and Culture: Ecology, Production, and Cognition in the California Fishing Industry Environmental Review 11 (1987): 289-305.

----- The Fisherman's Problem: Ecology and the Law in the History of California's Fisheries, 1850-1980 (New York: Cambridge University Press, 1986).

McGeary, M. Nelson. Gifford Pinchot: Forester-Politician (Princeton: Princeton University Press, 1960).

McIntosh, Robert P. Pluralism in Ecology Annual Review of Ecology and Systematics 18 (1987): 321-41.

----- The Background of Ecology: Concept and Theory (New York: Cambridge University Press, 1985).

MacKaye, Benton. Some Social Aspects of Forest Management Journal of Forestry 16 (1918): 210-14.

MacKenzie, Donald. Statistical Theory and Social Interests: A Case Study Social Studies of Science 8 (1978): 35-83.

----- Statistics in Britain 1865-1930: The Social Construction of Scientific Knowledge (Edinburgh: Edinburgh University Press, 1981).

MacKenzie, John M. 1987. The Imperial Pioneer and Hunter and the British Masculine Stereotype in Late Victorian and Edwardian Times. In Mangan, J.A. and Walvin, J., editors, Manliness and Morality: Middle Class Masculinity in Britain and America, 1800-1940 (Manchester: Manchester University Press, 1987), 176-98.

----- Empire of Nature: Hunting, Conservation, and British Imperialism (Manchester: Manchester University Press, 1988).

McLeod, John E. The Great Northern Paper Company (1978. unpublished book mss., University of Maine Library, Orono, ME), 7 vols.

MacMillan Bloedel. Beyond the Cut: MacMillan Bloedel's Forest Management Program (n.d.).

McPherson, Thomas. The Argument from Design (London: Macmillan, 1972).

Mack, Pamela E. Viewing the Earth: The Social Construction of the Landsat Satellite System (Cambridge: MIT Press, 1990).

Maine Greens. 1996 Clearcutting Referendum (n.p., Sept. 1995).

Maine Publicity Bureau, Maine Invites You (Portland: Publicity Bureau, 1990).

Malachowski, Alan R. and Burrows, Jo, editors, Reading Rorty: Critical Responses to Philosophy and the Mirror of Nature (and Beyond) (Cambridge, MA: Blackwell, 1990).

Malin, James C. The Grassland of North America: Prolegemena to Its History, with Addenda and Postscript (Gloucester, MA: Peter Smith, 1967).

----- History and Ecology: Studies of the Grassland, Swierenga, R.P., editor (Lincoln: University of Nebraska Press, 1984).

Mangan, J.A. Athleticism in the Victorian and Edwardian Public Schools (Cambridge: Cambridge University Press, 1981).

Mangan, J.A. and Walvin, J., editors, Manliness and Morality: Middle Class Masculinity in Britain and America, 1800-1940 (Manchester: Manchester University Press, 1987).

Mann, Kenneth H. Towards Predictive Models for Coastal Marine Ecosystems. In Pomeroy, L.R. and Alberts, J.L., editors, Concepts of Ecosystem Ecology: A Comparative View (New York: Springer-Verlag, 1988), 291-316.

Manning, Thomas G. Government in Science: The U.S. Geological Survey, 1867-1894 (Lexington: University of Kentucky Press, 1967).

-----U.S. Coast Survey vs. Naval Hydrographic Office: A 19th Century Rivalry in Science and Politics (Tuscaloosa: University of Alabama Press, 1988).

Mannion, Antoinette M. Global Environmental Change: A Natural and Cultural Environmental History (New York: Wiley, 1991).

Marcell, David W. Progress and Pragmatism: Dewey, Beard, and the American Idea of Progress (Westport, CT: Greenwood Press, 1974).

Marks, Stuart A. Southern Hunting in Black and White: Nature, History, and Ritual in a Carolina Community (Princeton: Princeton University Press, 1991).

Marsh, George Perkins. Report Made Under Authority of the Legislature of Vermont on the Artificial Propogation of Fish (Burlington, 1857).

----- Man and Nature: Or, Physical Geography as Modified by Human Action (1864. Cambridge: Harvard University Press, 1965).

Marsh, John. Back to the Land: The Pastoral Impluse in Victorian England from 1880 to 1914 (London: Quartet Books, 1982).

Marsh, Margaret. Suburban Men and Masculine Domesticity, 1870-1915 American Quarterly 40 (1988): 165-86.

Martin, Emily. Citadels, Rhizomes, and String Figures. In Aronowitz, S., Martinsons, B., and M. Menser, editors, Technoscience and Cyberculture (New York: Routledge, 1996), 97-109.

Marx, Leo. The Machine in the Garden: Technology and the Pastoral Ideal in America (New York: Oxford University Press, 1964).

May, Robert M. Levels of Organization in Ecology. In Cherrett, J. M., editor, Ecological Concepts: The Contribution of Ecology to an Understanding of the Natural World (Boston: Blackwell, 1989), 339-63.

Mayer, Alfred. Preface. In Mayer, A. editor, Sport with Gun and Rod in American Woods and Waters (New York, 1883), 11-12.

Meyer, W.H. Yields of Second Growth Spruce and Fir in the Northeast (Washington: U.S. Deptartment of Agriculture, technical bulletin 142, 1930).

Merchant, Carolyn. The Death of Nature: Women, Ecology and the Scientific Revolution (San Francisco: Harper & Row, 1980).

----- Ecological Revolutions: Nature, Gender and Science in New England (Chapel Hill: University of North Carolina Press, 1989).

----- Gender and Environmental History. Journal of American History 76 (1990): 1117-21.

----- Radical Ecology: The Search for a Liveable World (New York: Routledge, 1992).

----- Earthcare: Women and the Environment (New York: Routledge, 1996).

Mighetto, Lisa. Wild Animals and American Environmental Ethics (Tuscon: University of Arizona Press, 1991).

Milder, Robert. Reimagining Thoreau (New York: Cambridge University Press, 1995).

Miller, Angela Empire of the Eye: Landscape, Representation, and American Cultural Politics (Ithaca: Cornell University Press, 1993).

Miller, Char The Prussians Are Coming! The Prussians Are Coming! Bernard Fernow and the Roots of the USDA Forest Service Journal of Forestry 89 (3) (1991): 22-27.

Miller, Perry Nature's Nation (Cambridge: Harvard University Press, 1967).

Mills, Caroline A. 'Life on the Upslope': The Postmodern Landscape of Gentrification Environment and Planning D: Society and Space 6 (1988): 169-89.

Mitchell, Timothy. Colonising Egypt (1988. Berkeley: University of California Press, 1991).

----- The Object of Development. In Crush, J., editor, Power of Development (New York: Routledge, 1995), 129-157.

Mitman, Greg. The State of Nature: Ecology, Community and American Social Thought, 1900-1950 (Chicago: University of Chicago Press, 1992).

Mulkay, Michael. The Word and the World: Explorations in the Form of Sociological Analysis (London: Allen & Unwin, 1985).

Munroe, James P. A Life of Francis A. Walker (New York: Henry Hold & Co., 1923),

Munson, W.M. Distribution of Plants in Forest Regions. In Maine Forest Commissioner, Report (1902): 111-24.

Myers, R.L. and Peroni, P.A. Approaches to Determining Aboriginal Fire Use and Its Impact on Vegetation Bulletin of the Ecological Society of America 64 (1983): 217-218.

Naess, Arne. The Shallow and the Deep, Long-Range Ecology Movement Inquiry 16 (1973): 95-100.

Nash, Catherine. Remapping and Renaming: New Cartographies of Identity, Gender, and Landscape Feminist Review 44 (1993): 39-57.

Nash, Gerald. The Conflict between Pure and Applied Science in Nineteenth Century Public Policy: the California State Geological Survey, 1860-1874 Isis 54 (1963): 217-28.

Nash, Roderick. Wilderness and the American Mind (New Haven: Yale University Press, 1967).

----- The Rights of Nature: A History of Environmental Ethics (Madison: University of Wisconsin Press, 1989).

National Science Foundation. Characteristics of Recent Science and Engineering Graduates: 1990 (Washington, DC: NSF 92-316, Detailed Statistical Tables, 1994).

Nebeker, Frederik. Calculating the Weather (New York: Academic Press, 1995).

Nelson, Gareth. From Candolle to Croizat: Comments on the History of Biogeography Journal of the History of Biology 11 (1978): 269-305

Nicolson, Malcolm. The Development of Plant Ecology, 1790-1960 (Phd. diss., University of Edinburgh, 1984).

----- Alexander von Humboldt, Humboldtian Science, and the Origins of the Study of Vegetation History of Science 25 (1987): 167-94.

Northern Forest Alliance. The Northern Forest: A Legacy for the Future (Montpelier, VT: [1994?]).

Norton, Arthur H. Mammals of Portland, Maine, and Vicinity Proceedings of the Portland Society of Natural History 4 (1930): 1-145.

Norton, David. Sketches of the Town of Old Town, Penobscot County, Maine (Bangor, 1881).

Norwood, Vera. Made from this Earth: American Women and Nature (Chapel Hill: University of North Carolina Press, 1992).

Novak, Barbara Nature and Culture: American Landscape and Painting, 1825-75 (New York: Oxford University Press, 1980).

Novick, Peter. That Noble Dream: The Objectivity Question and the American Historical Profession (New York: Cambridge University Press, 1988).

Nye, Eric and Hoem, Sheri I. Big Game on the Editor's Desk: Roosevelt and Bierstadt's Tale of the Hunt New England Quarterly 60 (1987): 454-65.

Oelschlaeger, Max The Idea of Wilderness: From Prehistory to the Age of Ecology (New Haven: Yale University Press, 1991).

Opie, John. Environmental History: Pitfalls and Opportunities Environmental Review 7 (1983):

Osborne, Brian S. The Iconography of Nationhood in Canadian Art. In Cosgrove, D. and Daniels, S., editors, The Iconography of Landscape. New York: Cambridge University Press, 1988), 162-78.

O'Toole, Francis J. and Tureen, Thomas N. State Power and the Passamaquoddy Tribe: 'A Gross National Hypocrisy?' Maine Law Review 23 (1971): 1-39.

Overfield, Richard A. Science with Practice: Charles E. Bessey and the Nurturing of American Botany (Ames: Iowa State University Press, 1993).

Packard, Marlborough. A History of Packard's Camps, 1894-1916 (n..p, 1974).

Page, A.W. Report to the Stockholders of the United States World's Work 17 (February 1909): 11205-13.

Palm, Risa I. Natural Hazards: An Intergrative Framework for Research and Planning (Baltimore: Johns Hopkins University Press, 1990).

Palmer, Brian. Descent into Discourse: The Reification of Language and the Writing of Social History (Philadelphia: Temple University Press, 1990).

Palmer, Ralph S. Rufus Philbrook, Trapper New England Quarterly 22 (1949): 452-74.

Panofsky, Edwin. Studies in Iconology (New York: Harper & Row, 1962).

Panofsky, H. A. and Brier, G.W. Some Applications of Statistics to Meteorology (Univerisity Park, PA: College of Mineral Industries, Pennsylvania State University, 1965).

Parenteau, Bill. The Woods Transformed: The Emergence of the Pulp and Paper Industry in New Brunswick, 1918-1931 Acadiensis 22 (1992): 5-43.

Parenteau, Bill and Sandberg, L. Anders. Conservation and the Gospel of Economic Nationalism: The Canadian Pulpwood Question in Nova Scotia and New Brunswick, 1918-1925 Environmental History Review 19 (1995): 55-83.

Parmanchenee Club. Constitution, By-Laws, and Rules of the Parmanchenee Club New York, 1898).

Patterson, William A., III and Backman, Andrew E. Fire and Disease History of Forests. In B. Huntley, B. and Webb, T., III, editors, Vegetation History (Dordecht: Kluwer Academic Publishers, 1988), 603-32.

Patterson, William A., III and Sassaman, Kenneth E. Indian Fires in the Prehistory of New England. In Nicholas, G.P., editor, Holocene Human Ecology in Northeastern North America (New York: Academic Press, 1988).

Pawson, Eric. Two New Zealands: Maori and European. In Anderson K. and Gale, F., editors, Inventing Places: Studies in Cultural Geography (Melbourne: Longman Chesire, 1992), 15-33.

Peake, Linda. 'Proper Words in Proper Places ...' Or, of Young Turks and Old Turkeys Canadian Geographer 38 (1994): 204-206.

Pearson, Karl. The Grammar of Science (3rd ed. London: Adam & Charles Black, 1913).

Perkins, John H. Insects, Experts, and the Insecticide Crisis: The Quest for New Pest Management Strategies (New York: Plenum Press, 1982).

Pfitzer, Gregory M. Thoreau and Mother Nature: 'Ktaadn' as an Oedipal Tale American Transcendental Quarterly 2 (1987): 301-11.

Phillips, John C. The Passing of the Maine Wilderness American Forests 34 (1928): 195-98, 232.

Phillips, R. Vanishing Forests of America Harper's Weekly 48 (13 February 1903): 228-29.

Phillips, Richard A Geography of Adventure (Ph.D. thesis, University of British Columbia, 1994).

Philo, Chris. De-Limiting Human Geography: New Social and Cultural Perspectives. In Philo, C., editor, New Worlds, New Words (Aberystwyth: Institute of British Geographers, 1991), 25.

Pickens, Donald K. Westward Expansion and the End of American Exceptionalism: Sumner, Turner, and Webb Western Historical Quarterly 12 (1981): 409-18

Pickering, Andrew. The Role of Interests in High-Energy Physics: The Choice Between Charm and Colour. In Knorr K., Krohn R., and Whitley R., editors, The Social Process of Scientific Investigation (Dordecht: Reidel, Sociology of the Sciences Yearbook, vol. 4, 1981), 107-38.

----- Constructing Quarks: A Sociological History of Partical Physics Chicago: University of Chicago Press, 1984).

-----, editor. Science as Culture and Practice (Chicago: University of Chicago Press, 1992).

Pickering, C. On the Geographical Distribution of Plants Transactions of the American Philosophical Society n.s. 3 (1836): 27-84.

Pickett, Steward T. and White, P.S., editors, The Ecology of Natural Disturbance and Patch Dynamics (Orlando: Academic Press, 1985).

Pimm, Stuart L. The Balance of Nature? Ecological Issues in the Conservation of Species and Communities (Chicago: University of Chicago Press, 1991).

Pinch, Trevor. Confronting Nature: The Sociology of Solar-Neutrino Detection (Dordecht: D Reidel, 1986).

Pinch, Trevor and Pinch, Trevor. Reservations about Reflexivity and New Literary Forms or Why Let the Devil Have All the Good Times. In Woolgar, S., editor, Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge (London: Sage Publications, 1988), 178-97.

Pinchot, Gifford The Adirondack Spruce: A Study of the Forest in Ne-Ha-Sa-Ne Park (New York, 1898).

----- The Sustained Yield of Spruce Lands Paper Trade Journal 27 (11 February 1898): 157-62.

----- A Primer of Forestry: Practical Forestry (Washington: U.S. Dept. Agriculture, Bureau of Forestry, bulletin 24, 1905).

----- The Fight for Conservation (New York: Doubleday, Page & Co., 1910).

----- The Training of a Forester (3d ed. Philadelphia: J.B. Lippincott & Co., 1917).

----- The Lines Are Drawn Journal of Forestry 17 (1919): 899-900.

----- Breaking New Ground (New York: Harcourt Brace, 1948).

Pinkett, Harold T. Gifford Pinchot: Private and Public Forester (Urbana: University of Illinois Press, 1970).

Pomeroy, Laurence R., Hargrove, Eugene C. and James J. Alberts, The Ecosystem Perspective. In Pomeroy, L.R. and Alberts, J.J. editors, Concepts of Ecosystem Ecology: A Comparative View (New York: Springer-Verlag, 1988), 1-18.

Porter, Charlotte M. The Eagle's Nest: Natural History and American Ideas, 1812-1842 (Tuscaloosa: University of Alabama Press, 1986).

Porter, Theodore. The Rise of Statistical Thinking, 1820-1900 (Princeton: Princeton University Press, 1986).

Potter, Edward H. Public Policy and Economic Growth in Maine, 1820-1857 (Ph.D. thesis, University of Maine, 1974).

Prado, C.G. The Limits to Pragmatism (Atlantic Highlands, NJ: Humanities Press International, 1987).

Pratt, Mary L. Imperial Eyes: Travel Writing and Transculturation (New York: Routledge, 1992).

Pressly, Thomas J. Americans Interpret Their Civil War (2d ed. New York: Collier Books, 1965).

Price, Marie and Lewis, Martin. The Reinvention of Cultural Geography Annals of the Association of American Geographers 83 (1983): 1-17.

----- and ----- Reply: On Reading Cultural Geography. Annals of the Association of American Geographers 83 (1993): 520-22.

Putnam, Frank. Maine: A Study in Land-Grabbing, Tax-Dodging, and Isolation New England Magazine 36 (July 1907): 515-40

Putnam, Hilary. Reason, Truth, and History (New York: Cambridge University Press, 1981).

Pyne, Stephen J. Fire in America: A Cultural History of Wildland and Rural Fire (Princeton: Princeton University Press, 1982).

----- Firestick History Journal of American History 76 (1990): 1132-41.

Rampino, M. R. and Self, S. Sulfur-Rich Volcanic Eruptions and Stratospheric Aerosols Nature 310 (1984): 677-79.

Raumolin, J. L'homme et la destruction des ressources naturells: la *Raubwirtschaft* au tournant du siècle Annales: E.S.C. 39 (1984): 798-819.

Ravetz Jerome.Scientific Knowledge and Its Social Problems (New York: Oxford University Press, 1971).

Recknagel, Arthur B. and Spring, Samuel N. Forestry: A Study of Its Origin, Application, and Signigicance in the United States (New York: Alfred A. Knopf, 1929).

Reiger, John F. American Sportsmen and the Origins of Conservation (2d ed. Norman: University of Oklahoma Press, 1986).

----- Commentary Environmental Review 12 (fall 1988): 94-96.

Report of the Royal Commission on Pulpwood (Ottawa: A.C. Acland, sessional paper 30, 1924)

RESTORE. Maine Woods: Proposed National Park & Preserve, A Vision of What Could Be (Augusta, 1994).

Rhoads Bruce L. and Thorne Colin E. Geomorphology as Science: The Role of Theory Geomorphology 6 (1993): 287-307

Rhoads Bruce L. and Thorne Colin E. Contemporary Philosophical Perspectives on Physcial Geography with Emphasis on Geomorphology Geographical Review 84 (1994): 90-101.

Richards, Thomas. The Imperial Archive: Knowledge and the Fantasy of Empire (London: Verso, 1993).

Riess, Steven A. Sport and the Redefinition of American Middle-Class Masculinity International Journal of the History of Sport 8 (1991): 5-27.

[Ring, E.E.] History of the Wild Lands of Maine. In Maine Forest Commission, Report (1908): 36-103.

Ring, Elizabeth. The Progressive Movement of 1912 and Third Party Movement of 1924 in Maine (Orono: University of Maine Press, 1933).

Roach, Thomas and Judd, Richard W. A Man for All Seasons: Frank Dixie Barnjum, Conservationist, Embargoist, and Speculator" Acadiensis 20 (1991): 129-44.

Robbins, William G. American Forestry: A History of National, State, and Private Cooperation (Lincoln: University Nebraska Press, 1985).

Roberts, Rebecca and Emel, Jodie. Uneven Development and the Tragedy of the Commons: Competing Images for Nature-Society Analysis Economic Geography 68 (1992): 249-71.

Robinson, A.H. and H. M. Wallis. Humboldt's Map of Isothermal Lines: A Milestone in Thematic Cartography Cartographic Journal 5 (1967): 119-23.

Robinson, Clement F. State Taxation and Forest Lands Political Science Quarterly 24 (1909): 616, 615-22.

Rodgers, Andrew Denny, III. Berhard Eduard Fernow: A Story of North American Forestry (Princeton: Princeton University Press, 1951).

Rodgers, Daniel T. The Work Ethic in Industrial America, 1850-1920 (Chicago: University of Chicago Press, 1978).

Rolston, Holmes, III. Is There an Ecological Ethic? In Philosophy Gone Wild: Essays in Environmental Ethics (Buffalo: Prometheus Books, 1986), 12-29.

Roper, M. and J. Tosh, J., editors, Manful Assertions: Masculinity in Britain since 1800, (London: Routledge, 1991).

Roosevelt, Theodore, The Works of Theodore Roosevelt, Hagerdorn, H., editor (New York: Scribners, 1926), 20 vols.

----- Forestry and Foresters Proceedings of the Society of American Foresters 1 (1905): 3-9.

Rorty, Richard. Philosophy and the Mirror of Nature (Princeton: Princeton University Press, 1979).

Rose, Gillian. Feminism and Geography: The Limits of Geographical Knowledge (Minneapolis: University of Minnesota Press, 1993).

Rose, Hillary. Love, Power, and Knowledge: Towards a Feminist Transformation of the Sciences (Bloomington: Indiana University Press, 1994).

Rose, Hilary and Rose, Steven. Radical Science and Its Enemies. The Socialist Register (1979): 317-35.

Ross, Dorothy The Origins of American Social Science (New York: Cambridge University Press, 1991).

Rotundo, Anthony E. American Manhood: Transformations in Masculinity from the Revolution to the Modern Era (New York: Basic Books, 1993).

Rouse, Joseph 1992 What Are Cultural Studies of Scientific Knowledge? Configurations 1:1-22.

Rubner, Heinrich. Sustained-Yield Forestry in Europe and Its Crisis During the Era of Nazi Dictatorship. In Steen, H.K., editor, History of Sustained-Yield Forestry ([Durham, NC?]: Forest History Society, 1984), 170-75.

Rudwick, Martin J.S. The Emergence of a Visual Language for Geological Science History of Science 14 (1976): 149-95.

----- The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists (Chicago: University Chicago Press, 1985).

Russell, E. Wood Butchers Colliers 43 (8 May 1909): 19-20.

Russell, Emily W.B. Indian-set Fires in the Forests of the Northeastern United States Ecology 64 (1983): 78-88.

St. Pierre, Jym and Kellet, Michael. Maine Woods National Park: Questions and Answers RESTORE: The North Woods 4 (April 1996): 5.

Sanger, Mary E.J.E. William Francis Ganong, Regional Historian (M.A. thesis, University of Maine, 1980).

Sargent, Charles S. The Protection of Forests North American Review 135 (October 1882): 386-401

----- Report on the Forests of North America (Washington, vol. 9 of the Tenth Census of the United States, 1884).

Sauer, Carl O. Land and Life: A Selection from the Writings of Carl Ortwin Sauer, Leighley, J., editor. Berkeley: University of California Press, 1963).

Sayer, Andrew. Epistemology and Conceptions of People and Nature in Geography Geoforum 10 (1979): 19-43.

----- Postmodernist Thought in Geography: A Realist View Antipode 25 (1993): 320-44.

Sayre, Anne. Rosalind Franklin and DNA (New York: Norton, 1975).

Schenck, C. A. Forest Policy (Darmstaadt: C.F. Winter, 1911).

Schmidt, Peter J. Back to Nature: The Arcadian Myth in Urban America (1969. Baltimore: Johns Hopkins University Press, 1989).

Schulz William F., Jr. Conservation Law and Administration: A Case Study of Law and Resources Use in Pennsylvania (New York: Roland Press Co., 1953).

Scott, Joan W. Gender and the Politics of History (New York: Columbia University Press, 1988).

Seager, Joni. Earth Follies: Coming to Feminist Terms with the Global Environmental Crisis (New York: Routledge, 1993).

Sewall, James. Crusing for Quick Values in the Northeast Journal of Forestry 22 (1924): 65-68.

Sedgewick, Thomas Steele. Canoe and Camera: A Two Hundred Mile Tour Through the Maine Forests (Boston, 1882).

Seymour, Edward. Trout-Fishing in the Rangeley Lakes. In Mayer, A., editor, Sport with Gun and Rod in American Woods and Waters (New York, 1883), 351-78.

Seymour, Robert S. The Red Spruce-Balsam Fir Forest of Maine: Evolution of Silvicultural Practice in Response to Stand Development Patterns and Disturbances. In Kelty, M.J., Larson, B.C. and C.D. Oliver, editors, The Ecology and Silviculture of Mixed-Species Forests Dordecht: Kluwer, 1992), 217-44.

Shapin, Steven. The Politics of Observation: Cerebral Anatomy and Social Interests in the Edinburgh Phrenology Disputes. In Collins, H. M., editor, Sociology of Scientific Knowledge: A Source Book (Bath: Bath University Press, 1982), 103-50.

----- A Social History of Truth: Civility and Science in Seventeenth Century England (Chicago: University of Chicago Press, 1994).

Shapin, Steven and Schaffer, Simon. Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life (Princeton: Princeton University Press, 1985).

Shaw, V. Rape of the Redwoods Overland new ser. 39 (March 1902): 738-42.

Shea, W. R., editor. Nature Mathematized: Historical and Philosophical Case Studies in Classical Modern Natural Philosophy (Dordecht: D. Reidel, 1983).

Shi, David E. Facing Facts: Realism in American Thought and Culture (New York: Oxford University Press, 1995).

Shugart, H.L. and Urban, D.L. Scale, Synthesis, and Ecosystem Dynamics. In Pomeroy, L.R. and Alberts, J.L., editors, Concepts of Ecosystem Ecology: A Comparative View (New York: Springer-Verlag, 1988), 279-89.

Sibley, David. Gender, Science, Politics, and Geographies of the City Gender, Place, and Culture 2 (1995): 37-49.

Silver, Helenette. New Hampshire Game and Furbearers: A History (Concord: New Hampshire Fish and Game Department, 1957).

Silver, Timothy. A New Face on the Countryside: Indians, Colonists, and Slaves in South Atlantic Forests, 1500-1800 (New York: Cambridge University Press, 1990).

Sismondo, Sergio. Some Social Constructions Social Studies of Science 23 (1993): 515-53.

Skeels, Anna. A Passage to Premodernity: Carl Sauer Repositioned in the Field. (unpubl. M.A. thesis, University of British Columbia, 1993).

Sklar, Martin J. The Corporate Reconstruction of American Capitalism, 1890-1916: The Market, the Law, and Politics (New York: Cambridge University Press, 1988).

Smith, Charles D. The Mountain Lover Mourns: Origins of the Movement for a White Mountain National Forest, 1880-1903 New England Quarterly 33 (1960): 37-56.

Smith, David C. Wood Pulp Paper Comes to the Northeast, 1865-1900 Forest History 10 (1966): 12-25

-----Virgin Timber: The Maine Woods as a Locale for Juvenile Fiction. In Sprague, R.S., editor, Handfull of Spice: Essays in Maine Literature (Orono: University of Maine Press, 1968), 187-205.

----- Maine and Its Public Domain: Land Disposal on the Northeastern Frontier. In Ellis, D.M., editor, The Frontier in American Development: Essays in Honor of Paul Wallace Gates (Ithaca: Cornell University Press, 1969), 113-37.

----- A History of Lumbering in Maine, 1861-1960 (Orono: University of Maine Press, 1972).

----- The Logging Frontier Journal of Forest History 18 (1974): 96-106.

Smith, Henry N. Rain Follows the Plow: The Notion of Increased Rainfallfor the Great Plains, 1844-1880 Huntington Library Quarterly 10 (1947): 169-93.

Smith, Neil. Uneven Development: Nature, Capital, and the Reproduction of Space (Oxford: Basil Blackwell, 1984).

Snelders, H.A.M. Romanticism and Naturphilosophie and the Inorganic Natural Sciences, 1798-1840 Studies in Romanticism 9 (1970): 193-215.

Snow, Dean R. Eastern Abenaki. In Trigger, B.G., editor, Handbook of North American Indians: Northeast. (Washington: Smithsonian, 1978), 137-47.

Söderqvist, Thomas. The Ecologists: From Merry Naturalists to Savious of the Nations: A Sociologically Informed Narrative Survey of the Ecologization of Sweden, 1895-1975 (Stockholm: Almqvist & Wiksell, 1986).

Speck, Frank G. Penobscot Man: The Life History of a Forest Tribe (1940. New York: Octagon Books, 1970).

Spivak, Gayatri C. Speculations on Reading Marx: After Reading Derrida. In Attridge, D., Bennington, G. and R. Young, editors, Post-structuralism and the Question of History (New York: Cambridge University Press, 1987), 30-62.

----- The Post-Colonial Critic: Interviews, Strategies, Dialogues, S. Harasym, editor (New York: Routledge, 1990).

Sprague, John F. Backwoods Sketches (Augusta: Kennebec Journal, 1912).

Springer, John S. Forest LIfe and Forest Trees: Comprising Winter Camp-Life among the Loggers and Wild-Wood Adventure... (New York, 1851).

Stafford, Barbara. Voyage into Substance: Art, Science, Nature, and the Illustrated Travel Account, 1760-1840 (Cambridge: MIT Press, 1984).

----- Artful Science: Enlightenment, Entertainment, and the Eclipse of Visual Education (Cambridge: MIT Press, 1994).

Stanton, Don C. A History of the White-Tailed Deer in Maine (Augusta: Dept. of Inland Fisheries and Game, game division bulletin no. 8, 1963).

Starr, Frederick. American Forests: Their Destruction and Preservation. In U.S. Department of Agriculture, Report (1865): 210-34.

Steen, Harold K. The U.S. Forest Service: A History (Seattle: University of Washington Press, 1976).

----- editor, David M. Smith and the History of Silviculture: An Interview by Harold K. Steen (Durham, NC: Forest History Society, 1990).

Stevens, Charles W. Fly-Fishing in Maine Lakes, or Camp-Life in the Wilderness (Boston, 1884).

Stocking, George Victorian Anthropology (New York: Free Press, 1987).

Strohmayer, Ulf and Hannah, Matt. Domesticating Postmodernism Antipode 24 (1992): 29-55.

Stuckey, Ronald L., editor, Essays on North American Plant Geography from the Nineteenth Century (New York: Arno Press, 1978).

Sullivan, James. History of the Penobscot Indians Collections of the Massachusetts Historical Society 9 (1804): 207-32.

Sutton, S.B. Charles Sprague Sargent and the Arnold Arboretum (Cambridge: Harvard University Press, 1970).

Taylor, Alan. Liberty Men and Great Proprietors: The Revolutionary Settlement on the Maine Frontier (Chapel Hill: University of North Carolina Press, 1990).

Taylor, Peter J. An Interpretation of the Quantitative Debate in British Geography Transactions of the Institute of British Geographers n.s. 1 (1976): 129-42.

Taylor, Peter J. Technocratic Optimism, H.T. Odum, and the Partial Transformation of the Ecological Metaphor after World War II Journal of the History of Biology 21 (1988): 213-44.

Terrie, Philip G. Forever Wild : Environmental Aesthetics and the Adirondack Forest Preserve (Philadelphia: Temple University Press, 1985).

Thayer, Abbott H. The Worth of the Primeval Type of Forest. In Society for the Protection of New Hampshire Forests, Report (1911): 28-29.

Thelen, David P. Paths of Resistance: Tradition and Dignity in Industrializing Missouri (New York: Oxford University Press, 1986).

Thompson, E.P. Whigs and Hunters (1975. Harmondsworth: Penguin, 1985).

Thompson, Kenneth. Forests and Climate Change in America: Some Early Views Climatic Change 3 (1980): 47-64.

Thoreau, Henry David. The Maine Woods, ed. J.J. Moldenhauer (Princeton: Princeton University Press, 1972).

Tober, James A. Who Owns the Wildlife? The Political Economy of Conservation in Nineteenth Century America (Westport, CT: Greenwood Press, 1981).

Tobey, Ronald C. Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895-1955 (Berkeley: University of California Press, 1981).

de Tocqueville, Alexis Democracy in America, Mayer, J.P. and Lerner, M., editors, trans. G. Lawrence (New York: Harper and Row, 1966).

Towmey, James W. The Woodlot: A Problem for New England Farmers The Scientific Monthly 5 (1917): 193-203

Traweek, Sharon. An Introduction to Cultural and Social Studies of Sciences and Technologies Culture, Medicine, and Psychiatry 17 (1993): 3-25.

Tufte, Edward. Visual Display of Quantitative Information (Chesire, CT: Graphics Press, 1983).

Turco, R. P., Whitten, R. C., and Toon, O. B. Stratospheric Aerosols: Observation and Theory Review of Geophysics and Space Physics 20 (1982): 233-79.

Turner, B.L., II, editor, The Earth as Transformed by Human Action (New York: Cambridge University Press, 1990).

Twight, Ben W. Bernard Fernow and Prussian Forestry in America Journal of Forestry 88 (2) (1990): 21-25.

Ubique [Parker Gilmore]. Gun, Rod and Saddle: Personal Experiences (New York, 1869).

U.S. Census Office, Population of the United States in 1860 (Washington, 1864).

U.S. Congress, Letter from the Secretary of Interior, 5 July 1872 (Washington, H. ex. doc. 9 (42-3), 1563, 1873).

U.S. Congress, Pulp and Paper Investigation Hearings (Washington: GPO, 1909), 3 vols.

U.S. Congress. Report of the National Conservation Commission, Henry Gannett, ed. (Washington: GPO, S. Doc. 676, 1909).

U.S. Division of Forestry. Practical Assistance to Farmers, Lumbermen, and Other Owners of Forest Land (Washington, circular 21, 1898).

U.S. Forest Service, Forest Preservation and National Prosperity (Washington: GPO, USFS circular 35, 1905).

Van Der Vat, Dan. The Atlantic Campaign: The Great Struggle at Sea, 1939-1945 (London: Hodder & Stoughton, 1988).

Vertromille, Rev. Eugene The Abenakis and Their History (New York, 1866).

Waddle, W. Jr., The Game Water-Fowl of America Harper's New Monthly Magazine 40 (February 1870): 433-37.

Walker, Francis A. Discussions in Economics and Statistics, D.R. Davis, editor (1899. New York: Augustus M. Kelley, 1971), 2 vols.

Walter, François. Attitudes Towards the Environment in Switzerland, 1880-1914 Journal of Historical Geography 15 (1989): 287-99

Wamsley, K.B. Cultural Signification and National Ideologies: Rifle-Shooting in Late Nineteenth Century Canada Social History 20 (1995): 63-72.

Ward, Charles C. Moose-Hunting. In Mayer, A., editor, Sport with Gun and Rod in American Woods and Waters (New York, 1883), 154-81.

Ward, Steven C. In the Shadow of the Deconstructed Metanarratives: Baudrillard, Latour, and the End of Realist Epistemology History of the Human Sciences 7 (1994): 73-94.

Warner, William S. An Honest Woodsman: The Life and Opinions of Dave Priest-- Maine Trapper, Guide and Game Warden (Orono: Northeast Folklore Society, Northeast Folklore, vol. XXII, 1981).

Warren, Allen. Popular Manliness: Baden-Powell, Scouting and the Development of Manly Character In Mangan, J.A. and Walvin, J., editors, Manliness and Morality: Middle Class Masculinity in Britain and America, 1800-1940 Manchester: Manchester University Press, 1987), 199-217.

Watts, A.D. Analysis of the International Paper and Power Company: History and Prospects (Montreal: privately printed, 1929).

Watts, Michael. On the Poverty of Theory: Natural Hazards Research in Context. In Hewitt, K., editor, Interpretations of Calamity (Boston: Allen & Unwin, 1983), 231-62.

----- Silent Violence: Food, Famine, and Peasantry in Northern Nigeria (Berkeley: University of California Press, 1983).

Watts, Michael and Peet, Richard. Development Theory and Environment in an Age of Market Triumphalism Economic Geography 69 (1993): 227-53.

Wescott, Richard R. Early Conservation Programs and the Development of the Vacation Industry in Maine Maine Historical Society Quarterly 27 (1987): 2-13.

WHB [William H. Brewer?]. Walker's Statistical Atlas of the United States American Journal of Science and Arts 3d ser 10 (December 1875): 83-88.

Whipple, Joseph. A Geographic View of the District of Maine (Bangor, 1816).

White, Hayden. The Content of the Form: Narrative Discourse and Historical Representation (Baltimore: Johns Hopkins University Press, 1987).

White, Richard. Land Use, Environment, and Social Change: The Shaping of Island County, Washington. (Seattle: University of Washington Press, 1980).

----- Outlaw Gangs of the Middle Border: American Social Bandits Western Historical Quarterly 12 (1981): 387-408.

----- The Roots of Dependency: Subsistence, Environment, and Social Change Among the Choctaws, Pawnees, and Navajos (Lincoln: University of Nebraska Press, 1983).

----- American Environmental History: The Development of a New Historical Field. Pacific Historical Review 54 (1985): 297-335.

----- Environmental History, Ecology, and Meaning. Journal of American History 76 (1990): 1111-16.

----- Trashing the Trails. In Limerick, P.N., Milner, C. A., and C. E. Rankin, editors, Trails: Toward a New Western History (Lawrence, KA: University Press of Kansas, 1991), 26-39.

-----, 'Are You an Environmentalist or Do You Work for a Living?': Work and Nature. In Cronon, W., editor, Uncommon Ground: Toward Reinventing Nature (New York: W.W. Norton, 1995), 171-85.

Whitford, H.N. and Craig, Roland D. Forests of British Columbia (Ottawa: Commission of Conservation, 1918).

Wiener, Norbert. Cybernetics, or Control and Communication in the Animal and the Machine (New York: Wiley, 1948).

Wiens, John A. On Understanding a Non-equilibrium World: Myth and Reality in Community Patterns and Processes. In D.R. Strong, ed., Ecological Communities: Conceptual Issues and the Evidence (Princeton: Princeton University Press, 1984), 439-57.

The Wilderness Society. The Northern Forest: A Region at Risk (Boston, [1996?]).

Wilkins, Austin H. The Forests of Maine (Augusta: Maine Forest Service, bull. 8, 1932).

----- Ten Million Acres of Timber: The Remarkable Story of Forest Protection in the Maine Forestry District (1909-1972) (Woolwich, ME: TBW Books, 1978).

Williams, Michael. Ohio: Microcosm of Agricultural Clearing in the Midwest. In Tucker, R.P. and J.F. Richards, editors, Global Deforestation and the Nineteenth Centry World Economy (Durham: Duke University Press, 1985), 3-13.

----- Americans and Their Forests: A Historical Geography (New York: Cambridge University Press, 1988).

Williams, Raymond The Country and the City (London: Chatto & Windus Ltd., 1973).

----- Keywords (rev. ed., London: Fontana, 1983).

Williamson,William D. The History of the State of Maine (Hallowell, 1839).

Wills, Garry. Lincoln at Gettysburg: The Words That Remade America (New York: Simon & Schuster, 1992).

Wolf, Eric R. Europe and the People Without History. (Berkeley: University of California Press, 1982).

Wood, Denis. The Power of Maps (New York: Guilford, 1992).

Wood, Richard G. A History of Lumbering in Maine, 1820-1861 (Orono: University of Maine Press, 1935).

Woodwell, George M. and Pecan, Erene V., editors, Carbon and the Biosphere: Proceedings of the 24th Brookhaven Symposium in Biology (Washington: U.S. Atomic Energy Commission, 1973).

Woolf, Stuart. Statistics and the Modern State Comparative Studies in Society and History 31 (1989): 588-604.

Woolgar, Steve. Irony in the Social Study of Science. In Knorr-Cetina, K.D. and Mulkay, M., editors, Science Observed: Perspectives on the Social Study of Science (Beverly Hills: Sage Publications, 1983), 239-66.

----- editor. Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge (London: Sage Publications, 1988).

----- Science, The Very Idea (Chichester: Tavistock, 1988).

Woolgar, Steve. Some Remarks About Positionism: A Reply to Collins and Yearley. In Pickering, A., editor, Science as Culture and Practice (Chicago: University of Chicago Press, 1992), 327-42.

Worster, Donald. Nature's Economy: A History of Ecological Ideas (San Francisco: Sierra Club Books, 1977).

----- Dust Bowl: The Southern Plains in the 1930s (New York: Oxford University Press, 1979).

----- History as Natural History: An Essay on Theory and Method Pacific Historical Review 53 (1984): 1-19.

----- Review of Changes in the Land by William Cronon. Agricultural History 58 (1984): 508-509.

----- Rivers of Empire: Water, Aridity, and the Growth of the American West (New York: Pantheon, 1985).

----- World Without Borders: The Internationalizing of Environmental History. In Bailes, K.E., editor, Environmental History. (Lanham, MD: University Press of America, 1986), 661-69.

----- Doing Environmental History. In Worster, D., editor, The Ends of the Earth: Perspectives on Modern Environmental History (New York: Cambridge University Press, 1988), 289-307.

----- editor, The Ends of the Earth: Perspectives on Modern Environmental History (New York: Cambridge University Press, 1988).

----- Seeing Beyond Culture Journal of American History 76 (1990): 1142-47.

----- The Ecology of Order and Chaos Environmental History Review 14 (1990): 1-18.

----- Transformations of the Earth: Toward an Agroecological Perspective in History. Journal of American History 76 (1990): 1087-1106.

Wright, Carroll D. History and Growth of the U.S. Census (Washington: GPO, 1900).

Wright, Eric. Maine Game Wardens (Freeport: DeLorme Publishing Co., 1985).

Wright, James. The Progressive Yankees: Republican Reformers in New Hampshire, 1906-16 (Hanover: University Press of New England, 1987).

Wright, Will. Wild Knowledge: Science, Language, and Social Life in a Fragile Environment (Minneapolis: University of Minnesota Press, 1992).

Yapa, Lakshman.What Are Improved Seeds? An Epistemology of the Green Revolution Economic Geography 69 (1993): 254-73.

Young, Robert. Science Is Social Relations Radical Science Journal 5 (1977): 65-129.

----- Science, Ideology, and Donna Haraway Science as Culture 15 (1992): 165-207.

Young, Robert. White Mythologies: Writing History and the West (London: Routledge, 1990).

Zeller, Suzanne Inventing Canada: Early Victorian Science and the Idea of a Transcontinental Nation (Toronto: University of Toronto Press, 1987).

----- George Lawson: Victorian Botany, the Origins of Species, and the Case of Nova Scotian Heather. In Bogaard, P.A., editor, Profiles of Science and Society in the Maritimes Prior to 1914 ([Sackville, NS]: Centre for Canadian Studies, Mount Allison University, 1990), 51-62.

Zunz, Olivier Making America Corporate, 1870-1920 (Chicago: University of Chicago Press, 1990).