

Review of Report by Dr. John Daigle, “Impact of Plum Creek Petition for Rezoning and
Concept Plan on Recreation Resources in the Plan Area”

by
Mark W. Anderson
School of Economics &
Ecology and Environmental Sciences Program
The University of Maine

August 24, 2007

Prepared for Maine Land Use Regulation Commission
Under State/University Cooperative Agreement (#2007063)

Table of Contents

Executive Summary	2
Introduction	3
Context, Caveats, and Unanswerable Questions	5
Without Scenario	12
With Scenarios	14
Scenario A	21
Scenario B	23
Conclusion	25

Appendices

Appendix A -- "Issues to be Considered in Estimating the Effects on Primitive Recreation of the Plum Creek Concept Plan for the Moosehead Region."
Technical Report to the Maine Land Use Regulation Commission By Mark W. Anderson, October 2006

Appendix B -- Vita, Mark W. Anderson

Executive Summary

John Daigle of the School of Forestry at the University of Maine completed for Plum Creek an assessment of the potential impacts and changes to recreational activities in the Moosehead region from approval and implementation of the Plum Creek Concept Plan. This document, prepared for the Land Use Regulation Commission, is a review of the assumptions used and the conclusions reached by Dr. Daigle.

Daigle describes well the dynamic nature of outdoor recreation in the region, including a variety of forces that will bring about change even in the absence of the Concept Plan. He employs the Recreational Opportunity Spectrum (ROS) concept to describe changes that are likely under the Concept Plan. He characterizes these changes as shifts toward more modern or developed opportunities in and around proposed development zones while preserving more primitive opportunities elsewhere in the Concept Plan area. From this analysis and based on the assumptions he used, Daigle's report reasonably concludes that the recreational impacts of the Concept Plan will be within acceptable limits of change.

While Daigle's conclusion is reasonable based on the assumptions that he employed, there are significant uncertainties inherent in the Concept Plan that were not addressed in the Daigle Report. He assumed that key recreation components discussed in the Concept Plan (*e.g.*, the trail system) that are *allowed* to happen under the Concept Plan, but not *mandated* to happen, would indeed occur. If some or all of these allowed-but-not-mandated recreation elements do not occur, the impact to recreation in the Moosehead region from implementation of the Concept Plan could be very different. These key recreation elements include:

- (1) if and how the resorts are developed;
- (2) if the trail systems are built;
- (3) if the Legacy Conservation Framework is consummated;
- (4) if there is a public or private entity that has sufficient authority and resources to effectively manage increasing recreation use of regional resources; and
- (5) if, under the authority left to Plum Creek in the proposed "Balance" and "Legacy" easements, Plum Creek chooses to exercise its rights to limit public access over what now exists, in ways that would significantly change recreation opportunities in the region.

Implicit in the Daigle Report is one set of assumptions regarding these key factors (referred to as "Scenario A" in this report). Alternative assumptions about these factors lead to a less sanguine assessment of the recreation impacts of the Concept Plan. The polar opposite set of alternative assumptions ("Scenario B" in this report) could leave in doubt the future of the Commission's principal value of "...diverse and abundant recreational opportunities, particularly for primitive pursuits."

The goal of this report is to give the Commission a means of weighing recreation impacts under these various assumptions about those plan elements with the greatest potential to affect recreation.

Introduction

This report is a review of the report submitted by Plum Creek and prepared by John Daigle entitled “Impact of Plum Creek Petition for Rezoning and Concept Plan on Recreation Resources in the Plan Area” (Daigle, 2007), hereafter referred to as the Daigle report.

I find the Daigle report to be a balanced and professional review of the issues surrounding the potential recreation impacts of the Plum Creek Concept Plan given the assumptions he made regarding specifics of the plan’s implementation. The report applies two conceptual frameworks that I had suggested to the LURC staff were appropriate in this case (Anderson, 2006 -- see Appendix A). These frameworks are the Recreation Opportunity Spectrum (ROS) and Limits of Acceptable Change (LAC). However, results of forecasts such as these are sensitive to different assumptions, where the Daigle Report proceeds under just one set of assumptions. In this peer review I provide a framework for LURC Commissioners and staff to consider the recreation impacts under various realistic assumptions.

This report is structured as follows:

- 1) **Context, Caveats, and Unanswerable Questions** -- Outdoor recreation is a complex phenomenon. The first section of this report reviews the contextual issues as they relate to forecasting recreation impacts of proposed changes.

Development of these contextual issues is a strength of the Daigle Report. It

needs to be clear, however, that there are issues and questions that are beyond quantified and analytical answers in the context of these proceedings. The inability to make quantitative forecasts relates to the strengths and weaknesses of the ROS and LAC models and to the lack of historical data on recreation in this region.

- 2) **Without Scenario** -- The second section discusses the likely changes in the region covered by the Concept Plan were it not approved. This is a baseline for comparison and one where I largely agree with the Daigle report.
- 3) **With Scenarios** -- This section of the report deals with the multiple development paths that are possible if the Concept Plan were approved and the kinds of impacts on outdoor recreation of these alternative development paths. The Daigle Report does not address these uncertainties, rather it assesses impacts of just one possibility, essentially what I will refer to as Scenario A.

A Scenario A -- This is the scenario where both proposed resorts are developed as full service destination resorts (as described by DeMay, 2007); all of the trails for which easements are granted are built; an effective regional recreation management system is in place; and the Conservation Framework Easements are fully implemented. In this section I will suggest that the Daigle Report forecasts many of the recreation impacts appropriately given these assumptions. A significant issue where I diverge from his assessment is over public access protections under these assumptions.

B Scenario B -- This is the polar opposite scenario where none of the trails are developed; the Conservation Framework easements and fee purchases are not consummated by The Nature Conservancy; no effective regional recreation management is in place; and the resorts are not built as described. In this scenario, only minimum “resort amenities” are created and “resort accommodations” are essentially additional second home developments. My estimates of the recreation impacts of this scenario are presented.

Context, Caveats, and Unanswerable Questions

The Daigle report makes several important and valid observations about the likely impacts of the Plum Creek Concept Plan on recreation in the region. These insights build on the ideas that underlie the ROS and the LAC. Outdoor recreation relies on a complex of natural and human elements:

- the biological and physical environment of the region, including in this case lakes, rivers, streams, ponds, mountains, managed forest lands, wildlife, etc. (“physical attributes” in ROS terminology);
- the history of cultural impacts on that environment, particularly the history of industrial forest management in this landscape (also manifest as “physical attributes” in ROS);
- human management of the resource, both for continuing production of forest

products and for alternative recreation pursuits (“management attributes” in ROS language);

- competing uses for the resource, including conflicts and compatibilities between commercial forestry operation and recreation, and among alternative recreation pursuits (“social attributes” in ROS);
- expectations of recreationists, including those who have traditionally enjoyed the resources of the region and those with various perceptions of the region who are potential new users (reflected in “recreation activities” in the ROS framework).

Daigle points out in his discussion that, “One purpose of identifying some of the environmental, social, and managerial indicators is to illustrate the complexity of factors contributing to quality visitor experiences (p. 26).” Assessing impacts of any significant change, like that proposed by Plum Creek in its Concept Plan, must recognize the complexity of the interaction of these factors. As he says, “The findings reported above suggest that the visitors to the Plum Creek Concept Plan area will seek a wide variety of activities, and will differ in their expectations for the surrounding environment and level of development (p. 27).” There is no one recreation user type in this region and change will create benefits and costs for both traditional users and potential new users.

The Daigle Report also acknowledges the dynamic nature of outdoor recreation. Even without the Plum Creek proposal, recreation participation will change in this region due to both supply factors -- changes in public and private recreation infrastructure and

management -- and demand factors -- changes in societal tastes and preferences, in economic conditions, and in demographics. The proposed changes resulting from the Concept Plan would also change recreation in the region, as is discussed in the Daigle report. For example, he says, "There is no question that the development will shift some recreation opportunities elsewhere -- for example, Lily Bay and Brassua Lake will see greater recreational use, but in a somewhat less remote setting. Significantly, however, these opportunities will continue to be available and, in fact, will be permanently secured by the permanent conservation of more than 400,000 acres of undeveloped land in or adjacent to the Plan Area (p. 27)." In the ROS-type framework, opportunities will move "right to left," more toward the "semi-modern" category. Some visitors and area residents will find these changes desirable, while others will find them undesirable.

This is an example of the invasion/succession model that recreation managers use to understand the phenomena that happen when recreation infrastructure development creates new opportunities in an area previously less well developed and therefore less accessible. Those who had used the resource traditionally, because it had provided a less well developed experience, are displaced by the "invasion" of a larger number of new users who find the new level of development appealing. This is the irony of nature-based tourism as a regional economic development tool (Anderson et al., 2005). Economic development means, by definition, attracting a greater number of users, usually causing a sense of loss among those who previously enjoyed the resource in its less-developed

state. Change of this type is a general theme of the likely impacts on recreation of the Plum Creek Concept Plan if it were approved. There are likely to be more recreationists in the region with even greater diversity of expectations for types of experiences desired; therefore, social and management attributes will change recreation opportunities.

The basic idea of the Limits of Acceptable Change (LAC) model is applicable here (Cole and Stankey, 1979). Given the changes that are likely under various scenarios, Commissioners will be confronted with likely gains and losses in terms of outdoor recreation. Some recreationists will benefit from these changes while others will experience loss. The role of this report is to help understand the nature of these changes without passing judgment on whether they exceed some limit of what is acceptable.

As a final caveat, it is important to note the limits on applying the ROC and LAC models in this case. While they are the best conceptual tools available for thinking about the impacts of the Concept Plan on recreation (see Anderson, 2006), they are limited in two ways.

To understand these limits it is necessary to understand the uses these tools were developed for. The Recreation Opportunity Spectrum (ROS) was developed to assist public land managers to deal with mandates for the multiple use of natural resources, like the National Forests. The ROS was developed by the USDA Forest Service (Clark and Stankey, 1979) as a management tool. There have been several refinements and applications of the concept subsequently. For example, the Bureau of Reclamation

developed a Water Recreation Opportunity Spectrum (WROS), a tool of use in an area like the Moosehead Region where there is an abundance of water-based recreation opportunities (Haas, et al., 2004). The Forest Service modified the ROS for application in the Northeast where landscape is different from those in the West where ROS was originally used (More, et al., 2003).

All of these ROS variants share a common framework. They categorize recreation opportunities as a function of activities pursued and of the physical, social, and managerial aspects of the setting. The original ROS uses a four category model:

Modern -- Semi-modern -- Semi-primitive -- Primitive

to classify recreation opportunities; while the WROS and newer versions of ROS have moved to a six category model:

Urban -- Suburban -- Rural Developed -- Rural Natural -- Semi-Primitive -- Primitive

The land manager uses the spectrum to make decisions about infrastructure investment, access limits, fees charged, etc. to try to maximize benefits from the public resource given the other competing uses. The ROS and WROS are useful in the case of the Plum Creek Concept Plan to the extent that they help Commissioners think about how the proposed re-zoning might affect recreation opportunities in the region, particularly in terms of how it might change the setting attributes -- the physical, social, and managerial attributes of the landscape.

It would be desirable to be able to use these tools to forecast effects on specific recreation resources in the region. An example of the kind of important question it would be good to answer is: what change in recreation opportunities on Indian Pond will the proposed resort development on Big Moose Mountain bring about? There are many such specific impact concerns with the Concept Plan. Unfortunately, answering this type of question completely is not possible for two reasons.

First, there are few reliable data available on recreation use in the Moosehead region (Anderson, 2006), even though there is much anecdotal information about recreation patterns. The ROS tools are designed to be fully used as part of a long-term management planning process where necessary first steps are data collection on current use patterns and characterization of the various attributes of the resources. Neither of these exists for the lands in the Concept Plan. It is possible to do partial analyses using the ROS framework, as Palmer has done for the Commission in terms of road access and visual impacts of development. These analyses provide important insights into how lands in the Moosehead region fit into ROS opportunity setting classes, with or without the Concept Plan. The recreation use data limitations prevent a comprehensive ROS analysis, particularly in terms of social interaction factors. These factors may or may not place a portion of the Concept Plan area in the same class as the access or visual impacts factors do, an outcome which is common in using ROS for recreation management.

Second, the ROS cannot be used to manage opportunities and impacts because no

management entity has the authority and resources to control several of the relevant attributes. As will be discussed below, a number of the aspects of the Concept Plan are relevant factors that are allowed, but not required, to occur. And, as will also be clear, there is no management agency with the means or the authority to control the attributes of the region that contribute to recreation opportunities. Commissioners should be skeptical of overly-precise forecasts of recreation impacts. Recreation opportunity change will be a function of uncertainties that I will outline below. The ROS and WROS models help us to think about these potential changes but they do not provide precise, analytical forecasts of such change.

Dealing with these multiple issues while forecasting impacts of a significant change like that proposed by Plum Creek is difficult because of the uncertainty surrounding many of the factors that affect recreation participation and experience. The Daigle report reflects a number of explicit and implicit assumptions about these factors, but it does not deal directly with the uncertainties created by multiple assumptions. In order to provide LURC with guidance on the issues, below I outline the key assumptions in the without scenario -- how recreation might change in the region were the Plum Creek Concept Plan not approved -- and, more importantly, the with scenario -- if it were approved. As the Daigle report acknowledges, these assumptions are key to assessing impacts.

Without Scenario

Impact assessment is an exercise in social and economic forecasting which is very much more of an art than a science (de Jouvenel, 1967). Forecasting change in outdoor recreation patterns first requires assumptions about exogenous social and economic change. Recreation participation in the Moosehead Region may be affected by a number of different factors -- gasoline prices, income levels, terrorism threats, changing demographics of the U.S. population, and changing preferences for leisure activities. We have seen these changes affect outdoor recreation patterns in Maine in recent years -- for example, resulting in less hunting, fishing, hiking, and camping participation and more kayaking and snowmobiling. As pointed out in an earlier report (Anderson, 2006), there is an overall decline in many types of outdoor recreation participation in the U.S. It is reasonable to think that these trends are reflected in the Moosehead region and would continue at least into the near term. However, lack of reliable and comprehensive data on recreation participation in the region prevents saying this with assurance.

Without the Concept Plan it is likely that single home development, for both seasonal and year-round use, will continue in the region, either through smaller Concept Plans or through exercise of the “two in five” subdivision option. Whether this results in 975 new lots or not over the next 30 years is one important assumption. In any event, it seems likely that new housing development would be distributed more widely across the 421,000 acres of the plan area than would happen in the plan. The primary impact of

development like this is on the recreation opportunities at the primitive end of the ROS. It is reasonable to assume, as Daigle says, that housing development of this type would result in more of a patchwork of access limitations as new owners in remoter regions of the plan area post their land.

Two related issues should also be considered in the without scenario. During the time period of the Concept Plan, this area will not be immune to the sale of large parcels of land either for “kingdom lots” or for landscape scale conservation. Both of these phenomena are occurring in Maine’s north woods and both would have impacts on primitive recreation in the region. “Kingdom lots” are understood to be large acreages purchased by wealthy individuals for the creation of private residential retreats in the north woods. Kingdom lot owners typically restrict public access beyond what has been traditionally the case in this region of Maine. Alternately, large conservation acquisition may entail restrictions on motorized access or restrictions on type of activity pursued, for example prohibitions on hunting or trapping. Either or both of these are possible in the without scenario. It is a matter of conjecture how likely these types of sales are.

One could make other assumptions in a without scenario. For example, Maine law could change and restrict the two in five subdivision allowance in the unorganized territory of Maine. Another possibility in the without scenario is that Plum Creek gates its lands and begins charging fees for recreation access, for example by joining the North Maine Woods. This could be to generate a revenue stream from recreation use or to

manage more effectively the inevitable conflicts between recreation and commercial forest management activities. Reasonable assumptions for this time period of the Concept Plan are such that there is continued residential development throughout the Concept Plan area, resulting in a more complex mosaic of recreation use restrictions. At the same time, trends in recreation participation should continue, at least in the near term, including declining hunting, fishing, and hiking use, and increasing motorized recreation.

With Scenarios

The Daigle report depicts one set of assumptions for the with scenario, yet there are multiple variations in the path of regional development under the Concept Plan. The variations have different implications for recreation. The general issue here is that the Concept Plan supporting rezoning requested by Plum Creek has a number of elements that are allowed to occur but are not obliged to occur, leading to uncertainties in the development path in the with scenario. The Daigle report and other reports in the Concept Plan use assumptions provided by Plum Creek to forecast recreation, economic, and community impacts. Different scenarios for these assumptions result in different recreation impacts. There are four elements in the Concept Plan for which there are important uncertainties of this type that are not addressed in the Daigle Report or are addressed but not resolved. They are uncertainties about:

- 1) whether the Conservation Framework is funded;

- 2) whether trails are built and maintained where trail easements are granted;
- 3) whether resorts are built and, if so, what their specific recreation amenities are;
- 4) and whether there is funding and authority to manage increasing recreation use in the region.

First is the question of the Conservation Framework. Plum Creek's plan describes agreements to sell an approximately 266,000 acre conservation easement and two separate fee sales (29,500 and 45,000 acres respectively) to The Nature Conservancy, contingent on the approval of the rezoning requested. The Daigle report assumes that The Nature Conservancy will raise funds sufficient to consummate these purchase and sale agreements. Since the agreements entail certain guarantees regarding public access, restrictions on residential and commercial development (while still allowing some types of development), and agreements on forest management practices, assuming their consummation leads to specific and generally positive conclusions about recreation impacts in the Daigle report.

Furthermore, the report characterizes these easements as providing "permanent conservation" and guaranteeing public access. While "...daylight, pedestrian use of the Protected Property..." is granted by the easements, it is apparent that Plum Creek retains rights to limit or restrict certain types of traditional public access, for example with motor vehicles or by commercial guides. This leaves open the possibility of a number of different scenarios in the future where there is significant reduction of recreational access,

even if the funding for the Conservation Framework becomes available. Two potential adverse recreation impacts exist. First, exercise of some of the development rights retained by Plum Creek under the easements could affect recreation in ways similar to the residential development rights that the easements extinguish. Second, public access provisions of the easements do not guarantee the traditional access that the public has become accustomed to.

The second question is one of the development and maintenance of three different recreation trail systems for which Plum Creek grants easements under the Concept Plan. Permanent trail easements for an ITS snowmobile trail, for a proposed “peak-to-peak” hiking trail, and for a connection to the Moosehead-to-Mahoosucs Trail are included in the Concept Plan. Granting of the easements does not assure that the easement holders or others will have the capacity and/or means to construct and maintain these trail systems. Any one or all of the three trails may or may not be constructed and maintained under the Concept Plan. To give a sense of the uncertainties here, assuming reasonable trail construction costs of \$15,000 per mile, construction of the Peak to Peak trail system could cost nearly \$1 million, funding which is not identified in the Concept Plan. Likewise there are no provisions for operations and maintenance. Assumptions about these trails are important parts of the recreation impacts since the trail systems diversify the primitive recreation opportunities available in the region.

Third, the Concept Plan allows for the construction of two resorts, each of which

could simultaneously attract new visitors, provide new recreational opportunities, and change the experiences of others who have enjoyed the resources of the region in the current state. If and when such resorts are built obviously affects the quality and quantity of recreational impacts of the Concept Plan. There is no guarantee that either of these resorts will be built and no guarantee that if they are built they provide the kinds of amenities and recreational opportunities described in the Daigle and Colgan reports or in the DeMay (2007) letter. Residential development (some of the 975 house lots) could occur in the Big Moose resort zone with few of the resort amenities described.

Furthermore, there is a scenario where few of the resort amenities that would diversify recreational opportunities are developed yet the full 1,050 “resort accommodation units” are built in a manner that effectively makes them like the 975 single-family residential units in the Concept Plan. Colgan (2007), for example, refers to resort accommodations as “...single family, town house, or apartment-style units.” This scenario increases the seasonal and year-round population of the region without generating additional recreational opportunities described in the Daigle Report in relation to the resorts.

Finally, it is also important to note that the full development of the residences and resorts in the Concept Plan will increase significantly the number of recreationists in the region. The Daigle report acknowledges the need for a more active and integrated management of recreation in the region if the rezoning were approved. This

management need includes a variety of different activities including information (signage, maps, etc.), law enforcement, parking, sanitation, waste removal, boat launches, and other infrastructure. It is not clear what public or private entity would have the funding to undertake this management that would be necessary to reduce conflicts and otherwise manage the increased recreation demand that would come from making the assumptions that underlie the Daigle report. Even if funding for such a management regime were available, there is nothing in the Concept Plan that grants authority for such management on the lands in question.

The effects of these various assumptions are summarized in a simplified form in Table 1. This summary table should only be read in the context of the discussion of these various factors in the sections below.

Table 1. Simplified Summary of Recreation Impacts of Concept Plan Attributable to Key Assumptions in With Scenario **Compared to Without Scenario** (Concept Plan Not Approved) -- See Text for Details

Assumptions	Primitive Recreation Opportunities	Diversity of Recreation Opportunities	Regional Tourism Economy	Public Access	Commercial Guide Access	Recreation Management Burden	Kingdom Lot Development
Baseline -- 975 House Lots Developed & 90,000 acre Balance Easement	Diminished -- more users; remote pond opportunities preserved	Similar to "Without Scenario"	Increased activity	Pedestrian Access in Balance Easement Area	<i>Status quo</i> -- no guarantee	Increased	Prohibited in Balance Easement Area
Conservation Framework							
-Funded and consummated Scenario A	Enhanced/ No residences guarantee	Similar to "Without Scenario"	Some Nature-based tourism resources protected	Pedestrian access guaranteed	<i>Status quo</i> --no guarantee	Similar to "Without Scenario"	Prohibited
-Not consummated Scenario B	Diminished	Diminished	Enhanced -- increased residential numbers	<i>Status quo</i> -- no guarantee	<i>Status quo</i> --no guarantee	Similar to "Without Scenario"	Increased likelihood/restricted supply effect
Resorts							
-Built Scenario A	Possibly enhanced -- diversity of opportunity types	Enhanced	Substantial increase in activity	Similar to "Without Scenario"	Similar to "Without Scenario"	Greatly increased	Similar to "Without Scenario"
-Built with Minimal Resort Amenities Scenario B	Diminished -- more users	Similar to "Without Scenario"	Increased activity	Similar to "Without Scenario"	Similar to "Without Scenario"	Increased	Similar to "Without Scenario"
Trails							
-Built Scenario A	Greatly enhanced	Greatly enhanced	Enhanced	Enhanced in trail corridor	Enhanced in trail corridor	Enhanced	Similar to "Without Scenario"
-Not Scenario B	Similar to "Without Scenario"	Similar to "Without Scenario"	Similar to "Without Scenario"	Similar to "Without Scenario"	Similar to "Without Scenario"	Similar to "Without Scenario"	Similar to "Without Scenario"

Note: There are likely synergistic or countervailing effects among these factors that are not captured in this table.

Forecasting recreation impacts clearly is sensitive to assumptions made about these major factors. Although they are not the only sources of impact of the plan, they are likely the ones with the largest effects.

There are many permutations of the assumptions that could be made about these factors, too many to consider all of them. However, it may help the LURC staff and Commissioners to consider two “pure cases” that together bound the nature of impacts. Consider one extreme where all of the purchase and sale agreements in the Conservation Framework are exercised, all the trails for which trail easements are donated are built and maintained, both resorts are developed as described in the Daigle and Colgan reports, and a public or private entity is funded and has authority to manage recreation on the affected lands (referred to as Scenario A for the rest of the review). Compare this set of assumptions with the polar opposite, none of the Conservation Framework is consummated, none of the trails are constructed even though the easements remain in place, neither of the resorts is developed with full recreation amenities yet “resort accommodations” are constructed, and no management mechanism is in place (Scenario B).

For both of these scenarios, the assumption is that all 975 house lots will be developed and sold over the life of the plan. This alone will diminish primitive recreation opportunities in the region simply by increasing the number of social interactions among recreationists. At the same time, primitive recreation opportunities on the remote ponds

will be preserved by the residential development buffers as part of the Balance Easement. At the same time, this development will do little to diversify recreational opportunities but it will increase the expenditures in the local tourism economy. Day-time pedestrian access will be guaranteed in the Balance Easement area of 90,000 acres and residential development, including Kingdom lots, will be prohibited in that same area.

Scenario A. This is the scenario implicit in the Daigle report. The likely impacts of this scenario on recreation, particularly primitive recreation, in the region covered by the Concept Plan are as follows:

- There would be improved opportunities for hiking, cycling, cross-country skiing and like activities, particularly in relation to the resort complexes, assuming that they are developed in the manner Daigle describes. This would stimulate more of this activity throughout the region as the infrastructure developed as a result of the Concept Plan creates a critical mass that attracts users who spill over into areas beyond the resorts and trails planned in the Concept Plan. Much like anchor stores function in retailing, full-service resorts would stimulate business for small related commercial enterprises.
- Most of the hunting, fishing, camping, and other primitive uses that rely on the maintenance of the working forest landscape in the Balance Conservation and Legacy Easement lands would be preserved, to the extent these uses could be carried out by pedestrian access. In particular the patchwork of “kingdom lot” residences and access limits would be avoided, which would be of value as long as vehicular access and access by professional guides were still allowed (and which, as noted above, are not guaranteed by the easements proposed).
- Many of the remote and primitive paddling opportunities in the area would be

preserved at or near their current level of resource quality, including Prong Pond, Big W shore of Moosehead Lake, Second, Third, and Fourth Roach Ponds, and many of the smaller remote ponds, again assuming unrestricted road access for recreationists.

- There is a likely decline in the current sense of remoteness for other paddling resources in places like the East room of Long Pond, Brassua Lake, Indian Pond, Upper Wilson Pond, and Lily Bay. Little Brassua probably also becomes more heavily used, but not to the extent of the others. This will come from increases in numbers of boaters and numbers of power boaters. These water resources would move “to the left” on the ROS -- toward “semi-modern” in the language of the ROS or “rural natural” in the words of the WROS. It is not clear, due to the data issues discussed above, whether this is a leftward movement within these categories or a move from a more “primitive” category to these more developed ones. These are the places most susceptible to the invasion/succession phenomenon.
- There are enhanced boating opportunities, albeit probably in more developed sense, for Lily Bay, Brassua Lake, and Indian Pond.
- Overall, the number of year-around residents, seasonal residents, overnight tourists, and day users is greater throughout the region in this scenario. The level of use is estimated by Colgan (2007) to increase by 2025 by about 640,000 visitor days per year using Plum Creek’s assumptions for resort development.
 - To give some context for this estimate, the National Park Service estimates visitors (not visitor days) to Acadia National Park to be 2 to 2.2 million per year. This number probably generates approximately 6 million visitor days in the way Colgan uses the term. So the increase in visitors to the Moosehead Region under these assumptions is about 10% of the total use

of the Acadia Region.

- Another way to estimate the level of use impact of this scenario is to look at the change in lodging rooms available in the region. The Maine Department of Health and Human Services data base of eating and lodging licenses includes about fifty establishments with “location” in Greenville, Jackman, and Rockwood with some 476 “rooms” licensed. The proposed resort accommodations in the resorts triple the lodging capacity in the region. For comparison, the total number would be about 45% of the number of licensed rooms in Bar Harbor, Mt. Desert, Southwest Harbor, and Trenton. Of course these numbers apply to very different landscapes. Acadia region is more highly developed and approximately 10% of the size of the Concept Plan area, which is as large as some Maine counties. The regions are similar in the centrality of natural resources to their attractiveness and the existence of key entry points with concentrated visitor-oriented development.
- So, the two estimates of use impact together bound the increase in intensity of recreation use to somewhere between 10-45% of the recreation use of the Acadia National Park area.
- An integrated recreation management entity identifies evolving needs and conflicts and has both the financial resources and legal authority to manage these. The need for this is presented in the Daigle Report, but it is not addressed elsewhere in the Concept Plan.

Scenario B. This is the polar opposite scenario where none of the trails are developed, the Conservation Framework easements and fee purchases are not consummated by The Nature Conservancy, no recreation management is in place, and minimum resort amenities (not the full-service resources characterized in the Concept Plan documents)

are built with “resort accommodations” mostly providing seasonal or year round housing.

This outcome entails mostly adverse effects for recreation including:

- None of the improved opportunities for hiking, cycling, cross-country skiing and the like occur in Scenario A are likely here. So there would be no improvement in the diversification of recreational opportunities.
- A loss in access to some lands due to subdivision and sale of lots, including “kingdom lots” throughout the region, diminishing opportunities for hunting, fishing, camping, and trapping, particularly in the least developed forms of these in the region.
- Like in Scenario A, there is a likely decline in the current sense of remoteness for other paddling resources in places like the East room of Long Pond, Brassua Lake, Indian Pond, Upper Wilson Pond, and Lily Bay. Little Brassua probably also becomes more heavily used, but not to the extent of the others. This will come from increases in numbers of boaters and numbers of power boaters. These water resources would move “to the left” on the ROS -- from the range of “semi-primitive” to “semi-modern” in the language of the ROS. (It is not clear, due to the data issues discussed above, whether this is a leftward movement within these categories or a move from a more “primitive” category to these more developed ones.) These are the places most susceptible to the invasion/succession phenomenon.
- Also as in Scenario A, there are enhanced boating opportunities, albeit probably in more developed sense, for Lily Bay, Brassua Lake, and Indian Pond.
- Due to the Balance Conservation Easement, some of the remote and primitive paddling opportunities in the area would be preserved at or near their current level of resource quality, including Prong Pond, but not necessarily for Second, Third, and Fourth Roach Ponds or many of the smaller remote ponds, which could be

subject to back lot residential development. Indeed, the Balance Conservation Easement would make Kingdom lot sales more likely without the Conservation Framework because of the effect of decreasing the supply of land in the market.

- Increase in year-round and seasonal residents throughout the region with less increase in the over-night tourists and day users. The overall increase in recreation users is less than Scenario A but clearly more than in the without scenario.
- The lack of an empowered and integrated recreation management entity results in conflicts among recreationists and between recreationists and other land management activities, creating dissatisfaction with recreation as a contributor to the quality of life in the region.

Conclusion

The Daigle Report provides the Land Use Regulation Commission with much data and thoughtful interpretation to aid in the assessment of the impacts of the Plum Creek Concept Plan on recreational opportunities in the region. The material is most useful in the context of the assumptions that staff and Commissioners wish to make about both the without scenario and, more importantly, the with scenario. Scenario A above is mostly consistent with the assumptions that the Daigle Report uses for this analysis. Whatever scenario is chosen for forecasting the effects of the Concept Plan, it is clear that recreation opportunities and demand will change in the region, although a quantitative analysis of such change is not possible because of the lack of historical data on recreation use and because of the many uncertainties of what will happen if the Concept Plan is approved. The Limits of Acceptable Change model used in the Daigle

Report is a reasonable way for the Commission to think about the recreation impacts of the Plum Creek Concept Plan.

References

- Anderson, Mark W., Kathleen P. Bell, and Kevin J. Boyle. 2005. Procedures for Evaluating the Potential Regional Economic Impacts of Conservation Lands in the 100-Mile Wilderness Region. CenTRO Staff Paper 101. Orono, Maine: Center for Tourism, Research, and Outreach, The University of Maine.
- Anderson, Mark W. 2006. "Issues to be Considered in Estimating the Effects on Primitive Recreation of the Plum Creek Concept Plan for the Moosehead Region." Technical Report to the Maine Land Use Regulation Commission under Cooperative Project #. 2007063. Orono, Maine: Department of Resource Economics and Policy, The University of Maine.
- Clark, Roger N. and George H. Stankey. 1979. The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. PNW-98. Pacific Northwest Forest and Range Experiment Station. USDA Forest Service.
- Cole, David N. and George H. Stankey. 1998. "Historical Development of Limits of Acceptable Change: Conceptual Clarifications and Possible Extension." in McCool et al. Proceedings -- Limits of Acceptable Change and Related Planning Processes. Gen. Tech. Rep. INT-GTR-371. Ogden, Utah. Rocky Mountain Research Station, USDA Forest Service.
- Colgan, Charles S. 2007. "Estimated Economic Impacts from Development Associated with the Proposed Rezoning of Lands Owned by Plum Creek Timber in the Moosehead Lake Region." Report Prepared for Plum Creek Maine Timberlands, L.L.C. Portland, Maine: Center for Business and Economic Research, The University of Southern Maine.
- Daigle, John. 2007. "Impact of Plum Creek Petition for Rezoning and Concept Plan on Recreation Resources in the Plan Area." Report Prepared for Plum Creek Maine Timberlands, L.L.C. Orono, Maine: School of Forest Resources, The University of Maine.
- DeMay, Dwight. 2007. Letter to Mr. Luke Muzzy, Plum Creek Maine Timberlands, L.L.C. Re: Suitability of Site Locations for Big Moose Mountain and Lily Bay Resorts. Cambridge, Massachusetts: Hart Howerton Partners, Ltd.
- de Jouvenel, Bertrand. 1967. The Art of Conjecture. New York: Basic Books.

- Haas, Glenn, Robert Aukerman, Vernon Lovejoy, and Darrell Welch. 2004. The Water Recreation Opportunity Spectrum (WROS) Users Guidebook. Lakewood, Colorado: Bureau of Reclamation, Office of Program and Policy Services.
- More, Thomas A., Susan Bulmer, Linda Henzel, Ann E. Mates. 2003. Extending the Recreation Opportunity Spectrum to nonfederal lands in the Northeast: an implementation guide. Gen. Tech. Rep. NE-309. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station.

Appendix A

October 2006 -- Consultant Report -- Not Administration or Departmental Position
Issues to be Considered in Estimating the Effects on Primitive Recreation of the Plum
Creek Concept Plan for the Moosehead Region

Mark W. Anderson
Department of Resource Economics and Policy
The University of Maine

Abstract: The Department of Resource Economics and Policy was asked to offer guidance to the Maine Land Use Regulation Commission (LURC) on issues to consider and questions to ask about the recreation impacts of the Concept Plan for the Moosehead Region offered by Plum Creek to support its Petition for Rezoning. One of the principal values that define the distinctive character of the jurisdiction that LURC is committed to protect is that of “Diverse and abundant recreational opportunities, particularly for primitive pursuits.” Primitive recreation is a complex phenomenon, the product of opportunity in the form of characteristics of the natural resource base, of pursuit in terms of the attributes of the recreational activity, and of experience in terms of how opportunity and pursuit affect the individual involved. Land use planning and regulation cannot affect all of the elements of primitive recreation, but it can affect the opportunity in particular. Protecting the opportunity for non-motorized pursuits in remote environments is a means of assuring the continued availability of primitive recreation in the jurisdiction. All of the factors that determine primitive recreation in this jurisdiction are potentially changed by the Plum Creek Concept Plan. Determining the extent to which likely changes support or erode this recreation value defining the character of the region is part of the challenge facing the Commission. The Limits to Acceptable Change framework developed for assessing carrying capacities for outdoor recreation can be a useful tool for the Commission in meeting this challenge. This report offers the Commission background on key issues in assessment of recreation impact and concludes with a partial list of questions about how the Plum Creek Concept Plan would affect recreation opportunities in the Moosehead Region. Answers to these questions would assist the Commission in making an assessment of the Limits to Acceptable Change in this case.

The April 27, 2006 Plum Creek Petition for Rezoning and revised Concept Plan for further development and conservation designation of lands in the Moosehead Region of Maine will have economic, social, and recreation impacts throughout the region. The Moosehead Region is part of a larger mosaic of traditional remote recreation use in the industrial forests of Maine (Ireland, 1996). The rapidly changing ownership patterns and changes in Maine's forest products industries are challenging the traditional notions of allowable uses and access. The Plum Creek Concept Plan is another manifestation of these changes in Maine's north woods.

Change in forest ownership, access rights, and recreation infrastructure all affect outdoor recreation in the region (See Anderson, et al., 2005). A change in the land use regulation by the Maine Land Use Regulation Commission (LURC) of Plum Creek's land in this region, along with the commercial and recreational developments proposed by Plum Creek, may well affect the type, quality, and quantity of recreational opportunities in the region. In particular, what the Commission refers to as primitive recreation could change in the coming three decades, the period covered by the Plum Creek Concept Plan. Factors that will drive these changes include a host of situational factors on the landscape, changes in societal attitudes, and efforts by Plum Creek and others to develop recreational resources in the region. Specific factors of interest include:

- the number of recreationists with vacation homes or visiting the region;

October 2006 -- Consultant Report -- Not Administration or Departmental Position

- the density and quality of road access and other relevant infrastructure in the region such as boat launch sites, campsites, and hiking or snowmobile trails;
- promotion of nature-based tourism by public and private entities within the region;
- other commercial recreational developments;
- the rules governing public access to industrial forest lands;
- broader socioeconomic change, which could change the demand for outdoor recreation pursuits.

One of the obvious challenges facing LURC is distinguishing between changes that are likely to happen without approval of the Plum Creek Concept Plan from those attributable to elements of that plan.

Like the rest of Maine's north woods, the Moosehead region does not provide wilderness recreation experiences, at least using Federal wilderness definitions. (See 16 USC 23 § 1131.) Nonetheless, waterways in the region provide extensive recreation opportunities, including primitive paddling experiences. Land owners have traditionally provided public access at nominal fees or even free of charge for hunting, fishing, camping, hiking, snowmobiling, and other recreation pursuits that rely on the natural resources available in these largely wooded, albeit managed, landscapes. In most cases the lands have not been actively managed to provide recreational opportunities, rather recreation compatible with timber management activities has been accommodated. Intensity of use of these recreational resources is a function of both the number of potential recreationists and the specific attributes of the water-based and land-based recreation opportunities, including such things as the natural resources of the region, the

October 2006 -- Consultant Report -- Not Administration or Departmental Position
quality of road access, and the extent of other infrastructure facilities. Indeed,
infrastructure investment is a key determinant of type and quantity of recreation
opportunities in this type of region (Anderson, et al., 2005).

Since the Plum Creek development proposal should both increase numbers of
recreationists and change the access infrastructure, it could affect the nature of the
recreation opportunities. This report is not an impact assessment, rather it is an inquiry
into issues and factors that would be the basis of a qualitative evaluation of the range of
likely effects of the Plum Creek petition for rezoning on the primitive and other
recreation opportunities.

In undertaking this inquiry, particular attention is paid to the second of the
principal values articulated by Maine Land Use Regulation Commission (1997, p. 114)
“...that define the jurisdiction’s distinctive character.” Specifically, this is the value
associated with, “Diverse and abundant recreation opportunities, particularly for
primitive pursuits.” Changes proposed by Plum Creek might either support or degrade
the ability of the natural resources in the region to support this recreation value.

This report includes the following sections:

- Problems in defining the concept of “primitive” recreation in a way meaningful to the jurisdiction and practical to assess effects of the Plum Creek Concept Plan.
- The need to think about this question as one of a “with and without” question rather than “before and after.” This section includes discussions of national and state trends in outdoor recreation and the paucity of data on recreation use in the region covered by the Plum Creek Concept Plan.

October 2006 -- Consultant Report -- Not Administration or Departmental Position

- The central role that infrastructure, particularly roads, plays in creating both qualitative and quantitative changes in recreation use.
- A discussion of how both socioeconomic trends and changes in outdoor recreation opportunities change the mix of recreation users, perhaps favoring some users and uses and disadvantaging others.
- An assessment of whether given these issues discussed above there is further meaningful work that could be done to determine the impact of the Plum Creek Concept Plan on primitive recreation in the jurisdiction.

Primitive Recreation

A number of different adjectives are used to describe the recreational opportunities available in the Moosehead region which is covered by the Plum Creek Concept Plan. These include:

- Primitive
- Remote
- Wild or wilderness
- Nature-based
- Outdoor
- Unspoiled
- Sporting
- Adventure
- Backcountry

Some people use these adjectives interchangeably, while others feel the adjectives express different attributes of recreation opportunities.

The specific language in the LURC Comprehensive Plan expresses the value of “...diverse and abundant recreation opportunities, particularly for primitive pursuits...” that are supported by the conditions in the jurisdiction. One criterion for evaluating any

October 2006 -- Consultant Report -- Not Administration or Departmental Position

development proposal like the Plum Creek Concept Plan is the extent to which the land uses that the LURC ordinance allows support or degrade this value. The logical starting point for addressing this issue is determining what is meant by diverse, abundant, and primitive recreation opportunities.

The LURC Comprehensive Land Use Plan (1997 Appendix A-1) defines primitive recreation as “Those types of recreational activities associated with non-motorized travel, including fishing, hiking, hunting, wildlife study and photography, wild crop harvesting, trapping, horseback riding, tent and shelter camping, canoe portaging, cross country skiing, and snowshoeing.” The focus of this definition is on the recreation activity and whether or not it is associated with non-motorized travel. This focus is different from that of “primitive” as used in other recreation contexts. The activities used in the LURC definition may or may not be primitive as that concept has been used traditionally in recreation planning, particularly planning done by the U.S. Forest Service, the agency with the greatest legacy of work of this type. Primitive recreation has typically been thought of as describing more than just a type of activity or pursuit. A given activity might occur in multiple ways, not all of which would be thought of as primitive. For example, cross country skiing at a developed ski touring facility with groomed trails, warming huts, a club house, and other such amenities would not generally be thought of as primitive. A multi-day winter trek by ski in a forested landscape with little or not developed infrastructure would more likely be thought of as primitive. For LURC it may

October 2006 -- Consultant Report -- Not Administration or Departmental Position

be more productive to think of primitive recreation as the result of the interaction several factors -- the nature of the activity, the attributes of the natural resources within which the activity occurs, and the experience of the recreationists engaged in the pursuit.

The relationship between recreation activity and the natural and cultural landscape within which it occurs is one that Federal land managers have long dealt with. In particular, the USDA Forest Service is required to address this issue as it manages recreation in the multiple-use forests it operates. A number of different conceptual frameworks have been developed to address the management of lands and the nature of the recreation experience. One of the well-developed of these frameworks is the Recreation Opportunity Spectrum (Clark and Stankey, 1979). The Recreation Opportunity Spectrum (ROS) reflects the thinking that the setting in which recreation occurs is "... a combination of physical, biological, social, and managerial conditions that give value to a place" (Clark and Stankey, 1979, p. 1). These conditions, called situational factors, create opportunities. The idea in its simple form is that the nature of the opportunity, for example whether primitive recreation might occur on particular lands, is a function of the setting as well as the activity.

The ROS was designed for Forest Service personnel to meet their management obligations. Clark and Stankey (1979) say, "The basic assumption underlying the ROS is that quality in outdoor recreation is best assured through provision of a diverse set of opportunities" (p. 4). The original version of ROS assumed that managers needed to pay

October 2006 -- Consultant Report -- Not Administration or Departmental Position
attention to six situation factors that would define the nature of recreation opportunities:

- Access
- Other non-recreational resource uses
- Onsite management
- Social interaction
- Acceptability of visitor impacts
- Acceptable level of regimentation

By looking at the range of situations for each of these factors a spectrum of recreation opportunities is defined from those that are “primitive” to those that are “modern.” (See Figure 1.) In the figure, the “acceptable” range of combinations for “semi-modern” opportunities is highlighted for illustrative purposes.

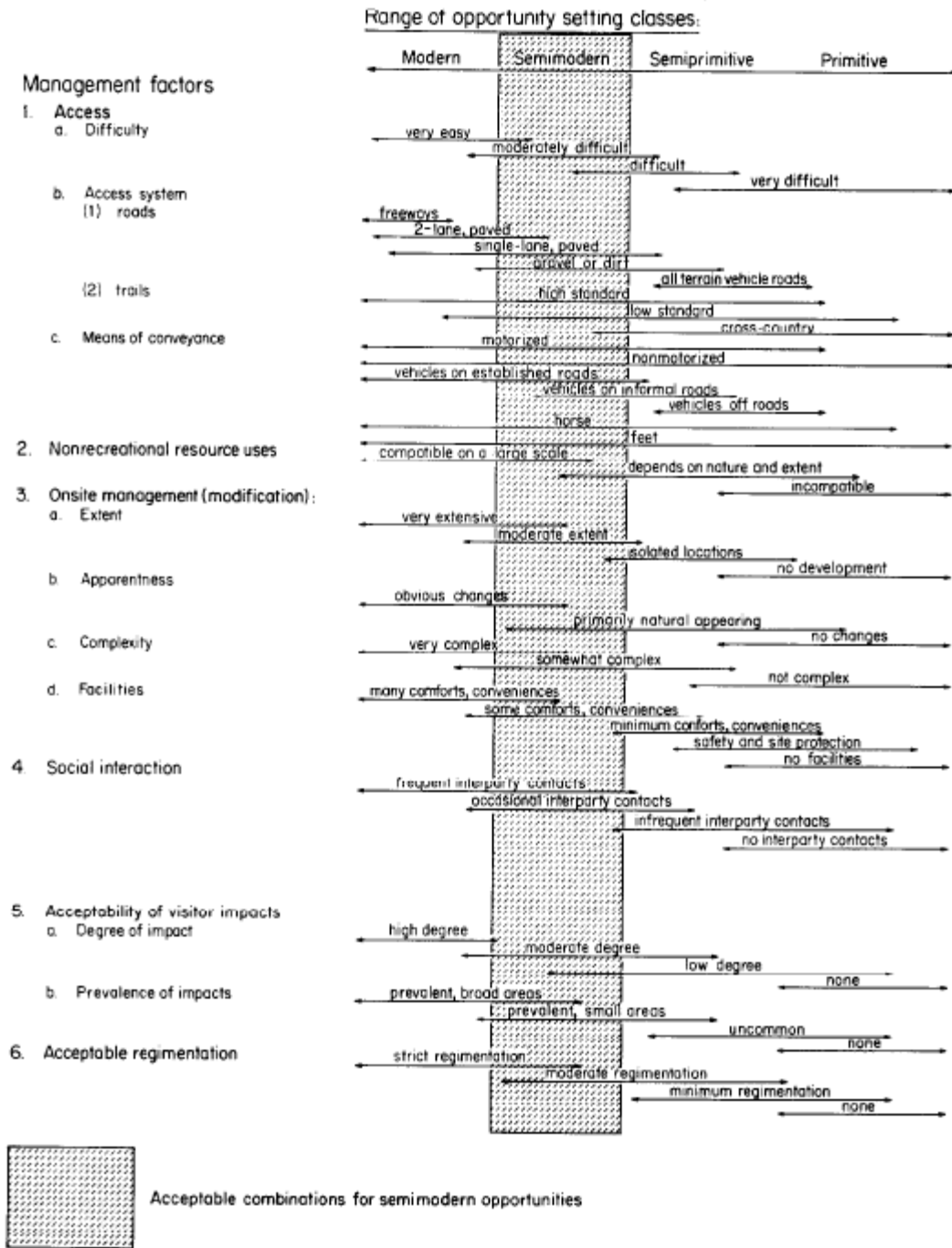


Figure 1. Range of Factors Defining Recreation Opportunity Spectrum from Clark and Stankey (1979, p. 15)

The ROS was designed for planning the provision of recreation opportunities in a public, multiple-use management setting, obviously very different from the circumstance the Commission faces in evaluating the effects of the Plum Creek Concept Plan. However, the tool can be useful to the Commission in helping it consider the impact of any development on its stated value of diverse recreation opportunities, including primitive pursuits. Clark and Stankey (1979) argue that, "Because the recreation opportunity spectrum focuses on specific features of the physical, social, and managerial setting, it facilitates analysis of how proposed management actions will alter the nature of specific opportunities" (p. 24). From this it is clear that a certain mix of situational factors is a necessary, if not sufficient, condition for primitive recreation to occur

There are direct links between a change in land use in the jurisdiction (for example, changes that result from a rezoning as we have in this case) and one or more of the situational factors in the ROS, and particularly the access factor and the social interaction factor. For example, changes in land use that enhance ease of access or increase frequency of contact with other people could move the recreation opportunities in the landscape from more primitive ones to more modern ones. The ROS thus becomes a tool for assessing impacts on recreation of the proposed rezoning.

Before doing this kind of impact assessment, the obvious issue that must first be

October 2006 -- Consultant Report -- Not Administration or Departmental Position
addressed is the extent to which the lands in question would support a given level of opportunity on the spectrum without the change in land use. That is, before the Commission could judge whether the Plum Creek Concept Plan adversely affects the Commission's expressed recreation value, it would need to know where on the ROS the areas in question would sit if the concept plan were not approved. This is central to the with/without issue discussed more in the next section of this report.

There are two additional points to bear in mind here. First, ROS is not a measure of either the experience of the recreationist or of the carrying capacity of the natural resource base. It only creates a framework for managing the provision of opportunity or for assessing the impact of management changes on opportunities. The related concept of carrying capacity addresses how much of various recreational opportunities could be provided with given resources. (See, for example, Newman et al., 2001.)

Second, a casual application of the ROS suggests that what the Commission and others in Maine think of as primitive activities may actually fall toward the semi-primitive or even the semi-modern range of the spectrum. In particular, access and social interaction are likely in much of Maine to an extent that is not consistent with what the Forest Service has considered to be primitive the ROS framework. For example, in one Forest Service (undated) recreation resource planning document primitive is defined in this way:

Generally, it is on a setting of at least 5,000 acres and 3 miles away from all roads

October 2006 -- Consultant Report -- Not Administration or Departmental Position
and trails with motorized use (or has sufficient spatial or topographic characteristics to allow a sense of solitude). Access is via non-motorized trails or cross country. Very low interactions with other visitors. Very high chance of solitude; unmodified natural or natural-appearing environment.

The extent to which primitive opportunities using this definition would exist in the land subject to the Plum Creek Concept Plan has not been carefully studied, but the extensive road network and history of industrial forest management in the region both reduce the likelihood that lands would be defined as primitive using the ROS framework.

A fruitful way to approach the question of how much of the recreation in this region is primitive is to consider again that primitive recreation is a function of three aspects -- the situation factors described by the ROS, the activity pursued, and the experience of the user. Using a local example, imagine canoeing along the shore of First Roach Pond. Is this primitive recreation? The boaters will be engaged in a non-motorized activity. Some sections of the shore appear largely undeveloped, while in other sections the boaters will note vegetative differences from previous timber management operations. The experience along the undeveloped shore of the pond may feel “primitive” to one individual while to another it does not since part of the experience will entail paddling along a shoreline with camps and cottages.

Prong Pond provides another example of this kind of definitional challenge. Prong Pond is reported to be a popular spot for canoeing and kayaking because of its solitude and ease of access. (Moosehead Region Futures Committee, 2006a) The

October 2006 -- Consultant Report -- Not Administration or Departmental Position
resource is a short drive from Greenville and the boat launch is very close to a paved highway, the Lily Bay Road. Applying the ROS framework, the proximity of this resource to Greenville and its ease of access might result in the resource being classified as semi-modern. Yet many users are reported to treasure the resource and experience it as a primitive pursuit. This affirms a truism that the experience of recreation says as much about the person as it does about the resource. Thus, in determining whether recreation is primitive or not, it is necessary to consider the situation factors of the landscape, the specific recreation pursuit, and the experiences of the user.

This reality suggests that the extent to which any re-zoning affects recreation opportunities will be a complex interaction of change in the situational factors of the resource, the changes in activity pursued, and the way in which these changes are perceived by users. All three potential changes would need to be understood to fully assess the impacts of the proposed development.

With/Without Analysis

In impact assessment of this type, it is important to differentiate a before/after analysis from a with/without analysis. One could compare the nature of recreation opportunities and pursuits in the jurisdiction 30 years from today if the Plum Creek concept plan were approved with the opportunities available today. However, that would be inappropriate for measuring impacts of the Concept Plan. That approach is known as

October 2006 -- Consultant Report -- Not Administration or Departmental Position
a before/after impact assessment. Clearly not all change in recreation in the region over this time period and beyond will be attributable to the effects of the concept plan.

Recreation opportunities and pursuits will change in the region even if the rezoning is not approved. One of the obvious reasons for this is that not all aspects of recreation in the region are determined by factors controlled by the LURC ordinance. Factors not controlled by land use planning and regulation are also at work in the region. Therefore, the appropriate approach to impact assessment is a with/without analysis -- comparing estimates of the impact of the concept plan on recreation with estimates of the change in recreation that would have occurred otherwise.

This difference between a with/without analysis and a before/after analysis is a common issue in environmental impact assessment. While a with/without assessment is more difficult to complete, it is the fair approach because it focuses on the proposed project at issue. This is the reason that the assessment of the No-Action Alternative is required in Environmental Impact Assessments under the National Environmental Policy Act (NEPA) (Eccleston, 1999, p. 275).

A with/without analysis in this case makes impact assessment particularly difficult because it requires estimating several kinds of change. Among other things, one must consider the exogenous change in recreation patterns of the people of Maine and beyond, the residential and commercial development that would occur in this region and adjacent lands without the rezoning, and then the changes attributable to the development allowed

October 2006 -- Consultant Report -- Not Administration or Departmental Position
in the rezoning.

A particular challenge in doing this analysis of recreation impacts is the paucity of data on recreation participation in the area covered by the concept plan. There are few data on specific participation trends in the Moosehead Region, so it is necessary to infer outdoor recreation participation trends, both for activities and level, from other data. Several sources suggest that, in general, the demand for the outdoor recreation of interest here, including what some would call primitive recreation, is declining. This appears to be true both nationally and in the northern Maine region. Visitation to National Parks has been declining fairly steadily since the late 1980s (Pergams and Zaradic, 2006). Closer to the area of interest here, there are fewer through hikers completing the Appalachian Trail at Baxter State Park (Anderson, et al., 2005) and the trend in visitors reported by the North Maine Woods is declining (Cowperthwaite, 2005). Without good data on specific activities, it is impossible to determine the meaning of these general trends for specific activities. Participation in some specific pursuits may be increasing while overall participation is declining.

Pergams and Zaradic (2006) suggest that these data may reflect a shift in attitudes in our society that need to be addressed as part both the with and the without scenarios. “We may be seeing evidence of a fundamental shift away from people’s appreciation of nature (biophilia ...) to ‘videophilia,’ which we here define as ‘the new human tendency to focus on sedentary activities involving electronic media’” (p. 393). Other social and

October 2006 -- Consultant Report -- Not Administration or Departmental Position
demographic trends may also be at work in changing recreation patterns, such as the aging of the baby boom generation.

Assuming recreation participation patterns in the Moosehead region match these national trends, there would be a declining participation in activities included in the LURC definition of primitive recreation. Examples of countervailing effects include activities by the Appalachian Mountain Club (2004) and others to develop the outdoor recreation assets in the 100-Mile Wilderness Region and public efforts to develop nature-based tourism in Maine (FERMATA, 2005). The risk in making projections such as these is the difficulty in sorting out long-term trends in societal behavior from cyclical variations. Impact assessment requires making explicit assumptions about key factors affecting aspects of interest, in this case outdoor recreation.

The without analysis requires making assumptions about social and economic factors for the next 30 years. Illustrative examples of such assumptions include:

- The likely changes in demand for nature-based or primitive recreation among demographic groups that have traditionally recreated in Maine.
- Likely development of residential, commercial, and recreational resources in the concept plan area that would happen if the rezoning were not approved.
- The likelihood that private land owners in the region, Plum Creek or subsequent land owners should Plum Creek sell some or all of their holdings, continue to allow free or low cost public access to their lands for recreation.
- Likely development of residential, commercial, and recreational resources in the regions adjacent to concept plan area that would happen if the rezoning were not approved.
- The likely forest management practices including harvest intensity, road construction and maintenance, and regeneration strategies.

October 2006 -- Consultant Report -- Not Administration or Departmental Position

- Finally, climate and other natural change that could affect the natural features of this region and therefore affect recreational opportunities available even without approval of the Plum Creek concept plan.

Each of these factors can affect the situational factors in the Recreation Opportunity Spectrum, so we can anticipate that the nature of recreational opportunities will change without the requested rezoning. Once assumptions have been made about the effects of the changes that are most likely, then the impact analysis (the with scenario) can be made. The question facing the Commission at that point is, how would the Plum Creek Concept Plan change the ROS situational factors for the region compared with these likely changes in the without analysis? Table 1. summarizes examples of the types of important decisions that need to be made in the without analysis and the types of effects on recreation of these assumptions.

Table 1. Illustrative Examples of Types of Assumptions for Without Analysis

Assumption Type	Specific Assumptions of this Type	Likely Effect on Recreation in Region
Public Access Rules for Plum Creek Lands	<p>1 Status quo</p> <p>2 Plum Creek sells “kingdom lots” exercising two in five rule</p> <p>3 Plum Creek Sells large parcels to conservation buyer(s)</p> <p>4 Plum Creek decides to restrict recreation access further on lands</p>	<p>No effect on trends in the region</p> <p>Fragments activities like hunting</p> <p>Depends on the values and objectives of buyer</p> <p>Reduced recreation access by pursuit type or overall</p>
Rules for Subdivision in LURC jurisdiction	<p>1 Status quo</p> <p>2 “Two in five” allowance in LURC jurisdiction eliminated by legislature</p>	<p>Build-out of residential lots increases as land owners exercise “two in five” options</p> <p>Build-out slowed by LURC approval processes</p>

<p>Public participation in outdoor recreation/nature-based tourism</p>	<p>1 Motorized and consumptive pursuits increase 2 Motorized and consumptive pursuits decrease 3 Non-motorized and non-consumptive pursuits increase 4 Non-motorized and non-consumptive pursuits decrease</p>	<p>Increased demand for infrastructure to support these activities Decreased demand for infrastructure to support these activities Increased demand for infrastructure to support these activities Decreased demand for infrastructure to support these activities</p>
<p>Timber management regimes</p>	<p>1 Not certified 2 SFI certified 3 FSC certified</p>	<p>? ? ?</p>
<p>Other important elements</p> <ul style="list-style-type: none"> • Climate change • Commercial and residential build out • Recreation resource development in lands adjacent to the Concept Plan 	<p>?</p>	<p>?</p>

Roads and Other Infrastructure

With the end of log drives on Maine rivers in the 1970s, road construction in Maine's industrial forests increased dramatically. One of the unintended consequences of this policy designed to improve Maine's water quality was a significant change in the way recreation occurred in Maine's woods. An informal view of this change is related by Langley (2006). "One hundred years ago the rivers, streams and lakes were the main highway, with many foot trails to out camps and other hunting and fishing areas. Now we have thousands of miles of logging roads, with shorter foot trails into ponds and other hot spots" (p. 26).¹

The change in road networks in Maine's industrial forests is probably the most significant change affecting recreation opportunities. Hannon (2004), in his study of wilderness experience programs in Maine, notes the importance of this change in road access: "...there are several material indicators of rising pressure on the remote places usually associate with primitive styles of recreation. For example, numerous roads developed primarily for timber harvest that were once kept locked have been opened since 1986 as North Maine Woods, Inc. has assumed recreation of more privately owned Maine timberlands" (p. 9). Changes in the road network are relevant because several

1 This perspective is in contrast to a common misperception of the Maine's forests, as a "...vast area of roadless lands, which cover nearly one-third of the state" (Woodward, 2006, p. 31).

of the situational factors in the ROS are affected by the density and quality of roads in the region.

Forest recreation managers see road construction and maintenance as a crucial part of the management framework. Queen et al. (1997) observe, “Roads themselves may be considered recreation facilities for activities such as recreational driving, ‘challenge’ driving, wildlife observation, and sightseeing. Conversely, lack of roads in an area helps provide primitive recreation opportunities such as trail hiking or cross-country travel, isolating the recreationists from the sights and sounds of humans” (p. 194).

Roads and other infrastructure are key determinants of the type and intensity of use of the forested landscape because of their effects on multiple situational factors in the ROS. Other infrastructure that supports increased use includes boat launches, signage, maps, guidebooks, toilet facilities, and parking.

One of the ironies of nature-based tourism is a tradeoff between infrastructure development and the extent to which the natural resources can serve as an engine for economic development in a region (Anderson et al., 2005). More infrastructure investment leads to more use and positive economic impacts. Yet this very increase in use can degrade the natural resources at the foundation of the recreation opportunities or adversely change the experience of various pursuits for those who have been enjoying them. To understand this tradeoff, it is necessary to understand the different ways people use the natural resources

that support outdoor recreation. There is a gradient of use that is both qualitative and quantitative in nature-based recreation. (See Figure 2)

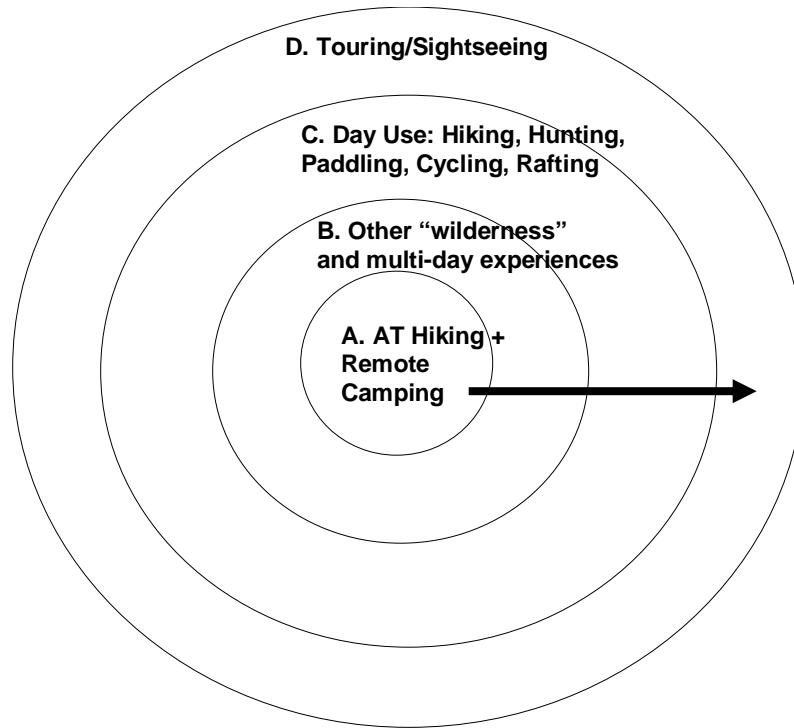


Figure 2. Model of Recreational Use Intensities (based on Anderson et al., 2005, p. 41)

This model was developed to consider the potential economic impacts of adding conservation lands to the 100-Mile Wilderness region of Maine (hence the reference to AT hiking and “wilderness”). The insight here was twofold. First, economic impacts from recreation increase as you move from activities at the core of this model outward. This is primarily because there are increasingly more potential participants as you move outward from the central activities. Also, recreationists tend to spend more per person in local

economies as you move outward from the central activities. Second, to generate these additional benefits requires investments in infrastructure to support them. This means moving from right to left on the ROS (from the primitive end toward more modern opportunities) is necessary for increasing the local economic benefits derived from these natural resources. This movement often results in a sense of loss among those who traditionally enjoyed the pursuits at the center of this model.

This same framework is helpful in assessing the impacts on recreation of the Plum Creek Concept Plan. The extent to which the elements of the concept plan change the infrastructure of the area will drive much of the effects on recreation opportunity, particularly as infrastructure affects ROS situation factors such as access and acceptable level of regimentation.

The infrastructure changes may well be more important than changes in level of use that potentially affect the social interaction situational factor. Federal wilderness managers struggle with whether they need to limit access and hence “use density” in order to preserve wilderness experiences. Borrie and Birzell (2001) argue that “...there may not be a simple and direct relationship between use levels and experiential quality” (p. 37). If this is true of wilderness experiences it probably applies to primitive recreation in this region as well.

Since the road infrastructure is related to forest management activities,

the impact of the roads goes beyond the question of access to recreational resources these roads supply. Construction and maintenance of roads to support forest management means that those management activities also affect recreation opportunities through the Other Non-recreational Use situational factors in the ROS.

Hunt et al. (2000) determined that there are clear differences in the desirability of recreation in what they termed “logged settings.” These differences are driven by both sociodemographic factors and by the activity interests of recreationists. Roads and related infrastructure obviously change the access situational factors. However it is the underlying purpose of the roads, industrial forest management, that probably affects the desirability of recreation in the region to various segments of the outdoor recreation markets. This reinforces the centrality of roads and other infrastructure to understanding the marginal effects of the proposed rezoning on recreation in this region.

Change in Recreation User Mix

The with/without analysis recognizes that change in recreation supply and demand over time is the rule. Recreation is a dynamic phenomenon. Several types of change help us understand the recent history of the Moosehead Region and contemplate its future.

First, there are changes in recreation resource management that trigger unintended, but perhaps predictable consequences. Valuable natural resources for recreation may be “discovered” either through media attention (being mentioned in a travel guide) or through explicit marketing (such as the FERMATTA (2005)) recommendations for development of more nature-based tourism in Maine). Increased use often leads to a phenomenon called “invasion and succession.” Clark and Stankey (1979) explain, “As the new type of user becomes increasingly established, original users move to other locations more to their liking, that is where the combination of all opportunity factors (including access, use density, and facilities) still resemble the kind of opportunity formerly enjoyed” (p. 20). Of course, for those who are displaced by the change, there is the question of whether there are “other locations more to their liking” for them to move to.

This dynamic typically represents a move from the center outward in the model of recreation use intensities in Figure 2 above. This invasion/succession creates both winners (new users who discover the site) and losers (those who previously enjoyed the site) making determination of the overall net benefits of the change difficult. The original users sense the loss of place they had come to enjoy. Its very enjoyment by an increasing number of others reduced its value to them through ROS situational factor Social Interaction. On the other hand, this type of change typically creates more economic activity in the regional

economy and increases benefits for a new group of users.

Recreation managers dealing with invasion/succession have to consider how the benefits to new users relate to the losses from those whose traditional recreational resource has been “invaded.” This is particularly true to trying to determine carrying capacities for resources characterized as wilderness. How much increase in use of a wilderness area leads to it no longer being wilderness?

One tool developed to address this issue is the Limits To Acceptable Change (LAC) model (Cole and Stankey, 1997). The LAC process focuses on both environmental conditions and visitor experiences to set standards and management prescriptions. The LAC model explicitly recognizes the issue discussed above that ideas like “wilderness” or “primitive” are multidimensional and include subjective elements of the recreationists’ experience.

This is relevant for the Commission here since a change from the rezoning might have counterintuitive effects, depending upon how much change particular users find acceptable. Return to the Prong Pond example discussed above. Some level of residential development could degrade the experience for some users, exceed their limit of acceptable change, so that they stop paddling there. Other users may regret the change but continue to enjoy the changed experience. And others still might discover the experience and find it “remote” or “primitive,” not having the previous less-developed alternative

to compare the experience to. The LAC framework reinforces the complex relationship between situational factors, pursuit, and individual experience that make up outdoor recreation.

Another dynamic affecting the Moosehead region is exogenous demographic change leading to change in demand for traditional recreation activities. Relevant to the Plum Creek Concept Plan is the study by Hunt et al. (2000) of the desirability of recreating in logged settings. While only one study, this work may help explain recent trends in recreation demand in the Moosehead region. This was a study of U.S. and Canadian recreationists in a region of Ontario similar to the Moosehead Region in geography and economic history. The authors found that “Many relationships exists between the desirability for logged settings and the sociodemographic characteristics of individuals...married, older, retired or blue-collar employed, and rural individuals with lower formal education all have greater desirability for recreating in logged settings...Additionally being a member of an environmental organization or an outdoor recreation club decreases an individual’s desirability for being in a logged setting” (p. 722).

They also found that activity interest of recreationists affected desirability of recreation in a logged setting. Consumptive and motorized activity interest were positively related to desirability while non-motorized and nature-based activity interests were negatively related to desirability. They

suggest from these results, “Given that ecotourists/nature-based tourists tend to be more educated than others, our finding suggests that ecotourists/nature-based tourists may be less accepting of logged settings than others. Therefore, any attempts to develop nonconsumptive, nature-based tourism in hinterland areas where logging is dominant may be difficult” (p. 730).

The results of the work of Hunt et al. (2000) and Pergams and Zaradic (2006), when taken together, suggest two points about changes in outdoor recreation in the Moosehead region. Demand for consumptive and motorized activities that have dominated in the recent past may continue to decline, although snowmobiling is one likely exception to this trend. (See Bureau of Parks and Recreation, 1994 and Maine Bureau of Parks and Lands, 2003.) Replacing this demand with new recreationists interested in non-motorized and non-consumptive activities typically associated with the idea of nature-based tourism may be a challenge given the continued active industrial forest management regime in the region.

The commitment of Plum Creek to management of its land to meet SFI or other certification standards may reinforce that effect, as counterintuitive as this first seems. To the extent that these certification programs encourage practices that entail more partial cutting of forests, more extensive management practices over a larger area are necessary more often. This requires more extensive road maintenance and increases the likelihood that recreationists will

encounter management practices through sight and sound. This increased likelihood will confront the negative desirability of such encounters for those who engage in nature-based tourism activities.

Estimating the Impacts of the Plum Creek Concept Plan on Recreation

Based on this preliminary inquiry, a professional (qualitative) judgment of the impacts of the Plum Creek Concept Plan on the LURC recreation value could be developed. It would require a set of detailed assumptions of the factors discussed above for both the with and the without scenarios. Using pursuits like those in the LURC definition of primitive recreation, a qualitative judgment could be made of the effects of the Plum Creek Concept Plan. Table 2. presents a template for reporting these judgments.

Table 2. Illustrative Template for Reporting Recreation Impact Assessment

Primitive Recreation Activity ²	Trend without Plum Creek Concept Plan	Effect of Plum Creek Concept Plan
Fishing		
Hiking		
Hunting		
Paddling sports		
Wild Crop Harvesting		
Trapping		
Horseback Riding		
Tent and Shelter Camping		
Wildlife Study & Photography		
Cross Country skiing		
Snowshoeing		

In making the judgments necessary to complete this exercise, a number of specific questions need to be considered. Below are some illustrative questions derived from the background discussion presented in this report and

² Examples of primitive recreation activities based on the definition used by the Maine Land Use Regulation Commission Comprehensive Land Use Plan.

from the specifics aspects of the Moosehead Region. Questions to be addressed in an impact assessment include, but are not limited to, the following:

- To what extent are the current recreation opportunities in this region carried out in a manner such that either the situational factors or the experiences of recreationists would be considered primitive?
- To what extent does the movement of the population center of the region northward by housing development in the Concept Plan change remote ponds further north that are currently beyond “day trip” status into “day trip” status for more anglers? How will this shift degrade the current fishing experiences on those ponds?
- Is the trail easement language submitted by Plum Creek to LURC in August 2006 sufficiently protective that a government agency or NGO would be willing to invest resources to construct and maintain trail systems? This will determine whether the Concept Plan enhances hiking opportunities in the region.
- Does the proposed peak to peak trail system provide adequate day hiking opportunities? There are differences of opinion in the recreation management community over whether the real demand in the future will be for more day hiking opportunities or more multi-day hiking opportunities.
- What impacts would proposed development on Long Pond, Brassua, and Moosehead at Big W have on the experience of and/or participation in the Northern Forest Canoe Trail?
- To what extent does the Lily Bay resort development replace low-intensity recreation use with high-intensity recreation use? Does this effect reduce primitive recreation opportunities or enhance them?
- How does house lot development on places such as Prong Pond, Indian Pond, and Upper Wilson Pond press up against the limits of acceptable change, particularly for those involved with day use paddling?
- Will the two resorts actually be built if the Concept Plan is approved? Are there business plans for these and their expansion of hiking and Nordic skiing opportunities? Will a downhill ski operation at Big Moose Mountain be viable in the future? These resorts and the likelihood of their success are important to the question of the overall diversity of recreation opportunities in the region.
- Do the current road networks and their improvements to provide access to new housing lots have differential implications for land-based and water-based recreation opportunities? Are paddling opportunities

- affected by road development differently from hiking, hunting, fishing, etc.?
- How much of the land covered by the concept plan will be posted for no hunting for safety purposes because of the increased number of house lots?
 - Is there a conflict in Maine between industrial forest management and nature-based tourism similar to that identified in the study by Hunt et al.? If so, is the conflict different for land-based and water-based pursuits?

Appendix

Telephone interviews conducted to assist in this research. Note that the judgments and opinions expressed in this report are those of the author alone and do not necessarily reflect those of the parties interviewed.

- Stephen Spencer, Maine Department of Conservation, September 2006
- Tom Rumpf, Maine Chapter, The Nature Conservancy, September 2006
- John Daigle, School of Forest Resources, The University of Maine, September 2006 (consultant to Plum Creek)
- Cathy Johnson, Natural Resources Council of Maine, October 2006
- Bryan Wentzell, Appalachian Mountain Club, October 2006

References

- Appalachian Mountain Club. 2004. "Progress Report on Maine Woods Initiative – November 2004" AMC web site:
www.outdoors.org/conservation/maine/mwi-progress.cfm.
- Anderson, Mark W., Kathleen P. Bell, and Kevin J. Boyle. 2005. Procedures for Evaluating the Potential Regional Economic Impacts of Conservation Lands in the 100-Mile Wilderness Region. CentRO Staff Paper 101. Orono, Maine: Center for Tourism, Research, and Outreach, The University of Maine.
<http://www.umaine.edu/nrc/welcome/100%20Mile%20Wilderness%20Report%208-17-05%20FINAL.pdf>
- Borrie, William T. and Robert M. Birzell. 2001. "Approaches to Measuring Quality of the Wilderness Experience." USDA Forest Service Proceedings. RMRS-P-20. pp. 29- 29.
- Bureau of Parks and Lands, Maine Department of Conservation. 2003. Maine State Comprehensive Outdoor Recreation Plan 2003-2008. Augusta, Maine.
- Bureau of Parks and Recreation, Maine Department of Conservation. 1994. Maine Outdoor Recreation Activity Participation and Trends. Augusta, Maine.
- Clark, Roger N. and George H. Stankey. 1979. The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. PNW-98. Pacific Northwest Forest and Range Experiment Station. USDA Forest Service.
- Cole, David N. and George H. Stankey. 1998. "Historical Development of Limits of Acceptable Change: Conceptual Clarifications and Possible Extension." in McCool et al. Proceedings -- Limits of Acceptable Change and Related Planning Processes. Gen. Tech. Rep. INT-GTR-371. Ogden, Utah. Rocky Mountain Research Station, USDA Forest Service.

- Colgan, Charles S. 2005. Estimated Economic Impacts of Implementing the Proposed Plum Creek Rezoning Plan in the Moosehead Lake Area. Report prepared for Plum Creek Maine Timberlands, LLC.
- Cowperthwaite, Albro. 2005. “North Maine Woods” & Changing Use of the Maine Woods. Presentation to the Commissioners and Staff of the Land Use Regulation Commission.
- Eccleston, Charles H. 1999. The NEPA Planning Process: A Comprehensive Guide with Emphasis on Efficiency. New York: John Wiley & Sons.
- FERMATA, Inc. 2005. Strategic Plan for Implementing the Maine Nature Tourism Initiative. Report Prepared for Maine Department of Community and Economic Development.
http://www.econdevmaine.com/resources/pdfs/0926_final_report.pdf
- Hannon, James. G. Jr. 2004. Place Needs and Client Outcomes of Wilderness Experience Programs in Maine: A Descriptive-Interpretive Approach. Master of Science (Forestry) Thesis. The University of Maine.
- Hunt, Len, G. David Twynam, Wolfgang Haider, and Dave Robinson. 2000. “Examining the Desirability for Recreating in a Logged Setting.” Society and Natural Resources. Vol. 13. pp. 717-734.
- Irland, Lloyd C. 1996. “Outdoor Recreation in the Maine Woods: Issues for the Future.” In Land, Timber, and Recreation in Maine’s Northwoods. MP. 730. Orono, Maine: Maine Agricultural and Forest Experiment Station, The University of Maine.
- Keene, Christopher. 2003. North Woods Walks: A Collection of Hikes in Northern Maine.
- Langley, Michael. 2006. “Guiding in the North Maine Woods.” North Maine Woods 2006: Experience the Tradition. Ashland, Maine: North Maine Woods.
- Maine Land Use Regulation Commission. 1997. Comprehensive Land Use Plan. Augusta, Maine.
- Moosehead Regional Futures Committee. 2006 a. “Suites of High Value

- Nature Tourism Experiences.” Unpublished report, provided by personal communication, Sandra Neily, September 2006.
- Moosehead Region Futures Committee. 2006 b. “Four Economic Sectors of the Moosehead Region’s Sustainable Economy.” Unpublished report, provided by personal communication, Sandra Neily, September 2006.
- Natural Resource Council of Maine. 2006. A Vision for the Mossehead Lake Region. Augusta, Maine.
- Newman, Peter, Jeffrey L. Marion, and Kerri Cahill. 2001. “Integrating Resource, Social, and Managerial Indicators of Quality into Carrying Capacity Decision-Making.” The George Wright Forum. Vol. 18. No. 3. pp. 28-40.
- Pergams, Oliver R.W. and Patricia A. Zaradic. 2006. “Is love of nature in the US becoming love of electronic media? 16-year downtrend in national park visits explained by watching movies, playing video games, internet use, and oil prices.” Journal of Environmental Management. Vol. 80. pp. 387-393.
- Queen, Lloyd P., Jonathan C. Vlaming, Greg J. Arthaud, and David W. Lime. 1997. “Modeling Impacts of Forest Roads on Recreation Opportunities.” Northern Journal of Applied Forestry. Vol. 14, No. 4. pp. 194--201.
- Spencer, Steve. 2005. Presentation for Land Use Regulation Commission.
- USDA Forest Service. Undated. Recreation Opportunity Spectrum (ROS). <http://www.fs.fed.us/recreation/programs/beig/beig6c.htm> Retrieved: August 14, 2006.
- USDA Forest Service. 1987. Project Planning: ROS User’s Guide Chapter 60. _Washington, D.C.: US Government Printing Office.
- Woodward, Colin. 2006. “The Sale of the Century.” Nature Conservancy. Vol. 56. No. 3. pp. 20-35.

Appendix B

MARK W. ANDERSON

Office: School of Economics
305 Winslow Hall
The University of Maine
Orono, Maine 04469
(207) 581-3198
email: Mark_Anderson@umit.maine.edu
web: www.umaine.edu/ees/

Employment History

June 1974 to June 1978: Research Associate, The Futures Group, a research and consulting firm in Glastonbury, Connecticut.

1978 to Present: The University of Maine.

August 1978 to May 1980: Graduate Research Assistant, Department of Agricultural and Resource Economics.

May 1980 to January 1982: Research Associate, Department of Agricultural and Resource Economics.

February 1982 to June 1983: Assistant Administrative Officer, Maine Agricultural Experiment Station and College of Life Sciences and Agriculture.

May 1982 to August 1997: Cooperating Assistant Scientist and Instructor, Department of Resource Economics and Policy.

July 1983 to August 1997: Assistant Director, Maine Agricultural & Forest Experiment Station and Administrative Officer, College of Natural Sciences, Forestry, and Agriculture. Promoted to Associate Director for Administration, July 1989.

September 1988 to August 1997: Coordinator, Natural Resources Program.

September 1997 to June 1998: Interim Chief Financial Officer: Responsible for financial management of the University of Maine within the framework established by the University of Maine System. Served as member of President's Cabinet and Executive Council. Reporting units included: Budget and Business Services; Bursar; Human Resources; Purchasing; Environmental Health and Safety; Employee Assistance.

June 1998 to June 1999: Interim Vice President for Student Affairs. Served as member of President's Cabinet and Executive Council. Reporting units included: Center for Students and Community Life; Residential Life; Dining Services; Student Health Services; Counseling Center; Public Safety; Student Employment; and Career Center.

July 1999 to 2001: Coordinator of Natural Resources Program; Instructor in Resource

MARK W. ANDERSON

Economics and Policy; and Assistant Director for Policy, Maine Agricultural and Forest Experiment Station.

September 2001 to January 2003: Interim Chief Financial Officer.

January 2003 to present: Senior Instructor, Resource Economics and Policy (School of Economics from July 2007) and Coordinator, B.S. program in Ecology and Environmental Sciences.

Major Committee Assignments at the University of Maine

- College and Experiment Station Executive Committee--1982 to 1997.
- Secretary to MAFES Research Council--1985 to 1996.
- Dow/Griffiee Graduate Research Awards Selection Committee--1984 to 1997.
- Search Committee for Assistant Vice President for Cooperative Extension--1987.
- Presidential Commission on the Land Grant/Sea Grant University of the Future--1987-1988.
- Student Conduct Code Committee--1987 to 1992. Committee Chair--1990 to 1992.
- Sponsored Programs Division Advisory Committee-- 1988 to 1992.
- Coordinator, exchange program with University of Sunderland, England--1990 to 1997.
- Chair, Holmes/Rogers Hall Building Renovations Project Committee--1990-91.
- Planning Committee for Inauguration of University of Maine President Frederick Hutchinson.
- Barrier Free Access Committee--1992-1996, and 1999 to 2003.
- Search Committee for Vice President for Research and Public Service--1993.
- NCAA Certification Self-Study Committee. Chair of Fiscal Integrity subcommittee--1994-97.
- University of Maine System Collective Bargaining negotiating team for bargaining with UM Professional Staff Association (UMPSA)--1994-1996.
- Chair, Aroostook Farm Potato Research Laboratory Building Committee--1994-1996.
- Chair, Chief Financial Officer Search Committee--1996.
- Chair, Task Force on Research--1995-1996.
- Professional Employees Advisory Council--1996 to 1997.
- President's Council on Women--1997 to 1999.
- Chair, Residence Hall Construction Planning Committee--1998-1999.
- Chair, Campus Alcohol Initiative--1999.
- Search Committee for Provost and Vice President for Academic Affairs--1999.
- Chair, Campus Marketing Committee--1998 to 1999.
- Chair, Hitchner Hall Science Building Committee--1999 to 2003.
- Search Committee, Director of Human Resources--2000.
- Chair, Campus Planning Committee--2000 to 2002.
- Elected member, Faculty Senate--2000 to 2001.

MARK W. ANDERSON

- NCAA Certification Interim Report Committee--2000.
- Search Committee, Senior Associate Director of Athletics--2001.
- Chair, Auxiliary Enterprise review committee for University Bookstore--2002.
- Chair, Bookstore Director Search Committee -- 2002
- Chair, Search Committee, Vice President for Administration--2002.
- International Affairs Program Steering Committee – 2003 to present.
- Search Committee, Director of Purchasing – 2004.
- Search Committee, Associate Provost for Undergraduate Education -- 2005.
- Center for Teaching Excellence Steering Committee -- 2005 to present.
- Search Committee, Dean, Natural Sciences, Forestry, and Agriculture -- 2005 to 2006.
- R.E.P. (School of Economics from March 2007) Policy Advisory Committee -- 2006 to present.
- Chair, Search Committee, Assistant Vice President for Human Resources -- 2006.

Education

Brewer High School, Brewer, Maine. Diploma--June 1970.

Bowdoin College, Brunswick, Maine. A.B. *Magna Cum Laude* with Honors in Government and Legal Studies--June 1974.

Durham University, Durham, England. Junior year through the Institute of European Studies--1972-1973.

University of Maine, Orono, Maine. M.S. in Agricultural and Resource Economics--1980. George F. Dow Award for graduate student research. Thesis entitled, "Socioeconomic Factors Affecting Rural Land Use Regulation in Maine."

Teaching Experience

1982 to 1997 and 1999 to present: Department of Resource Economics and Policy, University of Maine. Taught the following courses:

- Principles of Economics.
- Economics of Environmental Quality.
- Land Use Planning.
- Introduction to Natural Resource Economics and Policy.
- Resource Economics.
- Topics in Natural Resources--The Human Use of Nature.
- Introduction to Natural Resources.
- Senior Paper in Natural Resources.
- Environmental Protection Law and Policy

MARK W. ANDERSON

- Critical Issues in Natural Resource Policy (Capstone in EES program)
- Modern Economic Problems
- Environmental Assessment and Management Techniques
- Human Population and the Global Environment
- Honors College Tutorial: Globalization and the Environment
- Honors College Tutorial: Wilderness and the Frontier

1981: Instructor in Economics, Bangor C. C. Taught Principles of Economics.

1989: Instructor in Economics, University of Maine. Taught Principles of Microeconomics.

Student/Teaching Recognitions:

Residents on Campus (ROC) Outstanding Service to Students Award -- 1999.

Center for Teaching Excellence -- Assessment Book Prize -- 2006.

Publications

Book:

Theodore J. Gordon, Herbert Gerjuoy, and Mark W. Anderson, Life Extending Technologies: A Technology Assessment (New York: Pergamon Press, 1980).

Peer-Reviewed Articles:

Mark W. Anderson, "The Institutionalization of Futures Research in U.S. Congress," Technological Forecasting and Social Change, Volume II (1978), pp. 287-296.

Mark W. Anderson, "Regulatory Policy Toward Domestic Crude Oil Production," Policy Sciences, Volume XII, Number 3 (1980), pp. 245-265.

Mark W. Anderson and Johannes Delphendahl, "Competing Explanations of Formal Land Use Control: Additional Evidence," Journal of Environmental Management, Volume 14, Number 3 (1982), pp. 209-218.

Stephen D. Reiling, Mark W. Anderson, and Kenneth C. Gibbs, "Measuring the Costs of Publicly-Supplied Outdoor Recreation Facilities: A Methodological Note," Journal of Leisure Research, Volume 15, Number 3 (1983), pp. 203-218.

Mark W. Anderson, Stephen D. Reiling, and George C. Criner, "Consumer Demand Theory and Wildlife Agency Revenue Structure," Wildlife Society Bulletin, Volume 13, Winter (1985), pp. 375-384.

Stephen D. Reiling and Mark W. Anderson, "Equity and Efficiency in the Public Provision of

MARK W. ANDERSON

Forest-Based Recreation Facilities," Journal of Environmental Management, Volume 20, Number 2 (1985), pp. 149-161.

Mark W. Anderson, "Models of Land Use Regulation Adoption," Land Use Policy, Volume 3, Number 1 (1986), pp. 37-45.

Mark W. Anderson, "Images of Nineteenth Century Maine Farming in the Prose and Poetry of R.P.T. Coffin and C.A. Stephens," Agricultural History, Volume 63, Number 2 (1989), pp. 120-129. Reprinted in Twentieth Century Literary Criticism, Vol. 95 (2000).

Stephen D. Reiling, Kevin J. Boyle, Marcia L. Phillips, and Mark W. Anderson, "Temporal Reliability of Contingent Values," Land Economics, Volume 66, Number 2 (1990), pp. 128-134.

Mark W. Anderson, "Should Improving Student Thinking Include Altering Student Values? The Role of General Education," In Assessment Matters section of About Campus, Vol. 12. No. 2 (July/August 2007) pp. 23-25.

Mark W. Anderson, Mario Teisl, George Criner, Sharon Tisher, Stewart Smith, Malcolm Hunter, Stephen A. Norton, Jody Jellison, Andrei Alyokhin, Eric Gallandt, Sandra Haggard, and Elizabeth Bicknell, "Attitude Change of Undergraduate Students in General Education Courses," Journal of General Education, Volume 56, Number 2 (2007), pp.149-168.

Other Articles and Book Chapters:

Wayne I Boucher and Mark W. Anderson, "The Effect of EPA Administrative Practice on U.S. Industrial Innovation," in Donald E. Cunningham, John R. Craig, and Theodore W. Schlie (eds.), Technological Innovation: The Experimental R&D Incentives Program (Boulder, Colorado: Westview Press, 1977), pp. 399-424.

Mark W. Anderson, "Time: How Do Futurists Perceive It," World Future Society Bulletin, Volume XI, Number 3 (1977), pp. 15-21.

Mark W. Anderson, "Toward a Sharper Definition of the 'Baby Boom'," World Future Society Bulletin, Volume XII, Number 4 (1978), pp. 17-22.

Mark W. Anderson, Stephen D. Reiling, and Alan S. Kezis, "The Maine Hunter," Maine Fish and Wildlife, Fall (1981), pp. 6-9

Mark W. Anderson, "Opportunities for Students: Maine Agricultural Experiment Station Research Programs," Explorations, Volume III, Number 3 (Summer 1987), pp. 33-35.

Mark W. Anderson, "A Yank at Oxford," Bowdoin Magazine, Volume 61, Number 3 (Spring 1988),

MARK W. ANDERSON

pp. 8-11.

Mark W. Anderson, "Biotechnology, Alternative Agriculture, and Public Agricultural Research in Maine," Research for Maine and Its People, Volume 1, Number 4 (May 1988).

Mark W. Anderson, "Biotechnology and Alternative Agriculture: Conflict or Cooperation," Maine Organic Farmer and Gardener, Volume 15, Number 6 (1988), pp. 11-12.

Mark W. Anderson, "Two Pigs from Maine: Reflections on Regional Literature," The Maine Scholar, Volume 10 (1997), pp 203-215.

Mark W. Anderson. "Review of *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*," Environmental Conservation, Volume 30, Number 4 (2003), p. 410.

Reports of the Maine Agricultural Experiment Station, University of Maine, Orono, Maine:

Homer B. Metzger and Mark W. Anderson, Costs and Efficiencies in Fluid Milk Processing and Distribution in Maine--1979, Misc. Report #234 (1980).

Stephen D. Reiling and Mark W. Anderson, Relevance of Option Value to Benefit Cost Analysis, Technical Bulletin #101 (1981).

Homer B. Metzger and Mark W. Anderson, Costs of Handling Milk in Retail Food Stores in Maine--1980, Misc. Report #247 (1981).

Stephen D. Reiling and Mark W. Anderson, Estimation of the Cost of Providing Publicly-Supplied Outdoor Recreation Facilities in Maine, Bulletin #793 (1983).

Alan S. Kezis, Mark W. Anderson, and Neil Buitenhuys, A Theoretical Assembly, Processing, and Distribution System for the Maine Dairy Industry, Misc. Report #282 (1983).

George K. Criner, Alan S. Kezis, and Mark W. Anderson, Allocating Costs the Three Quart Milk Container, Misc. Report #291 (1983).

Mark W. Anderson, ed., Alternative Approaches to Economic Development in Maine: A Theoretical Inquiry, Misc. Publication #685 (1986).

Stephen D. Reiling, Kevin J. Boyle, Marcia L. Phillips, Vicki A. Trefts, and Mark W. Anderson, The Economic Benefits of Late-Season Black Fly Control, Bulletin # 822 (1988).

George K. Criner, Mark W. Anderson, and Steven L. Jacobs, Estimated 1988 Theoretical Processing and Distribution Costs for the Maine Dairy Industry, Misc. Report #332 (1989).

MARK W. ANDERSON

Stewart Smith, Matthew Kotchen, and Mark W. Anderson, Technology Choices: Finding Strategies for a Sustainable Maine, Misc. Pub. #734 (1997).

Reports of the Department of Resource Economics and Policy, University of Maine, Orono, Maine:

Mark W. Anderson, Patterns of Consumer Procurement of Fresh Produce in the Greater Bangor Area, ARE-317 (1979).

Mark W. Anderson, Regulation of the Maine Milk Industry Part I: The Nature of the Milk Market, ARE-345 (Reprinted as "Free Enterprise for Milk?" New England Farmer, Vol. 5, No. 10 (November 1981).

Mark W. Anderson, Regulation of the Maine Milk Industry Part II: The Agri-Mark/Agway Venture, ARE-347 (Reprinted as "Agrimark/Hood System," New England Farmer, Vol. 5, No. 11.

Homer B. Metzger and Mark W. Anderson, Regulation of the Maine Milk Industry Part V: Winners and Losers Under Milk Price Regulation, ARE-356.

Mark W. Anderson and Roger Hutchison, Impact of Wholesale and Retail Price Deregulation on Maine Dairy Producers and Alternative Producer Pricing Arrangements, ARE-364.

Stephen D. Reiling and Mark W. Anderson, The Economic Impact of the 1982 Maine Moose Hunt, ARE-360.

Stephen D. Reiling and Mark W. Anderson, Measuring the Economic Impact of Recreation and Tourism, ARE-375.

Mark W. Anderson, An Updated Estimate of Theoretical Processing and Distribution Costs of the Maine Dairy Industry, ARE-379.

Kevin J. Boyle and Mark W. Anderson. 2005. GK -12 Sensors! Project Assessment Report – 2003-2004. Final report issued in support of National Science Foundation Grant #0139323.

Kevin J. Boyle and Mark W. Anderson. 2004. Program Evaluation Report -- Research Experience for Teachers Site Sensors!. Final report issued in support of National Science Foundation Grant.

Mark W. Anderson. 2005. An Application of Learning Outcomes Assessment in a Higher Education Course Addressing General Education Curricular Requirements. REP-550.

MARK W. ANDERSON

Mark W. Anderson, Kevin J. Boyle, Kathleen P. Bell, and John Holden. 2005. Procedures for Evaluating the Potential Regional Economic Impacts of Conservation Lands in the 100-Mile Wilderness Region. Final Report to the Maine Department of Conservation. (Staff Report No. 001 of the Center for Tourism, Research, and Outreach).

Mark W. Anderson. 2006. Issues to be Considered in Estimating the Effects on Primitive Recreation of the Plum Creek Concept Plan for the Moosehead Region. Report to Maine Land Use Regulation Commission.

Mark W. Anderson. 2007. Reducing Your Footprint: A Handbook for Reducing Household Carbon Dioxide Emissions. School of Economics Staff Paper # 567.

Mark W. Anderson. 2007. Review of Report by Dr. John Daigle, "Impact of Plum Creek Petition for Rezoning and Concept Plan on Recreation Resources in the Plan Area. Final report to Maine Land Use Regulation Commission.

Presentations and Testimony:

Mark W. Anderson and Johannes Delphendahl, "The Adoption of Formal Land Use Regulation: The Maine Experience," Presented at the Eighth New England Business and Economics Conference, Hyannis, Massachusetts, 1980.

Mark W. Anderson, "Effects of Decontrolling Milk Marketing in Vermont," Testimony before Vermont Milk Control Board, 1982.

Mark W. Anderson, "Proposed Differential Pricing for Whole, Skim, And Low Fat Milk Processed and Sold by Maine Dairies," Testimony before Maine Milk Commission, 1982.

Stephen D. Reiling, Stephen P. Skinner, and Mark W. Anderson, "The Cost of Publicly Provided Outdoor Recreation: Who Should Pay?" Presented at Northeast Agricultural Council, 1983.

Stephen D. Reiling and Mark W. Anderson, "Class I Air Quality Designation: Analysis of Effects on Social and Economic Aspects of Recreation in Allagash Wilderness Waterway, Baxter Park, and Bigelow Preserve," Prepared for Great Northern Paper Company, 1983.

Fred C. Webster, Jack J. Kirkland, David E. Hahn, and Mark W. Anderson, Milk Pricing Alternatives for Maine (Augusta, Maine: Maine Department of Agriculture, Food, and Rural Resources, 1985).

Stephen D. Reiling, Mark W. Anderson, and Stephen E. Oltmans, "Recreation User Fees and Equity: Is There a Tradeoff?" Presented at Symposium on Social Science and Resource Management, Corvallis, Oregon, 1986.

MARK W. ANDERSON

Stephen D. Reiling and Mark W. Anderson, "An Analysis of Private Prices as a Guideline for Public Sector Pricing of Camping Opportunities," Report prepared for U.S.D.A. Forest Service, Intermountain Forest Experiment Station, Fort Collins, CO, 1987.

Mark W. Anderson, "Farmland Preservation: Some Myths and Heresies," Presentation to Penobscot Valley Council of Governments Annual Meeting, May 1989.

Mark W. Anderson, "Rachel Carson: The Public Policy Legacy," presented at Maine Humanities Council seminar, Sense of Wonder: Rachel Carson's Vision of the Natural World, Colby College, Waterville, Maine, July 27, 1999.

Mark W. Anderson, "Outcomes Assessment in a Course Designed to Meet General Education Goals in the Area of Population and the Environment," at 2004 National Summer Conference Integrating Science and Mathematics Education Research into Teaching, The University of Maine, June 22, 2004.

Mark W. Anderson, Mario Teisl, Caroline Noblet, and Gerooge Criner. "Using the New Ecological Paradigm (NEP) to Assess Attitudinal Change in Higher Education Courses on the Environment" at the 13th International Interdisciplinary Conference on the Environment, Portland, Maine, July 2007.

Reports Issued by The Futures Group, 76 Eastern Boulevard, Glastonbury, Connecticut.

Mark W. Anderson (ed.), A Compendium of Statements of Past and Future Changes, #200-76-02, Prepared for the Congressional Research Service, Library of Congress, 1976.

Wayne I. Boucher, Mark W. Anderson, et al., The Impact of EPA Administrative Practices on Innovation Process in U.S. Companies: A Case Study of Regulatory Barriers to Innovation, #198-53-03, Prepared for the National Science Foundation, 1976.

Wayne I. Boucher, Sarah Becket, Mark W. Anderson, et al., A Bibliography of Technology Assessment, #180-52-02, Prepared for the Denver Research Institute, 1976.

Theodore J. Gordon, Herbert Gerjuoy, and Mark W. Anderson, A Technology Assessment of Life-Extending Technologies, #272-46-18, Prepared for the National Science Foundation, 1976.

Theodore J. Gordon, Michael Oppenheimer, and Mark W. Anderson, Methods of Stimulating Innovation, #234-17-08, 1976.

Dana Bramlette, Mark W. Anderson, et al., Human Consumption of Edible Fats and Oils--Future

MARK W. ANDERSON

Issues, #276-36-06, 1976.

David Bronheim, Mark W. Anderson, et al., Environmental Forces for Change, #284-96-01, 1977.

Michael Oppenheimer, Hedvah Schuchman, Mark W. Anderson, et al., A Design for the President's Annual Science Report and Five Year Outlook, #285-95-02, Prepared for the President's Office of Science and Technology Policy, 1977.

Mark W. Anderson and Theodore J. Gordon, New Ventures for (A Major American Consumer Products Firm), #304-85-08, 1977.

Mark W. Anderson, Older Americans: A Brief Demographic Review, #317-50-03, Prepared for the Dreyfus Corporation, 1977.

Mark W. Anderson, Environmental Monitoring and Future Awareness in the Corporate Setting, #320-99-02, Prepared for an American chemicals company.

Mark W. Anderson, et al., Corporate Strategies of Automotive Manufacturers: A Scenario of the Automotive Industry 1978--1985, #395-107-02, Prepared for the National Highway Traffic Safety Administration, 1977.

Newspaper Contributions

January 1987 to March 1990: Contributing columnist to Bangor Daily News, "As Maine Grows" weekly column on agriculture, over fifty contributions.

Research Contracts and Consulting Projects

1979: Maine Land Use Regulation Commission. Developed a model zoning ordinance for use by LURC-regulated communities wishing to exercise local land use control.

1981: Maine Department of Agriculture, Food, and Rural Resources. Provided research, analysis, and support services to Maine Peat Task Force.

1981: Abt Associates (with Stephen Reiling). Analyzed the recreation costs and benefits associated with constructing a hydroelectric dam on the West Branch of the Penobscot River.

1981: Kleinschmidt and Dutting Engineers (with Stephen Reiling). Analyzed the investment attractiveness of potential hydroelectric dams on East Branch of the Penobscot River.

1982: Champlain Valley Milk Producers. Analyzed effects of decontrolling milk marketing in Vermont.

MARK W. ANDERSON

1982: Maine Milk Commission. Analyzed proposed differential pricing of fluid dairy products of various butterfat contents; analyzed potential impacts of retail and wholesale price deregulation.

1983: Maine Department of Inland Fisheries and Wildlife (with Stephen Reiling). Estimated the economic impact of the 1982 Maine moose hunting season.

1983: Maine Milk Commission. Provided analysis and testimony on theoretically lowest achievable costs of processing and delivering milk in Maine.

MARK W. ANDERSON

1983: Great Northern Paper Co. (with Stephen Reiling). Analyzed recreational impacts of reclassifying air quality regions in northern and western Maine.

1985: Maine Department of Agriculture, Food, and Rural Resources. Member of Maine Milk Study Panel--evaluated milk price regulatory alternatives for Maine.

1986: Maine Department of Agriculture, Food, and Rural Resources. Commodity contract arbiter under Maine Agricultural Marketing and Bargaining Act.

1986: Maine Milk Commission. Updated dairy processing cost estimates and provided testimony for rulemaking.

1987: Rocky Mountain Forest and Range Experiment Station (with Stephen Reiling). Price Structures for Selected Outdoor Recreation Opportunities Provided by Private Operators.

1988: Maine Milk Commission (with George Criner). Updated dairy processing cost estimate and provided testimony for rulemaking.

2004-2005: Maine Department of Conservation (with Kevin J. Boyle and Kathleen P. Bell). Assessing the Regional Economic Impact of Protected Lands Adjacent to the 100 Mile Wilderness Section of the Appalachian Trail.

2006: Maine Land Use Regulation Commission. Estimating the Effects on Primitive Recreation of the Plum Creek Concept Plan for the Moosehead Region.