Valuing the Nature of Maine

A Bibliography Prepared by
Maine Audubon Society
May 1996

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On the cover: Forester marking tree saved for wildlife, Scientific Forestry Management Area, Baxter State Park (Jensen Bissell photo); Clamming on the Maine Coast (photo courtesy of Natural Resources Council of Maine.)

Inside covers: Penobscot River at the Cribworks (Scott Perry photo)

Design of *Valuing the Nature of Maine* by Nina Medina, Basil Hill Graphics.

Valuing the Nature of Maine

Natural resources are the backbone of Maine's economy. Our ability to plan for a sustainable future requires a thorough understanding of the many different ways Maine's woods, waters, and wildlife contribute to the state's economy. In the past, information describing the economic role of our natural resources has been difficult to find, widely dispersed, and often narrowly focused. Now, with this bibliography, we hope to improve access to a broad base of information to help planners, policy makers, citizens groups, and others bridge the gap between economic planning and environmental protection. Enhancing Maine's economy through the wise stewardship of its resources could be the most enduring legacy we leave our children.

Table of Contents

Acknowledgments

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The Economic Role of Maine's Woods, Waters, and Wildlife

Maine's economy is fundamentally based on the very nature of the state: its vast tracts of woodland, productive farms, rich coastal waters, hard-working and resourceful people, abundant wildlife, and dramatic scenery. Natural resource-dependent businesses provide nearly 25% of Maine's paychecks (Benson 1994) and create an economic force stimulating many other businesses in the state. Although natural resource products and industries have changed over the years, sustaining the resource base for diversity and growth will continue to be essential to Maine's economic health.

The Second Paycheck

In addition to revenues, Maine's natural resources provide other benefits that one economist calls a "second paycheck" (Whitelaw 1989). This paycheck provides a quality of life above and beyond what is earned and spent: access to beautiful natural areas, stable and safe communities, outdoor recreation opportunities and proximity to wildlife. At the end of a day, during lunch hour, or on the weekend, Maine residents can collect one of the most sought after employee benefits an economy could deliver, the opportunity to claim Maine's woods, waters, and wildlife as a backyard bonus. This bonus retains qualified labor essential for business growth and it attracts talented workers every day. A major reason people move to Maine (and why Mainers return) is the opportunity to enjoy our natural resources. These "second paycheck" values, though difficult to measure, are essential to our economic well being.

Legitimate Issues

Given the values provided by our natural resources, creating public policy that sustains and improves this resource base might seem like an easy process. Obviously it is not. Sand dunes compete with real estate pressures. Budget cuts reduce state park staffing. Wetlands protection affects landowners' timber harvesting goals. Rural residents question the local value of proposed conservation lands that might leave their tax rolls. Hydroelectric producers worry about flow requirements that allocate water for fisheries and recreation. The path through this maze of competing demands has been confusing and filled with conflict, a conflict often characterized as a choice between jobs and the environment.

Jobs Versus the Environment

Framing state priorities and funding decisions based on the jobs-or-the-environment conflict has been a disservice to those who wrestle with natural resource issues and an insult to those who make their living either directly or indirectly from our environment. Part of what is needed to avoid this oversimplified debate is

broader information on the economic values provided by our natural resources. If people concerned with the future of our natural resources have broader information about their value, perhaps the challenge of how to allocate scarce public funding to regulate and manage our environment better could be guided by more realistic priorities. With this information it would be possible to create both economic and environmental policy that answers a more relevant question: how do we both sustain and enhance our natural resource base so that it can deliver long-term revenues and other benefits to our state?

Removing Barriers

Maine's natural resources are revenue and job generators, from the woodlot delivering trees to sawmills, to the river delivering recreational paddlers to tourism business owners; from the estuary that functions as a nursery for commercial fisheries, to the environmental engineers hired to help industry reduce emissions and capture byproducts. Information describing the many different ways Maine's woods, waters, and wildlife contribute to the state's economy is difficult to find, primarily focused on a few highly visible industries, and often incomplete. This bibliography attempts to gather references that discuss the economic value of Maine's woods, waters, and wildlife into one document. By broadening the understanding of natural resource values and the human aspect of environmental quality, we hope to enhance our ability to plan for the future of Maine's natural resources.

Economics, Environment, and Livelihood

Decisions affecting the fate of our natural resources are made far from those who actually depend on those resources for income. A lobster fisherman, white water outfitter, fishing guide, factory owner or the thousands of other people who depend on the quality of our natural resources for their paychecks depend on a clear understanding of the relationship between their livelihood and wise environmental stewardship. People involved in planning, protecting, managing and regulating the use of our natural resources already expect to be given biological and technical data, to discuss wildlife habitat or the chemical components of a factory's discharge. But more is needed. This bibliography was created to provide access to another vital area of information: the broad economic role played by Maine's woods, waters and wildlife.

Introduction to the Bibliography

The bibliography lists books, journal articles, state and federal government reports, research papers, conference findings, publications from non-profit organizations and university reports. The references are organized into eight sections: Recreation and Tourism, Forest Products, Marine Products, Real Estate Values, Valuation, Environmental Regulation, Agriculture, and Other. Publications that are relevant to more than one category may appear several times throughout the bibliography.

Of the 216 references, 153 refer directly to Maine and are highlighted with the Maine symbol () before the author's name. Every section represents a comprehensive listing for Maine-related literature. In areas where publications specific to Maine are limited, general references, or useful references from other regions are supplied. References from out-of-state were selected on the basis of their relevance to Maine. In each section the literature is listed alphabetically by author. Short descriptions intended to characterize the reference follow each entry.

Sections

Recreation and Tourism (pages 17-35) contains references related to outdoor-based tourism, recreation, or the nature travel industry. This section includes camping, hiking, hunting, fishing, and wildlife watching as well as other less active outdoor pursuits.

Forest Products (pages 35-41) includes references related to the economics of lumber, wood products and paper production. Literature on forest wildlife species is represented, for the most part, in Recreation and Tourism.

Marine Products (pages 41-45) involves references related to all marine related products (not including marine recreation) and their economic influence.

Real Estate Values (pages 45-50) contains references related to the economic impact of environmental protection, open space conservation, and other conservation activities on real estate values.

Valuation (pages 50-56) includes references which discuss developing monetary equivalents for natural resources values not available in the "marketplace."

Environmental Regulation (pages 56-61) contains references concerned with the economic impact of environmental protection.

Agriculture (pages 61-63) includes references related to the economics of agricultural production and land use.

Other (pages 63-64) lists related references that do not easily fit into the above categories.

Using the Bibliography

Many of the references will not be available at smaller libraries. If you have difficulty finding a particular report try writing the organization — many reports are available by mail and they are often free. Contact the nearest University of Maine library, the State Library in Augusta, or your county extension agent. For federal or state government reports contact the agency listed as publisher. Your congressional delegates may also have access to federal publications. Ask at their offices before buying the report.

The Maine Audubon Society has all of the publications from this bibliography in its research library, located at the Gilsland Farm Environmental Center in Falmouth, Maine. The library is available to the public by reservation.

All of the references in this bibliography are also entered into a bibliographic database, Bookends Pro version 3.1 (Westing Software, 800-325-1862, 2960 Paradise Drive, Tiburon, CA 94920). This program enables us to search the database using keywords. For example, if an organization is interested in finding information on the demographics of bird watching tourists, the keywords *demographics* and *birding* can be entered and the program will generate a list of publications touching on these topics. Maine Audubon welcomes visits to search this database or will receive phone requests for a database search.

To visit the Maine Audubon library, do a keyword search, or obtain a copy of this database on disc, please contact the secretary of Maine Audubon's Conservation Department at (207) 781-2330.

This bibliography is a work in progress. Maine Audubon Society is continually updating the data base and we welcome any suggestions that you might have concerning additions to the bibliography or people who might contribute to it. Please send suggestions to:

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Maine Audubon Society
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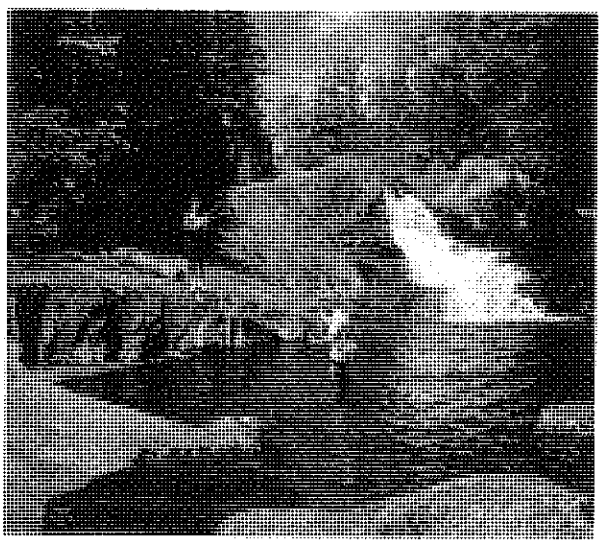
Selected Highlights From Publications Listed In The Bibliography

An illustration of the economics and natural resource information available in the bibliography.

Recreation And Tourism

Tourists visiting Maine in 1991 spent an estimated $2.75 billion on food, lodging, and recreation; tourism (including fishing, hunting, wildlife viewing, whitewater boating etc.) employed over seventy-eight thousand people, making it the state's single largest employment sector in 1991 (Maine State Office of Tourism 1994).



BILL CROSS, IF&W

In the Damariscotta River watershed over fifty percent of all taxable sales are provided by tourists who come to the area primarily because of the scenery (Bertaska 1995).

Estimated annual economic value for wildlife-related activities in Maine break down as follows:

Inland fishing	$300.7 - $494.2 million
Marine Sport Fishing	$135.4 - $274.5 million
Hunting	$183 - $291 million
Trapping *(residents only)*	$1.5 - $3.4 million
Nonconsumptive uses *(residents only)*	$55.4 million
TOTAL:	$676 million-$1.1 billion

(Boyle et al. 1990 in "A Study of the Impact of Game and Nongame Species on Maine's Economy")

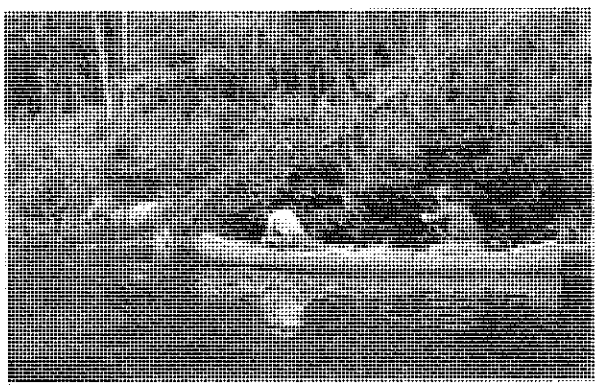
In Maine, 4,452 people have full-time jobs that *cater solely* to anglers, hunters, and wildlife watchers, and are directly dependent on wildlife. (Roper et al. 1992). Nationally, the estimated number of clients for fresh-water fishing guides in 1993 was over five hundred thousand; the clients spent an average of $92.50 per day for a total of $49.6 million (Mallet 1994).

Total payrolls for Maine's forest-based recreation sector are over $223 million (Northeastern Forest Alliance 1990).

"Maine's inland tourist economy depends on a high quality freshwater resource."
(Great Pond Task Force)

Whitewater Rafting in Maine grew from approximately ten thousand participants in 1980 to over sixty thousand in 1995. In 1993, nearly sixty-three thousand Maine rafters spent over $350 per trip (Great Northern Paper FERC re licensing data), contributing over $24.8 million; 70% was spent in Somerset, Piscataquis, and Penobscot counties (Great Northern Nekoosa Corp. 1991). Including indirect trip-related spending, commercial rafting in Maine generated an estimated total economic activity of $35 million (Maine State Planning Office 1993).

An estimated two hundred nordic skiing facilities are located in the Northern Forest region (Adirondacks through northern Maine). A national survey shows each facility, on average, hosts seventy-five hundred skier days and has about $93,100 in annual revenues. Each of these facilities employs five full-time and five part-time employees; total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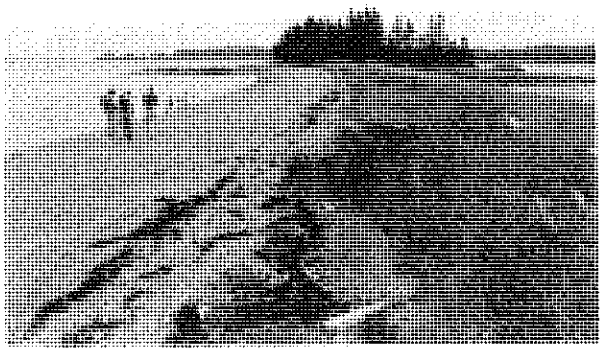

CHRIS AYRES

employment (direct and indirect) is estimated at over three thousand full and part-time jobs. Of gross spending ($18.6 million), $15 million is overhead costs, including $6.8 million spent on local labor costs (Northeastern Forest Alliance 1990).

River recreation on the West Branch of the Penobscot more than doubled from 1979 to 1989. The recreational use of the area increased 2.5 times faster than in Maine's state parks over the same time period (Central Maine Power 1989). In the summer of 1986 about thirty thousand people came to fish; twenty thousand to camp; fourteen thousand to hunt; thirty-eight thousand to sightsee; four thousand to canoe; and eighteen thousand to raft in the West Branch District of the Penobscot River (Great Northern Nekoosa 1991 Exhibit E).

"The Saco river forms the foundation for the region's economy. Tourism, recreation, industry, fisheries,... they all depend on clean, clear water and plenty of it."
—Bob Boilard, the "Saco River Man"

The most recent economic impact study of Maine's snowmobile industry, now thirteen years old, estimated that snowmobilers spent $135 -$153 million per year. (A new study by the Maine Snowmobile Association is expected in March, 1996). A new study in Vermont, which has 28,600 registered snow-mobiles, indicates that $165 million in revenues resulted from the 1994 snowmobile season (McElvany 1995). By contrast Maine has 78,000 registered snowmobiles (Aroostook County Tourism Inc. 1995).

Forest Products

Forest-based manufacturing and forest-based tourism contribute an estimated $39.8 million to Maine's tax revenues; recreation revenues provide more than half of this amount. Each thousand acres of usable Maine forest directly supports 1.4 manufacturing jobs and 1.5 forest-based tourism jobs. Both of these forest-based industries provide over fifty thousand jobs (12% of state employment) and generate a payroll of $888 million (11% of state payroll) (Northeastern Forest Alliance 1990 report, *The Economic Importance of Maine's Forest*).

"The two largest components of the Maine economy are forest products and tourism...Both rest directly on the sustainability of the Maine forest."
—Governor Angus King

There are over thirty thousand jobs in Maine's forest products industry. An additional fourteen thousand jobs are provided by forest products related support services. Forest products accounted for a third of Maine's manufactured product in 1992 and were valued at $4.3 billion (Benson 1994).

"I didn't buy this land as a get-rich-quick scheme. We gave it a real chance to produce, and it has paid off handsomely. It has performed far better than the stock market over the long haul."
—Mel Ames, owner and logger of 600 acres, from the Spring, 1996 *Amicus Journal* article titled "Living small in the great North Woods" by Will Nixon.

BILL CROSS, IF&W

Forest-based manufacturing (stumpage, harvesting, sawmills, pulp and paper, furniture and fixtures, and other wood products) generates a payroll of over $665 million, resulting in an estimated total economic impact (generated by sales and payroll) of $5.3 billion. Other revenues from Maine's forest products include: 112,000 gallons of maple syrup valued at nearly $1.9 million; more than one million wreaths valued at $6 million; and 300,000 Christmas trees worth $5.25 million (Northeastern Forest Alliance 1990).

Marine Products

In 1994, 1,268 acres of waters were leased to raise salmon, trout, mussels and oysters. In 1993, aquaculture sales topped $45 million, a 550% increase since 1987. Washington County now has twenty salmon farms contributing 500 or more full-time jobs. (Maine Aquaculture Association 1993).

Maine's 1993 clam harvest of 2.1 million pounds was worth approximately $10.4 million. Maine's 1982 harvest was approximately 6.7 million pounds. Clam landings state-wide are down by 47% over the past 50 years; 35% of Maine's clam flats have been closed due to pollution. The closure of over 40% of Casco Bay clam flats due to pollution results in an estimated $3.73 million of lost revenues to the area. Freeport had clam flats closed for five years due to malfunctioning septic systems and shoreland pollution. The town invested $5,000 to fix the problems and reopened the flats; fifty clammers retrieved $15,000 of clams in one day. The town licenses sixty-three diggers who bring $1 million a year to the local economy (Lewis 1993; Clements 1995; Heinig et al. 1995).

"As a commercial fisherman my livelihood is directly affected by water quality. Without protection of the Penobscot and other watersheds, efforts to conserve water quality in the Gulf of Maine are meaningless."
— Ike Johnson, Penobscot Bay fisherman

TOM HINDMAN, MAINE OFFICE OF TOURISM

Real Estate Values

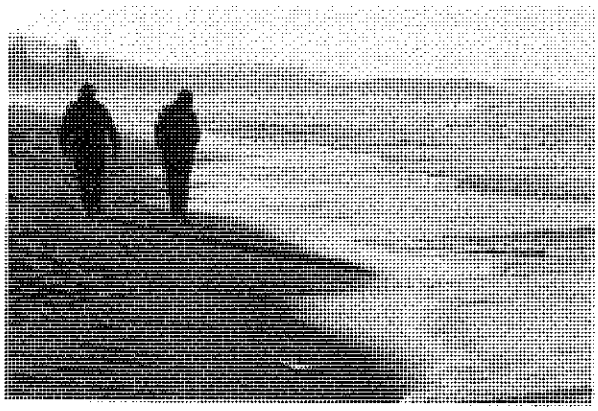
Waterfront real estate prices may be significantly lowered as a result of reduced water clarity. "The implicit price of one meter's improvement in water clarity ranges from $17 per foot frontage (in Auburn) to $66 per foot frontage (in Northern Maine). These implicit prices when aggregated for an entire lake equate to millions of dollars in improved property values." (James 1994).

On the Damariscotta river the premium for waterfront properties is over $73 thousand for upper river and over $128 thousand on lower river plus $48 per foot of actual frontage. This generates between $8.5 million and $9.5 million annually in benefits to residents living on or adjacent to the river (Rowland 1994).

According to a new study, the assumption that growth and development result in lower property taxes and that permanent land conservation measures lead to higher tax bills may not be accurate in all cases in Maine (Brighton *forthcoming*).

$ Valuation

An informal calculation suggests that Reid State Park, as real estate, could be sold for $4-8 million, but with 135,000 visitor days/



NANCY TRUEWORTHY

Reid State Park

"We must leave either-or behind and ask, 'How can we attend to Nature's needs while continuing to provide fiber for our mills and timber for our sawyers?'"

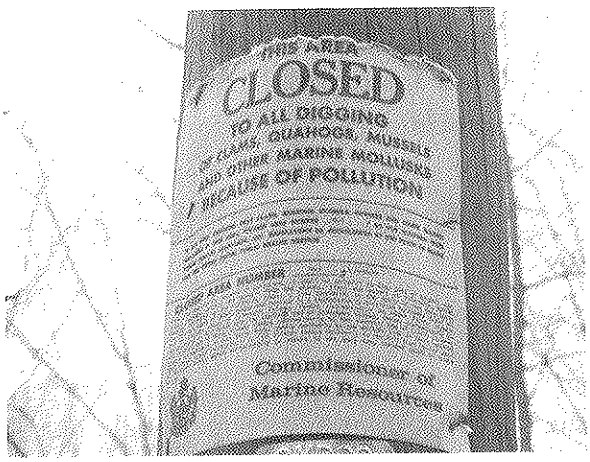
—Roger Milliken, Jr., President of Baskahegan Co.

year Reid State Park has an annual consumer surplus value as a recreational asset of $68-240 million. This is based on a consumer surplus value (economists call gains in people's welfare above and beyond out of pocket expenditures "consumer surplus") of $25-$90 per user-day (Freeman III 1994).

Nearly thirteen thousand jobs and $520 million are derived from Casco Bay's cargo ports, fisheries, tourism and recreation, and marina services. Property value assessments in Casco Bay towns total $9.4 billion. Estimated non-market values (ecosystem services such as water purification and fish spawning as well as aesthetic

values) may be as much as $6.5 million for parks on the bay and as much as $319 million for wetlands, depending on valuation methods (Colgan 1990).

Environmental Regulation



COURTESY NATURAL RESOURCES COUNCIL OF MAINE

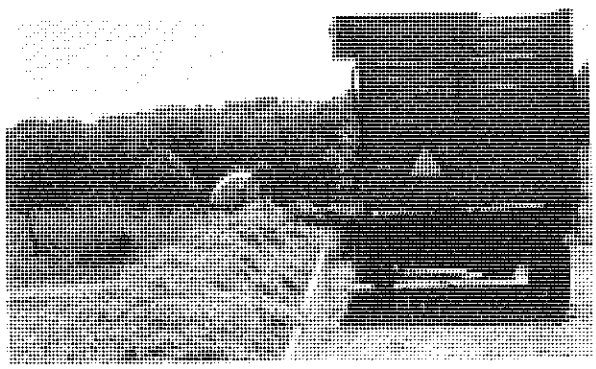
"The tourism industry, besides stimulating the economy and providing jobs, gives us a powerful incentive to preserve the beauty of Maine's natural resources. It is in everyone's interest to encourage stewardship of the environment, protect our historical landmarks, and maintain our state parks for the enjoyment of future generations of visitors."

— Senator Jeffrey H. Butland

In 1992, federal and state mandated environmental protection resulted in some sixteen thousand jobs in Maine and $700 million in sales related to environmental cleanup and protection activities and equipment (Bezdek 1993).

Agriculture

In 1984, farms in Maine numbered about seventy-seven hundred and comprised 1.53 million acres. By 1993 there were some sixty-eight hundred farms comprising 1.38 million acres, with an average farm size of 203 acres. This represents a twelve percent decline in farm numbers and an eleven percent decline in the area farmed over this ten-year period (New England Agricultural Statistics Service 1994.). In 1992 the market value of agricultural products sold in Maine topped $430 million; about half from crops and half from livestock and their products. Total farm expenses exceeded $350 million (Economics and Statistics Administration 1992).



NANCY TRUEWORTHY

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Recreation And Tourism

Aroostook County Tourism Inc. 1995. *1994-95 Snowmobile Aroostook Campaign*. Aroostook County Tourism, Inc., Presque Isle, ME.

Following an earlier campaign to promote and organize snowmobile tourism, the 1994-95 campaign was more targeted, but with only 40% of previous funding. Nonetheless, snowmobiler inquiries were up 185%, winter lodging expenditures were up about 15%, numbers of visitors increased by more than twenty three thousand and expenditures by $2.3 million. Motel owner: "This year's snowmobile season had the net effect of adding a thirteenth month to my annual financial statements."

Benson, J. 1994, November. *Background Paper: On the Economic Contribution of Maine's Natural Resource Industries*. A report for the Maine State Planning Office, Augusta, ME.

Reviews the economic impact of farming, forestry, and fishing in Maine. Recognizing the missing data on the secondary and tertiary impacts, the paper underscores the extent to which the industries are interconnected and affect each other. Includes an overview of employment and economic data for Maine. Natural resources-based industries account for nearly forty percent of goods-producing jobs in Maine, or employs one in five Mainers. Total sales value of farm products and fish catch is about $700 million for a processed export value of $1.1 billion. Forest industries generated $4.3 billion in manufactured product in 1992.Tourism is estimated to be worth $1.5 billion in 1992.

Bertaska, R. 1994, October. *Damariscotta River Estuary: What is it Worth? Sustainable Economic Opportunities: Natural Development in the Damariscotta River Region*. Damariscotta River Estuary Project, Damariscotta, ME.

This overview presents economic development paradigms, relationships, impacts, and trends associated with economic activity, and outlines new sustainable economic opportunities focused on the estuary, options for implementing economic development programs, and a ten-step action plan which can be undertaken immediately. The report also includes a review and analysis of 1994 Business and Visitor Surveys in the Damariscotta watershed which includes a finding that fifty to seventy-five percent of all taxable sales in the watershed are provided by tourists who come to the area primarily because of the scenery.

Boyle, K. J., J. C. Bergstrom, S. J. Reiling. 1994. *Qualitative and Economic Evaluations of White-water Boating on the Dead River*. Central Maine Power Company, Augusta, ME.

This Federal Energy Regulation Commission (FERC) study for the Central Maine Power Flagstaff Project focuses on the desirability of various release rates on the Dead River for white water boaters to determine the economic impact of water releases from Long Falls Dam in The Forks.

Boyle, K. J., A. G. Clark. 1993. Does Getting a Bull Significantly Increase Value? The Net Economic Value of Moose Hunting in Maine. *Alces* v29:201-211.

A study suggesting that hunters want trophy heads more than moose meat. Contains tables describing hunter expenditures and consumer surplus estimates.

Boyle, K. J., A. G. Clark, G. R. Lavigne. 1994. *Highlights from the 1988 Survey of Deer Hunters*. Department of Resource Economics and Policy, REP 454. University of Maine, Orono, ME.

A deer hunting survey containing data on hunter numbers, characteristics, effort, participation, success, dispersion, and opinions on management of the deer herd.

Boyle, K. J., O. Fenderson. 1994. *Sport Fishing Data Documentation Report*. Agricultural Experiment Station Staff Paper, REP 457. University of Maine, Orono, ME.

Based on resident and non-resident 1988 surveys, the report focuses on economic impact and economic value of inland sport fishing; and angler characteristics, effort, preferences, and opinions. Using multiplier effects, minimum annual economic impact estimates of inland fishing on Maine's economy is $172.2 million with income of $106.5 million and 4,739 jobs.

Boyle, K. J., M. Phillips, S. D. Reiling. 1990. *Highlights from the Survey of Anglers Holding a 1988 Maine Fishing License*. Department of Agricultural and Resource Economics, ARE 415. University of Maine, Orono, ME.

This survey contains data characterizing numbers of recreational fishermen and their expenditures, fishing economic revenues, total number of licenses, demographic characteristics, and angler interests, and includes both ice and open-water fishing data. Earlier surveys are available from the Department of Agricultural and Resource Economics.

Boyle, K. J., M. Phillips, S. D. Reiling. 1991. *Highlights from the 1989 Maine Wildlife Survey*. Department of Agricultural and Resource Economics, ARE 425. University of Maine, Orono, ME.

A survey of freshwater and marine recreational fishermen, hunters, trappers, and non-consumptive users of wildlife. Includes data and other information on characteristics (demographics) of respondents, wildlife observation, wildlife damage to property, the economic impact of non consumptive uses of wildlife, the respondents knowledge of wildlife in Maine, characteristics of wildlife observation trips in Maine, hunters opinions, personal importance of wildlife, wildlife revenues, and wildlife related expenses in Maine.

Boyle, K. J., M. Phillips, S. D. Reiling. 1989. *Highlights from the 1988 Survey of Maine Trappers* . Department of Agricultural and Resource Economics, ARE 396. University of Maine, Orono, ME.

A survey of 172 of Maine's 5,251 licensed trappers containing data on trapper characteristics, effort and participation, demographics, and earnings and expenditures. Also surveyed reasons for trapping, which according to this survey are primarily recreational.

Boyle, K. J., S. D. Reiling, M. Phillips. 1990. Species Substitution and Question Sequencing in Contingent Valuation Surveys Evaluating the Hunting of Several Types of Wildlife. *Leisure Sciences* 12:103-118.

A paper using a survey of Maine hunters to test contingent valuation models. Respondents did not change their statements of value when told that prices of substitutes had doubled.

Boyle, K. J., S. D. Reiling, M. Phillips. 1989. *Highlights from the Survey of 1988 Moose Hunters*. Department of Agricultural and Resource Economics, ARE 392. University of Maine, Orono, ME.

Data from a survey of 831 resident and 93 non-resident moose hunters describing the demographic and socio-economic profile of hunters from the 1988 season. The report quantifies hunting effort and average expendi-

tures of hunting groups. Residents averaged $428 and non-residents $871 of spending for an aggregate impact on Maine's economy of $470,000.

Boyle, K. J., S. D. Reiling, M. Teisl. 1992. *Qualitative and Economic Evaluations of Atlantic Salmon Fishing on the Penobscot River*. Agricultural Experiment Station report ARE 436. University of Maine, Orono, ME.

This paper examines the status of Atlantic salmon fishing on the Penobscot River during 1989. Angler surveys were used to determine participation, preferences, and opinions regarding management policies. In particular, the surplus value was gauged regarding a proposed five-year moratorium on salmon fishing and increased stocking. Marginal surplus values suggest that anglers' interests in fishing for salmon are greater than their interests in having Penobscot River salmon populations restored to naturally regenerating levels.

Boyle, K. J., S. D. Reiling, M. Teisl, M. Phillips. 1990. *A Study of the Impact of Game and Nongame Species on Maine's Economy*. Department of Agricultural and Resource Economics Paper #423. University of Maine University of Maine, Orono, ME.

A direct and indirect expenditure analysis including economic analyses of inland and marine sport fishing, hunting, trapping, non-consumptive wildlife use, and opportunities for improved wildlife management. Each topic includes specific recommendations based on survey results. Estimates of the economic value of inland fishing are $300.7 - $494.2 million, marine sport fishing $135.4 - $274.5 million, hunting $183 - $291 million, trapping $1.5 - $3.4 million (resident only), and non-consumptive wildlife recreation a minimum of $55.4 million (resident only). The total economic value for the wildlife-related activities analyzed represents a minimum of $675.7 million. The report states that participation in non-consumptive uses exceeds participation in both hunting and fishing and makes recommendations for enhancing access and wildlife viewing opportunities.

Boyle, K. J., S. D. Reiling, M. Teisl, M. L. Phillips. 1991. How Valuable—Maine's Wildlife and Fish Resources. *Maine Fish and Wildlife* v33, n1: 3-6.

The first of a five-part series describing a three year study of the economic value of recreational uses for Maine's game and non-game species. Surveys of 8,000 inland anglers, 9,000 hunters, 200 trappers, and 2,000 non-consumptive users were the basis of twenty-six recommendations for future management of wildlife resources.

Boyle, K. J., S. D. Reiling, M. Teisl, M. L. Phillips. 1991. How Valuable—Fishing for Angler Facts. *Maine Fish and Wildlife* v33, n2: 2-7.

The second of a five-part series on the economic value of recreational uses of Maine's game and non-game species. Details the responses of resident and non-resident anglers from a survey on open-water and ice fishing. Valuation methods are explained and aggregate values are highlighted. Fishing environment characteristics (remoteness, access, scenery, etc.) rate as high or higher than importance of actual catch.

Boyle, K. J., S. D. Reiling , M. Teisl, M. L. Phillips. 1991. How Valuable—A Special Section on Hunting. *Maine Fish and Wildlife* v33, n3.

The third of a five-part series on the economic value of recreational uses of Maine's game and non-game species. Four articles highlight results of hunter surveys and discuss management opinion and issues related to hunting deer, bear, moose, and other target species. Describes an opinion survey regarding baiting bears, hunting seasons, and deer and moose

herd management. In 1988, $185 million was spent on hunting. Of this amount nineteen percent, or $36 million, was spent by non-resident hunters.

Boyle, K. J., S. D. Reiling , M. Teisl, M. L. Phillips. 1991-1992, Winter. How Valuable—Trapping in Maine: Recreation or Business? *Maine Fish and Wildlife* v33, n4.

The fourth of a five-part series on the economic value of recreational uses of Maine's game and non-game species. Maine trappers report average earnings of $816 (1987-88) with costs of $883 — an average net loss of $67 per trapper. Thirty-seven percent of trappers reported surplus earnings, only thirteen percent of respondents named profit as their primary motivation for trapping.

Boyle, K. J., S. D. Reiling, M. Teisl, M. L. Phillips, A. G. Clark. 1992, Spring. How Valuable—Non-consumptive Use of Maine's Wildlife: What Is It? Who Participates? Why Do They Do It? *Maine Fish and Wildlife* v34, n1.

The fifth of a five-part series on the economic value of recreational uses of Maine's game and non-game species. Detailed analysis of the characteristics of participants and expenditures related to non-consumptive wildlife recreation. Ninety-one percent of Maine residents surveyed actively participated in wildlife observation while not hunting or fishing, nineteen percent contributed to wildlife conservation funds, fifty-five percent actively attracted wildlife to their homes. Respondents reported annual expenditures averaging $348 related to wildlife watching, with an aggregate value of $47.8 million. Eighty percent feel that the presence of wildlife in Maine is very important to them, forty percent said that the presence of wildlife influenced their decision to live in Maine; sixty-eight percent would spend money to protect all Maine wildlife species if priorities are established.

Boyle, K. J., R. K. Roper, S. D. Reiling. 1990. *Highlights from the 1988 Survey of Open Water Fishing in Maine*. Department of Agricultural and Resource Economics, ARE 416. University of Maine, Orono, ME.

This report contains data from a survey of 500 resident and 500 non-resident anglers. Includes data on fishermen's demographics, characteristics and preferences; participation in catch and release fishing, angler effort and angler's ratings of fishing sites. The report estimates 3.8 million resident angler days and 0.96 million non-resident angler days.

Boyle, K. J., V. A. Trefts, P. S. Hesketh. 1990. *Economic Values for and Uses of Maine's Inland Fish and Wildlife Resources*. Maine Agricultural Experiment Station Miscellaneous Publication 698. University of Maine, Orono, ME.

Report includes eight tables and eleven graphs describing the use of Maine's inland fish and wildlife resources including data on expenditures and valuation results by categories of anglers, hunters, and non-consumptive use. Trip specific daily expenditures for non-resident anglers averaged $249, for non-resident hunters $161.

Brown, T. 1994. Outdoor Recreation and Tourism Studies Applied to the Northern Forest Lands: Literature Review and Analysis. Section 7 in Northern Forest Lands Council, editors. *Technical Appendix*, U.S. Forest Service. Rutland, VT.

This report reviews national, northeast regional, and New York/ New England statewide trends in outdoor tourism and recreation activities and participation, access and resources, and economic impacts. About sixty-one percent of the Northern Forest Lands acreage is in private industrial ownership, though one-sixth is classified as large industrial use. Issues of maintaining public access to private lands is considered in this paper.

Carlson, B. D., D. B. Probst, D. J. Stynes, R. S. Jackson. 1995. *Economic Impact of Recreation on the Upper Mississippi River System*. U.S. Army Corps of Engineers, Technical Report EL-95-16, St. Paul, MN.

Comprehensive study of the number of visitors and recreational activities they engaged in, expenditures on recreation, and spending patterns. From a survey of 1,316 respondents, recreational spending averaged $15.84 per visitor per day for items consumed on trips plus $12.54 per visitor day for durable goods. Other economic data is region-specific. Study methodology is explained.

Carr, T. 1994. The Northern Forest Economy. Pages 52-70 in Klyza, C. M., S. C. Trombulak, editors. *The Future of the Northern Forest*. Middlebury College Press, Middlebury, VT.

Provides background on the economic factors relating to the controversy over the Northern Forest. Analysis focuses on sectors most relevant to land conversion: forest products, agriculture, tourism, development. It examines economic forces causing change and identifies key factors contributing to development. Includes charts and tables on area, demographics, social and economic indicators; economic output of forest products industry, employment and payroll in forest products, tourism, development, and second homes.

Casco Bay Estuary Project. 1995. *Opening Clam Flats and Swimming Areas in Casco Bay*. Casco Bay Estuary Project Issue Papers 1-5, v 3, Portland, ME.

An overview analysis of the causes, economic and social consequences, and possible prevention strategies of clamming and swimming areas closure.

Caverly, T. 1995. *Allagash Wilderness Waterway Winter Capsule, 1993-94 and Summer Capsule, 1994*. Bureau of Parks and Recreation, Augusta.

Summary report of winter and summer Allagash Wilderness use, trends, recreation demands and impact, and proposed action plans for management. Winter use was down by five percent from the previous season, the first decline over the five years reported. The 1994 summer use showed an increase consistent with the five-year trend indicating a twenty-three percent increase in the number of people visiting the area.

Colgan, C. S. 1990. *The Economic Value of Casco Bay*. A report for the Maine State Planning Office, Augusta, ME.

This report involves an integrated regional assessment of the values of goods and services derived from Casco Bay. The author discusses the context of the accounting which produces this broad-scale data with subsets of output sectors such as "coast-dependent activities," "coast-linked activities," and "coastal service activities." The report also considers real estate value of coastal property and emphasizes the importance and difficulty of measuring non-market values. Nearly thirteen thousand jobs and $520 million are derived from Casco Bay's cargo ports, fisheries, tourism and recreation, and marina services. Property value assessments in Casco Bay towns total $9.4 billion. Non-market values for parks on the Bay range from $774 ,000 to $6.5 million and for werlands from $63 million to $319 million depending on valuation methods.

Cordell, H. K., J. C. Bergstrom, L. A. Hartmann, D. B. K. English. 1990. An *Analysis of the Outdoor Recreation and Wilderness Situation in the United States: 1989-2040*. United States Department of Agriculture Forest Service, General Technical Report RM-189, Washington, D.C.

A comprehensive report on the national outdoor recreation and wilderness resource examining the demand and supply for outdoor recreation and wilderness; the social, economic, and environmental implications of demand

and supply; the opportunities for improving availability and management of recreation and wilderness resources; obstacles to improvement of wilderness recreation resources; and other wilderness and recreation program issues.

Davidson-Peterson Associates. 1992. *The Economic Impact of Expenditures by Tourists on Maine Calendar Year 1991*. Maine Tourism Coalition, Davidson-Peterson Inc., York, ME.

The purpose of this study was to measure the economic benefits derived by Maine residents from dollars spent in the state by tourists in 1991. This report describes total 1991 Maine tourist expenditures by category of expenditure. Tourist expenditures for 1991 are estimated to be $2.75 billion, supporting 78,320 jobs with a resident income of $1.25 billion and state tax revenues of $209 million and local tax revenues of $109 million. Figures are broken down by region, activities, lodging, and season.

Duda, M. D., K. C. Young. 1994. *Americans and Wildlife Diversity*. Responsive Management, Harrisonburg, VA. 155 +xx.

Commissioned by the wildlife diversity and watchable wildlife committees of the International Association of Fish and Wildlife Agencies, this book reports on public opinion, attitudes, interest and participation in wildlife viewing and wildlife diversity programs. Study concludes that there was a sixty-three percent increase in primary, non-residential non-consumptive participation between 1980 and 1990.

Eastern Maine Development Corporation. 1991. *Greenville Economic Base Profile*. Greenville Economic Development Office, Greenville, ME.

An economic base profile of the greater Greenville Labor Market Area (LMA) produced to support the town's Economic Adjustment Strategy. It was intended to identify and assess the resources and opportunities within the community that could support economic development, and to provide base-line data for consultants promoting tourism and forest products. The document details the demographics of the LMA labor force, seasonal trends in employment, and a ten-year trend in employment shifting from manufacturing to retail and service industries. For example, between 1981 and 1989, manufacturing employment in the Greenville LMA declined by sixty-seven percent as compared to a seven percent statewide decline.

El Hamzaoui, R., K. Boyle, C. McLaughlinn, J. Sherburne. 1994. *Black Bear Hunting in Maine: Do Hunter Characteristics Affect Opinions Regarding Hunting Regulations*. University of Maine Agricultural and Forest Experiment Station Bulletin 839, Orono.

Bear hunter opinion survey on permitting, regulations, and practices.

English, D. B. K., C. J. Betz, J. M. Young, J. C. Bergstrom, H. K. Cordell. 1993. *Regional Demand and Supply Projections for Outdoor Recreation*. USDA Forest Service General Technical Report RM-230, Washington, D.C.

This paper develops regional recreation supply and demand projections by combining coefficients from the national 1989 Resource Planning Act Assessment models with regional regressor values. Regional recreation opportunity estimates also are developed, based on regional travel behavior. Results show significant regional variations in projections of recreation opportunities, trip supply, and trip demand.

Federal Energy Regulatory Commission. 1995. *Draft Environmental Impact Statement - Kennebec River Basin, Maine*. FERC, Office of Hydorpower Relicensing. Washington, D.C.

This Draft Environmental Impact Statement evaluates the potential site-specific and cumu-

lative environmental consequences, economic costs, and related benefits associated with proposed changes in operation and maintenance of 11 hydroelectric dams in the Kennebec River Basin, Maine. In general, the applicants propose to continue operating the projects as in the past, with negotiated environmental enhancements. Included are estimated valuations of recreational use. According to a 1993 Maine State Planning Office report, commercial rafting is the primary recreation on the Upper Kennebec, and the numbers of passengers rose from about 7,300 in 1981 to over 30,000 in 1991; commercial rafting in Maine generated an estimated total economic activity of $35 million in 1989: $20 million on the Kennebec, $12 million on the Penobscot, and $3 million on the Dead River (FERC, 1995). There are no comprehensive visitation figures for the Kennebec Basin, but relicensing applicants estimate nearly 900,000 user days (12 hours/user day) in 1991; ninety-two percent was day use and eighty percent was in the summer recreation season. The Maine Tourism Coalition (1992) estimates 1991 economic impact of statewide tourism at $2.75 billion; estimated tourist expenditures in the Kennebec Basin were $177 million and $55 million in the Katahdin/Moosehead region (FERC, 1995).

Frederic, P. B. 1991. Public Policy and Land Development- The Maine Land Use Regulation Commission. *Land Use Policy* v8, n1: 50-62.

Rapid growth in water-oriented and ski resort recreation development and its impact in northern and western Maine, and Land Use Regulation Commission (LURC) response and handling of the emerging issues are reviewed by a University of Maine professor and LURC veteran. An analysis of policy trends and a suggested model for policy formulation are examined. Discusses how reactive policies and lack of long-range planning and policy have been detrimental to management of increasingly complex and intense issues.

Freeman III, A. M. 1994. The Economic Valuation of Coastal Resources Supporting Recreation. Pages 87-103 in Charles Colgan, editor. *Sustaining Coastal Resources: Economics and the Natural Sciences*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

Comparative review of major non-market resource valuation methods (travel cost, willingness to pay, random utility, and contingent valuation) and a brief review of some studies that use them. Includes an example calculation of the relative value of Georgetown's Reid State Park as development property and recreation asset, with references to data of other studies related to coastal recreation. The informal calculation suggests that the park has a value of $4-8 million for private development but with 135,000 visitor days/year Reid State Park has an annual consumer surplus value as a park (or recreational asset) of $68-$240 million. This is based on a consumer surplus value (economists call gains in people's welfare above and beyond out of pocket expenditures "consumer surplus") of $25-$90 per user-day.

Freeman III, A. M. 1993. *The Economics of Valuing Marine Recreation: A Review of the Empirical Evidence*. EPA Office of Policy Planning and Evaluation, Bowdoin College Economics Working Paper 93-102, Brunswick, ME.

Report addresses the question: Does available economics literature provide a basis for estimating the benefits to marine recreation which can be attributed to water pollution control programs of federal, state, and local agencies? The paper reviews the values of recreation and the transferability of value measures. The appendix includes summary descriptions of forty-two marine recreation studies referenced in the report. The conclusion states that the evidence suggests consumer surplus values per trip of $10-$100 and that value of access to fisheries annually could

range from $100-$1,000 per person. With 10 million marine recreational fishing participants nationally this represents a total surplus value of $1 -$10 billion per year.

Freeman III, A. M. 1995. *The Economic Benefits of Removing Edwards Dam*. Report prepared for the Natural Resources Council of Maine, Augusta, ME.

This report, part of testimony submitted by the Natural Resources Council of Maine at a Federal Energy Regulation Commission (FERC) hearing, briefly outlines how the benefit-cost framework can be used to analyze the question of whether to remove Edwards Dam to provide enhanced resource values in the Kennebec River Basin. An estimate of $36-$48 million in benefits from a previous study (by Boyle, Teisl, and Reiling 1991) is challenged as under-representing the potential value of dam removal.

Great Northern Nekooska Corporation. 1991. *Exhibit H- Appendix D: The Regional Impact of Commercial Whitewater Rafting in the West Branch*. Application for New License for Ripogenus Project, Federal Energy Regulation Commission report (FERC # 2572), Washington, D.C.

A report containing data on users, expenditures, employment, and a multiplier model to determine the economic benefit of whitewater boating on the West Branch of the Penobscot River.

Great Northern Nekoosa Corporation. 1991. *Exhibit E-Section 5.0 Report on Recreational Resources*. Application for New License for Ripogenus Project, Federal Energy Regulation Commission (FERC #2572), Washington, D.C.

Report describes existing and potential recreation use for the West Branch of the Penobscot River, the Katahdin and Moosehead area, and the Millinocket area. Contains information on recreation participation rates and on area leaseholders.

Great Pond Task Force. 1994. *An Interim Report of the Great Ponds Task Force*. Maine State Planning Office, Augusta, ME.

A report on the Great Ponds Task Force review of the key issues and existing policies regarding inland fisheries; lake access, habitat, water quality, and management; the aesthetic quality of Maine's inland lakes (>ten acres); and enforcement recommendations. There are 2,787 ponds in Maine ten acres or larger which are home to hotels, sporting camps, and individual camps. Freshwater fisheries alone are valued at over $160 million and their potential value is estimated at $300-$500 million annually. "Maine's inland tourist economy depends to a large degree on a high quality freshwater resource."

Greenville Office of Economic Development. 1991. *The Moosehead Lake Region Tourism Marketing Strategy*. Greenville Office of Economic Development, Greenville, ME.

This report is a summary of a four-part marketing strategy to develop and sustain a healthy wood-products industry while protecting the natural amenities of the Moosehead region. The report recommends that the region distinguish itself as a premier destination point for outdoor recreation while maintaining the traditional "partnership between lumbering and recreation." It reviews the region's tourism marketing image, recreational and service resources, visitor profiles, marketing analyses, and the context of the tourist economy. "Of the 148 businesses that are Chamber of Commerce members, seventy-six percent are directly related to tourism and nineteen percent are indirect beneficiaries of tourist activities."

Hansen, W. J., D. B. Badger. 1991. *National Economic Development Procedures Manual: Recreation, Vol. IV: Evaluating Changes in the Quality of the Recreation Experience*. U.S. Army Corps of Engineers, Washington, D.C.

The fourth of a series of manuals that describe recreation evaluation procedures for the U.S.

Water Resources Council. This volume emphasizes the evaluation of qualitative differences in recreational experiences. The primary purpose of this manual is to describe procedures and methodologies for evaluating changes in recreation use values that result from management decisions impacting on recreation services and facilities and on the natural resource base.

Harms, V. 1994. *The National Audubon Society Almanac of the Environment: The Ecology of Everyday Life*. G. P. Putnam's Sons, New York.

Describes economic impact of ecotourism. Tourism comprises seven percent of world trade in goods and services, produces $195 billion/year in domestic and international receipts; this according to World Trade Organization, a U.N. affiliate. These figures account for 390 million international tourists in 1988, up 20 million from 1987; creating 74 million jobs in tourism, up 9 million from 1987. Adventure travel, including ecotourism, accounted for almost ten percent of the market in 1989 and was increasing at rate of thirty percent per year.

Hartman, H., T. Cieslinski, C. Bastey. 1988. *Maine State Comprehensive Outdoor Recreation Plan, Vols. I and II, 1988*. Department of Conservation of the Bureau of Parks and Recreation, Augusta, ME.

Volume I contains an assessment and policy plan and has sections titled 1. Summary of Recommendations and Conservation Priorities, 2. State Characteristics, 3. Inventory of Outdoor Recreation, 4. Regional Needs and Analysis, 5. Urban Area Analysis, 6. Municipal Needs Analysis, 7. Issues and Actions.
Volume II is a technical appendix containing information on current and previous recreational plans, parks and historic sites, boat access, primitive campsites, wildlife management areas, rest areas, Nature Conservancy preserves, golf, indoor recreation, regional needs methodology, coastal beaches, open project selection system, and recreational demand indicators.

Hartman, H., T. Cieslinski, C. Bastey. 1993. *Maine State Comprehensive Outdoor Recreation Plan, Vols. I and II, 1993*. Department of Conservation, Bureau of Parks and Recreation, Augusta, ME.

Volume I contains sections titled: Summary of Proposed Actions and Conservation Priorities, Supply of Outdoor Recreation Areas and Facilities, Resident Participation In Outdoor Recreation Activities, Issues and Actions, The Maine Woods (Access and Recreational Opportunities), EcoTourism.
Volume II contains data on: Recreational Preferences Survey Results, Recreational Activity Trends, Maine Resident User Trends and Rates, User Days Per Trends, Opinions, Age Demographics, Task Groups Reports, Open Project Rating System.

Heise, D. 1991. *Promoting Tourism in Rural America*. USDA, National Agricultural Library, Rural Information Center Publication Series, No. 12, Washington, D.C.

An annotated bibliography of case studies of rural tourism development strategies and other resources.

Irland, L. 1994. Five Images of the Maine Forest. *The Maine Scholar* v7, Fall:1-12

Discussion of the Maine forest as a recreational resource (includes an Office of Tourism survey showing seventy-two percent of respondents had used the woods for recreation at least once in the previous five years); a biological resource (bio-chemical characteristics, forestry effects on wildlife and biodiversity, new focus on ecosystem integrity); a timber resource (refers to recently released Maine Forest Service "midcycle" inventory); sector of the economy (in 1905, forest was 30% of the economy's production and 27.4% of employment while in 1992, forest was 43.5% of production and 29% of employment); and as a cultural resource.

Irland, L. 1993. Outdoor Recreation Supply in the Maine Woods: Issue for the Future. *Renewable Resources Journal* v11, n 3: 6.

Anticipating an inevitable increase in public recreational use of private lands, the author examines the Maine Woods as a case study of current and potential issues and conflicts. Recreation "supply" is defined and assessed, patterns of ownership and recreational uses of the forest are described, options for managing over-demand, and political and social factors are discussed. Includes comprehensive reference section.

Jackson, R. S., D. B. Probst, L. E. Siverts. 1992. *Economic Impact Analysis as a Tool in Recreation Program Evaluation Instruction*, Report R-92-1, Natural Resources Technical Support Program. U.S. Army Corps of Engineers, Washington, D.C.

Description of the process of economic impact analysis and its role in recreation program evaluation.

Kerlinger, P. 1995. *The Economic Impact of Birding Ecotourism on Communities Surrounding Eight National Wildlife Refuges*. A report for the National Fish and Wildlife Association, Washington, D.C.

Study of ten National Wildlife Refuges (NWR) shows the economic impact from direct revenues delivered by bird watchers. Direct revenues range from $.5 million at Quivara NWR in Kansas to $14.4 million at the Santa Ana NWR in Texas.

Kerlinger, P. 1993. Birding Economics as a Tool for Conserving Neotropical Migrants. Pages 438-443 in *Transactions of the 58th North American Wildlife and Natural Resources Conference*. Wildlife Management Institute, Washington, D.C.

Paper outlines the potential for using the economic contribution of bird-watchers for supporting conservation activities. Includes demographic and economic data plus information on where birders are likely to travel and visit.

Kerlinger, P. 1993. Birding Economics and Birder Demographics Studies as Conservation Tools. Pages 32-38 in Finch, D. M., P. W. Stangel, editors. *Status and Management of Neotropical Migratory Birds*. USDA Forest Service, Publication #GTR RM-229, Washington, D.C.

Birdwatchers (birders) are the primary "user-group" of neo-tropical migratory birds. In the U.S., tens of millions of birders spend over $20 billion annually on bird seed, travel, and birding equipment. Average yearly spending by active birders is between $1,500 and $3,400 with travel being the major expenditure. This report reviews research on the demographics of this population, and their knowledge and attitudes toward wildlife management programs and issues, and stresses the need for more research of the same. Birders represent a large source of revenue for nongame programs just as hunters and anglers have helped fund game management programs.

Kerlinger, P., J. Brett. 1995. Hawk Mountain Sanctuary: A Case Study of Birder Visitation and Birding Economics. In R. Knight and K. Gutzwiller editors. *Wildlife and Recreationists: Co-existence Through Management and Research*. Island Press, Washington, D.C.

A survey of visitation, demographics of visitors, and local impact of birders visiting the Hawk Mountain Sanctuary. Describes survey techniques. Data highlight: 53,000 birders contribute $2.4 million to the local economy (the area surrounding Hawk Mountain) each year.

LaCaille, J., P. LaCaille. 1991. *Tourism and Outdoor Recreation—January 1979- September 1991*. Quick Bibliography Series. USDA,

National Agricultural Library— Document 1991QB 92-14, Washington, D.C.

An annotated bibliography on the topics of tourism and outdoor recreation; includes case studies.

MacDonald, B. 1994. *Opening Statement from the Northeast Whale Watching Association to the International Whaling Commission—46th Annual Meeting-1994*. New England Aquarium, Boston, MA.

A response to the conference topic: Assessing the Economic and Scientific Value of Whale Watching. Whale watches not only create a market, but also help researchers by providing free passage to do their counts in de facto exchange for interpretive services for visitors. Direct revenues from whale watching in the Northeast are $22.5 million, indirect revenue are $60 million with 1.6 million people participating in Massachusetts Bay, 0.6 million people in the Gulf of Maine and 0.1 million people in southern New England. New survey report due in 1996.

MacDonald, H. F., K. J. Boyle, O. C. Fenderson. 1995. *Maine Ice Fishing Survey - Winter, 1993-94*. University of Maine, Department of Resource Economics and Policy, Paper #REP 461, Orono, ME.

This report summarizes the results of a survey of ice fishing license-holders. Survey data reports ice fishing license purchases, ice fishing effort and estimated catch by management region, angler opinions regarding regulations and access, and socioeconomic characteristics of anglers. Economic values of the ice-fishing season are not considered.

Maine State Department of Conservation, Bureau of Parks and Recreation. 1994. *Maine Outdoor Recreation Activity: Participation and Trends*. Augusta, ME.

Survey of outdoor recreation activities in terms of total annual user days. An aging population in Maine will be the major variable influencing total resident participation and annual use in a given activity. By the year 2010 Maine will have fewer residents in the age range 0-34 and almost 30% more residents over age 35. Older individuals will participate more in walking for pleasure and exercise, visiting cultural and historical sites, golf, hunting and pleasure boating, and less in downhill skiing, hiking, active games, bicycling, camping, and jogging, given the current supply of facilities and the costs of using those facilities.

Maine State Office of Tourism. 1994. *Building Regional Tourism: A Technical Assistance Manual*. Maine Department of Economic and Community Development, Office of Tourism, Augusta, ME.

Two sections from a larger tourism development and assistance handbook that briefly discuss the principles of planning for "sustainable" tourism development (growth management and impact control) and ecotourism (directed visitation to natural areas).

Mallet, J. 1994, November. *Adventure Travel/ Ecotourism*. Maine Department of Economic and Community Development, Office of Tourism, Augusta, ME.

Report profiles the global and United States trends in the tourism industry and the growth in adventure travel. The purpose of this outline is to provide discussion that will lead to adopting a tourism policy supported by sustainable development. Report stresses the need to develop the industry based on conservation and strategic marketing of natural resources.

Manning, R. E. 1987. *Visitors and Neighbors of Acadia National Park: Planning for the Future*. U.S. National Park Service, Acadia National Park Library, Bar Harbor, ME.

A Study Completion Report of a survey of

visitors to Acadia National Park and of residents in the abutting communities. Surveys were used to develop a clearer profile of visitor patterns and demographics, satisfaction with current park services and management, and opinions for future planning and management of the resource.

McElvany, N. D. 1995. *Snowmobiling in Vermont: An Economic Impact Study and Snowmobiler User Survey*. Vermont Association of Snow Travelers and Johnson State College, Montpelier, VT.

This study, authorized by the Vermont Association of Snow Travelers (VAST), was conducted by Johnson State College to assess the economic impact of the sport of snowmobiling on the economy of the state of Vermont in the 1993-1994 season, as well as to survey the opinions of VAST members regarding several qualitative criteria regarding snowmobiling. Total estimates of expenditures plus a multiplier effect in Vermont for 1993-94 was $165,252,770.

Miller, S. 1995. Values of Open Space. In Leonard Hamilton, editors. *Benefits of Open Space*. Great Swamp Watershed Association, Meyersville, NJ.

This essay considers the valuation of natural capital. Examples of valuation techniques are described including de Groot's matrix which organizes relevant information, qualitative and quantitative, on the ecological functions of the area under discussion. A general discussion with examples which describe costs of development, principles of cost-benefit analysis, enhancement value, option value, market and surrogate-market price valuation methods, travel cost approach, sportsman, and "green" tourism expenditures.

Moore, L. R., B. Vickery. 1992. *Cobscook Bay's Industries and Uses: A Preliminary Inventory of Economic and Ecological Data*. The Nature Conservancy, Maine Chapter, Brunswick, ME.

This 1992 document, revised in 1994, is a preliminary inventory and assessment of the economic value of exclusively marine-based activities in Cobscook Bay and their dependence and effect upon the Bay's marine ecosystem. Five marine industries are identified as having major importance and are profiled in depth: salmonid aquaculture, scalloping, urchin harvesting, clamming, and shipping. Discussed in less detail are those marine activities identified as minor: lobster and crab fishing, periwinkle and marine worm harvest, seaweed harvest and culture, tourism, marine trades and education, waste disposal, and herring and groundfishing. Many references and citations, contact references, and suggestions for further study.

Morey, E. R., R. D. Rowe, M. Watson. 1993. A Repeated Nested-Logit Model of Atlantic Salmon Fishing. *American Journal of Agricultural Economics* 75, August: 578-592.

A study of recreational salmon fishing on the Penobscot River to test economic models. Participation and site choice for Atlantic salmon fishing are modeled in the context of a repeated three-level nested-logit model. Consumer surplus measures are derived for varying availability of target species. For comparison, six other travel-cost models are estimated. Value of maintaining the fishery in 1988 is estimated at $1.2 million/year or $810/angler/year (1,500 salmon anglers). The authors state that the cost of maintaining the Atlantic Salmon fishery may cost over $1 million/year making the cost close to or exceeding surplus values.

National Park Service Office of Social Science. 1995. *The Money Generation Model 1995-1996*. United States National Park Service, Washington, D.C.

This step-by-step manual explains the principles and use of the Money-Generation

Model (MGM). The MGM provides a way to estimate economic benefits of parks on gateway communities and adjacent areas. The model provides a calculation of the economic benefits to the local area resulting from: expenditures by non-local tourists, park-related federal government expenditures (e.g., payroll, supplies, services, and construction), park-related expenditures by other non-local parties (e.g. state expenditures on infrastructure, concessions, etc.). In applying the MGM, the economic benefits of sales, tax revenues, and jobs are considered.

National Fish and Wildlife Foundation. 1994. *Factsheet: Birding as an Economic Asset*. National Fish and Wildlife Foundation, Washington, D.C.

Two-page factsheet with nine bibliographic references contains nineteen statistical statements that illustrate the economic returns from active birdwatching. Examples: In 1991, more than 24 million Americans took trips for the expressed purpose of watching wild birds, as compared to 14 million hunters and 35 million anglers. Each year, more than $19 billion is spent on non-game wildlife appreciation.

Northeastern Forest Alliance. 1990. *The Economic Importance of Maine's Forest*. Northeastern Forest Alliance, Saranac Lake, NY.

This summary includes economic statistics and graphs on the forest product industries, statistics on "Multiple Use Value," i.e. tourism employment and revenues, recreational uses, and state tax revenues. It concludes that the forest provides more than fifty thousand jobs to the Maine economy. The value of annual outputs including stumpage, firewood, manufacturing and wood fuel total $5.7 billion; tourism and recreation expenditures based on the forest resource total $1.7 billion; and Christmas trees, maple syrup, and horticulture outputs add up to $13.1 million. The report suggests a total of $7.4 billion or 32% of Maine's Gross State Product of $23.5 billion.

Northern Forest Lands Council. 1994. *Finding Common Ground—Draft Recommendations of the Northern Forest Lands Council*. U.S. Forest Service, Rutland, VT.

Draft recommendations from the three-year survey of Northern Forest resources and issues. The appendixes have summary data on: forest stock, ownership, forest products, employment and value, land conversion, development, tax rates, usage-based taxes, and basic recreation trends.

Northern Economic Planners. 1995. *The Appalachian Mountain Club's Hut System and its Contribution to the White Mountains Regional Economy 1994-1995*. Appalachian Mountain Club, Gorham, NH.

This fifteen-page study was commissioned by the Appalachian Mountain Club (AMC) at the request of the U.S. Forest Service as part of the club's facilities permit renewal process. The study examines the economic impact of the AMC's twenty-seven hiking access facilities upon the White Mountains region. It concludes that in the twelve months of 1994: visitors to AMC facilities spent 662,746 visitor days not including 15,000 visits to the backpacker shelters. The total amount of spending directly or indirectly attributable to AMC facilities is approximately $48.8 million; $24.2 million direct and $24.6 million indirect. Of the $24.2 million direct spending, 84% occurred outside of AMC facilities. AMC visitors' combined economic impact statewide was $62.8 million. AMC visitors support 683 jobs, or 1.5% of regional employment; for each AMC facility job, seven are created in the region attributable to vistor spending. Approximately 2% of regional employment is directly or indirectly supported by AMC visitation.

Phillips, M., K. J. Boyle, S. D. Reiling. 1989. *Highlights from the Survey of Hunters Holding a 1987 Maine Hunting License*. University of Maine, Department of Agricultural

and Resource Economics #ARE 397, Orono, ME.

A report providing survey data on the demographics of hunters, the species hunted, and hunting related expenditures.

Potter, D. M., K. J. Boyle, S. D. Reiling. 1990. *Highlights from the 1989 Survey of Maine Turkey Hunters*. University of Maine, Department of Agricultural and Resource Economics #ARE 413, Orono, ME.

This report contains survey data on turkey hunting: permits and harvest, number of hunters, trip and equipment related expenditures, hunter characteristics, hunt distribution, hunting effort and results.

Preston, C., S. Phillips. 1995. *Economic Profiles of the Northern Forest*. The Wilderness Society, Washington, DC.

An economic profile of the rural economies in the Northern Forest region from New York's Adirondacks to Maine's North Woods. The profiles present information about the region's entire economy over a twenty-five-year period to allow comparisons across sectors and industries, and makes state-wide, multi-county, and multi-state spatial comparisons of data.

Reiling, S. D. 1994. *Maine Campground Occupancy Survey*, Miscellaneous Report #391. Department of Economic and Community Development, Augusta, ME.

Survey of 1994 occupancy data from participating commercial campgrounds in Maine. Tables and figures show occupancy statistics by season, month, time of week, etc. Also compares inland and coastal campgrounds.

Reiling, S. D., K. J. Boyle, M. L. Phillips. 1990. *Consumer Surplus Values and Economic Impacts of Hunting and Fishing*. Maine Agricultural Experiment Station Publication # 1362, University of Maine, Orono, ME.

Consumers' surplus values and expenditures associated with hunting and fishing in Maine are presented. Both types of economic data are presented on a per-person and aggregate basis. The magnitude of the aggregate surplus and expenditure values indicate the activities are important to participants and to the Maine economy.

Reiling, S. D., J. A. Michael. 1995. *An Analysis of Maine Tourism Indicators*. Department of Economic and Community Development, Augusta, ME.

Summary overview of Maine's economy and performance of key tourism sectors: restaurant, lodging, non-resident visitation, park users, information inquiries.

Reiling, S. D., M. F. Teisl, K. J. Boyle. 1991. *Highlights from the 1988 Survey of Bear Hunting in Maine*. University of Maine, Department of Agricultural and Resource Economics # ARE 430, Orono, ME.

A survey reporting information on the demographics of bear hunters, characteristics of the 1988 bear hunt, bear hunting related expenditures, and related policy issues.

Rivers Trails and Conservation Assistance Program. 1992. *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors*. United States National Park Service, Washington, D.C.

The Rivers, Trails, and Conservation Assistance Program of the National Park Service has produced this resource book to help local planners, park and recreation administrators, activists, and non-profit groups understand and communicate the potential economic impacts of their proposed or existing rivers, trails, and greenways corridors projects. The aim of the book is to encourage the use of economic concepts as part of their effort to protect and promote greenways; provide examples of how greenways have provided economic benefits to communities; demonstrate

how to determine the potential economic impacts; suggest other resources. Topic sections include: real property values; expenditures by residents; commercial uses; tourism; estimating effects of spending and agency expenditures; corporate relocation and retention; public costs reduction; benefit estimation.

Roper, R. K., K. J. Boyle, S. D. Reiling. 1992. The Economic Impact of Fishing, Hunting, and Wildlife Observation on Maine's Economy. *Maine Business Indicators* v37, n3:1-3.

This article uses data from a recent University of Maine study to discuss the economic benefits of inland fishing, hunting, and wildlife observation on Maine's economy. Highlights include: In 1988, roughly 19% of Maine's adult population fished and 17% hunted (combined, one in five of all Mainers). Thirty-four percent of anglers and 20% of hunters were non-residents. In 1989 about 55% of Maine residents spent money to attract wildlife to their homes and 35% (over one-third Maine residents) took trips to observe wildlife. Resident and non-resident total direct expenditures in 1989 for consumptive and non-consumptive use of wildlife was $274.5 million (2.9% of Maine's total business sales). In 1989, wildlife-related recreational activity accounted for 8,071 jobs or 1.4% of Maine's total employment. This represents 10.3% of the 78,320 jobs created by tourism each year.

Rose, G. L. 1995. *State of Maine Economic Report*. Maine State Planning Office, Augusta, ME.

Quarterly report with graphs describing the economic growth index for the U.S. and Maine, Maine wage and salary employment and unemployment, Maine production, Maine retail trade, Maine tourism (lodging sales), and other price and production indexes.

Smith, V. 1991. Protecting Rivers, Trails, and Greenways Reap Economic Returns. In Rosemary Infante, editor. *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This two-page article is reprinted from a 1991 edition of the quarterly journal, *Exchange*, in which the author briefly outlines several examples of American communities that have realized economic benefits by developing and maintaining municipal trails or greenways. Cites rising property values, recreation and tourism revenues and increased economic activity, reduced public spending, hazard mitigation and pollution control and enhanced quality of life as quantifiable benefits derived from open spaces.

Smith, V., M. Bosse. 1995. Maine Tourism Partnership Program. *1994-1995 Snowmobile Aroostook Campaign*. Aroostook County Tourism, Inc., Caribou, ME.

Final report of the 1994 winter season snowmobile tourism advertising campaign. Campaign cost of $16,378 yielded a fifteen percent increase in hotel occupancy for January-March generating a $2.3 million increase in lodging revenues over previous year. Report includes ad copy, conversion counts, and participant survey data.

Southern Maine Regional Planning Commission. 1983. *The Saco River: A Plan For Recreational Management*. Southern Maine Regional Planning Commission, Sanford, ME.

A 1983 recreational survey, inventory, and management plan which focuses almost entirely on canoeing. Includes user data, surveys and questionnaire results, recommendations for facility improvement, and action plan. Recreation spending in is included in appendixes with spending figures from the user survey. Describes hydro dam service of seven dams on Saco River including KWH figures for each; user days for canoeing on Saco River by section (1981 total: 151,130); and other river use information.

Southwick Associates. 1995. *Economic Impacts of 1991 Marine Recreational and Commercial Striped Bass Harvests: Maine to North Carolina.* Atlantic States Marine Fisheries Commission, Washington, DC.

Study prepared for the Commission featuring estimates based on a U.S. Fish and Wildlife Service national survey and a National Marine Fisheries Service survey. Includes direct, indirect and induced economic impacts by state. For striped bass fishing in Maine in 1993: retail sales were $3.3 million with a multiplier effect of $5.9 million. Salaries and wages were nearly $2 million paid to 124 jobs.

Stevens, T. 1990. The Economic Value of Bald Eagles, Wild Turkeys, Atlantic Salmon, and Coyotes in New England. *Resources and Environment: Management Choices* . November Report, University of Massachusetts, Department of Resource Economics, Amherst, MA.

Choosing species that are beneficiaries of recovery efforts (or, in the case of coyotes, recovery interest), this brief three-page article extends traditional economic analysis to estimate the value of eagles, turkeys, salmon, and coyotes and considers policy implications. To maintain different species populations, varying percentages of survey respondents expressed a willingness to pay an annual average of: $19.38 for bald eagles; $11.86 for wild turkeys; $7.93 for Atlantic salmon. Coyotes were more controversial: twenty-three percent would pay $5.35 to protect them while nineteen percent would pay $4.20 to control them. Many respondents refused to put dollar figures on species; other opinion-based data is included.

Stoll, J., J. Bergstrom, J. Titre. 1989. Regional Valuation Models for Wetland Recreation Benefits. Pages 365-406 in Boyle, K., T. Heekin, editors. *Benefits and Costs in Natural Resource Planning*. Western Regional Research Publication W-133. University of Maine, Department of Agricultural and Resource Economics, Orono, ME.

Provides a selection of economic models to assist in placing dollar values on the benefits provided by wetlands for a variety of recreational activities.

Strategic Marketing and Research Inc. 1995. *Conversion Study: Spring Advertising Campaign, 1994*. Maine Department of Economic and Community Development, Office of Tourism, Augusta, ME.

Statistical study to measure performance and revenue returns of a Spring 1994 tourism advertisement campaign. Report includes data on: overall impact of ads and return on investment on spending and taxes, specifics of travel expenditures, demographic and psychographic profile of visitors, comparative effectiveness of ads and markets, and conclusions and recommendations for 1995 advertisements. A $326,000 ad campaign resulted in new visitor spending of $37 million, more than $2.7 million in sales tax was generated, with each dollar spent on advertising resulted in $113 of spending and $7.41 in sales tax.

Strategic Marketing and Research Inc. 1994. *Conversion Study: Fall Advertising Campaign, 1994*. Maine Department of Economic and Community Development, Office of Tourism, Augusta, ME.

Statistical study to measure performance and revenue returns of the Fall 1994 tourism advertisement campaign. Report includes data on: overall impact of ads and return on investment on spending and taxes, specifics of travel expenditures, demographic and psychographic profile of visitors, comparative effectiveness of ads and markets, and conclusions and recommendations for 1995 advertisements.

Teisl, M. F., K. J. Boyle, O. C. Fenderson. 1993. Angler Opinions Regarding Management Options to Balance Ice Fishing and

Open Water Fishing Effort in Maine. *North American Journal of Fisheries Management* v13:353-359.

Study of angler opinion regarding state management that apportions ice and open water fishing limits and regulations in Maine. Residents favored even access distribution; nonresidents are ninety percent open water anglers and favor policies that benefit open water anglers. The report suggests that fisheries managers may want to enhance open water opportunities to attract tourist revenue, but cautions that the largest number of anglers are residents.

Teisl, M. F., K. J. Boyle, S. D. Reiling. 1991. *Highlights from the 1988 Survey of Ice Fishing in Maine*. University of Maine, Department of Agricultural and Resource Economics, Orono, ME.

Report of a survey on total catch; fishermen demographics, participation, efforts; and ratings of fish site characteristics.

Teisl, M. F., K. J. Boyle, S. D. Reiling. 1988. *Highlights from the Survey of Hunters Holding a 1988 Maine Hunting License*. University of Maine, Department of Agricultural and Resource Economics, Orono, ME.

A report providing survey data including the demographics of hunters, the species hunted, and hunting related expenditures.

Teisl, M. F., K. J. Boyle, S. D. Reiling. 1991. *Highlights from the 1988 Survey of Migratory Waterfowl Hunters in Maine*. University of Maine, Department of Agricultural and Resource Economics #ARE 434, Orono, ME.

A report providing survey data including the demographics of hunters, the species hunted, and hunting related expenditures, hunting methods, and opinions regarding waterfowl management.

Teisl, M. F., K. J. Boyle, S. D. Reiling. 1992. *Highlights from the 1988 Survey of Upland Bird Hunters*. University of Maine, Department of Agricultural and Resource Economics #ARE 444, Orono, ME.

A report providing survey data including the demographics of hunters, the species hunted, and hunting related expenditures and opinions regarding grouse and woodcock management.

Temple, Barker and Sloane 1991. *Recreational Activities in the Ripogenus and Penobscot Mills Project Area*. Temple, Barker and Sloane, Inc. (consulting firm) Lexington, MA.

As part of a Federal Energy Regulatory Commission hydroelectric licensing process, Great Northern-Nekoosa Corporation (a subsidiary of Georgia-Pacific) hired the authors to survey users of the Ripogenus to Penobscot Mills section of the West Branch of the Penobscot River , between June and September of 1990. The focus of the survey was to profile recreational users and their activities and to estimate how much they spent in Maine. The survey sample included: 925 whitewater rafters, 84 other whitewater boaters, and 84 anglers. On average, rafters spent $413 per trip to Maine for a cumulative value of $7.4 million. Other boaters spent an average of $176 per trip for a cumulative value of $100,000 annually. Anglers spent an average of $421 per visit to the West Branch for an estimated cumulative value of $1.5 million annually.

Tynon, J. F., M. J. Fusselman. 1994. *Penobscot River Recreation Study*. Maine Agricultural and Forest Experiment Station, University of Maine, Orono, ME.

Report on survey results regarding Penobscot watershed residents' general attitudes and use of Penobscot River recreational resources.

United States Department of the Interior. 1993. *1991 National Survey of Fishing, Hunt-*

ing, and Wildlife-Associated Recreation. U.S. Department of the Interior, Washington D.C. 124 pp.+ appendices.

Key data and reference resource details the national participation and expenditures of consumptive and non-consumptive wildlife use. Includes a detailed survey analysis. Data highlights: 108.7 million Americans participated in wildlife associated recreation in 1991 spending approximately $59 billion. Anglers spent a total of $24 billion, hunters $12.3 billion and primary non-consumptive participants $18.1 billion.

United States Forest Service. 1995. *National Survey on Recreation and the Environment: 1994-1995 Key Findings*. U.S. Forest Service, United States Department of Agriculture, Washington, D.C.

Key findings presented at a conference of federal agencies and sporting goods manufacturers. Report highlights data from major surveys including numbers and trends for participation in outdoor recreation; categories of information include type of activity (outdoor sport and human-powered recreation) and participant demographic characteristics. Selected statistics: 13.2 million Americans canoe; 53.7 million enjoy camping; 58.3 million fish; the three fastest-growing activities are hiking, backpacking, and primitive site camping.

United States Forest Service. 1993. *White Mountain Monitoring Report 1993*. U.S. Forest Service, Laconia, NH.

The Monitoring Report gives an assessment of progress in implementation of the Forest Service Management Plan of 1986, but also describes other projects and initiatives within the White Mountain National Forest (WMNF). Specific attention is given to condition of non-timber resources (as well as timber stock and health) such as wildlife habitat and recreation use. Recreation use in the WMNF has increased since 1986 at the following rates: alpine skiing, twenty-one percent; camping/picnicking, nine percent; dispersed use, thirty-seven percent; wilderness, forty-five percent. In 1986, WMNF recreation fees collected totaled $630,000; in 1992, they totaled $834,000.

United States Forest Service. 1990. *Income Opportunities in Special Forest Products*, Agriculture Information Bulletin 666. United States Department of Agriculture, Washington, D.C.

Subtitled "Self-help suggestions for rural entrepreneurs," this bulletin reviews small-scale extractive and non-consumptive derivatives from forests such as specialty wood products, botanicals and pharmaceuticals, and recreation and wildlife recreation access. Surveys potential markets, typical start-up costs, and potential values and profiles case study enterprises. Extensive reference section in each chapter.

United States Forest Service. 1986. *Land and Resource Management Plan White Mountain National Forest*. U.S. Forest Service, Eastern Region, Laconia, NH.

This is the 1986 United States Forest Service ten- to fifteen-year management plan. It outlines management direction and includes maps showing management areas, projected timber sales, recreation projects, and road-building. Present resource supply and use trends and projections are outlined, and management direction, criteria, guidelines and standards for timber valuation, recreation, and habitat management are explained. Appendices outline specific projects and timetables.

Waddington, D. G., K. J. Boyle, J. Cooper. 1994. *1991 Net Economic Values for Bass and Trout Fishing, Deer Hunting, and Wildlife Watching*. Addendum to 1991 Survey of Fishing, Hunting, and Wildlife-Associated Recreation. United States Fish and Wildlife Service, Washington, D.C.

This report is an addendum to the 1991 National Survey of Fishing, Hunting, and Wildlife-associated Recreation by the United States Fish and Wildlife Service. It includes state-by-state estimates of the net economic value of bass and trout fishing, deer hunting, and primary non-residential wildlife watching based on contingent valuation questions from a 1991 survey. The net economic values reported here are appropriate measures of economic value for use in cost-benefit analyses, damage assessment, and project evaluations. Example: "In 1991, more than 35 million Americans (over sixteen years of age) spent $12 billion on fishing trip-related expenses."

Widdekind, L. 1995. *Human Powered Outdoor Recreation—State of the Industry Report*. Outdoor Recreation Coalition of America, Boulder, CO.

Describes the scale of this rapidly growing industry with data on demographics of consumers, popularity of various outdoor activities, retail sales, associated economic benefits, demographic trends, and recreation lands supply. Human-powered recreation contributes $35 billion to the national economy annually.

Wiley, B. 1988. *Financial Impact of Snowmobiling in Millinocket*. Southern Piscataquis County Chamber of Commerce, Millinocket, ME.

Unofficial estimate from the Chairperson of the International Snowmobile Tourism Council. Snowmobiling's direct impact on Millinocket's economy is $1.08 million plus $68,800 in taxes for a total of $1.15 million. Included are Caribou Parks and Recreation Department's unofficial estimates for all of Maine which calculate direct revenues of over $48 million plus $3.3 million in taxes for a total impact of over $51 million.

Vincent, M. K., D. A. Moser, W. J. Hansen. 1986. *National Economic Development Procedures Manual: Recreation, Vol. I—Recreation Use and Benefit Techniques*. Institute for Water Resources, Fort Belvoir, VA.

This report summarizes the conceptual basis of procedures for recreation valuation associated with water and related land resource planning. Describes the mechanics of acceptable valuation methods, and offers criteria for determining the applicability of various methods to particular planning situations.

Ziegler, J. F. 1991. *Enhancing Rural Economies through Amenity Resources*. Pennsylvania State University, State College, PA.

The proceedings from a national symposium to develop information for policy makers to stimulate rural economies through conservation, sustainable development, and management and marketing of amenity resources. Through a variety of case studies this source provides background on rural economic development through enhancement of tourism and recreation opportunities.

Forest Products

Benson, J. 1994. *Background Paper: On the Economic Contribution of Maine's Natural Resource Industries*. A report for the Maine State Planning Office, Augusta, ME.

Reviews the economic impact of farming, forestry, and fishing in Maine. Recognizing the missing data on the secondary and tertiary impacts, the paper underscores the extent to which the industries are interconnected and affect each other. Includes an overview of employment and economic data for Maine. Natural resources-based industries account for nearly forty percent of goods-producing jobs in Maine, and employ one in five Mainers. Total

sales value of farm products and fish catch is about $700 million for a processed export value of $1.1 billion. Forest industries generated $4.3 billion in manufactured product in 1992. Tourism is estimated to be worth $1.5 billion in 1992.

Boyle, K. J. 1990. *The Role of Property Rights in Creating Economic Incentives for Wildlife Management on Private Timberland.* Maine Agricultural Experiment Station Publication #1364, University of Maine, Orono, ME.

Fundamental differences in property rights structures are examined as a basis for identifying tensions between the management of timber and wildlife resources, and to set a basis for economic evaluation. Components of total value for wildlife and timber resources are identified. Selected value estimates for consumptive uses (hunting and fishing) of wildlife in Maine are reported.

Carr, T. 1994. The Northern Forest Economy. Pages 52-70 in Klyza, C. M., S. C. Trombulak, editors. *The Future of the Northern Forest*. Middlebury College Press, Middlebury, VT.

Provides background on economic factors related to the controversy over management of Northern Forest resources. Analysis focuses on sectors most relevant to land conversion: forest products, agriculture, tourism, development. Examines economic forces causing change and identifies key factors contributing to development. Includes charts and tables on area, demographics, social and economic indicators; economic output of forest products industry, employment and payroll in forest products, tourism, development, and second homes.

Colgan, C. S., L. C. Irland. 1993. The "Sustainability Dilemma": Observations from Maine History. Pages 53-116 in Richard Barringer, editor. *Toward a Sustainable Maine*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland.

An historical overview of Maine's resource extraction history and trends occurring from the time of European settlement to 1991.

Colgan, C. S., L. C. Irland, J. Benson. 1986. *The Natural Resource Industries of Maine*. Maine State Planning Office, Augusta, ME.

This paper examines the changes in Maine's principle resource industries of agriculture, forestry, and fisheries from about 1970 to 1985. An assessment and statistical portrait of Maine's natural resource-based industries, their constraints, and strengths. Data describes fifteen-year trends in agriculture, food processing, fishing, and forest products production. In 1982, the natural resources industries provided about fourteen percent of Maine's jobs and about forty-five percent of the goods-producing jobs. Farming, fishing, and logging activities provided an average of about twenty thousand jobs, not including some thirty-one thousand agricultural short-term or harvest jobs.

Eastern Maine Development Corporation. 1991. *Greenville Economic Base Profile*. Greenville Economic Development Office, Greenville, ME.

An economic base profile of the greater Greenville Labor Market Area (LMA) produced to support the town's Economic Adjustment Strategy. It was intended to identify and assess the resources and opportunities within the community that could support economic development, and to provide base-line data for consultants promoting tourism and forest products. The document details the demographics of the LMA labor force, seasonal trends in employment, and a ten year trend in employment shifting from manufacturing to retail and service industries. For example, between 1981 and 1989, manufacturing employment in the Greenville LMA declined by sixty-seven percent as compared to a seven percent statewide decline.

VALUING THE NATURE OF MAINE

ADDENDUM 1997

The following are twenty-three additions to the original 1996 publication *Valuing the Nature of Maine.* All of these references were added to the Maine Audubon library and computerized database in April, 1997. This addendum compliments the original document and the references are formatted and organized in the same way.

Recreation and Tourism

Alaska Department of Fish and Game. 1993. *Alaska Watchable Wildlife and Ecotourism Interagency Strategic Plan.* Alaska Department of Fish and Game, Juneau, AK.

In 1993, 21 agencies and organizations representing state, federal, natural resources, tourism, and transportation agencies met to begin strategic planning built upon a 1992 Watchable Wildlife and Ecotourism in Alaska MOU (Memorandum of Understanding). This strategic plan identifies 34 priority guidelines for developing and implementing ecotourism opportunities in the state and plans for 13 specific actions. A copy of the MOU is attached.

Androscoggin Valley Council of Governments. 1989. *Western Lakes & Mountains Tourism Plan 1989.* Androscoggin Valley Council of Governments, Augusta, ME.

This report outlines the economic contributions of tourism in the Western Lakes and Mountains region, the character of tourism in the region, the structure of the planning process used in the previous year, specific strategies to address identified issues, and priority activities for implementation of the plan. The primary direction is to capitalize on the increased tourism but manage its growth to minimize potential negative impacts of the region's character and economic health. In 1987, Maine tourism directly supported 58 thousand full-time equivalent jobs, more than any other single sector of the state's economy. The annual payroll from tourist activity was $518 million, $1.6 billion in sales to travelers, and $85 million to state tax revenues and $16.8 million to local tax revenues. From 1987-88, Maine's tourism increased more than three times faster than the national average; tourism in the western Maine region grew 15.7%, more than 50% faster than the state average. Tourist expenditures for the region in that time were over $246 million.

Dolan, K. 1997. *Wet, Wild, and Profitable: A Report on the Economic Value of Water-Based Recreation in Vermont.* Northeast Natural Resource Center, Montpelier, VT.

This report presents the results of a survey-based study that targeted Vermont's water-based recreation businesses. The purpose was to study the relationship between water quality and economic health. Among the study's key findings: water-based recreation in Vermont is at least a $109 million per year business, creating up to 3,600 jobs; 64% of businesses support state efforts to improve water quality including increasing enforcement of current water quality standards; of businesses surveyed, 92% believe that improvements in water quality are important for business; 74% believe that flow levels are important. Six figures and five tables present data on survey results, recreation business profiles, and other data of the study.

Echelberger, H.E., Jonathan B. Wiesel. 1990. *Tracking the Health of the Cross-Country Ski Industry 1984-1988.* USDA Forest Service, Northeastern Forest Experimental Station, Burlington, VT.

Data from four annual surveys of commercial cross-country ski areas across the United States are summarized. From it's non-industry status in the 1970's, cross-country (X-C) skiing grew to about 800 commercial operations in the 1980's. Trends from 1984-85 to 1987-88 reported in this analysis are: kilometers of commercially maintained trails; X-C facilities and services and rental and retail packages kept in stock at X-C centers, employment, fees, visitation, associated revenues, and expenses of running these operations. At the time of the report, 40% of X-C facilities were in the northeast states, 20% in the upper Midwest, and 40% in the western states and Alaska. The industry, at report date, employed about 4,000 full-time and 4,000 part-time jobs in the 2 to 5 month season, generating $27 million in wages, $44 million in revenues, and dispersing $36 million in operating expenses into regional communities.

English, B.K.. 1994. *1993 River Study Pilot Data, Final Report.* America Outdoors, Knoxville TN.

This report summarizes data collected in 1993 from outfitter clients at five rivers in the US: the Chattanooga, Gauley, Kennebec, Nantahala, and Middle Fork of the Salmon. Three categories of information are included: demographics, river use and satisfaction, and expenditures/economic impacts; most of the information is presented in graphs or tables. Included in the findings for the Kennebec River: total industrial output to state, $513,000; total employment income, $298,000; total state-wide economic impact from out-of-state outfitters, $11.8 million.

Greenville Office of Economic Development. 1991. *The Moosehead Lake Region Tourism Marketing Strategy.* Greenville Office of Economic Development, Greenville, ME.

Facing declines in forest-related and other industrial employment, the northern Maine town of Greenville secured a grant to study and plan an "Economic Adjustment Strategy." This is Part Two of four sections. This marketing strategy sets forth long- and short-term goals for increasing the region's image, identity, and promotion as a premier destination; it includes assessments and inventories of resources, market and labor pools, and other data, supported with tables and charts. Among the key findings: of 148 businesses allied with the Chamber of Commerce, 76% are directly related to tourism and another 19% indirectly benefit from tourism.

Reiling, S., Matthew Kotchen, Alan Kezis. 1997. *An Economic Evaluation of Snowmobiling in Maine.* Maine Snowmobiling Association, Augusta, ME.

This report is a study of the economic impact of snowmobiling in Maine conducted for the Maine Snowmobiling Association by the Department of Resource Policy and Economics at the University of Maine in Orono. The report outlines the survey procedures and design, characteristics of resident and non-resident snowmobilers, activities and expenditures for 1995-1996, Maine trail-related expenditures, a New Hampshire survey, and the total economic impact of snowmobiling in Maine, and 22 tables. Among the key findings: there are 69,000 sleds registered to Maine residents; another 6,500 were registered in state to non-residents. Snowmobiling in Maine resulted in $152.5 million in direct expenditures in 1995-96; using input-output multipliers, the total economic impact for that season was $226 million.

Sylvester, J.T., Marlene Nesary. 1994. *Snowmobiling in Montana.* Univ. of Montana, Bureau of Business and Economic Research, Missoula, MT.

This study was sponsored by Montana's Department of Fish, Wildlife, and Parks, Department of Commerce, and the Montana Snowmobile Association. The research indicates that about 12% of the state's households participate in snowmobiling, with a total estimate of 95 thousand participants. While residents are estimated to spend about $60 million per year, non-residents spend about $40 million per year. Nearly 5 million gallons of gasoline are consumed each year, generating annual gas tax revenues of $1.3 million for highway funds. Data includes participant characteristics, activity, destinations, itemized expenditures, preferences and opinions.

Wiesel, J.B., Herbert E. Echelberger. 1991. *Cross-Country Ski Area Operations Survey Winter 1989-1990.* Cross Country Ski Areas Association, Jackson Hole, WY.

This is the sixth in a multi-year series of national studies of Nordic ski operations in the United States. Data from survey responses for the 1989-90 season reported in this analysis are: kilometers of commercially maintained trails; X-C facilities and services and rental and retail packages kept in stock at X-C centers, employment, fees, visitation, associated revenues, and expenses of running these operations. Data is reported mostly as medians and mean averages; cumulative economic impacts are not reported.

Forest Products

High, C., Ed Wood, Kristen Byrd. 1994. *The Economic Impacts of Wood Energy in the Northeastern States Volume I: General Report.* Coalition of Northeastern Governors Policy Research Center, Wash, DC.

This report gives an assessment of the economic impacts, in terms of direct and indirect employment and income and tax payments generated by the industrial/ commercial and residential use of wood for energy in he eleven northeastern states. Data was collected on a state level and analysis of the aggregate patterns of wood energy use, combined with state level data on wages, wood prices, taxes, etc. Indirect and direct economic impacts, and those of cost savings and displacement of conventional fuels are assessed. Among the key findings: total use of wood fuel in the region in 1992 was 28 million tons (16 million residential, 12 million industrial/ commercial); wood energy generated nearly 53 thousand jobs and 2.9 billion in income. Wood energy use eliminated the need for approximately 1 billion gallons of oil and 4 million megawatt hours of electricity.

Marine Products

No new references.

Real Estate Values

Brighton, D. 1997. *Open Land, Development, Land Conservation, and Property Taxes in Maine's Organized Municipalities.* Maine Coast Heritage Trust, Brunswick, ME.

This study investigates concerns that permanent land conservation, through public or non-profit ownership of either land or a conservation easement, leads to higher tax bills. This study calculates the extent of the tax burden shift from conserved lands to other taxable lands caused by various conservation alternatives for the towns of Freeport, Mt. Desert, and Vinalhaven. To determine the association between various types of development and low tax bills, the study correlates the property tax bill on the median-value house of each of these towns with various measures of development and ruralness. The analysis looks at the tax base as well as the actual tax bill paid by the resident. Among the major findings: the tax bill on the median-value home is, on average, lower in towns with more acres of open land and a higher ration of seasonal to year-round homes; the tax bill for same is, on average, higher in towns with larger tax bases, populations, and more employment, higher values of taxable sales and properties; the tax mill rate averages higher in towns that are more developed and lower in rural towns; between 1980 and 1990, the tax bill on median-value houses saw more increase in towns with the most growth in population and tax base. Included in the appendices are the executive summaries for each individual town study. [Note: in Maine Audubon's collection, each town report in its entirety is also attached to this document.]

Commonwealth Research Group, Inc. 1995. *Cost of Community Services in Southern New England.* Southern New England Forest Consortium, Chepachet, RI.

This report, commissioned by the Southern New England Forest Consortium, presents the Cost of Community Services (COCS) studies performed for eleven towns in Connecticut, Massachusetts and Rhode Island to evaluate fiscal contributions of developed land versus forest, farm, and other open space. The study examines annual income and expenses generated for different land-use sectors: residential, commercial/industrial, and forest, farm, and open space lands. Build-out analysis were also performed to determine the maximum development potential of the community. The study concluded that for every dollar of revenue raised from the residential sector, the eleven towns spent $1.14 on services; the commercial/ industrial sector spent 43 cents to support public services for every dollar raised; for every dollar of revenue raised from farm, forest, and open space land, only 42 cents was required for services. A regional analysis shows a correlation between towns with large or fast-growing populations and high cost of community services.

Fausold, C.J., Robert J. Lilieholm 1996. *The Economic Value of Open Space: A Review and Synthesis.* Lincoln Institute of Land Policy, Cambridge, MA.

This paper reviews several approaches for measuring and expressing the economic value of open space, and summarizes examples of each from published reports and research findings. Included are fiscal impact studies, market and enhancement value, use and nonuse value, production value, the value of open space-related activities, and tangible values. These values are not universally present within a given community, nor are they quantitatively additive. However, a comprehensive consideration of the multiple values of open space will better inform community decisions about land conservation and development.

Valuation

Freeman, A.M., III. 1987. *Assessing Damages to Marine Resources: PCB's in New Bedford Harbor.* Bowdoin College, Brunswick, ME.

The principal objective of this paper is to review the methods used to estimate the monetary damages that are alleged to have been caused by the discharge of polychlorinated biphenyls (PCBs) into the harbor at New Bedford, Massachusetts. The study reviewed empirical data and calculated the damages as evidence in litigation proceedings. The study estimates a loss in property value between $26.2 million and $39 million (1985) and damages to lobster fisherman of over $2 million. The research supports claims in damages of $40-56 million to the natural resources of the New Bedford area.

Freeman, A.M., III 1995. The Benefits of Water Quality Improvements for Marine Recreation: A Review of the Empirical Evidence. *Marine Resource Economics* v.10: 385.

This paper reviews the empirical literature on the economic value of marine recreation fishing, beach visits and boating. Questions addressed include: what values do people place on changes in the attributes of recreation sites and activities? what do we know about how water pollution control policy affects these attributes? and is it feasible to use the value information obtained for specific sites and/or activities to estimate the benefits of improving marine water quality? The literature establishes that some measures of pollution reduce the values of trips to beaches and that improved fishing success is valued by anglers. However, there is substantial variation in value measures across the studies. Welfare estimates can be sensitive to model specification and estimation. In the case of marine recreational fishing, the links between pollution control policy and the attributes of the activity that people value (catch rate) have not been established.

Michael, H.J., Kevin J. Boyle, Roy Bouchard. 1996. *Water Quality Affects Property Prices: A Case Study of Selected Maine Lakes.* University of Maine, Orono.

Originally published as a Masters thesis titled "A Hedonic Property Value Study of Water Quality in Maine Lakes" by Holly L. James, this report is based on a study of thirty-four Maine lakes in six separate market groups to determine if lake water clarity has a significant influence on property values in order to estimate the implicit price of water clarity. Also considers which measures of water clarity most closely reflect consumers' perceptions of clean water. Results show that one meter of water clarity increased property value from $11 to $200 per frontage foot, depending on the market group.

Pearce, D.W. 1993. *Economic Values and the Natural World.* MIT Press, Cambridge, MA.

This book includes analysis and arguments about the ways in which economists seek to "measure preferences" for improvements in environmental quality, natural assets, and preventing their deterioration. The British author examines these topics in an international context. Appendix I critically examines the role of environmental policy in economic growth; Appendix II outlines monetary evaluation techniques. Contains an extensive bibliography.

Environmental Regulation and Policy

Adams, M.A. 1996. *Maine Employment Statistical Handbook 1995.* Maine Department of Labor, Augusta, ME.

This annual publication is a statistical summary of the following: labor force statistics; non-farm wage and salary employment; hours and earnings; covered employment and contributions; Unemployment Insurance Program; Job Service Program. This is a specific profile of all aspects of employment in Maine.

Eastern Maine Development Corporation. 1991. *Greenville Economic Base Profile.* Greenville Economic Development Office, Greenville, ME.

Facing declines in forest-related and other industrial employment, the northern Maine town of Greenville secured a grant to study and plan an "Economic Adjustment Strategy." This is Part One of four sections. The purpose of this economic overview and assessment is to identify resources and opportunities for economic development and provide statistical data for the Greenville Economic Development Office as well as tourism and forest products consultants. The data includes: local economic activity model; human resources in the area; employment sources and trends; export and retail trade analysis; supporting appendices.

Maine Center for Economic Policy. 1994. *Maine Choices: 1995 A Preview of State Budget Issues.* Maine Center for Economic Policy, Augusta, ME.

The purpose of this collection of reports by various authorities is to re-focus Maine's state budget debate, on the premise that the state legislature errs when it builds its budget priorities by only looking at allocating existing revenue, rather than setting clear policy and budget goals, then resolving the revenue supply issues. Included in the collection is "A Sustainable Vision for Maine's Natural Resources" (Sullivan and Giffen) which makes recommendations for state policy support of conservation and sustainability, noting that Maine's natural resources deliver $7.2 billion in total sales and 90 thousand jobs.

Niemi, E., Ed Whiteall. 1995. *The Economic Consequences of Protecting Salmon Habitat in Idaho (Preliminary Report).* ECO Northwest, Eugene, OR.

ECO Northwest was contracted by Pacific Rivers Council, a plaintiff in a Federal lawsuit that brought a preliminary injunction to certain mining, logging, and grazing activities in six National Forests in the Pacific northwest. This study is a preliminary assessment of the economic consequences of curtailing grazing, logging, and mining activities to protect the habitat of the endangered Chinook salmon on these areas. Major findings, supported by itemized observations and data, include: forest degradation can slow Idaho's economic growth; protecting salmon habitat will strengthen, not weaken the national, regional, and state economies, particularly when accounting of taxpayer subsidies to the industries; economic transitions already occurring will be accelerated by habitat protection; protecting salmon habitat can reinforce efforts to break economic dependency on diminishing grazing, logging, and mining industries; curtailing conventional logging, grazing, and mining activities will have minimal adverse impact on Idaho's economy, and these will be offset by positive impacts on other elements of the state's economy.

This report contains data on the state's economic growth, recreational values of salmon, and surveys of resident preferences and opinions. Much of the analysis includes "full accounting" principles which involve such values as quality of life, hidden costs of environmental degradation, and the distorting effect of subsidies on economic benefit-cost analysis.

Power, T. M. 1996. *Lost Landscapes and Failed Economies- The Search for a Value of Place*. Island Press, Covalo, CA.

Economist Thomas Power argues that the quality of the natural landscape and environmental health is an essential part of a community's permanent economic base and well-being and that they should not be sacrificed to sustain extractive industries that are not sustainable in the long-term. Numerous case studies in ranching, mining and timber industries provide critical analysis of the economic role of these extractive industries in local communities. Also examined are areas where environmental protections have been enacted and those impacts on the local economies. The author concludes and empirically demonstrates fundamental over-estimation of the economic importance of extractive industries and suggests models for economic analysis and evaluation that include social and environmental costs of environmental degradation.

Sullivan, M., R. Alec Giffen. 1994. *A Sustainable Vision for Maine's Natural Resources.* Maine Center for Economic Policy, Augusta, ME.

Noting that the natural resources of Maine produced over $7.2 billion and employed 90 thousand in 1992, the authors conclude that state budgetary policies must seek better and more efficient means to invest in effective management of Maine's natural resources. Several key recommendations for the state are advanced, including: future natural resources management be predicated on principles of sustainable development; doubling of land under conservation protection in 10 years; revive state energy planning to encourage utilities competition; make investment in natural resources economically competitive with other investment options; market Maine's environment as a business attractant; regionalize sustainable development strategies; focus governmental resources on job-producing, natural resource-based growth industries. Several charts compare Maine's overall budget to various non-DEP natural resource agency budgets.

Agriculture

No new references.

(end)

Enterprise Resources Incorporated. 1991. *Greenville Forest Products Study*. Greenville Economic Development Office, Greenville, ME.

A report to identify opportunities for Greenville to diversify its forest-based products industry with an eye toward increasing value-added products, and reducing reliance on unstable, low-value-added lumber markets.

Fongemie, R. A. 1988. *Careers in the Maine Woods*. State of Maine Labor Market Information Services, Maine Department of Labor, Augusta, ME.

An outline of career opportunities in the wood harvesting industry; includes descriptions of jobs, harvesting and non-cutting occupations, and organizational charts, average hourly wages and prevailing piece rates for pulpwood and logs.

Harper, S. C., L. L. Faulk, E. W. Rankin. 1992. *The Northern Forest Lands Study of New England and New York*. Northern Forest Lands Council.

This report follows a 1988-1991 study by the congressionally appointed Northern Forest Lands Council. The report is organized into eight chapters and twelve appendices: Chapter 1 describes the significance of the forest as a biological, recreational, and timber resource. Chapter 2 describes patterns of ownership and use. Chapter 3 examines the changing economic forces affecting the land use in the forest and describes the trends in land use and development. Chapter 4 reviews the significant resources in the forest and Chapter 5 presents a criteria for assessing the resources and outlines a framework for mapping the important resources. Chapter 6 gives a demographic profile of the region. Chapter 7 presents twenty-eight strategies in six categories for protecting important resources. Chapter 8 describes actions needed to implement changes.

Irland, L. 1994. Five Images of the Maine Forest. *The Maine Scholar* v7, Fall:1-12

Discussion of the Maine forest as a recreational resource (includes an Office of Tourism survey showing 72% of respondents had used the woods for recreation at least once in the previous five years); a biological resource (bio-chemical characteristics, forestry effects on wildlife and biodiversity, new focus on ecosystem integrity); a timber resource (refers to recently released Maine Forest Service "midcycle" inventory); a sector of the economy (in 1905, forest was 30% of the economy's production and 27.4% of employment while in 1992, forest was 43.5% of production and 29% of employment); and as a cultural resource.

Jaakko Poyry Consulting Inc. 1995. *Diagnostic Review of the Pulp and Paper Industry in Maine*. A report for the Commission on the Future of Maine's Paper Industry, Office of Policy and Legal Analysis, Maine Legislature, Augusta, ME.

Current status of the pulp and paper industry in Maine is evaluated with regard to wood resources, capital investments, regulatory environment, key industry factors, and markets served. Detailed report prepared for the Commission on the Future of Maine's Paper Industry.

Knox, J. B. 1995. *Report of the Commission to Study the Future of Maine's Paper Industry*. Office of Policy and Legal Analysis, Maine Legislature, Augusta.

Commission's findings and recommendations on: economic value of Maine's paper business; diagnostic review; business climate; education and training; energy; environmental protection; human resources and labor; research and technology; taxation; transportation. Currently, Maine's paper industry provides some sixteen thousand direct jobs and pays the highest wage of any Maine manufacturing sector. Also generates twenty-nine thousand

intermediate and induced jobs for a 1993 combined total of $1.5 billion in annual personal income to about forty-five thousand employees and a contribution to the Gross State Product of $2.3 billion. The primary strengths of Maine's paper industry are: quality fiber at competitive prices; skilled and experienced workforce; and abundant, though high-priced, energy supply. The primary weaknesses are cited as: lack of investment in technology and facilities; relative isolation from access to emerging international markets; weaknesses in the business climate including poor transportation infrastructure, high energy costs, and inconsistent regulatory process.

Maine Forest Products Marketing. 1994. *Directory of Secondary Wood Producers, 1994*. Maine Department of Economic and Community Development, Augusta, ME.

Fully indexed and categorized list of value-added producers who responded to survey (577 companies total) by county. Information includes: company structure, product information, raw resources, residues, production, manufacturing, business development, marketing, training, and numbers employed.

MaineWatch Institute. 1992. *Families and Forests: Improving Prosperity Through the Secondary Wood Products Industry in the Western Mountains of Maine*. MaineWatch Institute, Hallowell, ME.

Although paper production accounts for most of the wood-based economy in Oxford, Franklin, Somerset and Piscataquis counties, there is a significant secondary wood products industry made up of manufacturing enterprises that add value to lumber either through completed wood products or components. This study evaluates the pressures facing this secondary wood products industry, and outlines methods for improving the long-term prospects for this industry.

MaineWatch Institute. 1988. *Maine's Forest Economy: Crisis or Opportunity?* MaineWatch Institute, Hallowell, ME.

This study defines the most critical problems and the most promising opportunities affecting the future of Maine's forest economy into the twenty-first century. In particular, it identifies critical information gaps and recommends a policy and research agenda. Out of this study came a recommendation to evaluate ways to expand the secondary wood products sector in Maine's western mountain region.

Northeastern Forest Alliance. 1990. *The Economic Importance of Maine's Forest*. Northeastern Forest Alliance, Saranac Lake, NY.

This summary includes economic statistics and graphs on the forest product industries, statistics on "Multiple Use Value," i.e. tourism employment and revenues, recreational uses, and state tax revenues. It concludes that the forest provides more than fifty thousand jobs to the Maine economy, the value of annual outputs including stumpage, firewood, manufacturing and wood fuel = $5.7 billion, tourism and recreation expenditures based on the forest resource total $1.7 billion, and Christmas trees, maple syrup, and horticulture outputs add up to $13.1 million. The report suggests a total of $7.4 billion or thirty-two percent of Maine's Gross State Product of $23.5 billion.

Northern Forest Lands Council. 1994. *Finding Common Ground—The Conservation of the Northern Forest*. U.S. Forest Service, Rutland, VT.

Recommendations from the three-year survey of Northern Forest resources and issues. The appendixes have summary data on: forest stock, ownership, forest products, employment and value, land conversion, development, tax rates, usage-based taxes, and basic recreation trends.

Northern Forest Lands Council. 1994. *Technical Appendix*. U.S. Forest Service, Rutland, VT.

This is a compendium of technical research and forum proceedings from the three-year Northern Forest Lands Council study of issues and options facing the Northern Forest of New York and northern New England. Twenty-nine separate reports are included from six sub-committees which reported on the following general topics: Forest land conversion and ownership patterns; Biological resources and biodiversity; Conservation strategies; Local forest-based economies; Taxes of forested properties; Forest-based recreation and tourism; State and federal tax policies for timberlands; and miscellaneous reports on wildlife inventory, public opinion and comments, forest inventory procedures, and conservation activities in the area.

Palola, E. and S. Minter. 1995. *Getting the Cut Out: Raw Log Exports in the Northern Forest Region*. National Wildlife Federation, Montpelier, VT.

This report represents a year-long investigation into economic forces that currently affect the forests and employment in the Northern Forest (NY to ME). The authors describe how log exports and the global forest products markets affect the northern forest and how current log export trends may impact the health of the forest and the regional forest products economy. Specifically, inquiry focused on: current level of whole-log exports from the Northern Forest region; likely impacts on regional employment and economy and trade-offs of limiting log exports; the influence of Canadian forest products sector and provincial government subsidies; policy options that have been considered in state and federal governments. This report focuses only on the effect and concerns raised by the export of raw or unprocessed logs. Includes extensive bibliography. The authors "conservatively estimated" that if all the sawlogs exported from Maine and Vermont in 1993 were instead processed regionally, Maine would have up to twenty-five hundred (and Vermont up to six hundred) additional jobs.

Paper Industry Information Office. 1994. *Maine's Pulp and Paper Industry* (Information Service Fact Sheets). Paper Industry Information Office, Augusta, ME.

Brief fact sheet on pulp and paper employment and production. Data highlights:
Maine's paper and pulp industry employs about fifteen thousand people; as much as one-quarter of Maine people are directly or indirectly supported by paper/ forest industry; as many as twenty thousand cut wood in Maine for at least part of their livelihood; gross payroll, papermaking (twenty-eight percent of Maine's manufacturing payroll) is $623 million. In 1994 pulp and paper deliver $3.547 billion or thirty-two percent of Maine's total manufacturing product, providing Maine's greatest export value of $229 million. Maine provides twenty-five percent of the nation's paper.

Phillips, S. R. 1993. *Forest Products Manufacturing: Factors and Trends Affecting the Working Forest*. The Wilderness Society, Washington, DC.

This is volume one of a two-part report for the Wilderness Society. In the executive summary, the author outlines his skepticism toward the status quo in Northern Forest management and policy. The Wilderness Society has examined the primary forest products industry in New York-New England. Among their findings are: a concentration of timber land ownership with relatively little publicly owned land; forest products manufacturing grew about one-half as fast as the overall regional economy and about two-thirds as fast as southern wood and paper industry; from 1970-1990, total employment in the forest products industry in the Northern Forest states fell by thirteen percent (almost seventeen thousand jobs) while region employment in all sectors grew by twenty-three per-

cent and southern forest products manufacturing grew by twenty-four percent; low capital investment in northern paper industry holdings; and declining quality of timber resources.

Phillips, S. R. 1994. *Toward a Sustaining Forest: Development Opportunities for the Maine Woods*. The Wilderness Society, Washington, DC.

This is volume two of a two-part report for the Wilderness Society. This report examines opportunities for diversification of Maine's forest-based economy. Discussion includes Maine's comparative advantages in forest-based entrepreneurial opportunities; value-added wood products; certified forest products; paper conversion and printing; value-added tourism and recreation; energy products and efficiency; development assistance.

Preston, C., S. Phillips. 1995. *Economic Profiles of the Northern Forest*. The Wilderness Society, Washington, DC.

An economic profile of the rural economies in the Northern Forest region from New York's Adirondacks to Maine's North Woods. The profiles present information about the region's entire economy over a twenty-five year period to allow comparisons across sectors and industries, and provide state-wide, multi-county, and multi-state spatial comparisons of data.

Tietenberg, T. 1992. *Environmental and Natural Resource Economics*, 3rd edition. Harper Collins, New York.

Principles, economic models, and case studies on environmental policy, natural resources, sustainability, property rights, pollution, welfare economics, and cost-benefit analysis of renewable and non-renewable resources including forest resources.

United States Forest Service. 1990. *Income Opportunities in Special Forest Products, Agriculture Information* Bulletin 666. United States Department of Agriculture, Washington, D.C.

Subtitled "Self-help suggestions for rural entrepreneurs," this bulletin reviews small-scale extractive and non-consumptive derivatives from forests such as specialty wood products, botanicals and pharmaceuticals, and recreation and wildlife recreation enterprises. Surveys potential markets, typical start-up costs, and potential values . Provides case studies of existing enterprises. Extensive reference section in each chapter.

Whitelaw, E. 1991. *Testimony of W. Ed Whitelaw on Behalf of Fish and Wildlife Service to Endangered Species Committee U.S. Department of Interior*. ECO Northwest, The Atrium 99 W. Tenth Avenue. Eugene, OR 97401, or Endangered Species Committee, Office of Hearings and Appeals, United States Department of the Interior.

Testimony of prominent resource economist regarding the U.S. Bureau of Land Management's request for exemption from the Endangered Species Act for forty-four timber sales. Questions the economic assumptions of projected timber sales revenues. Attached is Rebuttal Testimony of Whitelaw for FWS (133649-A).

Whitelaw, E. 1990. Oregon's turn: A blueprint for economic growth in the 1990's. *Old Oregon* v69, n3: 22-24.

A discussion of how Oregon's economic potential is passed over by regional markets. Considers the concept of the "second paycheck" or how quality of life issues translate to real economic benefits.

Whitelaw, W. E., E. G. Niemi. 1989. Money: The Greening of the Economy. *Old Oregon* v68, n3: 26-27.

Analysis thar gauges the dollar value of clean air, water, and healthy ecosystem and describes the competitive advantage these values offer to Oregon's economy.

Whitelaw, E., E. Niemi. 1994. *Economic Critique of the Forest Service Environmental Impact Statement on Management of Old-Growth Habitat.* Critical Response to the Final Supplemental Impact Statement on Management of Late Successional and Old-Growth Forest Related Species, U.S. Forest Service Environmental Impact Statement. ECO Northwest, The Atrium 99 W. Tenth Avenue. Eugene, OR 97401.

Review finds that the Forest Service Environmental Impact Statement: overlooks the ability of unlogged federal forests to contribute to stability of regional economies; abandons principles of sustainable forestry and exaggerates negative economic effects of alternatives with lower timber harvests; misconstrues the ability of higher timber harvests to stabilize regional economies.

Marine Products

Benson, J. 1994. *Background Paper: On the Economic Contribution of Maine's Natural Resource Industries.* A report for the Maine State Planning Office, Augusta, ME.

Reviews the economic impact of farming, forestry, and fishing in Maine. Recognizing the missing data on the secondary and tertiary impacts, the paper underscores the extent to which the industries are interconnected and affect each other. Includes an overview of employment and economic data for Maine. Natural resources-based industries account for nearly forty percent of goods-producing jobs in Maine, and employ one in five Mainers. Total sales value of farm products and fish catch is about $700 million for a processed export value of $1.1 billion. Forest industries generated $4.3 billion in manufactured product in 1992. Tourism is estimated to be worth $1.5 billion in 1992.

Bertaska, R. 1994. *Damariscotta River Estuary: What is it Worth? An Estimate of Marine-Related Activities Associated with the Damariscotta River Estuary.* The Damariscotta River Estuary Project, Damariscotta, ME.

This report on the Damariscotta River estuary is a detailed examination of economic activity for the area, directly related to marine-based enterprises. Estimates include $3.6 million to $4.8 million for "harvested fisheries," $7.9 million in employment payrolls, and $1.3 million in "non-resource value." Not included are associated economic activities or values generated by real estate, recreation, tourism, multiplier effects, or non-tangibles.

Bertaska, R. 1994. *Damariscotta River Estuary: What is it Worth? Sustainable Economic Opportunities: Natural Development in the Damariscotta River Region.* Damariscotta River Estuary Project, Damariscotta, ME.

This overview presents economic development paradigms, relationships, impacts, and trends associated with economic activity, and outlines new sustainable economic opportunities focused on the estuary, options for implementing economic development programs, and a ten-step action plan which can be undertaken immediately. The report also includes a review and analysis of 1994 Business and Visitor Surveys in the Damariscotta watershed which includes a finding that fifty to seventy-five percent of all taxable sales in the watershed are provided by tourists who come to the area primarily because of the scenery.

Casco Bay Estuary Project. 1995. *Opening Clam Flats and Swimming Areas in Casco Bay.* Casco Bay Estuary Project Issue Papers 1-5, v3, Portland, ME.

An overview analysis of the causes, economic and social consequences, and possible prevention strategies of clamming and swimming areas closure.

Clements, J.D. 1995. Nonpoint Source Pollution. *Maine Townsman*. May: 19-22.

Examines the economic advantages for Maine in maintaining clean waters. Provides examples of nonpoint problems in coastal zone management and on freshwater resources. Describes economic benefits for reducing pollution. In Freeport, a $5,000 grant allowed shellfish commissioners to remedy a pollution problem allowing acres of clamflats, closed for five years, to be reopened. "Clammers then raked in $15,000 of clams in one morning."

Colgan, C. S. 1990. *The Economic Value of Casco Bay*. A report for the Maine State Planning Office, Augusta, ME.

This report involves an integrated regional assessment of the values of goods and services derived from Casco Bay. The author discusses the context of the accounting which produces this broad scale data with subsets of output sectors such as "coast-dependent activities," "coast-linked activities," and "coastal service activities." The report also considers real estate value of coastal property and emphasizes the importance and difficulty of measuring non-market values. Nearly thirteen thousand jobs and $520 million are derived from Casco Bay's cargo ports, fisheries, tourism and recreation, and marina services. Property value assessments in Casco Bay towns total $9.4 billion. Non-market values for parks on the Bay range from $774 ,000 to $6.5 million and for wetlands from $63 million to $319 million depending on valuation methods.

Colgan, C. S. , editor. 1994. *Sustaining Coastal Resources: Economics and Natural Sciences*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

In a search to help formulate comprehensive environmental policies, a group of economists, scientists, and environmental policy professionals came together at a University of Maine conference in 1994 to explore how economists and scientists perceive and measure the value of coastal ecosystems and provide that information to decision-makers. The papers in this volume were presented at the workshop and represent a summary of the state of the art, while also providing frank discussions of the limitations of current approaches and innovative thinking about the future of "integrated ecosystem management." [Many of the papers are referenced individually in this bibliography.]

Colgan, C. S., L. C. Irland. 1993. The "Sustainability Dilemma": Observations from Maine History. Pages 53-116 in Richard Barringer, editor. *Toward a Sustainable Maine*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

An historical overview of Maine's resource extraction history and trends occurring from the time of European settlement to 1991.

Colgan, C. S., L. C. Irland, J. Benson. 1986. *The Natural Resource Industries of Maine*. Maine State Planning Office, Augusta, ME.

This paper examines the changes in Maine's principle resource industries of agriculture, forestry, and fisheries from about 1970 to 1985. An assessment and statistical portrait of Maine's natural resource-based industries, their constraints, and strengths. Data describes fifteen-year trends in agriculture, food processing, fishing, and forest products production. In 1982, the natural resources industries provided about fourteen percent of Maine's jobs and about forty-five percent of the goods-producing jobs. Farming, fishing, and logging activities provided an average of about twenty thousand jobs, not including some thirty-one thousand agricultural short-term or harvest jobs.

Freeman III, A. M. 1993. *The Economics of Valuing Marine Recreation: A Review of the Empirical Evidence*. EPA Office of Policy Planning and Evaluation, Bowdoin College Economics Working Paper 93-102, Brunswick, ME.

Report addresses the question: Does available economics literature provide a basis for estimating the benefits to marine recreation which can be attributed to water pollution control programs of federal, state, and local agencies? The paper reviews the values of recreation and the transferability of value measures. The appendix includes summary descriptions of forty-two marine recreation studies referenced in the report. The conclusion states that the evidence suggests consumer surplus values per trip of $10-$100 and that value of access to fisheries annually could range from $100-$1,000 per person. With 10 million marine recreational fishing participants nationally this represents a total surplus value of $1-$10 billion per year.

Freeman III, A. M. 1994. The Economic Valuation of Coastal Resources Supporting Recreation. Pages 87-103 in Charles Colgan, editor. *Sustaining Coastal Resources: Economics and the Natural Sciences*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

Comparative review of major non-market resource valuation methods (travel cost, willingness to pay, random utility, and contingent valuation) and a brief review of some studies that use them. Includes an example calculation of the relative value of Georgetown's Reid State Park as development property and recreation asset, with references to data of other studies related to coastal recreation. The informal calculation suggests that the Park has a value of $4-$8 million for private development but with 135 thousand visitor days/year Reid State Park has an annual consumer surplus value as a park (or recreational asset) of $68-240 million. This is based on a consumer surplus value (economists call gains in people's welfare above and beyond out of pocket expenditures "consumer surplus") of $25-$90 per user-day.

Heinig, C. S., P. J. Moore, D. W. Newberg, L. R. Moore. 1995. *Economic Analysis of the Soft-shelled Clam, Mya arenaria, Industry in Maine*. Casco Bay Estuary Project, Portland.

This study found that in 1994, clam diggers landed 63,805 bushels of clams for a total value of about $4.65 million. This represents production from only a portion of Casco Bay's clam flats since approximately forty percent are closed because of pollution or lack of monitoring. Other findings: Average harvest, 1984-1994, worth $4.27-$4.58 million; the value beyond the landed value is between $11.6-$15.7 million; Casco Bay's soft-shelled clam fisheries support 380 people; the economic value of closed flats is estimated to be 51,160 bushels worth $3.73 million; municipalities are having difficulty achieving effective management.

Larson, J. S. 1991. North America. Pages 57-84 in Finlayson, M., M. Moser, editors. *Wetlands*. Facts On File, Inc., New York, NY.

Authors state that because the wetlands of the Atlantic and the Gulf coasts occur in the most populated region of North America, their values as sources of water, wood and fish rank as high or, in some areas, higher than their values as havens for wildlife. Where people live near wetlands, the hydrological values to humans, such as flood control, sediment trapping and maintenance of water quality may equal or exceed any other values. Two thirds of commercial shellfish and finfish landed in the U.S. depend on coastal wetlands for nursery and breeding habitat or on forage fish that breed in wetlands.

Lewis, B. 1993. *Maine Clam Landings by County ,1941-1993*. Maine Department of Marine Resources, Hallowell, ME.

A report containing a spreadsheet table indicating a forty-seven percent decline in clam landings over the record keeping period.

Lewis, B. 1993. *Maine Landings of Finfish and Shellfish for 1993, 1988, 1983, 1978*. Maine Department of Marine Resources, Hallowell, ME.

A report quantifying Maine landings of finfish and shellfish.

Maine Aquaculture Association. 1993. *The Aquaculture Industry in Maine*. Maine Aquaculture Innovation Center, Orono.

A one-page summary on Maine aquaculture data, resource advantages in Maine, and constraints to the industry's expansion. Data includes: Maine's 1993 Aquaculture harvest: $45 million from thirty aquaculture farms (seventeen in Washington County, two in Hancock County, eight in Lincoln County, 1 in Knox County); 485 full-time employees. Maine ranks second in aquaculture production in the Northeast producing twenty-nine percent of "farmed" marine products. A five hundred-fifty percent increase in production occurred from 1986 to 1993.

Maine Coastal Program. 1995. *Land-Based Sources of Pollution: An Inventory of the Gulf of Maine*. Maine State Planning Office, Augusta, ME.

This forty-two page report presents an overview of the geology, ecology, and environmental stresses in the Gulf of Maine; the work of the Gulf of Maine Program; and a summary of the results of a point source inventory to determine land-based sources of pollution in the Gulf of Maine.

Moore, L. R., B. Vickery. 1992. *Cobscook Bay's Industries and Uses: A Preliminary Inventory of Economic and Ecological Data*. The Nature Conservancy, Maine Chapter, Brunswick, ME.

This 1992 document, revised in 1994, is a preliminary inventory and assessment of the economic value of exclusively marine-based activities in Cobscook Bay and their dependence and effect upon the Bay's marine ecosystem. Five marine industries are identified as having major importance and are profiled in depth: salmonid aquaculture, scalloping, urchin harvesting, clamming, and shipping. Discussed in less detail are those marine activities identified as minor: lobster and crab fishing, periwinkle and marine worm harvest, seaweed harvest and culture, tourism, marine trades and education, waste disposal, and herring and groundfishing. Many references and citations, contact referrals, and suggestions for further study.

New England Agricultural Statistics Service. 1994. *New England Agricultural Statistics 1993*. New England Agricultural Statistics Service, Concord, NH.

A report of comprehensive agricultural statistics for New England, state by state. Includes key economic indicators and data related to crops, vegetables, fruit, syrup, floriculture, and livestock including aquaculture.

New England Fishery Management Council. 1995. *Draft Amendment #7 to the Northeast Multispecies Fishery Management Plan*, incorporating the Draft Supplemental Environmental Impact Statement (DSEIS). New England Fishery Management Council, Boston, MA.

Pages 104-105 describe the ports of Portland and Stonington in terms of their fisheries revenue, number of vessels operating from the port, and relative importance of groundfish. Portland's total fishing revenues in 1993 were $49.6 million. Of this total, cod, haddock and yellowtail flounder (groundfish species) accounted for $7 million. Portland ranked second among all Northeastern ports in both total revenue and cod/haddock/yellowtail flounder revenue. 143 vessels landed fish in

Portland in 1993. Stonington total fishing revenues in 1993 were listed at $3.6 million with 30 vessels permitted to Stonington in 1993.

Southwick Associates. 1995. *Economic Impacts of 1991 Marine Recreational and Commercial Striped Bass Harvests: Maine to North Carolina*. Atlantic States Marine Fisheries Commission, Washington, DC.

Study prepared for the Commission featuring estimates based on U.S. Fish and Wildlife Service National Survey and National Marine Fisheries Service survey. Includes direct, indirect and induced impacts by state. For striped bass fishing in Maine in 1993: retail sales were $3.3 million with a multiplier effect of $5.9 million. Salaries and wages, were nearly $2 million paid to 124 jobs.

Thurston, L., P. Larsen. 1994. *Gulf Of Maine State of the Environment Fact Sheet # 94-1*. Maine State Planning Office, Augusta, ME.

Overview of the status of pollution in the Gulf of Maine, likely and known sources of pollution, most prevalent contaminants, and levels and dangers of contamination. Describes current knowledge on levels of heavy metals, dioxins, PCB's and hydrocarbons and their biological, human health and economic effects in the Gulf of Maine.

Wilson, J. 1993. *Estimated Value of Maine's Fisheries*. University of Maine, Department of Resource Economics, Orono, ME.

A set of tables describing 1993 Maine landings of finfish and shellfish broken down into species, dollars total, pounds, and price per pound. Also includes tables on in-state multipliers and income, and in-state income of marine product processing sectors. The 1993 total estimated for harvest and processing income was $462 million resulting in some twenty-two thousand jobs. This paper provides an update of "An Input-Output Analysis of Maine's Fisheries" Marine Fisheries Review, 1982.

Real Estate Values

Brighton, D. *The Effects of Land Conservation and Development on Property Taxes in Maine Towns*. A report (forthcoming) for the Maine Coast Heritage Trust, Brunswick, ME.

This study analyzes the short and long-term property tax implications of conservation and development activities in Maine communities, particularly in four coastal towns where pressures on the property tax have created increased strains on local governments and taxpayers.

Brueckner, J. K. 1990. Growth Controls and Land Values in an Open City. *Land Economics* v66, n3: 237.

This paper demonstrates that growth controls in an amenity-based model may raise rather than lower the value of undeveloped land in some locations. It also shows how to construct a simple framework for the analysis of growth controls.

Carr, T. 1994. The Northern Forest Economy. Pages 52-70 in Klyza, C. M., S. C. Trombulak, editors. *The Future of the Northern Forest*. Middlebury College Press, Middlebury, VT.

Provides background on the economic factors relating to the controversy over the Northern Forest. Analysis focuses on sectors most relevant to land conversion: forest products, agriculture, tourism, development. It examines economic forces causing change and idenrifies key factors contributing to development. Includes charts and tables on area, demographics, social and economic indicators; economic output of forest products industry, employment and payroll in forest products, tourism, development, and second homes.

Cheney, J. 1993. Is Land Conservation Bad for the Tax Base? *Landlines* v5, n5: 6.

A brief discussion of several studies regarding the effects of conservation on property tax values. They conclude that the net revenue (tax contribution minus infrastructure demand) is highest for open space and farmland, largely because of their low demand on infrastructure services.

Colgan, C. S. 1990. *The Economic Value of Casco Bay*. A report for the Maine State Planning Office, Augusta, ME.

This report involves an integrated regional assessment of the values of goods and services derived from Casco Bay. The author discusses the context of the accounting which produces this broad-scale data with subsets of output sectors such as "coast-dependent activities," "coast-linked activities," and "coastal service activities." The report also considers real estate value of coastal property and emphasizes the importance and difficulty of measuring non-market values. Nearly thirteen thousand jobs and $520 million are derived from Casco Bay's cargo ports, fisheries, tourism and recreation, and marina services. Property value assessments in Casco Bay towns total $9.4 billion. Non-market values for parks on the Bay range from $774 ,000 to $6.5 million and for wetlands from $63 million to $319 million depending on valuation methods.

Feather, T. D., E. A. Petit, P. Ventikos. 1992. *Valuation of Lake Resources Through Hedonic Pricing*. Institute for Water Resources, National Technical Information Service, Springfield, VA. 117.

This report describes the application of so-called hedonic pricing techniques (used to value changes in environmental characteristics) to the evaluation of lake resources. Hedonic methods are developed to test three hypotheses: Land value of lakefront property is greater than non-lakefront property; lake characteristics (size and water quality) will affect land values; water resource-related impact on land value will diminish with distance from the water resource. Results confirmed all three hypotheses and illustrated the use of the hedonic technique for evaluating such environmental amenities as lake resources.

Fischel, W. A. 1990. Introduction: Four Maxims for Research on Land-Use Controls. *Land Economics* v66, n3: 229.

Introductory remarks for conference proceedings of the Committee on Taxation, Resources, and Economic Development (Lincoln Institute of Land Policy).

Frederic, P. 1992. Economic Development Versus Land Use Regulation. Pages 225-241 in Bowler, I. Bryant, C. and Nellis, M. editors. *Contemporary Rural Systems in Transitions*, Vol. II: Economy and Society. C-A-B International, London.

Examines the relationship between non-metro and metro economic trends relative to development incentives and land use regulation.

Frederic, P. B. 1991. Public Policy and Land Development—The Maine Land Use Regulation Commission. *Land Use Policy* v8, n1: 50-62.

Rapid growth in water-oriented and ski resort recreation development and its impact in northern and western Maine and Land Use Regulation Commission (LURC) response and handling of the emerging issues are reviewed by a University of Maine professor and LURC veteran. An analysis of policy trends and a suggested model for policy formulation are examined. Discusses how reactive policies and lack of long-range planning and policy have been detrimental to management of increasingly complex and intense issues.

Freedgood, J. 1993. *Is Farmland Protection a Community Investment? How to do a Cost of Community Services Study*. American Farm-

land Trust, Washington, D.C.

Handbook explains how to reorganize local financial data to reflect the demand for services by different land uses. In general, farmland contributes three times more in revenues than it consumes in services, while residential development costs more in services than it provides in revenues.

Harper, S. C., L. L. Faulk, E. W. Rankin. 1992. *The Northern Forest Lands Study of New England and New York*. Northern Forest Lands Council.

This report follows a 1988-1991 study by the congressionally appointed Northern Forest Lands Council. The report is organized into eight chapters and twelve appendices: Chapter 1 describes the significance of the forest as a biological, recreational, and timber resource. Chapter 2 describes patterns of ownership and use. Chapter 3 examines the changing economic forces affecting the land use in the forest and describes the trends in land use and development. Chapter 4 reviews the significant resources in the forest and Chapter 5 presents a criteria for assessing the resources and outlines a framework for mapping the important resources. Chapter 6 gives a demographic profile of the region. Chapter 7 presents twenty-eight strategies, in six categories for protecting important resources. Chapter 8 describes actions needed to implement changes.

Harrigan, D., K. Morse. 1989. The Cost of Growth. Pages 18-20 in Rosemary Infante, editor. *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This article proposes a model to determine if development in your town brings in as much as it costs. The model is based on simple arithmetical calculations of municipal costs and revenues for the average house, depending on the number of local school children living there.

Infante, R., editor. 1994. *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

A compilation of nine articles describing the economic benefits that land conservation provides for communities. The articles also examines the common assumption that development provides greater economic benefits than conservation. [Many of these articles are included separately in this bibliography.]

James, H. L. 1995. *A Hedonic Property Value Study of Water Quality in Maine Lakes*. University of Maine Graduate School, Orono, ME.

A Masters thesis based on a study of thirty-four Maine lakes in six separate market groups to determine if lake water clarity has a significant influence on property values in order to estimate the implicit price of water clarity. Also considers which measures of water clarity most closely reflect consumers' perception of clean water. Results show that one meter of water clarity increased value from $17 to $66 per frontage foot, depending on the market group.

Land Use Regulation Commission. 1990. *Amendment of the Comprehensive Land Use Plan*. Maine Department of Conservation, Augusta, ME.

Amendments to the comprehensive Land Use Regulation Commission plans for managing the development and conservation of Maine's lakes in unorganized areas.

Maine Coast Heritage Trust. 1991. *The Positive Economics of Conservation:* Technical Bulletin No. 112. Maine Coast Heritage Trust, Brunswick.

As a response to municipal concern that protected land may not generate sufficient revenue for the town budget, Maine Coast Heritage Trust has reviewed numerous recent development impact studies, as well as interviewed many town and state officials. This

bulletin presents a summary of that research and concludes that undeveloped or minimally developed (e.g. agricultural) land may save public money. Includes a thirty-five title bibliography.

MaineWatch Institute. 1992. *Green Development—Balancing Development with Conservation: Nine Case Studies of Rural Subdivisions*. MaineWatch Institute, Hallowell, ME.

This report shows, by example, how attractive and profitable residential subdivision can be achieved in rural areas while helping to conserve open space in the community. It explores principles of such development and discussed the economic value of open space planning. It examines case studies of efforts to balance aesthetic, social, environmental, and financial considerations of project developments.

Marx, S. S. 1992. *Preserving Open Space: A Guide for New England*. Taubman Center for State and Local Government, Harvard University, Boston (also National Park Service, Washington, D.C.). 60 pages.

This is a guidebook for citizens and planning officials in New England who want to protect open space in their communities. It has three main sections: a series of brief profiles of important state land use laws and programs; an inventory and comparison of open space preservation techniques and strategies; and four case studies illustrating how available tools and strategies can successfully be used.

Miller, S. 1992. The Economic Benefits of Open Space. In Rosemary Infante, editor, *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This study reviews literature and techniques that inquire into the valuation of natural resource preservation and open space benefits. The report provides a means of accounting for open space economies (the net municipal tax impact as well as other measurable open space economic values) and describes results pointing to significant values. Two major sections describe tax implications of open space and the cost-benefit analysis of open space. Major findings regarding the economic benefits of open space are that open space produces a tax revenue surplus that subsidizes other land use; and that open space contributes public environmental benefits of substantial, measurable value that more than compensate for referential tax costs.

Miller, S. 1995. Values of Open Space. In Leonard Hamilton, editor, *Benefits of Open Space*. Great Swamp Watershed Association, Meyersville, NJ.

This essay considers the valuation of natural capital. Examples of valuation techniques are described including de Groot's matrix which organizes relevant information, qualitative and quantitative, on the ecological functions of the area under discussion. A general discussion with examples which describe costs of development, principles of cost-benefit analysis, enhancement value, option value, market and surrogate-market price valuation methods, travel cost approach, sportsman, and "green" tourism expenditures.

Mills, D. E. 1990. Zoning Rights and Land Development Timing. *Land Economics* v66, n3: 283.

This study examines the hypothesis that given the extent local governments can estimate the collective loss or gain caused by land-use changes, land market performance could improve if zoning could be bought and sold. The main claim of this paper is that none of the property rights regimes it examines are uniformly superior in terms of land market performance. Under some conditions of technology and demand, the land market performs better when the community holds property rights to the most intensive land uses.

Nantucket Land Council Inc. 1989. Balancing Today's Development and Tomorrow's Taxes. In Rosemary Infante, editor. *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This chapter summarizes a study commissioned in 1989 by the Nantucket Land Council. The original study, entitled "The Fiscal and Economic Impacts of Growth on the Island of Nantucket" compares the economic and fiscal outcomes of future growth scenarios, focusing on three alternatives: high, moderate, and low growth. The report concludes that orderly, slow growth is the most beneficial scenario for Nantucket's taxpayers. Continuation of the construction boom of the 1980s is seen as threatening the island's economy.

Perrin, S. 1994. *White Paper: Conservation Easements and Property Valuation on Mount Desert Island 1970-1993*. Acadia National Park, Bar Harbor, ME.

Study of the effect of conservation easements upon local tax revenues on Mt. Desert Island, Acadia National Park. Paper concludes that conservation easements have little impact on tax levy.

Pollakowski, H. O., S. M. Wachter. 1990. The Effects of Land-Use Constraints on Housing Prices. *Land Economics* v66, n3: 315.

This paper estimates the direct and spill-over effects of zoning control and other growth restrictions on housing prices. It concludes that the aggregate effect of various constraints is greater than that of individual regulations and that they generally raise the price of housing and developed land.

Preston, C., S. Phillips. 1995. *Economic Profiles of the Northern Forest*. The Wilderness Society, Washington, D.C.

An economic profile of the rural economies in the Northern Forest region from New York's Adirondacks to Maine's North Woods. The profiles present information about the region's entire economy over a twenty-five year period to allow comparisons across sectors and industries, and makes state-wide, multi-county, and multi-state spatial comparisons of data.

Rowland, D. M. 1994. *The Damariscotta River Estuary: What is it Worth? An Analysis of Property Values*. Damariscotta River Estuary Project, Damariscotta, ME.

Preliminary study by Williams College student. Summary concludes that the waterfront premium for properties is over $73,000 for upper river and over $128,000 on lower river plus $48 per foot of actual frontage. This generates $8.5 - $9.5 million annually in benefits to residents living on or adjacent to the river.

Smith, V. 1991. Protecting Rivers, Trails, and Greenways Reap Economic Returns. In Rosemary Infante, editor, *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This two-page article is reprinted from a 1991 edition of the quarterly journal, *Exchange*, in which the author briefly outlines several examples of U.S. communities that have realized economic benefits by developing and maintaining municipal trails or greenways. Cites rising property values, recreation and tourism revenues, increased economic activity, reduced public spending, hazard mitigation and pollution control, and enhanced quality of life as quantifiable benefits derived from open spaces.

Thomas, H. L. 1991. The Economic Benefits of Land Conservation. In Rosemary Infante, editor. *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

This four-page article is reprinted from a memo from the Duchess County (N.Y.) Planning Department. The article cites several studies of U.S. municipalities that compare the fiscal impacts of development to those of

open space protection; the cited studies conclude that open space preservation has a more positive impact on community economy than most conventional suburban-style development, even when property is preserved through public moneys.

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Economic Valuation

Adler, R. W., J. C. Landman, D. M. Cameron. 1993. The Economics of Clean Water. Pages 87-115 in Adler, Robert W., Jessica C. Landman and Diane M. Cameron, editors. *The Clean Water Act: 20 Years Later*. Island Press, CA.

Case studies, surveys, and reports on the economic impacts of marine and fresh water pollution; potential revenue of pollution prevention; and models to measure non-market values of clean water and conserved habitat. Cites several EPA, state, and university studies.

Aschauer, D. A. 1993. Infrastructure and Sustainable Development. Pages 147-180 in Richard Barringer, editor. *Toward a Sustainable Maine*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

This article provides principles for developing a calculus involving sustainable growth and infrastructure investment.

Boyle, K. J., J. C. Bergstrom, S. J. Reiling. 1994. *Qualitative and Economic Evaluations of White-water Boating on the Dead River*. Central Maine Power Company, Augusta.

This Federal Energy Regulation Commission (FERC) study for the Central Maine Power Flagstaff Project focuses on the desirability of various release rates on the Dead River for white water boaters to determine the economic impact of water releases from Long Falls Dam in The Forks.

Boyle, K. J., S. D. Reiling, M. Phillips. 1990. Species Substitution and Question Sequencing in Contingent Valuation Surveys Evaluating the Hunting of Several Types of Wildlife. *Leisure Sciences* 12: 103-118.

A paper discussing contingent valuation and the willingness to pay for hunted species.

Boyle, K. J., S. D. Reiling, M. Teisl. 1992. *Qualitative and Economic Evaluations of Atlantic Salmon Fishing on the Penobscot River*. Agricultural Experiment Station report ARE 436. University of Maine, Orono, ME.

This paper examines the status of Atlantic salmon fishing on the Penobscot River during 1989. Angler surveys were used to determine participation, preferences, and opinions regarding management policies. In particular, the surplus value was gauged regarding a proposed five-year moratorium on salmon fishing and increased stocking. Marginal surplus values suggest that anglers' interests in fishing for salmon are greater than their interests in having Penobscot River salmon populations restored to naturally regenerating levels.

Boyle, K. J., S. D. Reiling, M. Teisl, M. L. Phillips. 1991. How Valuable—Fishing for Angler Facts. *Maine Fish and Wildlife* v33, n2: 2-7.

The second of a five-part series on the economic value of recreational uses of Maine's game and non-game species. Details the responses of resident and non-resident anglers for open-water and ice fishing. Valuation methods are explained and aggregate values are highlighted. Fishing environment characteristics (remoteness, access, scenery, etc.) rate as high or higher than importance of actual catch.

Boyle, K. J., V. A. Trefts, P. S. Hesketh. 1990. *Economic Values for and Uses of Maine's Inland Fish and Wildlife Resources*. Maine Agricultural Experiment Station Miscellaneous Publication 698. University of Maine, Orono, ME.

Report includes eight tables and eleven graphs describing the use of Maine's inland fish and wildlife resources including data on expenditures and valuation results by categories of anglers, hunters, and non-consumptive use.

Brabec, E. 1992. *On the Value of Open Spaces*. Scenic America Technical Information Series, v1 n2, Washington, D.C.

This eight-page bulletin cites a body of evidence that land and resource conservation are both economically and socially beneficial to the community, that sprawling residential development consumes more from the municipal taxbase than it returns, and that proximity to open space increases property value. Citing several case studies, the bulletin discusses fiscal impact analysis, economic value of open space, economics of cluster zoning, and economics of open space regulation such as purchase or transfer of development rights. Includes bibliography. [This bulletin is included in a Land Trust Alliance booklet *Economic Benefits of Land Protection*, edited by R. Infante cited in this bibliography under Real Estate Values.]

Carter, L. L. 1991. *A Contingent Valuation of Open Space on Merrymeeting Bay in Dresden, Maine*. Bowdoin College, Brunswick, ME.

A research report prepared as a Bowdoin College senior thesis which discusses the economic theory behind contingent valuation in the context of a survey testing a "willingness to pay" (through increased taxes) for maintaining undeveloped, open land on Merrymeeting Bay. The survey used as examples a fifty-acre parcel and a ten-acre parcel of open land. For the fifty-acre open land area, eighteen percent of residents surveyed would pay at least $30 more in annual taxes, twenty-four percent at least $10 more, thirteen percent at least $5 more, and forty-five percent less than $5 more in annual taxes.

Colgan, C. S. 1990. *The Economic Value of Casco Bay*. A report for the Maine State Planning Office, Augusta, ME.

This report involves an integrated regional assessment of the values of goods and services derived from Casco Bay. The author discusses the context of the accounting which produces this broad scale data with subsets of output sectors such as "coast-dependent activities," "coast-linked activities," and "coastal service activities." The report also considers real estate value of coastal property and emphasizes the importance and difficulty of measuring non-market values. Nearly thirteen thousand jobs and $520 million are derived from Casco Bay's cargo ports, fisheries, tourism and recreation, and marina services. Property value assessments in Casco Bay towns total $9.4 billion. Non-market values for parks on the Bay range from $774 ,000 to $6.5 million and for wetlands from $63 million to $319 million depending on valuation methods.

Dixon, J. A., P. B. Sherman. 1990. *Economics of Protected Areas. A New Look at Benefits and Costs*. Island Press, CA. 234 +xvii.

Methodologies and foreign case studies for determining the cost-benefit relation and valuation of protected areas.

Dolan, K., P. Field. 1995. *Fishing For Values* . Volumes 1 and 2 and Appendices. National Wildlife Federation, Montpelier, VT.

A primer for river protection through the use of contingent valuation as an economic tool for conserving anadromous fisheries. Describes economic valuation, development issues, biases of the contingent valuation method, and contains case histories.

Dolcino, C. and S. O. Andersen. 1986. *River Valuation Bibliography —A Practitioners Guide to River Valuation Literature*. River Network, Portland, OR.

This bibliography, including over 100 references, was first compiled in 1986, but the preface states that it will be periodically updated. Two tables annotate the bibliography, describe the important methods of river valuation, and indexes the result of the studies included.

Feather, T. D., E. A. Petit, P. Ventikos. 1992. *Valuation of Lake Resources Through Hedonic Pricing*. Institute for Water Resources, National Technical Information Service, Springfield, VA.

This report describes the application of the hedonic pricing (used to value changes in environmental characteristics) techniques to the evaluation of lake resources. Hedonic methods are developed to test three hypotheses: Land value of lakefront property is greater than non-lakefront property; lake characteristics (size and water quality) will affect land values; and water resource-related impact on land value will diminish with distance from the water resource. Results confirmed all three hypotheses and illustrated the use of the hedonic technique for evaluating such environmental amenities as lake resources.

Freeman III, A. M. 1993. *The Economics of Valuing Marine Recreation: A Review of the Empirical Evidence*. EPA Office of Policy Planning and Evaluation, Bowdoin College Economics Working Paper 93-102, Brunswick.

This report addresses the question: Does available economics literature provide a basis for estimating the benefits to marine recreation which can be attributed to water pollution control programs of federal, state, and local agencies? The paper reviews the values of recreation and the transferability of value measures. The appendix includes summary descriptions of forty-two marine recreation studies referenced in the report. The conclusion states that the evidence suggests consumer surplus values per trip of $10-$100 and that value of access to fisheries annually could range from $100-$1,000 per person. With 10 million marine recreational fishing participants nationally this represents a total surplus value of $1-$10 billion per year.

Freeman III, A. M. 1993. *The Measurement of Environmental and Resource Values*. Resources for the Future, Washington, D.C.

Theories and models to evaluate environmental market and non-market resource values.

Freeman III, A. M. 1994. The Economic Valuation of Coastal Resources Supporting Recreation. Pages 87-103 in Charles Colgan, editor. *Sustaining Coastal Resources: Economics and the Natural Sciences*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

Comparative review of major non-market resource valuation methods (travel cost, willingness to pay, random utility, and contingent valuation) and a brief review of some studies that use them. Includes an example calculation of the relative value of Georgetown's Reid State Park as development property and recreation asset, with references to data of other studies related to coastal recreation. The informal calculation suggests that the park has a value of $4-$8 million for private development but with 135 thousand visitor days/year Reid State Park has an annual consumer surplus value as a park (or recreational asset) of $68-240 million. This is based on a consumer surplus value (economists call gains in people's welfare above and beyond out of pocket expenditures "consumer surplus") of $25-$90 per user-day.

Freeman III, A. M. 1995. *The Economic Benefits of Removing Edwards Dam*. Report prepared for the Natural Resources Council of Maine, Augusta, ME.

This report, part of a testimonial submitted by the Natural Resources Council of Maine at a Federal Energy Regulation Commission (FERC) hearing, briefly outlines how the benefit-cost framework can be used to analyze the question of whether to remove Edwards Dam to provide enhanced resource values in the Kennebec River Basin. An estimate of $36-$48 million in benefits from a previous study (by Boyle, Teisl, and Reiling 1991) is challenged as under-representing the potential value of dam removal.

James, H. L. 1995. *A Hedonic Property Value Study of Water Quality in Maine Lakes*. University of Maine Graduate School, Orono.

A Masters thesis based on a study of 34 Maine lakes in six separate market groups to determine if lake water clarity has a significant influence on property values in order to estimate the implicit price of water clarity. Also considers which measures of water clarity most closely reflect consumers' perception of clean water. Results show that one meter of water clarity increased value from $17 to $66 per frontage foot, depending on the market group.

Kopp, R. J., K. V. Smith. 1993. Valuing Natural Assets. In Raymond Kopp and V. Kerry Smith, editors, *Valuing Natural Assets: Economics of Natural Resource Damage Assessment*. Resources for the Future, Washington, D.C.

Recommends valuation models and practices for the economic evaluation of damage to the environment. Reviews related laws and statutes.

Mac Donald, H. F, K. J. Boyle, A. G. Clark, A. E. Hutchinson, J. E. Anderson. 1994. *Highlights from the 1991 Survey of Maine Resident's Opinion Regarding Bald Eagle Restoration in Maine*. University of Maine, Department of Resource Economics and Policy, REP 458, Orono, ME.

A survey to research respondents' knowledge and observation of bald eagles and respondents views on eagle protection in Maine, increasing the eagle population, the economic benefits of increasing eagle numbers, and the value of eagles. Contains data on the demographics of respondents.

Miller, S. 1992. The Economic Benefits of Open Space. In Rosemary Infante, editor, *Economic Benefits of Land Protection*. The Land Trust Alliance, Washington, D.C.

The purpose of this study is to review literature and techniques that inquire into the valuation of natural resource preservation and open space benefits. The report provides a means of accounting for open space economies (the net municipal tax impact as well as other measurable open space economic values) and describes results pointing to significant values. Two major sections describe tax implications of open space and the cost-benefit analysis of open space. Major findings regarding the economic benefits of open space are: open space produces a tax revenue surplus that subsidizes other land use; open space contributes public environmental benefits of substantial, measurable value that more than compensate for referential tax costs.

Miller, S. 1995. Values of Open Space. In Leonard Hamilton, editor, *Benefits of Open Space*. Great Swamp Watershed Association, Meyersville, N.J.

This essay considers the valuation of natural capital. Examples of valuation techniques are described including de Groot's matrix which organizes relevant information, qualitative and quantitative, on the ecological functions of the area under discussion. A general discussion with examples which describe costs of development, principles of cost-benefit analysis, enhancement value, option value, market and surrogate-market price valuation methods, travel cost approach, sportsman, and "green" tourism expenditures.

Mitchell, R. C., R. T. Carson. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Resources for the Future, Washington, DC.

Describes the process of creating and carrying out public and user survey to assist in the development of values for public goods such as clean air and water.

Morey, E. R., R. D. Rowe, M. Watson. 1993. A Repeated Nested-Logit Model of Atlantic Salmon Fishing. *American Journal of Agricultural Economics* 75, August: 578-592.

A study of recreational salmon fishing on the Penobscot River to test economic models. Participation and site choice for Atlantic salmon fishing are modeled in the context of a repeated three-level nested-logit model. Consumer surplus measures are derived for varying availability of target species. For comparison, six other travel-cost models are estimated. Value of maintaining the fishery in 1988 is estimated at $1.2 million/year or $810/angler/year (1,500 salmon anglers). The authors state that the cost of maintaining the Atlantic Salmon fishery may cost over $1 million/year making the cost close to or exceeding surplus values.

National Park Service Office of Social Science. 1995. *The Money Generation Model 1995-1996*. United States National Park Service, Washington, D.C.

This step-by-step manual explains the principles and use of the Money-Generation Model (MGM). The MGM provides a way to estimate economic benefits of parks on gateway communities and adjacent areas. The model provides a calculation of the economic benefits to the local area resulting from: expenditures by non-local tourists, park-related federal government expenditures (e.g., payroll, supplies, services, and construction), park-related expenditures by other non-local parties (e.g. state expenditures on infrastructure, concessions, etc.). In applying the MGM, the economic benefits of sales, tax revenues, and jobs are considered.

Power, T. M. 1995. *Economic Well-Being and Environmental Protection in the Pacific Northwest*. University of Montana, Missoula, MT.

Subtitled "A Consensus Report by Pacific Northwest Economists," this is the summary report based on transcripts of a two-day meeting of thirty-four economists from the five-state Pacific northwest about the issues and opportunities facing the region's economy and environment. The report underscores the region's economic growth of at least twice the national average, despite dramatic transition away from traditional natural resource extraction and aerospace industries. The economists describe the regional economy as "successfully navigating from being dependent on a few extractive industries to having a modern, widely diversified economy . . . As quality of life becomes more important to the region's economy and natural-resource extraction becomes less important, a shift is taking place in the economic role that natural resources play." The contributing economists assert that the region's population and economic growth has been very strong from 1988-1994. Despite the loss of 25,000 timber jobs and 12,000 aerospace jobs, the number of jobs in the region increased by 940,000, or eighteen percent with an average real income increase of nine percent. The region's natural amenity-based quality of life is cited as a major contributor to the growth and diversification of new economic investment and vitality in the region. "The region is perceived as providing a superior, attractive environment in which to live, work, and do business . . . The natural environment appears to be especially important."

Rivers, Trails and Conservation Assistance. 1992. *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors*. United States National Park Service, Washington, D.C.

The Rivers, Trails, and Conservation Assistance Program of the National Park Service

has produced this resource book to help local planners, park and recreation administrators, activists, and non-profit groups understand and communicate the potential economic impacts of their proposed or existing rivers, trails, and greenways corridors projects. The aim of the book is to encourage the use of economic concepts as part of their effort to protect and promote greenways; provide examples of how greenways have provided economic benefits to communities; demonstrate how to determine the potential economic impacts; suggest other resources. Topic sections include: natural resource valuation; real property values; expenditures by residents; commercial uses; tourism; estimating effects of spending and agency expenditures; corporate relocation and retention; public costs reduction; benefit estimation.

Stevens, T. 1990. The Economic Value of Bald Eagles, Wild Turkeys, Atlantic Salmon, and Coyotes in New England. *Resources and Environment: Management Choices*. November Report, University of Massachusetts, Department of Resource Economics, Amherst, MA.

Choosing species that are beneficiaries of recovery efforts (or, in the case of coyotes, recovery interest), this brief three-page article extends traditional economic analysis to estimate the value of eagles, turkeys, salmon, and coyotes and considers policy implications. To maintain different species populations, varying percentages of survey respondents expressed a willingness to pay an annual average of: $19.38 for bald eagles; $11.86 for wild turkeys; $7.93 for Atlantic salmon. Coyotes were more controversial: twenty-three percent would pay $5.35 to protect them while nineteen percent would pay $4.20 to control them. Many respondents refused to put dollar figures on species; other opinion-based data is included.

Stoll, J., J. Bergstrom, J. Titre. 1989. Regional Valuation Models for Wetland Recreation Benefits. Pages 365-406 in Boyle, K., T. Heekin, editors. *Benefits and Costs in Natural Resource Planning*. Western Regional Research Publication W-133. University of Maine, Department of Agricultural and Resource Economics, Orono, ME.

Provides a selection of economic models to assist in placing dollar values on the benefits provided by wetlands for a variety of recreational activities.

Tietenberg, T. 1992. *Environmental and Natural Resource Economics*, 3rd edition. Harper Collins, New York.

Principles, economic models, and case studies on environmental policy, natural resources, valuation, sustainability, property rights, pollution, welfare economics, and cost-benefit analysis of renewable and non-renewable resources.

Waddington, D. G., K. J. Boyle, J. Cooper. 1994. *1991 Net Economic Values for Bass and Trout Fishing, Deer Hunting, and Wildlife Watching*. Addendum to 1991 Survey of Fishing, Hunting, and Wildlife-Associated Recreation. United States Fish and Wildlife Service, Washington, D.C.

This report is an addendum to the 1991 National Survey of Fishing, Hunting, and Wildlife-associated Recreation by the United States Fish and Wildlife Service. It includes state-by state estimates of the net economic value of bass and trout fishing, deer hunting, and primary non-residential wildlife watching based on contingent valuation questions from the 1991 survey. The net economic values reported here are appropriate measures of economic value for use in cost-benefit analyses, damage assessment, and project evaluations. Example: "In 1991, more than 35 million Americans (over sixteen years of age) spent $12 billion on fishing trip-related expenses."

Whitelaw, E. 1990. Oregon's turn. A blueprint for economic growth in the 1990's. *Old Oregon* Spring: 22-24.

A discussion of how Oregon's economic potential is passed over by regional markets. Considers the concept of the "second paycheck" or how quality of life issues translate to real economic benefit and attractiveness to a quality labor force.

Whitelaw, W. E., E. G. Niemi. 1989. Money: The Greening of the Economy. *Old Oregon* v68, n3:26-27.

Analysis providing valuation of clean air, water, and healthy ecosystem and describes the competitive advantage these values offer to Oregon's economy.

Environmental Regulation

This section provides an outline of literature on the economic impact of environmental regulation. The references listed do not represent an exhaustive review of the subject. They are recent and key studies describing both the economic benefits and the adverse economic effects of environmental regulation.

Three themes are common to most of these references: the benefits of environmental and natural resource protection are not well measured in economic studies or national income accounts; some firms can improve productivity through regulatory compliance; and regulation can benefit the economy as a whole. Although the benefits are clearly described, much of this literature also cautions that there is great room for improvement in the development and implementation of environmental regulations. The problem with regulation is often not its strictness, but the way the standards are written and the inefficiency with which regulations are administered. Michael Porter and Claas van der Linde, in their Sept./Oct. 1995 *Harvard Business Review* article, state "Strict [environmental regulation] standards can and should promote resource productivity." Comparing U.S. and Scandinavian regulations imposed on the pulp and paper industry, Porter and Linde suggest that "bad regulation is damaging to competitiveness, but the right kind of regulation can enhance it."

It is this area, environmental regulation, which spurs the jobs vs. the environment debate. The prevailing view seems to be that there is an inherent and fixed trade-off: progress on environmental quality versus the economy. The literature listed in this section suggests that this conflict, if it exists at all, is the result of insufficient information about the costs and particularly the benefits of environmental protection.

Bezdek, R. H. 1993. Environmental Protection and Economy: What's the Bottom Line. *Environment* v7, n7: 7-32.

Information on the "environmental protection economy" including tables detailing job creation, jobs and sales, U.S. environmental protection expenditures, ranking of states benefiting from environmental protection spending, projected jobs and expenditures for environmental protection from 1992-2005. Maine is listed as gaining some sixteen thousand jobs in 1992 and $700 million in sales created by environmental expenditures.

Bogen, D., R. Walsh. 1993. *Water Pollution Control in Maine: Getting the Job Done Without Bankrupting Our Communities*. Clean Water Fund/Clean Water Action, Portsmouth, NH.

Report cites findings of Maine Department of Environmental Protection and recommends methods for controlling water pollution through alternative wastewater treatment systems and funds raised by a "polluter pays" policy.

Cannon, F. 1993. Economic Growth and the Environment. *Economic and Business Outlook*. June. Bank of America.

Report examines impact of environmental regulations on the economy, particularly how market-based incentives in addition to regulations can be used to achieve economic strength and environmental improvement. Considers the relationship between the economy and the environment, the high costs of misapplied environmental laws, and free-market environmentalism. Table 2 shows Maine ranked fifteenth ("strong") in environmental standards, and twelfth in economic growth (rate of 3.13%).

Chadwick, D. H. 1995. Dead or Alive—The Endangered Species Act. *National Geographic* March: 6-41.

A look at the Endangered Species Act, its accomplishments, its costs, and its chances for survival when it comes up for its sixth reauthorization in 1995.

Colgan, C. S., editor. 1994. *Sustaining Coastal Resources—Economics and Natural Sciences*. Edmund S. Muskie Institute of Public Affairs, University of Southern Maine, Portland, ME.

In a search to help formulate comprehensive environmental policies, a group of economists, scientists, and environmental policy professionals came together at a University of Maine conference in 1994 to explore how economists and scientists perceive and measure the value of coastal ecosystems and provide that information to decision-makers. The papers in this volume were presented at the workshop and represent a summary of the state of the art, while also providing frank discussions of the limitations of current approaches and innovative thinking about the future of "integrated ecosystem management." [Many of the papers are referenced individually in this bibliography.]

Congressional Budget Office. 1985. *Environmental Regulation and Economic Efficiency*. Congress of the United States—Congressional Budget Office, Washington, D.C.

A report reviewing macroeconomic models and assessing the costs of environmental regulation. Four countries—Germany , Canada, Japan, and the U.S.—are examined. The assessment determines that "environmental regulation has not been a significant source of productivity loss for the private sector" and "moreover, the economic losses attributable to environmental regulation, in terms of both measured output and productivity, appear to have declined over time." The report claims that U.S. economic performance has not been reduced relative to other nations because of environmental regulations.

Cropper, M. L., W. E. Oates. 1992. Environmental Economics: A Survey. *Journal of Economic Literature* v30, June: 678-697.

Review of economic literature finds that domestic environmental policies do not appear to have significant effects on patterns of international trade.

Frederic, P. B. 1991. Public Policy and Land Development: The Maine Land Use Regulation Commission. *Land Use Policy* v8, n1:50-62.

Rapid growth in water-oriented and ski resort recreation development and its impact in

northern and western Maine and Land Use Regulation Commission (LURC) response and handling of the emerging issues are reviewed by a University of Maine professor and LURC veteran. An analysis of policy trends and a suggested model for policy formulation are examined. Discusses how reactive policies and lack of long-range planning and policy have been detrimental to management of increasingly complex and intense issues.

Freeman III, A. M. 1987. *The Benefits of Environmental Improvement: Evidence from The United States*. Prepared for the Taiwan 2000 Project, (available in the Bowdoin College Library).

This paper describes the types of benefits that can result from environmental protection and describes methods to measure these benefits. Reviews information on the economic benefits and costs of U.S. pollution control programs. The author discusses the impact of environmental protection on GNP, inflation, unemployment and productivity, and the importance of avoiding excessive environmental costs through the development of cost effective-regulation.

Freeman III, A. M. 1992. An economic perspective on environmental regulation. *Maine Policy Review* June: 31-34.

An article promoting economic analyses that considers the economic benefits of environmental regulation as well as the costs.

Freeman III, A. M. 1993. *The Economics of Valuing Marine Recreation: A Review of the Empirical Evidence*. EPA Office of Policy Planning and Evaluation, Bowdoin College Economics Working Paper 93-102, Brunswick, ME.

This report addresses the question: Does available economics literature provide a basis for estimating the benefits to marine recreation which can be attributed to water pollution control programs of federal, state, and local agencies? The paper reviews the values of recreation and the transferability of value measures. The appendix includes summary descriptions of forty-two marine recreation studies referenced in the report. The conclusion states that the evidence suggests consumer surplus values per trip of $10-$100 and that value of access to fisheries annually could range from $100-$1,000 per person. With 10 million marine recreational fishing participants nationally this represents a total surplus value of $1-$10 billion per year.

Governor's Business Advisory Council. 1985, November. *State Regulations Affecting Maine's Businesses*. The Maine Development Foundation, Augusta, ME.

Results of a special problem-solving workshop for business leaders, legislators, regulators and others sponsored by the Governor's Business Advisory Council. From consensus on priority problems in regulatory procedure, general solutions and action plans were recommended, each with discussion on three key aspects: alternative approaches to rule-making, enhancing decision-making, and accountability.

Hall, B. 1994. *Green and Gold*. Institute for Southern Studies, Durham, NC.

Study shows that states with the best environmental records also offer the best job opportunities and climate for long-term economic development. Twenty economic indicators are compared with twenty environmental measures state by state. Maine ranks third on "Green" ranking and thirty-first on the "Gold" ranking (New Hampshire is second and sixth; Vermont is first and third).

Hanke, S., S. Walters. 1994. *Social Regulation: A Report Card*. The National Chamber Foundation, Washington, D.C.

This study covers working conditions, consumer safety and environmental regulation.

The authors state that the EPA has spent too much money relative to the gains achieved in environmental quality. In addition environmental programs are criticized for enforcement asymmetries: different requirements for different plants confer cost advantages on some firms while handicapping others. "EPA regulations, for example, are often used to protect large, unionized firms in the Northeast from the smaller, non-unionized employers in the South and West."

Jorgenson, D. W., P. J. Wilcoxen. 1985. *Environmental Regulation and Economic Growth*. Harvard Institute of Economic Research, Discussion Paper Series, Boston, MA.

The rate of U.S. economic growth fell sharply in the 1970s and has remained low through the 1980s. One factor often held responsible is the increase in environmental regulation. This paper analyzes the economic impact of pollution controls by simulating the growth of U.S. economy with and without regulation. For this purpose, the researchers construct a detailed model of the economy that includes the determinants of long-term growth. They find that environmental regulation has been an important contributor to the slowdown. They also find that pollution abatement has emerged as a major claimant on the resources of the U.S. economy. The cost of emission controls is more than ten percent of total cost of government goods and services.

Kentucky Natural Resources and Environmental Protection Council. 1993. *From Rio to the Capitols: State Strategies for Sustainable Development*. Kentucky Department of Natural Resources, Louisville, KY.

A 282-page report of the May, 1993 conference "State Strategies for Sustainable Development," includes transcripts of speeches by vice-president Al Gore, EPA director Carol Browning, writer Wendell Berry, and ten other notable speakers. Topic panels describe case studies on agriculture, forestry, water management, the role of negotiation, redevelopment, incentives vs. regulation, and twenty-four other topics related to sustainable economic development. Examples of state-level strategies are emphasized.

Meyer, S. M. 1992, October. *Environmentalism and Economic Prosperity: Testing the Environmental Impact Hypothesis*. Massachusetts Institute of Technology, Cambridge, MA.

Massachusetts Institute of Technology study compares key economic indicators to key environmental indicators and demonstrates that environmental regulations do not have a negative impact on economic prosperity and may possibly have a positive impact on prosperity.

Nicolaison, J., P. Hoeller. 1990. *Economics and the Environment: A Survey of Issues and Policy Options*. Organization for Economic Coordination and Development (OECD), Washington, D.C.

The paper addresses how economic considerations should be given due weight in environmental policy making and how environmental considerations could be better integrated into economic policy decisions.

Office of Technology Assessment. 1994. *Industry, Technology, and the Environment: Competitive Challenges and Business Opportunities*. Office of Technology Assessment, OTA-ITE-586, Washington, D.C.

A comprehensive review and reference work on issues related to industry, technology, and the environment. Most relevant to this bibliography is "Appendix A, Effects of Environmental Regulations on Economic Growth; A Review of Research." This appendix states that the economic and social impact of environmental regulation is based on whether the benefits outweigh the costs but that "few studies have included the benefits, primarily be-

cause while estimates of compliance costs are readily available, estimates of benefits are not." "It remains unclear whether environmental regulations impose more costs than benefits, and until that question is answered, it is not possible to accurately measure the impacts of regulations on productivity or GDP [gross domestic product]".

Power, T. M. 1995. *Economic Well-Being and Environmental Protection in the Pacific Northwest*. University of Montana, Missoula, MT.

Subtitled "A Consensus Report by Pacific Northwest Economists," this is the summary report based on transcripts of a two-day meeting of thirty-four economists from the five-state Pacific northwest about the issues and opportunities facing the region's economy and environment. The report underscores the region's economic growth of at least twice the national average, despite dramatic transition away from traditional natural resource extraction and aerospace industries. The economists describe the regional economy as "successfully navigating from being dependent on a few extractive industries to having a modern, widely diversified economy . . . As quality of life becomes more important to the region's economy and natural-resource extraction becomes less important, a shift is taking place in the economic role that natural resources play." The contributing economists assert that the region's population and economic growth has been very strong from 1988-1994. Despite the loss of 25,000 timber jobs and 12,000 aerospace jobs, the number of jobs in the region increased by 940,000, or eighteen percent with an average real income increase of nine percent. The region's natural amenity-based quality of life is cited as a major contributor to the growth and diversification of new economic investment and vitality in the region. "The region is perceived as providing a superior, attractive environment in which to live, work, and do business . . . The natural environment appears to be especially important."

Porter, M. E., C. van der Linde. 1995. Green and Competetive: Ending the Stalemate. *Harvard Business Review* September-October: 120-134.

This article refutes the premise that environmental regulation inevitably erodes competition. Using examples from a variety of businesses, the authors' research finds that innovation to meet the requirements of regulations can result in better use of inputs, the creation of better products, or improving product yields. Their research on competitiveness highlights the role that outside pressure plays in motivating companies to innovate. Examples are provided on how bad regulation is damaging to competitiveness, while the right kind of regulation can enhance it. The authors see the current jobs-versus-the-environment debate simply as an economically destructive struggle over redistribution which is the norm in many areas of public policy. They state, "[s]uccessful environmentalists, regulatory agencies, and companies will reject old tradeoffs and build on the underlying economic logic that links the environment, resource productivity, innovation, and competitiveness."

Porter, M. E. 1991. Green Competitiveness. *Scientific American* April: 138.

Essay makes the case that pollution prevention leads to technological innovation, improved efficiency and increased competitiveness. "The conflict between environmental protection and economic competitiveness is a false dichotomy based on a narrow view of the sources of prosperity and a static view of competitiveness."

Repetto, R. 1995. *Jobs, Competitiveness, and Environmental Regulation: What Are the Real Issues*. World Resources Institute, Washington, D.C.

Discusses the economic impacts of environmental regulation and protection in terms of

employment, international and domestic competition, profitability, and market performance. States that the core issue is not "job versus the environment," but what we want our economy to produce and whether environmental spending reduces competitiveness if the benefits derived are included in the equation.

Schmidheiny, S. 1992. *Changing Course: A Global Business Perspective on Development and the Environment*. MIT Press, Cambridge, MA.

A book written for and by the Business Council on Sustainable Development, a group of 50 major international business leaders, and covering a broad range of issues. Chapter headings include: The Business of Sustainable Development, Pricing the Environment, Markets, Costs and Instruments, Energy and the Marketplace, Capital Markets, Financing Sustainable Development, Trade and Sustainable Development, Managing Corporate Change, The Innovation Process, Technology Cooperation, Sustainable Management of Renewable Resources.

Templet, P. H., S. Farber. 1991. *The Complementarity Between Environmental and Economic Risk: An Empirical Analysis*. Louisiana State University, Baton Rouge.

The complementary relationship of economic and environmental risks is empirically demonstrated by using an emissions-to-jobs ratio (E/J). Relationships among economic indicators, energy use indicators, and E/J ratio are found to be significant. Economic indicators include disposable income, unemployment rate, and poverty level, while environmental indicators are Green's Total Index, Policy Index, and Conditions Index. Energy indicators are per capita energy use and a state's total energy use per job. A multi-variate analysis shows that poor environmental conditions, weak environmental policy, and higher E/J ratio are all inversely related to indicators of economic welfare.

Whitelaw, W. E., E. G. Niemi. 1993. After the Owl. *Old Oregon* v73, n 2: 26-29.

Discusses the need for new methods of economic policy analysis for sustainable development, anticipating the next inevitable "spotted owl" style controversy.

Agriculture

Benson, J. 1984. *Impact of Land Related Components on Farm Profitability for Livestock Operations*. A report for the Maine State Planning Office, Augusta, ME.

Discussion paper on the cumulative effects and causes of agricultural decline in Maine. Cites property taxes which are sixty percent higher than the national average for farmland; decline in fertility; increased costs of supplemental feed and high operating costs as components of the problem.

Benson, J. 1994. *Background Paper: On the Economic Contribution of Maine's Natural Resource Industries*. A report for the Maine State Planning Office, Augusta, ME.

Reviews the economic impact of farming, forestry, and fishing in Maine. Recognizing the missing data on the secondary and tertiary impacts, the paper underscores the extent to which the industries are interconnected and affect each other. Includes an overview of employment and economic data for Maine. Natural resources-based industries account for nearly forty percent of goods-producing jobs in Maine, and employ one in five Mainers. Total sales value of farm products and fish catch is about $700 million for a processed export value of $1.1 billion. Forest industries generated $4.3 billion in manufactured product in

1992. Tourism is estimated to be worth $1.5 billion in 1992.

Benson, J., P. B. Frederick. 1982. *A Study of Farmland Conversion in Nineteen Maine Communities*. A report for the Maine State Planning Commission, Augusta, ME.

The study seeks to quantify and characterize the rate and types of agricultural land conversion, reasons for conversion, and the effects of agricultural land conversion on community composition and demography.

Carr, T. 1994. The Northern Forest Economy. Pages 52-70 in Klyza, C. M. and S. C. Trombulak, editors. *The Future of the Northern Forest*. Middlebury College Press, Middlebury, VT.

Provides background on the economic factors relating to the controversy over the Northern Forest. Analysis focuses on sectors most relevant to land conversion: forest products, agriculture, tourism, development. It examines economic forces causing change and identifies key factors contributing to development. Includes charts and tables on area, demographics, social and economic indicators; economic output of forest products industry, employment and payroll in forest products, tourism, development, and second homes.

Cheney, J. 1993. Is land conservation bad for the tax base? *Landlines* v5, n5: 6.

A brief discussion of several studies regarding the effects of conservation on property tax values. They conclude that the net revenue (tax contribution minus infrastructure demand) is highest for open space and farmland, largely because of their low demand on infrastructure services.

Colgan, C. S., L. C. Irland, J. Benson. 1986. *The Natural Resource Industries of Maine*. Maine State Planning Office, Augusta, ME.

This paper examines the changes in Maine's principle resource industries of agriculture, forestry, and fisheries from about 1970 to 1985. An assessment and statistical portrait of Maine's natural resource-based industries, their constraints, and strengths. Data describes fifteen-year trends in agriculture, food processing, fishing, and forest products production. In 1982, the natural resources industries provided about fourteen percent of Maine's jobs and about forty-five percent of the goods-producing jobs. Farming, fishing, and logging activities provided an average of about twenty thousand jobs, not including some thirty-one thousand agricultural short-term or harvest jobs.

Economics and Statistics Administration. 1992. *1992 Census of Agriculture*, Vol. 1, Geographic Area Series - Maine. United States Department of Commerce, Washington, D.C.

Report of each category of agricultural product for Maine, by county.

Freedgood, J. 1993. *Is Farmland Protection a Community Investment? How To Do a Cost of Community Services Study*. American Farmland Trust, Washington, D.C.

Handbook explains how to reorganize local financial data to reflect the demand for services by different land uses. In general farmland contributes three times more in revenues than it gets back in services, while residential development costs more in services than it provides in revenues.

Henderson, J. S. 1994. *Maine Almanac and Book of Lists*. Maine Times, Brunswick.

A compilation of Maine data and vital statistics about state government, infrastructure, economic base, educational resources, cultural resources, health and social services, and natural resources. Some highlights: Gross State Product in 1989: $23.5 billion; percent of land in farms in 1992: 15%, compared to U.S. 43.6%; tables on water quality in Maine's rivers, lakes, estuaries and marine waters, etc.

Kentucky Natural Resources and Environmental Protection Council. 1993. *From Rio to the Capitols: State Strategies for Sustainable Development*. Kentucky Department of Natural Resources, Louisville, KY.

A 282-page report of the May, 1993 conference "State Strategies for Sustainable Development," includes transcripts of speeches by vice-president Al Gore, EPA director Carol Browning, writer Wendell Berry, and ten other notable speakers. Topic panels describe case studies on agriculture, forestry, water management, the role of negotiation, redevelopment, incentives vs. regulation, and twenty-four other topics related to sustainable economic development. Examples of state-level strategies are emphasized.

New England Agricultural Statistics Service. 1994. *New England Agricultural Statistics 1993*. New England Agricultural Statistics Service, Concord, N.H.

The 1994 report of comprehensive agricultural statistics for New England, state by state. Includes key economic indicators and data related to crops, vegetables, fruit, syrup, floriculture, and livestock including aquaculture.

Tietenberg, T. 1992. *Environmental and Natural Resource Economics*, 3rd edition. Harper Collins, New York.

Principles, economic models, and case studies on environmental policy, natural resources, sustainability, property rights, pollution, welfare economics, and cost-benefit analysis of renewable and non-renewable resources.

Other

Adler, R. W., J. C. Landman, D. M. Cameron. 1993. The Economics of Clean Water. Pages 87-115 in *The Clean Water Act: 20 Years Later*. Island Press, CA.

Case studies, surveys, and reports on the economic impacts of marine and fresh water pollution; potential revenue of pollution prevention; and models to measure non-market values of clean water and conserved habitat. Cites several EPA, state, and university studies.

Ballard, S., S. Seguino, C. Colgan. 1994. Economic Development in Maine: Strategies and Opportunities. *Maine Policy Review* May: 15-25.

This article addresses what Maine can do to enhance long-term development capacity and stimulate economic activity. It argues that by making investments and partnerships between the private and public sectors and research communities, Maine can become an "entrepreneurial state" in which most jobs are created by small businesses. With comparative assessment of strategies in other states and with data of Maine's economic development, the paper details the characteristics of the changing U.S. and regional economies, and Maine's primary advantages and obstacles to cultivation of new economic development.

Division of Economic Analysis and Research. 1994. *Maine Employment Statistical Handbook*. Maine Department of Labor, Augusta, ME.

Provides comprehensive monthly and annual labor statistics for the state, counties, and labor market areas; hours and earnings data by industry; employment data by industry.

Division of Economic Analysis and Research. 1993. *Maine Labor Market Review*. Maine Department of Labor, Augusta, ME.

A profile of employment in Maine by major sector.

Evans, D. A. 1993. *Trends in the Maine Labor Market*. Maine Department of Labor, Division of Economic Analysis and Research, Augusta, ME.

Summary of statistics on Maine's labor market including predictions to the year 2000.

Karr, P. 1991. Green-Collar Workers. *Sanctuary* January: 12-14.
A brief review of the diversity and rapid growth in employment in conservation and environmental engineering and technology. ". . . one of the fastest-growing sectors of the U.S. economy . . . it is projected that by 1995, the environmental industry overall will be worth $150 billion." "A Council on Economic Priorities report revealed that each dollar spent on energy efficiency produced four times as many jobs as a dollar spent on building a power plant. An Alaska study showed that home weatherization created more jobs in the state than any other investment a community could make—including money spent to build hydropower dams, highways, and hospitals."

Lincoln Institute of Land Policy. 1995. *Managing Land as Ecosystem and Economy*. Lincoln Institute of Land Policy, Lincoln, MA.
This report is based on quotes from a 1993 workshop, "Managing Land as Ecosystem and Economy," sponsored by the Lincoln Institute of Land Policy. The report is intended to capture behind-the-scenes insights from all sides in the debate over conservation and development, particularly regarding wetlands and endangered species. Includes a mix of text and color graphics designed to provide background for educational programs and civic meetings.

Maine Economic Growth Council. 1995. *Goals for Growth- Progress 95*. Maine Economic Growth Council, Augusta, ME.
A sixteen-page report supporting the goal of maintaining a healthy natural resource base for Maine. Recommends increasing the sophistication and diversity of marketing efforts, along with improving information and communication about natural resource use and protection. States major goals, specific objectives, performance measures and benchmarks.

MaineWatch Institute. 1990. *Maine's Progress Toward a Sustainable Future*. MaineWatch Institute, Hallowell, ME.
This report explores the interdependence of Maine's natural environmental, economic, and social systems, attempts to define a future that promotes sustainability in these areas, and assesses the current condition of Maine in relation to these goals. It defines the indicators of progress toward creating a sustainable future, and discusses shortcomings in each of these areas.

Potter, E. W. 1988. *A Strategy to Assist Regional Economies of Maine During Structural Economic Change and Growth*. Office of Policy and Legal Analysis, Maine Legislature, Augusta, ME.
Economic profile by region with recommendations related to natural resource dependent enterprises.

Schaner, G. September 1993. *St. John River 2000: Towards Greater International Cooperation*. Northern Maine Development Commission, Caribou, ME.
A report from a July 15, 1993 conference at the University of Maine at Fort Kent. The conference brought together Canadian and U.S. business-people, government officials and other interested citizens to discuss issues related to the watershed's natural resource management, environmental protection, economic opportunities, regional planning, and fisheries management. Contains local surveys and transcripts of discussions related to the construction of a fish ladder to allow salmon into the upper St. John watershed, an area historically inaccessible to salmon because of a large waterfall.

Appendix

A Phone List of Maine-based and Maine-related Natural Resource Organizations

The phone numbers of organizations located in Maine are listed without their (207) area code. Out-of-state organizations are listed with their state location and area code in parentheses.

Acadia National Park 288-3338
Agricultural Research Service, United States Department of Agriculture 581-3266
Agricultural Stabilization and Conservation Service 942-0342
Agriculture, Food and Rural Resources, Maine Department of Agriculture 287-3871
Air Quality Control, Maine Department of Environmental Protection 287-2437
Allied Whale 288-5644
American Forest Institute (New Hampshire) ..... (603) 224-9694
American Pulpwood Association 622-3705
Androscoggin Valley Council of Governments 783-9186
Androscoggin Valley Soil And Water Conservation District 783-9196
Appalachian Mountain Club (Massachusetts) ..... (617) 523-0636
Appalachian Trail Conference (New Hampshire) ..... (603) 795-4935
Appalachian Trail Club, Maine ..... 453-7722 or 453-9301 x5136
Aquatic Animal Health Lab 581-2802
Army Corps of Engineers, United States (Massachusetts) ..... (617) 647-8711
Association of Consulting Foresters 549-7622
Atlantic Center for the Environment (Massachusetts) ..... (508) 356-0038
Atlantic Salmon Federation (Massachusetts) ..... (617) 356-0717
Atlantic Sea Run Salmon Commission 941-4449
Atlantic States Marine Fisheries Commission (Washington D.C.) ..... (202) 387-5330
Attorney General's Office 626-8800
Baxter State Park 723-9616
Bigelow Laboratory for Ocean Sciences 633-2173
Bowdoin Scientific Station 725-8731
Central Aroostook Soil And Water Conservation District 764-4153
Cobbossee Watershed District 377-2234
College of the Atlantic 288-5015
Congress of Lake Associations 846-4271
Conservation, Maine Department of 287-2211
Conservation Education Foundation of Maine 665-2068
Conservation Law Foundation of New England (Massachusetts) ..... (617) 742-2540
Rockland office 594-8107

Cornerstone Energy Group 729-6701
Cumberland County Soil And Water Conservation District 871-8651
Darling Center (Marine Biology/Conservation) 563-3146
Down East Chapter, Maine Audubon Society 288-5377
Down East Rural Conservation and Development (RC&D) area 546-2368
Ducks Unlimited, Maine State Committee 657-2555
Ducks Unlimited, North Atlantic Field Operations (Connecticut) ..... (203) 438-4300
Earth First 247-4112
Economic and Community Development, Maine Department of 287-2656
Environmental Careers Organization (Massachusetts) ..... (617) 426-4783
Environmental Health Unit, Maine Department of Human Services 287-5378
Environmental Law Institute 780-4474
Environmental Protection, Maine Department of 287-7688
Environmental Protection Agency-Region 1, United States (Massachusetts) ..... (617) 223-2100
Farmers Home Administration, United States Department of Agriculture 947-1031
Fish and Wildlife Service, United States 828-1080
Forest Society of Maine and New Hampshire (New Hampshire) ..... (603) 224-9945
Franklin County Soil And Water Conservation District 778-4279
Friedman Cobscook Bay Laboratory 726-4767
Friends of Casco Bay 799-8574
Garden Club Federation of Maine 288-3709
Geological Survey, United States 622-8208
Greater Portland Council of Governments 774-9891
Greater Portland Landmarks 774-5561
Greenpeace New England (Massachusetts) ..... (617) 983-0300
Hancock County Regional Planning Commission 667-7131
Hancock County Soil And Water Conservation District 667-8663
Health Engineering Division, Department of Human Services 287-3826
Inland Fisheries and Wildlife, Maine Department of 287-3286
Institute of Quaternary Studies 581-2190
Island Institute 594-9209
Kennebec County Soil And Water Conservation District 622-8289
Knox-Lincoln Soil And Water Conservation District 832-4292
Lakes Environmental Association 647-8580
Land and Water Resources Council 287-3261
Land Quality Control Bureau, Maine Department Of Environmental Protection 287-2111
Land Trust Exchange (Virginia) ..... (703) 683-7778
Land Use Regulation Commission, Maine Department of Conservation 287-2631
League of Women Voters 945-5786
Legislative Revisor of Statutes 287-1650
Maine Agriculture Experiment Station 581-3202

Maine Appalachian Trail Club ..... 453-7722 or 453-9301 x5136
Maine Association of Conservation Commissions 623-4850
Maine Association of Conservation Districts 778-3835
Maine Association of Planners 774-9891
Maine Audubon Society 781-2330
Penobscot Chapter, East Holden 469-6066
Downeast Chapter, Ellsworth ..... 244-7126 or 288-5746
Schoodic Chapter, Calais 726-5091
Maine Citizens for Historic Preservation 775-3652
Maine Coast Heritage Trust 729-7366
Maine Conservation School 665-2068
Maine Cooperative Extension Service 581-3188
Maine Cooperative Fishery Research Unit 581-2580
Maine Cooperative Wildlife Research Unit 581-2870
Maine Emergency Management Agency 287-4080
Maine Environmental Education Association 882-7323
Maine Farm Bureau Association 622-4111
Maine Forest Products Council 622-9288
Maine Forest Service, Maine Department of Conservation 287-2791
Maine Geological Survey, Maine Department of Conservation 287-2801
Maine Green Party 843-5269
Maine Historic Preservation Commission 287-2132
Maine Historical Society 774-1822
Maine Lung Association 622-6394
Maine Mineral Resources Association 772-3994
Maine Municipal Association 623-8428
Maine Nuclear Referendum Committee 622-4395
Maine Organic Farmers and Gardeners Association 622-3118
Maine Peoples Alliance 761-4400
Maine Professional Guides Association 785-2061
Maine Small Farm Association 622-2767
Maine Snowmobile Association 622-6983
Maine Solar Energy Association 497-2204
Maine Solid Waste Management and Recovery Association 623-8428
Maine Sportsman 846-9501
Maine State Archives 287-5790
Maine State Legislature ..... (800) 452-4601
Maine State Library 287-5600
Maine State Museum 287-2301
Maine Wastewater Control Association 623-8428
Maine Youth Camping Association 581-1350

Marine Law Institute 780-4474
Marine Resources, Maine Department of 624-6550
Mid-Coast Regional Planning Commission 594-2299
Mt. Desert Island Biological Laboratory 288-3605
National Audubon Society (Connecticut) ..... (203) 364-0520
Natural Resources Council of Maine 622-3101
Nature Conservancy 729-5181
New England Environmental Network (Massachusetts) ..... (617) 628-5000
New England Fishery Management Council (Massachusetts) ..... (508) 535-5451
New England Forestry Foundation 864-4229
New England Interstate Water Pollution Control Commission (Massachusetts) ..... (617) 367-8522
New England Natural Resources Center (Massachusetts) ..... (617) 451-3670
New England Trail Conference (Massachusetts) ..... (413) 525-7052
Northern Forest Lands Council (New Hampshire) ..... (603) 224-6590
Northeastern Lumber Manufacturers Association 829-6901
North Kennebec Regional Planning Commission 873-0711
North Maine Woods 435-6213
North Woods Arts Center 564-3423
Northern Maine Regional Planning Commission 498-8736
Oil and Hazardous Materials Control, Maine Department Of Environmental Protection 287-2651
Organized Camping Resources 581-1350
Oxford County Soil And Water Conservation District 743-7019
Paper Industry Information Office 622-3166
Parks and Recreation, Maine Department of Conservation 287-3821
Pemaquid Watershed Association 563-2196
Penobscot County Soil And Water Conservation District 947-6622
Penobscot Paddle and Chowder Society 945-5961
Penobscot Valley Council of Governments 942-6389
Policy and Legal Analysis, Office of 287-1670
Pesticides Control Board, Maine Department of Agriculture 287-2731
Piscataquis County Soil And Water Conservation District 564-2321
Public Health Laboratory 287-2727
Public Lands, Maine Department of Conservation 287-3061
Public Utilities Commission 287-3831
Quoddy Regional Land Trust 733-5509
Resource Management Bureau , Inland Fisheries and Wildlife 287-3286
Restore the North Woods 626-5635
Ruffed Grouse Society 865-4448
Saco River Corridor Commission 625-8123
St. John/Aroostook Rural Conservation and Development Area 764-4126
St. John Valley Soil And Water Conservation District 834-3311

Sea Grant Program	581-1435
Sheepscot Valley Conservation Association	586-6455
Shelter Institute	442-7938
Shoals Marine Laboratory (Cornell University, New York)	(607) 255-3717
Sierra Club, Maine Chapter	761-5616
Sierra Club, New England Chapter (Massachusetts)	(617) 227-5339
Small Woodland Owners Association of Maine	626-0005
Society of American Foresters	622-4023
Soil and Water Conservation Commission	287-2666
Solid Waste Management, Maine Department Of Environmental Protection	287-2651
Somerset County Soil And Water Conservation District	474-8324
Southern Aroostook Soil And Water Conservation District	582-2087
Southern Kennebec Planning and Development Council	622-7146
Southern Maine Regional Planning Commission	324-2952
Sportsman's Alliance of Maine	622-5503
State Planning Office	287-3261
Threshold to Maine Rural Conservation and Development (RC&D) area	657-3131
Time and Tide Rural Conservation and Development (RC&D) area	832-5348
Trans-national Network of Appropriate Alternative Technology	864-2252
Trust for Public Land	563-5959
Unity College	948-3131
University of Maine at Augusta	621-3000
University of Maine at Farmington	778-7000
University of Maine at Fort Kent	834-3162
University of Maine at Machias	255-3313 ext. 287
University of Maine at Orono	581-1490
University of Maine at Presque Isle	764-0311
University of Southern Maine, Portland	780-4141
Waldo County Soil And Water Conservation District	338-2320
Washington County Regional Planning Commission	255-8686
Washington County Soil And Water Conservation District	255-3995
Water Quality Control, Maine Department Of Environmental Protection	287-3901
Wells National Estuarine Research Reserve	646-1555
White Mountain National Forest	824-2134
Wilderness Society (Massachusetts)	(617) 350-8866
York County Soil And Water Conservation District	324-7015