

BAXTER STATE PARK

Scientific Forest Management Area

October 5, 1998



Contents

A. INTRODUCTION	4
A.1. Deeds of Trust:	4
B. RESOURCE HISTORY	7
B.1. Physical Resource:	7
B.2. Social Resource:	8
C. TIMBER RESOURCE SUSTAINABILITY	12
C.1. Harvest Regulation:	12
C.2. Estimation of Base Annual Increment:	13
C.3. Rotation Length and Forest Control:	17
C.4. Pest and Pathogen Management Strategy	19
C.5. Forest Access	22
C.6. Marketing, Harvest Efficiency and Product Utilization	27
C.7. Management Plan and Information Base	29
D. FOREST ECOSYSTEM MAINTENANCE	31
D.1. Forest Class Distribution	31
D.2. Long-Term Ecological Productivity	33
D.3. Wildlife Management Actions, Strategies, And Programs	35
D.4. Watercourse Management Policies and Programs	41
D.5. Pest Control: Practices and Policies	43
D.6. Ecosystem Reserve Policies	43
E. FINANCIAL AND SOCIO-ECONOMIC CONSIDERATIONS	46
E.1. Financial Stability	46
E.2. Community and Public Involvement	48
E. 3. Public Use Management	50
E.4. Investment of Capital and Personnel	56

A. INTRODUCTION

If you're reading this the chances are good that you have an interest in forest management, Baxter State Park, or both. We'd like to express our appreciation for that interest right up front. We hope you find the following pages interesting and thought-provoking - they represent the combined efforts and talents of many people, all working toward a vision made possible by the creator of Baxter State Park, Percival Proctor Baxter.

A.1. Deeds of Trust:

Percival Baxter gave, **IN TRUST**, the lands comprising the Scientific Forest Management Area (SFMA) of Baxter State Park to the people of Maine. As TRUSTEES, our sole responsibility is to carry out the wishes of the TRUSTOR.

This document represents our commitment to that responsibility as expressed within the trust communications presented by Percival Baxter to the 97th Maine Legislature. The communications represent the sentiments of a conservationist written over 40 years ago, but the sincere intent of Baxter's words remain as clear today as four decades ago. The philosophies, management procedures and plans detailed within this plan are extensions of these communications:

*Baxter Communications (1955) to Governor Muskie;
Senate and House of Representatives, 97th Legislature*

"This 3,569 area will be available both for recreation and for scientific forestry management and can be made to produce a continuing crop of timber to be harvested and sold as are potatoes or any other product of the soil."

"It long has been my purpose to create in our forests a large area wherein the state may practice the most modern methods of forest control, reforestation and production....This new 3,569 acres is an excellent location for this purpose."

"In my travels in foreign lands I have seen beautiful great forests that for centuries have been producing a crop of wood without depletion. In Sweden, Norway, Finland, Germany, Chile, Russia and elsewhere what has been done by scientifically controlled forestry can be done in Maine. I now make it possible for the state to try a major experiment here at home, an experiment that can mean much for our future timber supply, which all admit is the chief natural resource of our State."

"The terms of this gift are identical with those of the three thousand five hundred sixty-nine (3,569) acre; Public Park, Public Forest, Public Recreational and Scientific Forestry Purposes and Reforestation. I want this township to become a show place for those interested in forestry, a place where a continuing timber crop can be cultivated, harvested and sold; where reforestation and scientific cutting will be employed; an example and an inspiration to others. What is done in our forests today will help or harm the generations who follow us."

"This township six (6) range ten (10) is what is termed by woodsmen 'good growing land'. An area with an abundance of wildlife, especially moose. Fishing and hunting will be allowed under the general Fish and Game Laws of the State."

Private and Special Laws 1955, Chapter 61

"All harvesting of said products shall be done according to the most approved practices of Scientific forestry and all revenue derived from the sale of said products shall be used by said state for the care, management and protection of Baxter State Park as now or hereafter defined."

Private and Special Laws 1955, Chapter 171

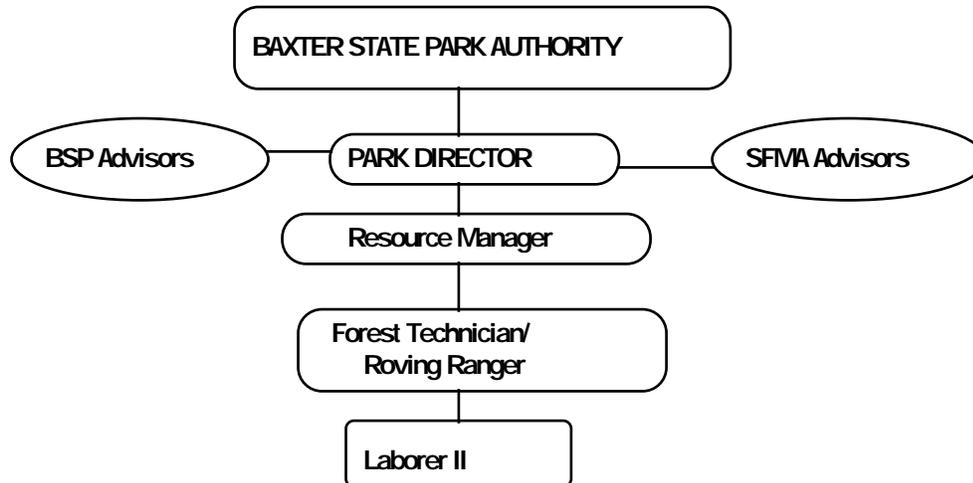
"The trees harvested may be cut and yarded on the premises but no manufacturing operations shall be carried on within said township. All revenue derived from the sale of timber shall be used by the State IN TRUST for the care, management and protection of Baxter State Park as now and hereafter defined, and the said twenty-five thousand twenty-five (25,025) acres forever shall be held by said State as Trustee in Trust..."

Private and Special Laws 1955, Chapter 2

"The State of Maine is authorized to clean, protect and restore areas of forest growth damaged by Acts of Nature such as blowdowns, fire, floods, slides, infestation of insects and disease or other damage caused by Acts of Nature in order that the forest growth of the Park may be protected, encouraged and restored."

Administrative Structure

The SFMA represents about 14% of the land area of Baxter State Park and is administered by the following individuals, groups and relationships:



- ***Baxter State Park Authority***

Composed of the Commissioner of Inland Fisheries and Wildlife, the Director of the Maine Forest Service, and the Maine Attorney General, this body holds complete and total responsibility for the administration, policy and management of Baxter State Park.

- ***Park Director***

Holds responsibility for the operation, management and day-to-day protection and preservation of Baxter State Park. As needed, develops and proposes policy, management and personnel actions for review and action by the Authority.

- ***Resource Manager***

Holds responsibility for long term planning and day-to-day management and operations on the SFMA as well as other administrative responsibilities within Baxter State Park as determined by the Park Director.

- ***Forest Technician/Roving Ranger***

In concert with the Resource Manager, conducts and directs field operations within the SFMA. Responsibilities also include coverage park-wide in the event of unanticipated openings and temporary vacancies.

- ***SFMA Advisors***

This standing committee of 12 volunteer citizens serves at the pleasure of the Authority and works closely with the Resource Manager to provide continuity, expertise and advice on a wide range of issues regarding management of the SFMA.

- ***BSP Advisors***

This standing committee of 15 volunteer citizens is similar to the SFMA Advisors but works with issues more closely related to the “forever wild” portions of the Park.

B. RESOURCE HISTORY

B.1. Physical Resource:

The forests of the SFMA as we know them today began to develop about 12,000 years ago as the Laurentide ice sheet melted northward out of New England. Over the next 1,000 years the land that would become the SFMA developed a tundra ecology and the first human inhabitants left evidence of their presence. The following 1,000 years brought a steady emergence of forest growth:

*"The development of the first forests in northern New England disrupted Paleo-Indian culture. Northern boreal forests of spruce and fir support relatively little herbaceous vegetation, and therefore offer little subsistence for gregarious herbivores like the caribou. Some of the large herbivores, such as musk ox and caribou, remained on the tundra, drifting gradually northward out of the region. Many other species simply died out, no longer able to find enough forage."*¹

The retreating glaciers left the SFMA with a generally flat to rolling terrain, with west to east ridges interspersed with streams and bogs. The highest point in the management area, Wadleigh Mountain, is located in the southeastern corner of the SFMA and rises to 1,203 feet above mean sea level; the lowest areas, in the north and eastern sections of Township 6, Range 10, W.E.L.S (T6,R10) where the land begins to slope toward the East Branch of the Penobscot River, are approximately 760 feet above mean sea level. Most of the area lies between 800 and 1000 feet above mean sea level (U.S. Geological Survey 1955).

Most of the 29,537 acres of the SFMA are underlain by sandstones and shales from the older Devonian period, with a thin cover of glacial tills. Overlying these rocks, Wadleigh Mountain is composed of Traveler Rhyolite of volcanic ash origin. Between Wadleigh Mountain and Traveler Mountains lies the younger Devonian Trout Brook formation composed of sandstones, shales and ironstones. Glacial outwash deposits lie along the Trout Brook valley.

Over the ensuing 8,000 years as the climate gradually warmed, the forests of the SFMA developed from the boreal forests now found further to the north to the spruce and fir dominated "Acadian" or "spruce flat" forest. This forest is characterized by poor or moderately drained soils over compressed glacial till or areas of shallow soil over bedrock (Leak and Riddle, 1979). U.S. Department of Agriculture Bulletin 544 of 1917 offers a description of the earlier SFMA forests:

"...Spruce, birch, soft maples, white pine, hemlock, and balsam are the characteristic trees in mixture...The presence of black ash, which is usually accompanied by considerable balsam, denotes conditions bordering on the swamp type. The presence of sugar maple, on the other hand, denotes a transition to the hardwood lands. White pine of good quality formerly occurred in abundance in this type in both Maine and the Adirondacks... Spruce attains an intermediate development here, while birch and the better hardwoods are inferior in development as compared with the same species growing on the hardwood lands.....Windfall is not uncommon, and as a result young

¹From a draft synthesis paper on the effect of forest practices in northern forest lands, C.R. Foss, L.S. Deming, S.F. Gage, Audubon Society of New Hampshire, 1992

even-aged stands of spruce are found occupying the ground where this has taken place...".

A landmark study by Ralph S. Hosmer in 1902-3 in nearby Squaw Township described a tract of "virgin forest" of 20 acres (even by the 1900's unharvested forest was rare) on somewhat similar sites as the SFMA. Over ninety percent of the stand was composed of 5 species, spruce (65.4%), yellow birch (14.3%), sugar maple (5.7%), paper birch (4.1%) and balsam fir (2.7%).² The maximum diameter of spruce measured on the site was 27 inches. In most respects, this description would probably apply reasonably well to the forests of the SFMA around at the start of the nineteenth century. Without question, human action over the ensuing decades has altered the forest mosaic in many ways.

B.2. Social Resource:

Townships in this area of north central Maine were first delineated in 1833 by surveyors for the State Land Agent. This was during the so-called "Pine Era" in the State of Maine. The survey notes make frequent reference to "scattered timber pine, long and handsome", spruce, fir and hardwood growth, and describe streams that fed the Allagash watershed. It was not long before people began making determined efforts to access and capture this vast resource:

"In 1841 Hastings Strickland and Amos Roberts constructed two dams, one on dry land about 200 yards below Telos to be used for regulating the flow of water into the East Branch and another at the outlet of Chamberlain to raise the fifteen-mile stretch of water. As they had predicted, the 1842 East Branch drive went to market on an ample supply of Allagash water."³

In 1841, as water flowed, so flowed wood, and the change of watershed supply had vast implications regarding the supply of wood to Penobscot mills and as importantly, the supply of water for Allagash and St. John river drives. Clear evidence of late 1800's logging activity exists in the SFMA in the form of very old pine stumps, existing trees and snags with axe-cut faces still clearly evident and mechanical parts and debris such as the boiler from a log-hauler resting in a stand of fir along Webster Stream. For obvious reasons, activity appeared to be restricted to areas relatively close to the major water courses and ponds of the SFMA, but is clear that even these early activities began to significantly change the forest.

In 1903, sections of the SFMA, primarily in T6,R9, were burned in an extensive fire. This fire was part of a larger complex of fires that erupted across the northeast under widespread dry conditions:

"...but the spring of 1903 brought five weeks of drought in northern and eastern Maine and set the scene for one of the worst conflagrations since the Mirimichi Fire of 1825. By May 21 the forests along the northeastern border were ablaze...A narrow escape on a

²Page 79, "A Study of the Maine Spruce" by Ralph S. Hosmer, as part of the Maine Forest Commissioner's Report of 1903, Table 4.

³Pg 67, Aroostook, A Century of Logging in Northern Maine, Judd, Richard W., University of Maine Press, 1989.

*B & A express prevented heavy loss of life as flames engulfed the towns of Sherman and Crystal, and only a change of wind saved Patten, Presque Isle, and Fort Fairfield."*⁴

The 1903 complex of fires was typical of a series of fire events beginning with the onset of significant settlement and extending well into the 20th century culminating in the devastating fires of late 1947. It could be argued that these fires are social more than physical events. Studies by Lorrimer⁵ indicate the natural fire cycle (catastrophic stand replacement fires) of the spruce/fir forests of northern Maine to be from 800 to 2000 years. Evidence indicates that one reason behind a series of severe fire periods in northern New England and Maritime Canada is the complex mixture of heavy fuel loading (from logging, insect epidemics, and clearing for settlements), drought conditions, and plentiful source of ignition from untended campfires, lightning, and brush and debris burning.

The Eastern Corporation acquired majority interest in T6, R10 in 1911, and by 1944 owned full interest in the T6, R10 & the portion of T6, R9 that today form the SFMA. A timber inventory and harvest plan of T6, R10 was developed by the J.W. Sewall Company in 1942. The inventory described a mixture of generally young softwood forest, rebounding from the severe 1916-20 spruce budworm epidemic that decimated softwood growth over much of northern and eastern Maine, and poorer quality mixedwood and softwood growth developing upon land covered by the 1903 fire. A sparse but irregular stocking of softwood logs and pulp, primarily within the more mixedwood stands, had survived the budworm and in the late 1940's the Eastern Company conducted harvest operations in the township to capture this volume. Apparently guided by diameter and species requirements, the harvest varied in intensity over the area. The stumps and tote-roads from this operation are still clearly apparent in the forest today. By 1950 the recent harvest of the late 40's, together with the 1903 fire and the 1916-20 spruce budworm combined to form the three most apparent influences upon the forests of the SFMA.

In 1955 the Eastern Company's interest in T6, R10 & 9 was sold to Percival P. Baxter, and subsequently conveyed to the State of Maine by Baxter in two separate deeds to "**.....to be forever held...for State Forest, Public Park, and Public Recreational Purposes and for the Practice of Scientific Forestry and Reforestation...**"⁶. These deeds conveyed all interest except a 25-acre dam lot on Webster Stream at the outlet of Webster Lake owned by the East Branch Improvement Co., and certain easements of rights-of-way. The dam lot and associated easements were subsequently conveyed to Baxter State Park in 1982. The actual area determined by planimetry of maps prepared from aerial photographs is 29,537 acres; the deeded acreage of the parcels conveyed is 28,594 acres.

When the 97th Maine Legislature accepted these townships as the 26th and 27th additions to Baxter State Park, the Park was operated in a different fashion than it is today. Although Percival Baxter was then 79 years old he remained active in guiding the operations and management of his gift to the people of Maine. Resource management operations within the Park were funded by a combination of fees charged for camping and legislated appropriations from the General Fund. If specific or unexpectedly thorny problems cropped up, Baxter often personally supplied the necessary funds to resolve the conflict or need. In 1955, the establishment of the

⁴Pg 211, Aroostook, A Century of Logging in Northern Maine, Judd, Richard W., University of Maine Press, 1989.

⁵ The Presettlement Forest and Natural Disturbance Cycle of Northeastern Maine, Lorrimer, Craig G., Reprinted from ECOLOGY, Vol.58, No.1, Winter 1977.

⁶ Private and Special Laws, Chapter 171, page 1, 1955,

SFMA proposed a type of management and structure that was both philosophically foreign and structurally and economically difficult for the existing Park management to accomplish. As a result, although the area was managed and developed for recreation similarly to other areas within the Park, no real effort to effect the mandates of the Deeds of Trust was attempted on the SFMA for nearly two decades.

On June 12, 1969, former Governor of Maine and Park donor Percival P. Baxter died at the age of 92. Following Baxter's death, his will made available trust fund monies to be used for the care and maintenance of Baxter State Park. The availability of these funds significantly changed the operational structure of the Park in a short period of time; the staff increased in three years to levels similar to the present, and more importantly, the Park ceased to require any General Fund appropriations and began to operate in an independent fashion combining trust fund earnings and use fees to fund Park operations.

In 1972 the Great Northern Paper Company announced plans to exercise "cutting", or harvest rights on timber inside the southern boundary of the Park. In obtaining land for the Park from industrial landowners reluctant to reduce their supply of raw materials, Baxter often was forced to allow the companies the option to harvest the timber from the land for a certain period into the future. This arrangement, allowing subsequent harvest after establishment as Park land, was not uncommon throughout the 31 years of Park establishment. The announcement to harvest within such a heavily used area of the Park raised strong concerns within the Authority and subsequently an agreement was reached for the Baxter State Park Authority to exchange the harvest rights held by the Great Northern Paper Company adjacent to the southern boundary of the Park for timber of equal consideration from the SFMA. This proposal in turn created considerable public controversy regarding its effectiveness at meeting the former Governor's forest management mandate for the SFMA. Operations commenced on the SFMA, but continued for a short time only - after approximately one-half mile of right-of-way had been cleared, the operation was terminated in March of 1973 with a cash settlement of \$725,000 to the Great Northern Paper Company.

The settlement was costly for the Park and severely depleted an Authority-controlled investment fund that had been some years in the making. Nevertheless, the settlement focused attention on the SFMA and spurred the beginnings of an effort toward management effort of the area. For some years, however, the negative feelings generated by the harvesting rights controversy would hamper the Authority and park staff in adopting a consistent and positive position in supporting the development of the SFMA.

In 1976, the Park hired its first forester, to organize the effort to begin management on the SFMA. The delineation of operational boundaries of the SFMA and initial timber cruises were accomplished, followed later by a forest-wide timber inventory, soil survey and the development of a management policy and planning document for the area. Expenses for these efforts were significant, and by 1981, with road construction underway, Park staff was anticipating the capture of some revenue from an ambitious harvest plan. Unfortunately, the beginning of harvest activities coincided with the second major spruce budworm epidemic of the century. Faced with the threat of widespread mortality in spruce and fir, softwood markets plummeted and most Maine mills were swamped with an overwhelming supply of low-cost raw material from salvage operations. As a result, the SFMA recorded no harvest for 1981 and only about 1,400 cord/equivalents in 1982.

With the departure of the Park Forester in 1983, the Baxter State Park Authority began a tenure of management of the SFMA by the Maine Forest Service. From 1983 until 1986,

management of the SFMA was conducted by foresters from the Maine Forest Service, initially at no cost but subsequently for a management fee. With the collapse of the spruce budworm epidemic in 1984 and the rebound of softwood markets, the Authority redoubled its efforts at recovering some of the initial investment in SFMA management with a continuing increase in harvest rates. This course of action and the way it was carried out led to considerable controversy in 1985 over the levels, characteristics and appropriateness of harvesting operations on the SFMA. Eventually, in February of 1986, the Authority responded by suspending all operations on the SFMA, terminating its management agreement with the Maine Forest Service, and forming an SFMA Advisory Committee to review the situation and offer counsel on future actions. As a result, the Park resumed the role of active management of the SFMA in 1987 with the hiring of a Resource Manager. In 1988, with a revised management plan, a new harvest permit and contractor and the steady involvement of the SFMA Advisors, road construction activities were resumed, followed by harvest activities in 1989.

The mid-seventies to the late eighties were often difficult years in the management of the SFMA. Forest management was an endeavor new to both the Authority and park staff and as might be expected, first steps were occasionally mis-steps. Public observation focused as citizen activism invariably pointed out inappropriate management and after a period of review and resolution, efforts resumed to carry out the Trust mandate of the SFMA. In hindsight, it's always tempting to focus on errors in judgment or practice that were made, often without the benefit of the complete context of the times. A more productive approach may be to review the process over time. The Authority has made mistakes in the management of the SFMA, but the initiation of a new enterprise, or the constant effort to improve an existing one, will always result in some errors in judgment. The test of our performance isn't whether we make mistakes, it's how effective we are at learning from them.

Strong financial markets of the late 80's added strength and value to the Park trust funds and the pressure for revenue was replaced with the more fundamental and long-term goal of establishment of the SFMA as an appropriate example of Baxter's intentions in the Trust Deeds. Harvest and revenue levels remained relatively stable over this period as effort was expended to define an appropriate and long-lasting philosophy of forest stewardship, demonstrated through forest management, that exemplified Baxter's wishes for the area as expressed in his communications to Governor Muskie at the time of the gift, "*a showplace for those interested in forestry...an example and inspiration to others.*" This period has been marked by consistent involvement on the part of the SFMA Advisors, and in 1994 the Park once again added a Forest Technician/Roving Ranger to assist in the SFMA activities and provide roving coverage for Park-wide staffing contingencies. Tours of the area by public and professional groups have increased steadily, woods labor has stabilized and management has successfully initiated a significant change in harvest technology. In addition, harvests have produced a significant flow of revenues as well as the promise of additional growth on the most promising stems. The SFMA has begun to emerge as a diverse forest mosaic with its own character and aesthetic. The considerations detailed in this plan characterize a gradual shift in management approach that focuses more on the forest as a system than simply a source for commodity extraction. Most importantly, a steady process has begun to fully define and evolve the clear direction provided by Percival Baxter over 40 years ago.

C. TIMBER RESOURCE SUSTAINABILITY

C.1. Harvest Regulation:

The SFMA today can be separated into five distinct forest classes, or management units. For the most part, each management unit is distinct biologically as well as geographically. The acreage allotments for each management unit listed below are constantly changing as active management progresses through the Fire Origin and Unharvested/Unaccessed areas and these acres are reclassified to harvest and reserve acres. The management units, (or MU's) are as follows:

MU1 - Forest harvested prior to 1987 (2,578 acres):

This forest comprises most of compartments 1 and 3 and parts of 2, 4 and 6. Most of the harvests were accomplished under the direction of the Maine Forest Service and utilized rubber-tired skidders for yarding tree-length wood which was then delimbed at roadside. The harvests were strongly oriented toward softwoods and reflect an aggressive attempt to capture anticipated spruce budworm mortality in combination with instances of uncontrolled highgrading.

MU2 - Forest harvested from 1987 to 1997 (6,175 acres):

This forest comprises all of compartments 5, 9 and 11 and parts of compartment 2, 4, 6, and 7. Harvests were accomplished under the direction of SFMA management with a mixture of rubber-tired skidders, single-grip cut-to-length and forwarder/chain saw systems. All harvest volume was delimbed at the stump. The harvests were based on a first-entry stand conditioning philosophy oriented toward:

1. identifying and enhancing the individual stem growth of vigorous stems
2. providing for the advancement of natural regeneration
3. harvesting mature and/or at-risk stems.

MU3 - Unharvested and Unaccessed Forest (10,447 acres):

This forest is comprised of stands earmarked for harvest in the next 10 years but currently unharvested and stands that will be considered for harvest as access is developed over the next 10 years. Harvest orientation is anticipated to be consistent with stands harvested from 1987-97.

MU4 - Fire Origin Stands (5,000 acres):

This forest originated from one of two fire events (1903 and 1930's era) and are comprised generally of bigtooth and trembling aspen overstories with spruce/fir/pine/maple understories in various mixtures and stages of development. Relatively mature spruce and pine often share the overstory mix with the aspen. Most of this type is currently unharvested. Harvests focus on the thinning or removal of a significant percentage of the aspen overstory to reduce soil competition for nutrients and to release the developing softwood species to grow in full or nearly full sunlight.

MU5 - Reserve and Riparian Areas (3,957 acres):

These forests are comprised of:

1. reserve areas - intentional set-asides allowing the development of an older, more mature stratum within a matrix of a more "managed" forest. Reserves can serve as benchmarks for comparison to harvest areas and are an important component in increasing diversity.
2. riparian areas - bands or areas of forest having significant influence on, and in turn being influenced by, an adjacent stream or pond ecosystem.

C.2. Estimation of Base Annual Increment:

Over the past 10 years, stand structure data for most of these management units has been developed from pre and post harvest prism cruises tabulated by operational area for numerous discrete stand level management units referred to as polygons or blocks. In addition, 1996 and 1997 Continuous Forest Inventory (CFI) data, based on a grid system of 1/5 acre plots, is also available and can be stratified to specific management units. Finally, prism cruise data from a 1979 SFMA inventory CFI is also available. Data and individual cruises for each block were entered as files in the U.S. Forest Service Northeast Decision Model Stand Inventory Processor⁷. This model summarizes and presents original stand structure data in a variety of ways and provides modeling platforms to project stand growth under different management scenarios.

Using these data, the following steps were followed to estimate a base annual increment:

1. Existing cruise data for operational polygons within each management unit (MU) were combined and summarized into tabular form representing the “average” stand structure for each MU including the volume of current acceptable growing stock in cubic feet per acre (cf/ac).
2. Harvest volumes for SFMA stands were tabulated for the history of SFMA management (active management harvests began in 1980 - see Tables 1, 2; Fig. 1.) This estimate does not include volume lost to mortality during the 1970’s/80’s spruce budworm outbreak, and also fails to include volume removed from known logging activity in the late 1940’s. Conversely, the estimate fails to adjust for 10-15 years of advance growth held by much of the regeneration that grew to occupy the canopy after the 1916-20 spruce budworm mortality. Although arguments could be made to increase the estimated inventory to account for unrecorded losses from insects and harvesting, experience and history indicate that insect, fire and weather will probably cause losses again, so any adjustment would be unwarranted and probably unrealistic. Our approach is to remain conservative and to estimate the growth increment without consideration of the budworm and 50’s harvesting mortality. Harvest volumes tabulated were then added to the estimate of current acceptable growing stock developed in (1) above to determine a total average growing stock estimate for each MU.
3. SFMA stand age was determined to be 85 years for all management units. The average age of all SFMA stands in the 1979 inventory was determined to be 65 years. This age extended to the current year would increase the average age to 80 years. This age reflects the overwhelming influence of the 1916-20 spruce budworm outbreak on the development of SFMA stands. Fire origin stands exhibit evidence of fires from both the first and third decades of this century and these stands probably average out to roughly 80 years in age also. As discussed here, forest age is strictly an estimated average. Many stands of trees and individual trees within stands on the SFMA are older or younger than the average age. However, for the purposes of estimating growth over time, an estimate of average age is useful.
4. The total average growing stock estimate for each MU (current standing volumes plus any volume harvested after 1980) was divided by the estimated average stand age to generate a mean annual increment/acre over the life of the forest. This increment was multiplied by

⁷ Northeast Decision Model and Stand Inventory Processor and Simulator, Simpson, B.T., Kollasch, R.P., Twery, M.J., Schuler, T.M., U.S. Dept. of Agriculture, Northeastern Forest Experiment Station, Gen. Tech Report NE-205.

management unit acres to generate an estimated mean annual increment for each management unit.

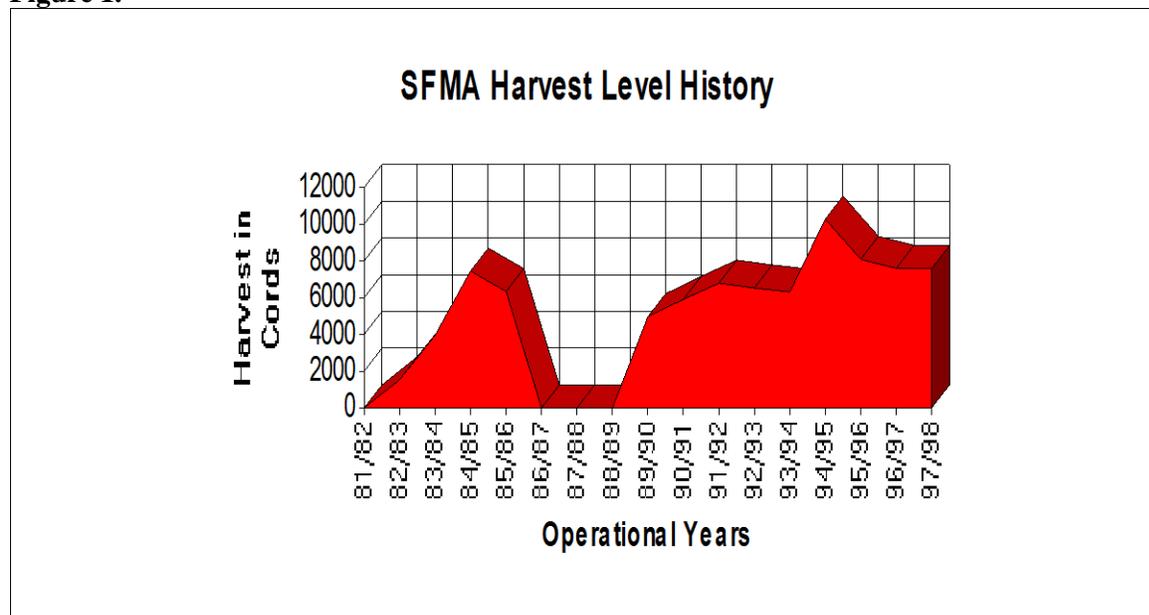
Table 1. SFMA Harvest Volume History

Year	Harvest Volume (Cords)	Harvest Volume (CF)	Area Harvested (Acres)	Harvest Volume** Per Acre (Cords)
81/82	0	0	0	0
82/83	1,538	130,730	271	5.7
83/84	3,968	337,280	946	4.2
84/85	7,449	633,165	792	9.4
85/86	6,338	538,730	1,069	5.9
86/87	0	0	0	0
87/88	0	0	0	0
88/89	0	0	0	0
89/90*	4,305	365,925	453	9.5
90/91*	5,244	445,740	413	12.7
91/92*	6,124	520,540	550	11.1
92/93*	5,861	498,185	541	10.8
93/94*	5,646	479,910	523	10.8
94/95	9,155	778,175	955	9.6
95/96	7,511	638,410	958	7.8
96/97	7,191	611,235	1,000	7.2
97/98	7,546	641,410	918	8.2
Total	77,876	6,619,435	9,389	
Average '81-'97	4,581	413,715	552	8.30
Average '82-'86	4,823	409,976	770	6.30
Average '89-'97	6,509	553,281	701	9.30

* listed volumes reflect reductions for estimated ROW volume.

** includes acres with no harvest, actual harvest intensities are higher than indicated.

Figure 1.



Calculations of average annual increment by Management Unit (MU):

MU1 - Forest harvested prior to 1987:

$$\frac{1,474 \text{ cf/acre (current)} + 636 \text{ cf/acre (harvested)}}{80 \text{ years}} = 26.4 \text{ cf/acre/year}$$

$$26.4 \text{ cf/acre/year} \times 2,578 \text{ acres} = \mathbf{67,994 \text{ cf/year annual increment}}$$

MU2 - Forest harvested from 1987 to 1997:

$$\frac{1,465 \text{ cf/acre (current)} + 777 \text{ cf/acre (harvested)}}{80 \text{ years}} = 28.0 \text{ cf/acre/year}$$

$$28.0 \text{ cf/acre/year} \times 6,175 \text{ acres} = \mathbf{173,054 \text{ cf/year annual increment}}$$

MU3 - Unharvested and unaccessed forest:

$$\frac{2,192 \text{ cf/acre}}{80 \text{ years}} = 27.4 \text{ cf/acre/year}$$

$$27.2 \text{ cf/acre/year} \times 10,447 \text{ acres} = \mathbf{286,640 \text{ cf/year annual increment}}$$

MU4 - Fire Origin Stands:

$$\frac{2,444 \text{ cf/acre}}{80 \text{ years}} = 30.6 \text{ cf/acre/year}$$

$$30.6 \text{ cf/acre/year} \times 5000 \text{ acres} = \mathbf{152,750 \text{ cf/year annual increment}}$$

MU5 - Reserve and Riparian Areas (5,000 acres):

$$\frac{2,192 \text{ cf/acre}}{80 \text{ years}} = 27.4 \text{ cf/acre/year}$$

$$27.4 \text{ cf/acre/year} \times 3,957 \text{ acres} = \mathbf{137,187 \text{ cf/year annual increment}}$$

Total annual increment excluding riparian & reserve: **680,438 cf**
 (8005 cords @ 85 cf/cord)
Average annual increment per acre -excluding rip/res: **28.11 cf/acre/year**
 (0.33 cords/acre/year)
Total annual increment - all management units: **817,625 cf**
 (9619 cords @ 85 cf/cord)
Average annual increment per acre - all management units: **29.03 cf/acre/year**
 (0.34 cords/acre/year)

Table 2: Inventory and Area Summary

Total Estimated Standing Inventory:	Average	
	Acres	CF/Ac
		Total CF

• MU1 Forest harvested prior to 1987	2,578	1,474	3,799,972
• MU2 Forest harvested from 1987 to 1997	6,175	1,465	9,046,375
• MU3 Unharvested and unaccessed forest	10,447	2,192	22,899,824
• MU4 Fire Origin Stands	5,000	2,444	12,220,000
	24,200		47,946,171 cu ft (1,981 cf/acre) (564,072 cds or 23.3 cords/acre)
• MU5 Reserve and Riparian Areas	3,957	2,192	8,673,744
Totals:	28,157		56,639,915 cu ft (2,011 cf/acre) (666,351 cords or 23.6 cords/acre)
• Bog and Swamp	1,043		
• Lakes and Ponds	387		
Total Acres:	29,587		

(See Appendix for thematic map depicting each management class on the landscape)

C.3. Rotation Length and Forest Control:

Forest control is provided by an area approach based on a rotation length of 140 years in combination with a stand visitation cycle of 20 years. The selection of a 140 year rotation length is an expression of our attempt to provide some measure of large tree/old forest structure over the landscape. The visitation cycle of 20 years will provide a regular opportunity to assess stand conditions, conduct improvement or intermediate harvests and capture the age-related mortality expected within spruce/fir stand structures held to a 140 year rotation. Current calculations indicate a mean annual increment of about 29 cu ft/ac but a periodic annual increment (comparing the 1978 inventory totals to the 1997 estimates in Table 2) of around 32 cu ft/acre indicating the “traditional” rotation age would likely be somewhere around 90 years for this mostly managed period of forest development (“in an even-aged stand,...periodic annual increment is equal to mean annual increment when mean annual increment culminates at its maximum...the age of maximum mean annual increment is the rotation length where the economic objective is to maximize production from a limited land base”⁸). It is likely that active management would increase the yields over time and consequently lower the age at which mean annual increment culminates. It is apparent that our selection of a substantially longer rotation age is based on considerations of the benefits of an overall older and more developed forest structure and the recognition that the risk of holding trees to the age of a century and a half is reasonable with relatively long-lived species such as red spruce, white pine, maple spp. and yellow birch.

A rotation length of 140 years requires that about 170 acres/year be regenerated by providing established regeneration adequate space and sunlight to progress toward a position in the forest canopy. ***This acreage can occur within the conduct of any silvicultural regeneration system from clearcutting to selection harvest and appropriate acreage will be tallied for any applied system.*** For the 10-year planning period, most, if not all, regeneration harvests will be applied to the fire origin types. An approach to harvest levels would be as follows:

⁸ Pg 41, The Practice of Silviculture, Smith, David M., John Wiley and Sons Pub., 1986

Regeneration harvests: Conduct regeneration harvests over 170 acres/year (24,200/140 years). If average stocking is 1,981 cu ft/acre then assume harvest of 1,723 cf/acre (leaving 258 cf/acre for biodiversity and forest structural reasons). *This would generate 292,910 cf/year gross harvest volume.*

Intermediate harvests: Determination of intermediate harvest acres are based on the assumption that the forest is balanced by age class- as if the harvest approach currently being discussed had been in place for 140 years and each of the 24,200 base acres had been regenerated under management at least once. Conduct intermediate harvests over 700 acres (24,200 acres/20 year = 1210 acres, 1210 acres - 170 acres regenerated = 1040, 1040 acres - 340 acres in the 20 and 40 year age groups and unavailable for harvest = 700 acres) at the rate of 550 cf/acre. *Intermediate harvests conducted at this level would generate 385,000 cf/year gross harvest volume.*

Total harvest rate: 292,910 + 385,000 cf = 677,910 cf/year gross harvest.
(7,975 cords/year excluding ROW volume)

It is our opinion that these harvest figures represent quite conservative estimates of the increment that will be accrued on SFMA forests in the future. In rough terms, current growth over the last 80 years, with almost no active management, averages out to about 29 cu ft or about 1/3 of a cord per acre per year. These yield estimates do not account for normal mortality in maturing stands that would be utilized, at least in part, in the normal course of activity in a managed forest. In addition, these yields do not account for volume lost in the spruce budworm outbreak of the late 1970's and early 1980's (estimated to be at least 500 cu. ft/acre in the SFMA). Lastly, our estimated yields do not include an unknown amount of volume harvested in the late 1940's prior to Percival Baxter's purchase of the land. These lost volumes would clearly increase the average yields of the SFMA forests and current experience indicates that a yield of 42 cu ft or 1/2 cord per acre is a reasonable expectation for SFMA forest yields in the future. We are not currently planning based on these yields, but believe they are likely to occur. Consequently, the importance of continued evaluation of forest growth and mortality data, particularly Continuous Forest Inventory data, should be clearly recognized. CFI data should be evaluated closely at the next planning cycle and harvest levels adjusted accordingly. In the meantime, it is likely that our conservative harvest levels will allow overall stocking levels to increase from our current average of slightly over 2,000 cu ft/acre to 2,500 cu ft/acre or better.

Silvicultural Priorities in Harvesting:

The present day SFMA is not balanced by age and exists of a variety of stands as described in sec. C.1. above. Important characteristics of SFMA stands include a generally uniform average age of 80 years (relatively mature to mature) including a mixture of species, and widespread regeneration resulting from partial harvests, the spruce budworm outbreak of the 1970's, and the natural mortality of short-lived species. For the planning period moving toward a balance forest, some basic silvicultural directives shape our harvesting approach:

- Improve the quality and potential of existing growing stock.
- Capture imminent mortality in mature, susceptible or vulnerable stems.
- Begin progress toward target mix of development classes (see sec. D.1., Forest Class Distribution) by releasing established regeneration and building overall stocking levels by 15% (26 cds/ac to 30 cds/ac - increased stocking levels in riparian and reserve areas, aggressive release work in fire origin stands).
- Develop adequate forest-wide access.

Continuous Forest Inventory

For long-term forest management, Continuous Forest Inventory (CFI) plots provide an invaluable tool for monitoring trends and developments in the forest over time. By definition, the SFMA is the kind of forest management entity that should have a system of CFI plots and consideration began in earnest in 1995. A stratified plot design was considered at length, but finally abandoned in favor of a simple grid to insure the direct and clear comparability of future measurements with past measurements as stand types change as a result of management.

The installation and measurement of 1/5 acre CFI plots began on the SFMA in 1996 and 1997 with 67 plots. An additional 58 plots will be installed prior to the year 2000 completing the 125 plot target for CFI coverage. The 125 plot total is considered a minimum for this acreage and additional plots may be installed in subsequent re-measures. The plots are semi-hidden and will allow normal timber marking and harvest activities to proceed without bias. Current plot measurements include simple stand structural measurements (DBH, spp, height, condition, regeneration, coarse woody debris), but over the next planning period data collection is expected to expand to more non-timber resource measurements such as bird, ground vegetation, amphibian and water quality resources. Over time, the remeasurement of these plots will provide the strongest foundation for decision-making regarding forest management activities on the SFMA.

C.4. Pest and Pathogen Management Strategy

Spruce Budworm

The spruce budworm (*Choristoneura fumiferana*) has long been a part of SFMA forest ecology. Stand development on the SFMA consistently reveals the impacts of the spruce budworm outbreak of 1916-1920 and cores of older trees often indicate a possible earlier episode in the mid 1800's. As with most of Maine, the forest stands of the SFMA were significantly changed by the spruce budworm (SBW) outbreak of 1972-84. Susceptible stands on the SFMA were treated by aerial spraying of insecticides, primarily utilizing initial formulations of the biological insecticide *Bacillus thuringiensis* or "BT". So strong was the concern that the initial SFMA management plan of 1980 proposed an accelerated road construction and harvest plan targeting the forest-wide harvest of all merchantable fir in 10 years. Most land managers had similar plans and the market was soon glutted with salvage volume and consequently little harvesting actually took place on the SFMA. Rough comparisons of unharvested stands cruised in the 1990's with similar stands cruised in 1978 indicate a drop in percentage of stand basal area occupied by balsam fir from 32% to 7% over the period. The majority of this change was probably due to the spruce budworm.

*"In spite of research on the epidemiology of this insect (spruce budworm) over the last 60 years, there is still no generally accepted, single hypothesis explaining the initiation and collapse of outbreaks."*⁹

Although there is much uncertainty regarding the population dynamics of the SBW, there seems to be universal agreement that the insect will eventually return to Maine softwood forests. Various predictions indicate an expected renewal of SBW activity as early as 2005 or as late as 2025.

Outbreaks of the spruce budworm are complicated natural events relying on a host of regional factors and conditions that extend well past Maine's boundaries. Short-term forest management activities over relatively small areas such as the SFMA will have little effect on the

⁹ Pg 4, The Spruce Budworm Outbreak in Maine in the 1970's-Assessment and Directions for the Future, Maine Agricultural Exp. Sta Bulletin No. 819, L. Irland, J. Dimond, J. Stone, J. Falk, E. Baum, 1988

population dynamics of the spruce budworm, but could significantly alter the impacts of an outbreak on SFMA forests.

The following current practices and efforts in SFMA management are considered positive actions toward mitigating the effects of future SBW outbreaks:

- SFMA management does attempt to promote the establishment and growth of red spruce and white pine over balsam fir whenever possible - current silviculture is strongly biased against retention of mature fir in spruce/fir types.
- Although regenerating fir is abundant in most SFMA stands, our silvicultural approach will tend to remove developing fir in favor of spruce and pine in intermediate treatments, leaving only a small percentage of the fir to reach mature stages of development.
- Although SFMA management will attempt to increase spruce percentages in mixedwood stands, it is not our intent to convert mixedwood stands to softwood stands.
- Stand treatments and management activities will attempt to create a mixed mosaic of stand structures and compositions within the limits of natural stand development and so promote and maintain diverse and stable populations of bird species and other natural pest controls.
- The continued development of forest access increases the ability of SFMA management to assess, treat and salvage stands.
- As the regeneration on SFMA partial harvests develops, overstory removals on true shelterwoods will create a more sharply defined mix of forest structures.
- SFMA management recognizes the role of the spruce budworm in spruce/fir forest ecology and remains alert to signs of unexpected changes.

Conversely, the following current practices and efforts in SFMA management are considered negative actions toward mitigating the effects of future SBW outbreaks:

- The widespread partial harvesting conducted on the SFMA will eventually produce deep crowned softwoods more vulnerable to spruce budworm infestation.
- The inclusion of a significant, well distributed percentage of the landbase in unharvested softwood structure (riparian and reserve areas) may provide a susceptible/vulnerable locus for an emerging outbreak.
- Target stand structures for the SFMA will trend toward a majority of the forest in relatively mature or mature development stages.

Field observation of areas of undisturbed (no discernable prior harvesting or fire history) softwood sites such as the Boody Brook area indicate that in natural ecosystems repeated spruce budworm outbreaks eventually purge mature fir from softwood sites and promote overstory dominance by less susceptible species with greater longevity such as red spruce, white pine and eastern hemlock. These areas also demonstrate long periods of forest development (200 + years) and high stocking levels. Although natural pests and pathogens are at work in these stands (significant spruce beetle activity in older spruce), no agent has been successful at a stand-replacing disturbance for at least 100 years. *The diversity of structures and species, together with the natural processes of stand development inherent in these stands provides the best model for forest-wide strategies for pest and pathogen protection and should be incorporated as much as possible in overall SFMA management.*



SFMA Forest Management Road

C.5. Forest Access

The principle reason for the preparation and use of a management document such as this is to provide a means for reasoned consideration of the changes and manipulations that we humans will effect on the forested landscape. Forest roads are the platform we use to implement almost all our changes.

Our road system also represents a singular, and very substantial, investment in long-term forest management. While providing access for timber removals, these roads will also be used to enjoy the many other forest amenities of the SFMA.

These considerations lead us to plan and implement a road access system that is:

1. adequate but not excessive in design and distribution and cost,
2. well-maintained and reasonably safe for both visitors, operations and management,
3. environmentally stable and
4. in the character of the landscape and aesthetically pleasing.

Design of Roads

Our philosophy regarding the design and placement of SFMA forest access roads reflects a number of considerations:

Adequacy for use in the transport of forest products and equipment:

At a minimum, SFMA roads must be adequate to accommodate the needs of normal forest management operations, including log truck, equipment and crew traffic. *As in all areas of forest roads, it is our intent to provide adequate, but not excessive design in the accomodation of these needs.* Road widths are generally 16', although terrain features can modify this standard, with occasional turnouts as prompted by terrain and safety considerations. Gravel sources for surfacing are rare to non-existent in the SFMA and roads are normally constructed by hydraulic excavator using on-site materials. After the completion of construction, new roads are closed to vehicle access and allowed to "cure" until the next operating season. Occasionally, the shale-based geology of the SFMA presents material that is suitable for use in minor, specifically directed surfacing efforts. *These areas may be developed as rough surfacing sources to accomodate maintenance and construction needs, but development should be kept to the minimum necessary to provide stable road surfaces and minimize erosion.*

About 25% of the operating year is conducted during the winter period from January to early March. Most, but not all, of the harvesting conducted during this period is from winter roads. Winter roads are constructed to a lower standard than "all-season" roads (and are accordingly less expensive) and usually are not accessible by vehicle after the specific harvest activities are completed. *For this reason, winter roads shall be considered for accessing both stands suitable for winter harvest activites and areas sensitive to increased use provided through vehicle access on all-season roads.*

Adherence to "Best Management Practices" in road construction.

"Noncompliance of haul road BMPs tends to be a chronic problem that continues long after harvest operations cease because the roads remain. Eighty-nine percent of the observed

cases of sediment movement were judged to be long-term impacts.”¹⁰ Road construction on the SFMA shall strive to apply recognized “Best Management Practices” in the construction and maintenance of forest roads. The prevention of sedimentation and the control of water movement in and around roads demands a recognition of the wide range of possible responses when a variety of soil/site conditions is impacted by the extremes of northern Maine weather. SFMA management should strive to test and develop new and effective structures and procedures to optimize management practices. Important procedures that should be implemented in the construction of SFMA access roads include:

- all-weather road construction during wet periods, especially the fall months, shall be avoided;
- open culverts or road dips shall be installed on long slopes leading to stream crossings;
- ditches and road slopes of all new all-season construction shall be seeded as soon as possible after construction;
- winter roads shall be seeded in the first spring after construction;
- whenever possible, wooden crossing structures shall be used over 3rd order¹¹ and higher streams to maintain a wide opening and a natural streambed.

The use of conservation mix and/or coated seed mixes consisting of fescue/clover/trefoil have generated discussion regarding the introduction of a steady source of naturalizing non-native plants to the forested ecosystem. Although this concern is recognized, no apparent alternative (native seed source of suitable rapid-colonizing plants) exists to effectively stabilize road slopes and ditches. Anecdotal observation suggests that plant populations from roadside seeding reach a peak from 2 to 4 years after seeding and then lose ground to larger, hardier native sedges/grasses/shrubs and trees. However, in areas where roadsides were seeded 15 years ago, small populations of tenacious species (birdsfoot trefoil, *Lotus corniculatus*) have persisted. Tests are in progress using seed from native vegetation gathered from SFMA ditchlines and we should continue to determine and develop more sources of native colonizers to employ to stabilize disturbed sites.

Distribution of Roads

There are currently 50 miles of forest management roads on the SFMA. Access to the SFMA has been developed from two discrete points of entry, north and south of the Webster Lake/Webster Stream watershed that divides the SFMA. A self-registration station at each entrance point provides an opportunity to educate the visitor and catalog a database to guide management decisions. The bi-polar nature of the access systems in the SFMA (separate systems north and south of the Webster waterway) is a product of the last planning period decision to protect the pristine nature of Webster Stream. Additional experience and consideration of this issue has only strengthened this decision: *the development of forest access in the SFMA shall not include bridging or impacting the Webster Stream corridor with vehicular access.*

The high construction cost of forest roads, especially in remote regions such as the SFMA, provides a strong incentive to maintain the total miles constructed at a level that is adequate but not excessive. During the “development stage” of forest access on the SFMA, (1980-2008), road construction costs will account for about 40% of annual expenditures. After this initial period of construction, we anticipate that road maintenance costs will require about

¹⁰ Assessing Compliance with BMPs on Harvested Sites in Maine: Final Report, Briggs, Russell D., Kimball, Alan J., Cormier, Janet; Cooperative Forestry Research Unit, Research Bulletin 11, August 1996.

¹¹ First Order Stream: tributary streams that have no branches. Second Order Stream: the stream segment flowing downstream from the confluence of two first order streams. Third Order Stream: the steam segment flowing downstream from the confluence of two second order steams. Pg. 44, Appendix 2 - Working Definitions, Sustaining Maine’s Forests, Criteria Goals and Benchmarks for Sustainable Forest Management, DOC, July 1996.

15% of annual expenditures. The incentive to minimize road miles is countered by the well-documented relationship between average yarding distance required to transport forest products to roadside and logging costs- the longer the yarding distance the higher the costs. Although not a linear relationship (costs usually escalate dramatically after a certain threshold distance is exceeded), the relationship is highly dependent on the type, method and application of logging system used. A strong factor in the decision to implement the current harvesting systems in use on the SFMA was the tendency of forwarder-based systems to minimize (but not eliminate) the effects of yarding distance on logging costs.

Road density is usually measured as a percentage of the land surface covered by roads. On the SFMA, road development in the area north of Webster Stream (compartments 4,5,9 and 11) is nearly complete. An examination of this area reveals the following:

Total area:	9,167 acres
Total road:	201.9 acres (30.29 miles @ 55' ROW width)
Road coverage:	2.2% of land surface area occupied by roads
Area accessed:	302.6 acres/mile (264 ac/mile w/o 1,172 ac riparian area)

This road system is not complete and will require some additional construction over the next 10 years, but it is not anticipated that coverage will ever exceed 2.5%. It can be assumed that a road density of 2.5% can be expected for the entire SFMA (110 miles of road). Yarding distances in these compartments are quite variable (up to 2500 feet in some cases), but on average have been acceptable for the current harvesting systems.

Safety

The SFMA attempts to combine log truck traffic on narrow, scenic, forest management roads with pickup and car traffic of recreational users and forest visitors. The potential conflict of this situation is somewhat mitigated by the low level of log traffic necessary to transport SFMA forest products, but nevertheless road safety should be considered through the following practices:

- Educate the users regarding potential truck traffic via roadside signs and information delivered at the entrance self-registration box;
- All roads are named and signed to provide visitors with sense of orientation; to allow visitors to be directed to specific areas; and to allow visitors to relay spatial information to staff more adequately (i.e., "I saw such-and-such at the Hornbeam Road");
- Educate and communicate with truck drivers regarding the likelihood of encountering visitor traffic;
- Maintain sight distances on curves to provide sufficient time for identification and reaction;
- Repair (or clearly mark until repair) any dangerous areas such as culvert wash-outs, bridge failures etc. If necessary, access to these areas may be closed until repairs are complete;
- Placement of temporary warning signs in areas of active operations;
- SFMA management will require groups who wish to tour operations to organize their visit with SFMA staff.

New road construction on the SFMA usually employs a clearing width of 55'. Immediately after construction the road appears to be quite sufficient in width and sight distance, however, native vegetation begins to re-colonize the ditch line and back slopes almost immediately. Field observation has clearly indicated that a significant percentage of yearly maintenance costs on SFMA roads will involve the mowing or reduction of roadside brush to

keep the roads free of encroaching vegetation. Efforts should be made during this planning period to develop and implement a regular system of vegetation control on SFMA management roads. *In addition, the expectation of future mowing needs should be considered in current road construction design by ensuring that obstacles such as rocks, stumps and slash are removed from the road shoulder and ditch.*

Road Access Policy - Forest Management Roads

In order to protect and maintain wild land resource quality in the manner envisioned by Governor Baxter, SFMA management shall maintain control of vehicular and pedestrian access and limit access when Park resources are threatened by overuse, misuse or extreme environmental conditions. Access control on the SFMA will be consistent with the overall policies of Baxter State Park concerning access and registration procedures. The restriction of access shall be implemented under the following conditions:

- as necessary during period of high fire danger and/or in areas of elevated fire hazard;
- as necessary to protect roads surfaces immediately after construction or during periods of high moisture or thawing;
- as necessary to protect the public and the resource during and after natural catastrophes such as blowdown, fire or storms;
- as necessary to provide a safe working environment for operational crews during hunting season;
- as necessary to protect fragile or pristine resources from overuse.

Road Access Policy - Black Brook Service Road

In the fall of 1995, work began on installing a narrow, 4 mile service road connector from the Park Tote Road near Black Brook Crossing and the SFMA's Black Brook management road. The service road utilized the location of the Webster Lake Trail (formerly an old logging and access road to Webster Lake. The decision to install the service connector was the result of several considerations including the planned installation of a septic waste disposal site near the road, the construction of a new trail segment to replace the Webster Lake Trail, the decision to permanently close the Thissell Pond access point to Baxter State Park (formerly Telos Gate), and to provide limited administrative connection between the Park's Forest Tote Road and the SFMA management roads south of Webster Stream. Work was completed on this project in 1996. The Black Brook Service Road provides an important link between the SFMA and the rest of Baxter State Park, but it is important to note that careful consideration of the action prior to the start of construction resulted in a clear commitment that the Service Road is for administrative use only, limited to those activities associated with the preservation and protection of Baxter State Park. To control access, the Service Road is gated and locked at the connection with the Park Tote Road and the SFMA Black Brook Road. Acceptable uses of the Black Brook Service Road are limited to the following:

- access by Park staff in patrol, maintenance or forest management work.
- access by septic contractors for the use of the septic waste disposal area.
- access by Park staff conducting organized tours of SFMA operations and management.
- access by Park volunteers working out of the Webster Lake Camp.
- access by outside agencies or personnel when such access is clearly beneficial to and in accordance with the performance of their employment duties and is approved by the Park Director.

Aesthetics

Percival Baxter wrote, ***“I want this township to become a show place for those interested in forestry...”***. The forest road network on the SFMA will be the place from which most visitors interested in forestry will view our forest management and judge in their own minds if we qualify as a “show place”.

Our observation indicates that the incorporation of aesthetic considerations in the design and construction of forest roads is both inexpensive and effective and in keeping with the “show place” standards set by Percival Baxter.

The design and layout of SFMA roads attempts to incorporate aesthetic considerations in every step of the process. It is our intention to locate roads in such a way that they “fit” and not “fight” the landscape. We attempt to incorporate curves and natural points of interest in our layout and follow up with a neat and orderly construction process capped with roadside seeding. The aesthetics of forest roads is only as good as the aesthetics of the adjacent forest stands. Accordingly, harvest patterns near roads and the incorporation of an appropriate mixture of stand treatments along a road system are also considered. In addition, the accumulation of logging residues is minimized with the current cut-to-length systems in use on the SFMA. Machine trail layout discourages machine access to harvest blocks directly from main access roads.

Trash and refuse are not tolerated anywhere on the SFMA, nor are receptacles provided. Consistent with Park policy, the SFMA is managed on a “Carry-In, Carry-Out” basis.

Rottne single-grip at work

C.6. Marketing, Harvest Efficiency and Product Utilization

Early in the 1990's SFMA management began a steady transition from a stumpage based payment system to a service-based system, completing the transition in the 1994-95 operating year. The marketing of forest products from the SFMA is influenced by the distance to markets, private control and use fees required for the use of the Telos/Pinkham road systems, and the poor quality and low value of many of the marginal forest products presently generated by SFMA silviculture. In contrast, the value of spruce, fir and white pine log volume promises to remain strong into the foreseeable future and provides tremendous opportunity for the application of sound silviculture and stand improvement.

Markets

The SFMA is in many ways one of the most difficult marketing locations in Maine. Distance often is a limiting factor on all markets, both domestic and foreign. Although traditionally the flow of labor and products from the Webster area has been strongly influenced by Canada, marketing efforts should reflect Baxter's intent to provide Baxter Park as a gift to the people of Maine. *Accordingly, marketing shall seek to utilize domestic markets. Small volumes*

of specialty products, limited market opportunities or significant price differentials shall constitute situations in which foreign markets should be considered.

Payment Basis

It is important to remember that the SFMA is not a part of a processing facility, and in accordance with the Trust communications, never will be¹². Consequently, the earning potential of the SFMA is based on our ability to increase the yield and quality of wood products available on the SFMA. The majority of current and anticipated harvest activities through this planning period are expected to concentrate primarily on stand improvement harvests that remove at-risk or low value components of the stand. Generally, stems with good potential for future growth in size and value are retained. Consequently, residual average stand diameters are almost always higher than pre-harvest averages. The wood products resulting from current harvesting are primarily sold on a weight basis. Other means of payment measures should be evaluated when seeking a premium on the value of future harvests that include a higher percentage of larger softwood stems.

Utilization

Current cut-to-length harvesting equipment on the SFMA produces high utilization rates on most softwood species and the forwarder/chainsaw system is applied to the larger diameter overwood portions of harvest areas, or to harvests oriented more toward hardwood removals. Softwood markets now exist to accommodate stems down to 2" in diameter at the small end. This standard would allow removal of almost all the softwood stem volume from many of the typical SFMA harvest blocks. This aggressive utilization would produce marginal profit while removing an additional, and important, component of the residual material leaving reduced debris for soil protection and nutrient cycling. Based on these considerations this option has not been pursued. *Attempts to increase yields through improved utilization should be tempered by consideration of nutrient cycling, moisture retention and site protection needs.*

In the 1996-97 operating season, hardwood products comprised about 2.5% of the overall wood products mix by weight but 4% of overall net revenues. This percentage is well below the potential of SFMA sites and while it suggests that overall hardwood quality could be improved, it may also suggest that existing hardwood log volume is under utilized or poorly utilized. *Merchandizing of hardwood log material in the woods will always be a somewhat complicated and arduous process and regular on-site training by mill representatives should be encouraged.*

Residual Stand Protection

Two of the best opportunities to improve utilization are to reduce stand damage during logging and to efficiently capture incidental mortality from windthrow and disease. A strong consideration for the implementation of a single-grip cut-to-length harvesting system in the SFMA was the ability of the system to reduce damage to the residual stand - both regeneration and overwood. This system has clearly proven its ability in this regard and reserve or residual stand damage is a rare occurrence in harvest operations on the SFMA.

The wide-spread application of a variety of partial harvest approaches in SFMA stands quickly generated a concern regarding windthrow. Line transects of harvested stand and unharvested controls indicated only a minor difference in windthrow occurrence, but the study was limited in scope. Concern and discussion over this issue contributed to the implementation of a second harvest system in 1996 employing a small forwarder to transport harvest volume coupled with a chainsaw operator to cut and limb. The system has been applied to a wide variety

¹² Private and Special Laws, 1955, Chapter 171, regarding T6,R10, "The trees harvested may be cut and yarded on the premises but no manufacturing operations shall be carried on within said township".

of harvest prescriptions and as such, payment is determined on a per-diem basis. This system has proven to be safe and efficient in the salvage of scattered windthrow volume as well as working effectively in a wide variety of even and uneven structured prescriptions.

Log transport on the Webster Ledge Road

C.7. Management Plan and Information Base

The principle sources of data and information that provide the foundation for SFMA management planning are:

- operating area (block) cruises prior to and immediately after harvest activities.
- block cruise of reserve areas at the time of designation.

- formal inventory data from past surveys (timber, botanical, geological)
- CFI data
- ongoing survey and study data on specific resources, i.e. white-tail deer and moose pellet/browse surveys, fisheries surveys, recreation use counts.
- ongoing utilization and harvest summaries for wood products.

Current research projects:

- Establishment/naturalization study of Orono Sedge (*Carex oronensis*), A. Dibble
- Regeneration studies of red spruce in various stands, A. Dibble
- Lichen studies, S. Selva

Most of the data are consolidated in several spreadsheet formats and under a Mapinfo based GIS format. Cruise information is oriented by operating blocks or by CFI plot. Also tabulated within the GIS is specific mapping of information on all roads within the SFMA. Information on harvest, revenues and recreational use is tabulated annually and included in the Baxter State Park Annual Report, along with a general narrative about on-site activities.

Cruise data is tabulated under the U.S. Forest Service Northeast Decision Model and stored based on the cruise source (operating blocks, reserve, CFI). Cruise information for operating blocks is transferred to the GIS. Summary cruises are generated as necessary and hard copies of all cruise information is filed in folders. Data is regularly copied to a storage disk via a zip drive and stored off-site.

A photographic library (primarily slides) is maintained in several binders.

D. FOREST ECOSYSTEM MAINTENANCE

A case could be made that exemplary long-term forest management is simply a synonym for ecosystem management. It is the objective of management of the 29,587 acres on the SFMA that an acceptable distribution of forest development classes be maintained over the landscape and that our forest management thinking considers all elements of the natural forest ecosystem. Considering Lorimer's estimates of the pre-settlement forest in Maine¹³, an *acceptable* distribution of development classes would probably not be an *equal* distribution, but would reflect a natural majority of immature, maturing, and mature stages managed within a mixture of single story, two-story and multi-cohort stands. The Maine Council on Sustainable Forest Management stated the following:

*“For landowners who own over 500 contiguous acres, mature, multi-story forests should eventually cover a significant portion of their ownership. Because many of the issues associated with this criterion remain unresolved, the council recommends....The development of benchmark parameters for maintaining a diversity of forest maturity classes and structures appropriate to Maine conditions...”*¹⁴

Over time, this management framework will undoubtedly be punctuated by pulses of natural disturbance that temporarily elevate the percentage of acres in the immature class. Knowledge of natural forest structure may be insufficient at this time to definitively state the “correct” percentages of acres that should exist in each development class and the organization of the classed over the landscape, but reasonable estimates can, and should, be made to guide management decisions over time.

D.1. Forest Class Distribution

Aside from patchy openings created from harvesting in the mid 1980's compartments 1 and 2, and about 500 acres of old growth forest north of Wadleigh Mountain, the majority of the forest of the SFMA originated as a result of the spruce-budworm epidemic of 1916-1920, fires in 1903 and the mid 1930's (possibly associated with deposition of logging slash), and a wave of scattered harvesting in the late 1940's. Harvesting in the mid 1980's in areas along Murphy Brook in compartments 1, 2 and 4 have created a number of small (<10 acre) patchy openings of immature structure as well as a larger mosaic of partially (50% removal) harvested acres interspersed with small irregular patches of unharvested forest. Additional harvesting north of Webster Stream in compartments 4,5,9 and 11 from 1989 to 1997 has created a larger mosaic of widely varying light to moderate partially harvested (20-40% removal) stands, interspersed with defined areas of unharvested “green retention” forest (areas suitable for harvest but intentionally passed over). These structures are complicated by the typical and widespread occurrence of a two-storied stand structure with relatively mature to mature overstory (often partially harvested) over an early understory varying in height from 3' (well stocked s/f types) to 20'+ (1903/1930's burn types) in height. In addition to the unharvested “green retention” stands, all harvested areas retained substantial unharvested acres as riparian semi-reserves. There are currently no large (>50 acres) openings on the SFMA other than natural heath bogs associated with streams.

¹³ The Presettlement Forest and Natural Disturbance Cycle of Northeastern Maine, Lorimer, Craig G., Reprinted from *ECOLOGY*, Vol.58, No.1, Winter 1977.

¹⁴ Pg 28, *Sustaining Maine's Forests: Criteria, Goals, and Benchmarks for Sustainable Forest Management*, Maine Council on Sustainable Forest Management, July 1996.

Our best estimates of the current age class distribution over the SFMA using tabulated stand structure data for harvested stands and some reserves indicate the following:

Table 3; Forest Maturity Class Distribution.

SFMA Estimated Current Forest Maturity Class Distribution (acres)

A G E C L A S S					
silvicultural system	IM	RM	MA	Totals	% of Total
Single Story	150	500	5,041	5,691	19.5
Two Story	2,713	5,239	9,281	17,233	59.0
Multi Story	n/a	4,102	2,178	6,280	21.5
Totals	2,863	9,841	16,500	29,204	
% of Total	9.8	33.7	56.5	100	

SFMA Target Forest Maturity Class Distribution (acres)

A G E C L A S S					
silvicultural system	IM	RM	MA	Totals	% of Total
Single Story	2,044	1,635	2,184	5,863	20
Two Story	6,133	4,907	6,810	17,850	61
Multi Story	n/a	1,635	3,856	5,491	19
Totals	8,177	8,177	12,850	29,204	
% of Total	28	28	44	100	

IM = immature (< 40' in height, average DBH < 5")

RM = relatively mature (generally >40' in height, > 40 years in age)

MA = mature (generally > 70' in height, > 80 years in age)

Class criteria as defined in page 33 of MCSFM report; July 1996

The age diversity of SFMA stands, especially in softwoods, is somewhat limited as a result of the strong influence on stand origin within the SFMA by the spruce budworm, fires, and harvesting. Although not heavily represented, a steady but light stocking of older trees can be found on almost all forest sites in the SFMA except the fire origin stands. Some of these individuals survived the 1916-20 spruce budworm outbreak and some were missed or below quality standards in the harvest of the 1940's. The great majority of spruce trees are between 60 and 80 years of age (effective) or 80 to 150 years of age (absolute). Two distinct age classes of white pine are found, a SBW origin class and a class from an earlier disturbance around 1865. Hardwoods and less desirable softwoods such as hemlock and northern white cedar, demonstrate a much wider range in age classes. Trees in the 20 to 50 year age class are noticeably rare on most SFMA sites.

Size diversity limitations follow the patterns discussed above regarding age. Red spruce trees exceeding 20" DBH are somewhat rare in most areas of the SFMA and are totally lacking in the burn origin stands. Mixedwood sites and some softwood pockets display reasonable stem size and height growth in hardwoods and hemlock.

In 1978, balsam fir comprised 32% of the forest stocking. The 1978-84 SBW outbreak resulted in an overall thinning of softwood and mixedwood stands through the mortality of about 65% of the fir stocking forest-wide. This mortality in fir has resulted in a widespread surge of regeneration from 6 to 10' in height consisting primarily of red maple, balsam fir, red spruce, birch spp. and some white pine.

As discussed under Forest Developmental Classes above, SFMA harvested and fire origin forest stands often exhibit a two-stage structure. Stands in green retention or riparian areas often display a greater diversity of vertical structure, but in general, most unmanaged stands in the SFMA are somewhat even-structured in appearance with typical carpet of 6" to 6' shade tolerant regeneration under a fully closed young/mature canopy. The best representation of vertical, size and age diversity existent on the SFMA is the large reserve on the south fork of Boody Brook in compartment 8. The second entry in many stands partially harvested since 1980 will provide an opportunity to evaluate the stand regarding the benefits of further vertical differentiation. Continued light partial harvests will slowly generate increased levels of vertical diversity. (See Appendix for display of average stand structure for forest classes.)

On a landscape scale, species diversity appears to be good, with appropriate mixtures of species for representative sites and past disturbance histories. As would be expected, more limited sites such as forested wetlands, dry ledge knolls and fire origin stands, present lower levels of species diversity but these sites are rarely extensive on the SFMA and are usually interspersed with richer upland sites having a mixture of disturbance histories and a full representation of naturally occurring species. We are concerned about the potential effects on species composition changes resulting from the continued decline of American beech (*Fagus grandifolia*) as a result of the necrotic canker. Although some of the relatively richer SFMA sites contain reasonably healthy beech, in most areas beech is affected to some extent and nearly all trees exhibit some level of infection and an associated decline in vigor. It is unlikely that beech will disappear from SFMA stands as a result of necrotic complex, but it seems probable that large mast-bearing trees will become rarer.

Botanical survey transects were examined in portions of the SFMA by James Burns in 1981 and Sally Rooney in 1985. The surveys noted occurrence of a rare orchid (*Calypso bulbosa*) and advised of the likelihood of populations based on the regular occurrence of suitable sites such as fully stocked cedar swamps. Species diversity and distribution of shrubs and herbaceous plants seemed to be representative of the sites examined. Concern has been expressed regarding the existence of non-native plants and the dispersal of non-native seed during the stabilization efforts on the slopes and ditches of new road construction. Some plants existing in relatively remote areas result from earlier logging operations including species noted by Rooney: hawkweeds (*Hieracium*), clover (*Trifolium spp.*), pigweed (*Chenopodium album*), shepherd's purse (*Capsella bursa-pastoris*), and common plantain (*Plantago major*). Plants distributed through roadside seeding efforts include clover, annual and perennial ryegrasses, common vetch and birdsfoot trefoil.

D.2. Long-Term Ecological Productivity

The maintenance of long-term ecological productivity is reliant on two components under our local control: (1) the protection of soil structure and productivity and (2) the retention of levels of all components of natural forest structure including species diversity and some provision that a threshold level of both individual trees and acres of forest structure be allowed to reach full

ecological development. This provision would include very long rotation levels for a pre-determined percentage of shade tolerant species and associated flora and fauna.

Protection of Soil Structure and Productivity:

In forest management, soil protection involves allowing for natural levels of nutrient cycling and maintenance of the soil organic horizon.

Maintenance of Soil Organic Horizons

Management shall consider and work toward implementation of harvesting equipment that reduces soil disturbance (compaction, rutting and soil displacement) during the harvesting process. In concert with low-impact/long reach equipment, management objectives shall provide appropriate general restrictions on the operating season for harvesting including shutdown periods in both early spring and late fall and a mechanism for effectively implementing short-term restrictions on operations based on unusual or extreme weather including precipitation, temperature and wind.

In the establishment of operating blocks management shall consider soil structures and moisture levels and schedule operations, if any, for seasonally appropriate entries. Isolated or numerous inclusions of differing soil or site conditions and wood flow patterns within an operating block will be noted and addressed in the operations planning process and, if necessary, with appropriate field layout.

Any and all concerns regarding soil sensitivity and harvesting operational measures to address such concerns will be discussed with the harvester prior to beginning operations. The education and development of knowledgeable equipment operators capable and willing to make sound on-site decisions regarding the protection of soil resources is of paramount importance in SFMA harvesting operations.

Nutrient Cycling:

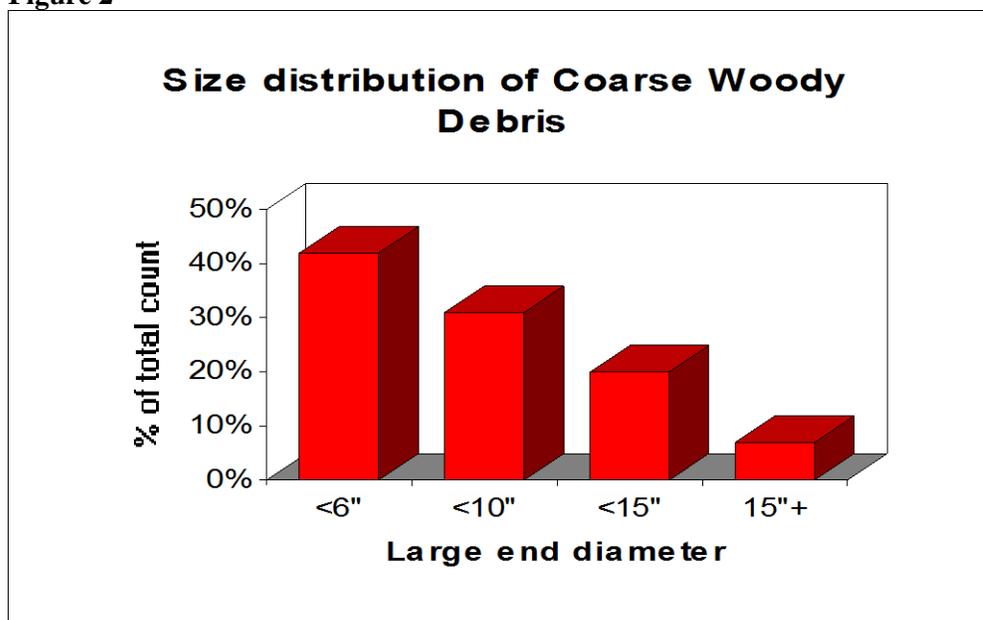
“Any activity that removes biomass from the forest alters the forest nutrient balance, either temporarily or indefinitely. Soil nutrient loss studies, particularly the Weymouth Point Study, demonstrate that whole tree clearcutting removes approximately 90% of above-ground nitrogen, phosphorus, potassium calcium and magnesium. While this amounts to less than 5% of total nutrient reserves, it can significantly affect the amount of exchangeable nutrients available for plant uptake. Absent the return of some harvesting residues to a given site, exchangeable nutrients available for plant uptake suffice for less than one rotation on infertile sites. Leaving behind tops and limbs that would otherwise have been removed returned 33% to 61% of the nutrients to the site...”¹⁵

“Coarse Woody Debris” (CWD) is a term that is currently used to describe the dead tree boles, old logs and other woody debris commonly found on or near the forest floor. The measurement of this material can provide insight into habitat quantity and quality for a wide number of vertebrate and invertebrate animal species as well plants. Data from measurements of coarse woody debris can also be used to generate estimates and general estimates of forest

¹⁵ Pg 7, Sustaining Maine’s Forests: Criteria, Goals, and Benchmarks for Sustainable Forest Management, Maine Council on Sustainable Forest Management, July 1996.

biomass and the quantity of carbon stored as coarse woody debris. Beginning in 1997, CFI plot measurement included transects for the measurement of CWD. 22% of the plots tabulated zero CWD. Calculated cf/ac CWD ranged over the plots measured from 0 to 3296 cf/ac and the average CWD for the 32 plots measured was calculated to be 681.54 cf/ac. This number falls within the range experience in other CWD measurements in Maine and will serve primarily as a benchmark against which to hold future CFI measures of CWD. The average diameter of the large end of CWD pieces measured was 7.15". The distribution of piece sizes measured is displayed in Figure 2:

Figure 2



Tree length removal (limbs and bole) has not been a part of SFMA management application since 1986. Harvesting efforts on the SFMA should consider the benefits of retaining as much residue as possible, well-distributed on the forest site, to maintain the nutrient cycle with as little disruption as possible. The deposition of forest residues, specifically tops and limbs, at roadside shall be avoided, although occasional volumes of cull logs may be accumulated and remarketed or used. The appropriateness of wood product markets that accommodate tree boles down to small top sizes (1-2") shall be considered in light of the reduction of residues retained (both in nutrient retention and need for material as a trail mat with cut-to-length equipment) as well as economic benefits.

Management shall maximize efforts to avoid soil damage during harvesting operations. This effort includes the yarding of all wood by forwarders, a general restriction of operations to a 35 week operating year including a 3 week shutdown in late fall and a 14 week shutdown in early spring, and specific restrictions of operations based on extreme weather.

D.3. Wildlife Management Actions, Strategies, And Programs

- Wildlife is considered within the context of forest management on the SFMA by:
- considering wildlife management as primarily habitat management and;

- providing a diverse mixture of productive forest structures, managed in accordance with the ecological processes natural to those structures will inherently ensure stable, healthy and diverse populations of fauna.

An adherence to these statements will ensure and institutionalize a more holistic approach to the management of animal life on the SFMA and over time management should attempt to include consideration of appropriate fungal and invertebrate lifeforms in the list of species considered as yardsticks of success in “wildlife” management. The designation of the SFMA as a hunting area will always insure a strong focus on white-tail deer, coyote, black bear, ruffed grouse, marten and other active game species. However, our management should seek to avoid singular manipulations of forest structures simply to provide species-specific habitat that are not characteristic of the structures typical of natural forest development in the region.

Although the SFMA has clearly benefited from the advice of University of Maine and Inland Fisheries and Wildlife wildlife biologists as active members of the SFMA Advisory Committee, wildlife management on the SFMA could benefit by implementing the following:

- regular census procedures for indicator species (a selection of representative classes of fauna and flora).
- regular census of any known and located rare or vulnerable species on the SFMA.
- regular sampling of water resources and determination of water chemistry and clarity.
- regular census of sensitive game species under trapping pressure.(i.e. marten) to determine the effect of trapping on populations.

Currently, specific wildlife management actions are in four areas:

1. Provision for an appropriate distribution of forest structures over the SFMA in proportion of age classes, species composition and connectivity.
2. Provision for retention or development of necessary individual forest structural components currently lacking or at risk.
3. Development of a more specific plan for determination of amounts and distribution of winter cover structure for white tail deer.
4. Ongoing fisheries management in Webster Lake, Webster Stream and Hudson and Frost Ponds.

Provision for an appropriate distribution of forest structures over the SFMA in proportion of age classes, species composition and connectivity.

This work is large scale and on-going and reflects our efforts, using both science and judgement, to develop a mosaic of forest structures on the landscape of the SFMA that provides optimum habitat mixes and adequate connectivity between and among habitats. This work primarily considers the distribution of the following management designations:

Reserve areas (6% of operable landbase): These areas comprise representative stands, including two areas of over 300 acres, that were intentionally passed by during access and harvest activities to:

- increase the diversity of stand structures in any one area;
- complement and sometimes complete the connectivity provided by riparian areas;
- provide a baseline for comparison of developmental changes as a result of harvest or stand treatment activities;

- allow some areas to proceed in development toward late-successional stages and multi-cohort stands (See also section D.6., Ecosystem Reserve Policies).

Riparian Areas (11% of operable landbase): These areas comprise protected or semi-protected areas along watercourses and wetlands to:

- provide protected corridors for travel and shelter connectivity to adjacent riparian areas and reserve areas with the SFMA;
- provide protected corridors for migration to seasonal ranges outside or inside the SFMA;
- provide specific micro-climate structures for the more diverse habitats often found along waterways, lakes and ponds;
- complement, and sometimes complete, the habitat provided by reserves;
- allow some areas to proceed in development toward late-successional stages and multi-cohort stands.

Harvest Areas: (80-85% of the operable landbase)

- provide a variety of stand structures distributed across the landscape reflective of a mixture of sites and developmental classes.

Provision for retention or development of necessary individual forest structural components currently lacking or at risk.

- **Large Down Woody Debris**
- **Large Bole Trees for Cavity Dwellers**
- **Beech Decline**
- **Threatened, Rare or Endangered Species**

The two-storied and relatively immature nature of many SFMA stands combines to raise concerns about the lack of large down woody debris (class IV decay logs) and the lack of large trees likely to provide adequate nesting habitat for cavity nesters. In addition, the decline of beech as result of necrotic complex is of continuing concern regarding a reduction in species diversity and mast production.

Anecdotally, sightings of Pileated woodpeckers are fairly common on the SFMA and an assumption could be made that at least marginal habitat must exist, although other cavity nesters like the barred owl are not commonly seen and require specific survey methods to estimate. Conversely, earlier logging and fires have removed most of the large tree component of stand structure and this fact, combined with the lack of truly older large trees (most large white pine on the SFMA are still vigorous) promotes the careful designation of trees to fill this need in the present and the future.

Figure 3.

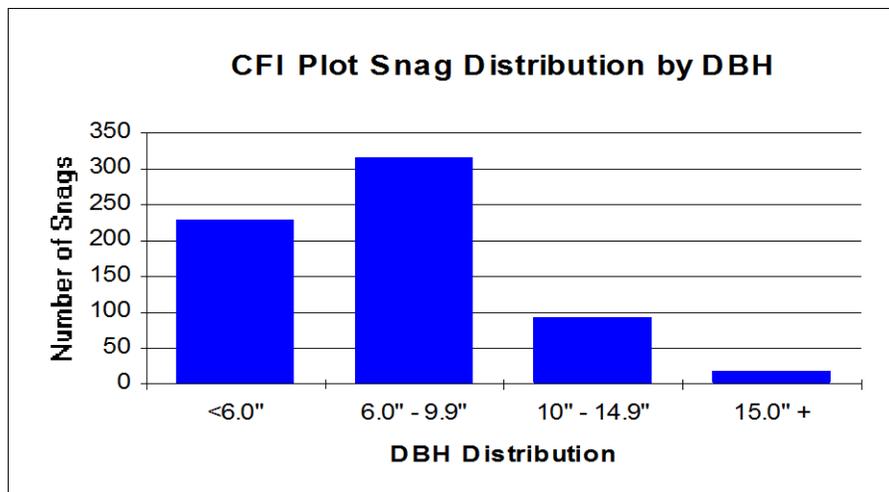
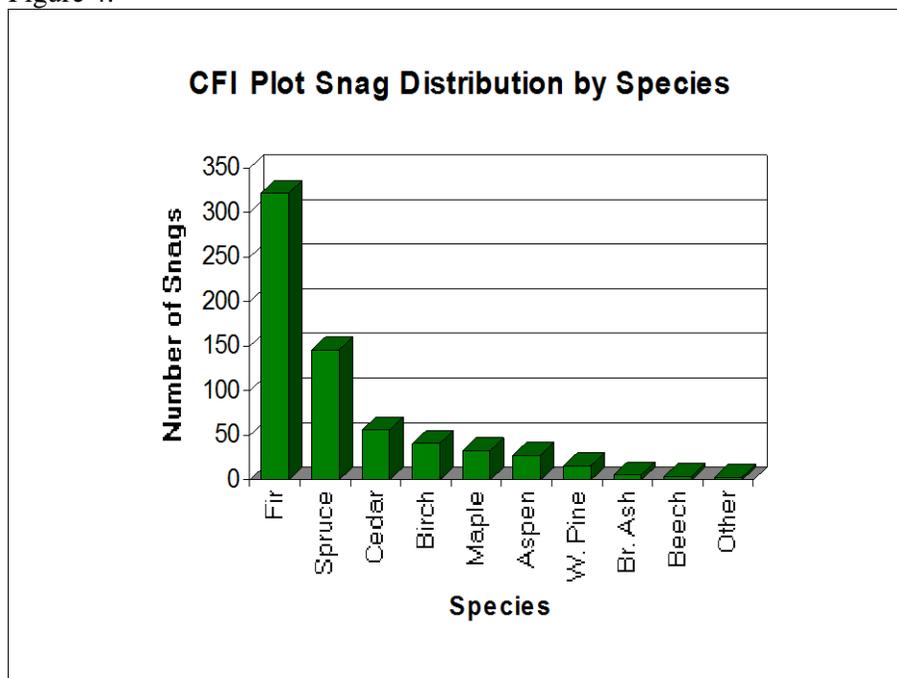
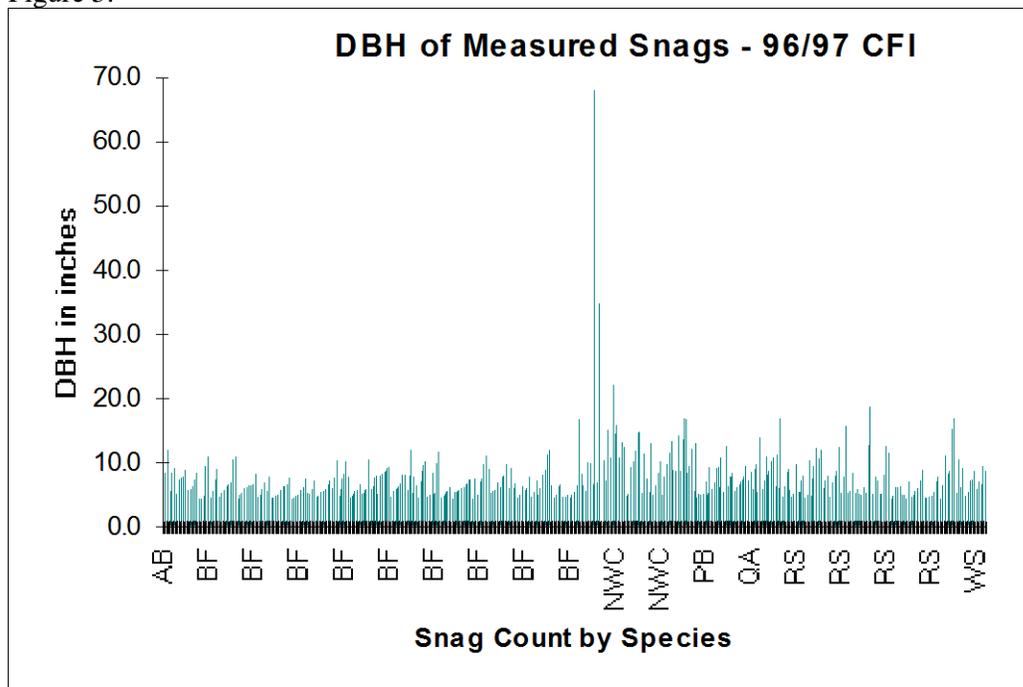


Figure 4.



Typical stand marking procedures on the SFMA have included the marking with a painted “W” of any tree deemed to have notable potential to provide wildlife habitat whether current or predicted. Designated wildlife trees are usually in the 15”+ DBH class. CFI data indicates an overall snag density of 49 trees per acre on the landscape. However, as Figures 3 and 4 above reveals, most of these snags are under 15” with the great majority (83%) represented by balsam fir under 10” DBH. For the most part, these snags are the result of interstand competition for light and space and while they do provide food and structure for some components of the forest ecosystem, they are generally not large enough to provide nesting habitat for cavity dwellers. Trees above 15” DBH account for about 3% of measured snags (1.3 per acre). Continuation of the practice of field marking of potential wildlife trees should eventually build a stocking of designated trees to be held and monitored for wildlife use.. As these trees age and die, they should also provide a continuing source of large down decay logs. As indicated by Figure 5 below, cedar, white pine and aspen provide the best potential for large diameter habitat.

Figure 5.



Where stands display a population of American beech (*Fagus grandifolia*), consideration shall be given to the maintenance of populations of healthy beech in the stand over the long term. Healthy, relatively smooth barked individuals (these trees almost always exhibit signs of use by black bear) shall be retained.

The Wood Turtle (*Clemmys insculpta*) has been identified in at least two areas of the SFMA. These reptiles are currently classified as a “special concern” species in Maine. This is an administrative category having no legal standing under Maine’s Endangered Species statutes. Current designations of riparian zone should provide adequate protected habitat for this species. The potential for poaching of this species is a concern and is likely to remain so with monitoring and prevention being difficult or impossible. Management shall work to develop reasonable methods for census and survey of this species (or at least suitable habitat) before the next management cycle. Orono sedge (*Carex oronensis*) is on the State list as threatened. This plant has been purposely introduced in 1992 and 1993 on selected SFMA sites as part of a research project.

Development of a more specific plan for determination of amounts and distribution of winter cover structure for white tail deer.

Although we consider it as only one component of a vast and complex array of fauna living in SFMA forests, the white tail deer has long been a focal point of forest management in Maine due to traditional hunting practices and the state-wide economic importance of this animal. At the State level, specific and intensive efforts have been directed at determining habitat needs, population measures and dynamics and target numbers for the population levels of this species in different forest and climate zones of the state.

On a Land Planning Unit basis, white tail deer management is complicated by a number of issues including the migratory nature of this species seasonally into and out of the SFMA and large scale changes in forest structure in habitat areas adjacent to the SFMA. For these reasons, and others associated with the habitat needs of white tail deer, representatives from the Department of Inland Fisheries and Wildlife (IF&W) approached SFMA management in late 1997 regarding evaluating the predicted development of forest structures over the SFMA in relation to the habitat needs of white tail deer.

In Maine, white tail deer are economically important as a game species. In northern Maine, the species is approaching the northern limits of its range and populations are particularly sensitive to the severity of winter. The deer wintering area (DWA) provided by relatively mature to mature softwood cover on the SFMA is part of a larger complex of DWA involving several different landowners that extends from Telos Lake, down the Webster Lake/Stream corridor to Matagamon and northward up the East Branch of the Penobscot River. Loss of DWA from harvesting in the region has increased the relative importance to white tail deer of this remaining complex of softwood structure. IF&W personnel suggest that deer may migrate some distance from adjacent areas to utilize this complex of cover for winter shelter, but hard data defining deer movement in the area is not available. Future efforts to acquire this information would be very helpful in decision making. Original forest inventory data and soil classifications¹⁶ indicate that 70% of SFMA sites are naturally suited to softwood growth. The remaining 30% of the area is classified as mixedwood site occurring along ridges and on better-drained, more upland sites. Based on Table 3., Forest Maturity Class Distribution (see page 27), management to meet the target forest structures would eventually develop a total of approximately 74% of managed acres on the SFMA in mature to relatively mature forest structures (softwood and mixedwood - 21,600 acres with heights > 40' and ages > 40 years). This acreage is far in excess of current indications of acreage utilized for winter cover by white tail deer. In addition, the usefulness of SFMA forest structures for deer wintering should be enhanced by (1) the expectation of slow accretion of average growing stock volume, (2) the full development of mature (and over-mature) cover possible under the relatively long rotation and (3) the consideration of connectivity issues in management (see text above). Although we feel that viable white deer populations would persist under a wide range of management on the SFMA, we recognize the importance of this mature softwood cover as a critical structural component for white tail deer during the winter months. *We feel that management toward the target forest maturity class distribution described in this plan will ensure adequate winter cover for this species in perpetuity. Efforts should be made in the planning period to institute procedures for the regular census of SFMA white tail deer populations and the determination of migratory rates and pathways involving the SFMA.*

As an adjunct to white tail deer management, the issue of predator control activity has been addressed by Park management. Predator control activity consists of attempts, primarily through the use of snare sets, to limit coyote populations actively preying on wintering populations of white tail deer. *Although it is recognized that wintering populations of deer are migratory in nature and may summer outside of Baxter State Park, it is the objective of Park management, within the spirit of the Trust Communications, to allow the unimpeded interaction of natural ecological processes within the boundaries of Baxter State Park. Accordingly, actions such as predator control will be discouraged. Any predator control action within Baxter State Park must first have the approval of the Baxter State Park Authority before implementation in the field.*

Mapping, stand development classes, data evaluation and conclusions, including specific directives of SFMA management toward the maintenance and distribution of forest structures on the SFMA, are included as an appendix to this plan.

¹⁶ Baxter State Park SFMA Base Inventory Report, 1980

Ongoing fisheries management in Webster Lake, Webster Stream and Hudson and Frost Ponds.

In cooperation with the IF&W, major fisheries resources on the SFMA are regularly surveyed and fisheries biologists meet with Park personnel to discuss the status of the resource and any regulatory changes in creel limits that might be appropriate to maintain the fisheries resource.

Frost Pond is a 37 acre pond providing excellent holding habitat for brook trout but lacking in any reproductive habitat. IF&W began stocking Frost Pond in 1970 with 3100 brook trout. The pond has been stocked 17 times in the 26 years to 1996 with current stocking levels of around 750 fish per stocking. Since Frost Pond is a remote pond without natural reproductive habitat, stocking must be continual and would serve a recreational use only. *The consistency of this practice to the overall SFMA approach of following natural ecological processes is questionable and should be reviewed over the planning period.*

Forest management roads and the construction of the Wadleigh Brook Trail have improved the access to Hudson Pond and the potential is likely that fishing use on this formerly very remote pond will increase in the years ahead. *Although stable native populations exist in Hudson Pond, reproductive habitat is limited and the fishery should be carefully monitored to evaluate the effect fishing pressure may have on the stability of natural populations. Management shall work with IF&W fisheries biologists to ensure that fish population levels in Hudson Pond are adequately maintained.*

D.4. Watercourse Management Policies and Programs

RIPARIAN AREAS

From the perspective of overall resource value and diversity, riparian areas exceed all others in importance. Riparian zones provide an area for concentrated use by terrestrial wildlife, the filtering of runoff and floodwater, nesting and breeding sites for a variety of animals and a focal point for human recreation within the SFMA. In addition, under long-term forest management riparian areas:

- provide protected corridors for travel and shelter connectivity to adjacent riparian areas and reserve areas with the SFMA;
- provide protected corridors for migration to seasonal ranges outside or inside the SFMA;
- provide specific micro-climate structures for the more diverse habitats often found along waterways, lakes and ponds;
- complement, and sometimes complete, the habitat provided by reserves;
- allow some areas to proceed in development toward late-successional stages and multi-cohort stands.

We feel our riparian areas, in thoughtful combination with our reserve areas and adjacent forest management, can form structural entities and habitat types that transcend the common perception of a thin strip of reserve trees along a stream; the so called “buffer strip”. It is our intent to blend active timber management with reserves and riparian areas to provide a full range of native habitats characteristic of the SFMA.

Applying this approach, we have abandoned the traditional pre-determined distance approach to establishing riparian boundaries and instead use on-site indicators to drive the location of riparian boundaries. This has resulted in a highly variable streamside buffer on all 3rd order and higher streams (i.e. Webster Stream, Wadleigh Brook, Brayley Brook, Murphy Brook). Some site indicators used to establish riparian lines are:

- a distinct break in slope or grade approaching the stream or pond signifying a departure from an upland type;
- a change in forest type from typical upland species (red spruce, northern hardwoods) to wetland types (fir, cedar);
- evidence of travel pathways for wildlife;
- intact developed structure providing connective pathways between less developed structure;
- aesthetic sensitivity with recreational corridors;
- uniform forest structures coincident with existing significant wetlands or heath bogs (black spruce flats, cedar swamps);
- obvious concentration areas for wildlife and wetland habitat, i.e. the confluence of 3rd and 4th order streams.

These guidelines have resulted in the definition of riparian boundaries determined by landscape features, consequently, riparian lines can vary from 50' to well over 1000' from the shorelines of waterbodies.

In the SFMA, we refer to riparian zones as “semi-protected”. Sensitive and thoughtful harvesting can be conducted within riparian areas without degradation of the structural features that provide protection to water quality resources and may be necessary at times to maintain or encourage vertical diversity in forest structure. At times, we expect that certain conditions - insect/disease damage, massive windthrow etc. - may prompt some level of harvest entry on some portions of our riparian areas. Under no circumstances do we envision extensive harvest, or even a complete salvage, of any riparian area. In general, our riparian areas serve a combined purpose in the development of wildlife habitat, protection of water quality, and the evolution of mature multi-story forest structure and in most cases are best left undisturbed.

STREAM CROSSINGS

*“Forest management in riparian zones has a greater influence on the ecological processes in small streams than in large streams”.*¹⁷ We recognize the critical importance of maintaining shade and minimizing disturbance on 1st and 2nd order streams. SFMA policy and practice is to use 1st and 2nd order streams as boundaries between management blocks, therefore providing a clear opportunity to limit harvest within 50 to 100' of the stream and completely avoid the need for crossing of the stream with equipment or activity. In addition, timber marking of partial harvests approaching the stream should gradually reduce removal intensities as the riparian line is approached.

Although our strong preference is to organize management blocks to avoid the crossing of any 1st or 2nd order stream, on some occasions avoidance of crossing a stream would require additional road construction. In these cases, assignment of reserve status to the block beyond the stream should be considered. If reserve status is not appropriate and harvest activities will involve crossing the stream, a minimal number (preferably 1) of stream crossings should be

¹⁷ Pg 10, Sustaining Maine's Forests: Criteria, Goals, and Benchmarks for Sustainable Forest Management, Maine Council on Sustainable Forest Management, July 1996.

identified in the field and appropriate measures taken to minimize disturbance implemented. Temporary crossings shall utilize portable bridging and/or winter conditions whenever possible. If necessary, stabilization work shall immediately follow the conclusion of use of the crossing. Finally, temporary crossing locations and uses should be noted in the stand history database so the same site can be used again during any subsequent entry.

Research consistently indicates that forest management roads are the leading cause of sedimentation of streams and ponds in forested landscapes. The SFMA is near the mid-point of a 28 year effort to build and establish an access network of forest management roads. In addition to adherence to accepted Best Management Practices, the following benchmarks shall guide road construction and maintenance in order to protect water quality:

- Primary planning of the overall road system shall seek to minimize the overall number of stream crossings, understanding that this may increase the travel distance for wood products transport;
- Webster Stream shall not be bridged in any way for vehicle traffic;
- When crossing 3rd order and higher streams, wooden bridge-type crossings will be considered over culvert installation to preserve a natural stream bottom and allow more unimpeded water flow;
- Main haul roads will be located on upland sites well away from major watercourses;
- Secondary spur roads approaching watercourses shall terminate as far from riparian zones as possible;
- Secondary spur roads approaching 4th order and higher streams will be closed to vehicle access when operations are not in progress and there exists no management need for vehicle access;
- Road grades approaching stream crossings will utilize open culverts, road dips or other means to ensure water running down wheel tracks or on the road surface does not enter the stream;
- Right-of-Way clearing widths shall be the minimum necessary at stream crossings (normally 20')

D.5. Pest Control: Practices and Policies

Pest control in the form of a biological control agent, *Bacillus* was applied to the SFMA during the SBW outbreak of 1978-84. On the SFMA, no pesticides have been applied since the SBW event. As of the preparation of this plan, no herbicides have been applied on the SFMA.

SFMA management does not believe that exemplary forestry necessarily precludes the use of chemicals, but it is our experience that the patient application of forest management principles based on natural ecological processes renders the application of chemicals a rare choice rather than a common necessity. Subsequent epidemics of SBW or other insects or diseases are inevitable and the application of pesticides to control or modify the effects of an epidemic should be considered at that time based on available chemicals, formulations, biocontrols, the arrangement of forest structure and the particular nature of the outbreak.

D.6. Ecosystem Reserve Policies

The establishment of reserve areas within the SFMA is a difficult issue requiring careful consideration and judgment regarding the true intent of Baxter State Park donor Percival Baxter.

In his trust communications to the 97th Legislature Baxter wrote primarily about his wish that careful management produce:

- *“a continuing crop of timber to be harvested and sold as are potatoes or any other product of the soil.”*
- *“a showplace for those interested in forestry, a place where a continuing timber crop can be cultivated, harvested and sold; where reforestation and scientific cutting will be employed; an example and an inspiration to others.”*
- *“beautiful great forests that for centuries have been producing a crop of wood without depletion...”*

Clearly, these words articulate a direction to practice sustainable forest management in the production of marketable wood products. Baxter directed that “scientific cutting”, the removal of specific stems according to thoughtful silvicultural prescription and practice, be applied on the SFMA. On one hand, the establishment of reserves directly implies the elimination of all cutting, scientific or otherwise. On the other hand, Percival Baxter wanted the SFMA to be a *“showplace for those interested in forestry...an example and inspiration to others”* and the concept of ecological reserves within the matrix of managed (harvested) forest landscapes is emerging as a viable portion of *exemplary* forest management.

Complicating the consideration of SFMA reserves is the role of the SFMA as part of Baxter State Park. Aside from the SFMA, the 204,733 acres of Baxter State Park are forever protected from harvesting or any other significant human disturbance and comprise one of the premier “reserve” areas in Maine. A close examination of the forests of Baxter Park, however, reveals that much of the Park was harvested for wood products within the last 100 years and many of the forest structures are just now approaching mature conditions and for many areas it will be another 100 years before true late-successional stages will be attained.

After weighing these considerations, it seems reasonable to consider, with some moderation, the idea of a mosaic of reserve areas within the confines of the SFMA, including some reasonable limitations on harvest disturbance regimes. Reserve areas should be considered on a landscape scale with the following benchmarks:

- Reserve areas should be considered in combination with Riparian areas and as a total these zones should have a target of from 10 - 15% of the total surface area of the SFMA less acres in ponds and lakes (note: currently, riparian areas cover 11% of the SFMA and listed reserve blocks cover 6% with approximately 13,000 acres currently unclassified).
- The importance of SFMA reserve areas in any regional sense may diminish over time as forest structures in the remainder of Baxter State Park mature.
- Designation of reserve areas should focus primarily on issues of connectivity, the establishment of more mature developmental classes, and the extension of riparian habitat complexes.
- Established reserve areas in excess of the target percentage may be reclassified as harvest blocks.
- As long as the target percentage is maintained or exceeded, selected reserve areas may be reclassified to harvest blocks in exchange for new classifications of reserve areas if the new classifications are better qualified as reserves based on the following considerations:
 1. if the diversity of stand structures in any one area is increased.
 2. to complement and sometimes complete the connectivity provided by riparian areas.
 3. to provide a baseline for comparison of developmental changes as a result of harvest or stand treatment activities.

4. to allow some areas to proceed in development toward late-successional stages and multi-cohort stands.

Of special note in any discussion of SFMA reserves is an area known as the Boody Brook Natural Area.. This area lies just north of the Wadleigh Mountain formation and encompasses the part of a small watershed drained by a southern fork of Boody Brook. The area is unique in the SFMA, and rare in Maine, in that there is no apparent evidence of significant prior harvests or fires. In general, the site covers the north and south sides of a 2nd order drainage flowing into the main course of Boody Brook. The south side of the drainage holds to a moderate slope with a northern aspect and carries mixedwood stands with a component of hemlock. The north side of the brook exhibits somewhat shallow soils to ledge and carries primarily softwood stands heavy to red spruce. There is some indication that some harvesting of pine, probably in the early 1800's, may have occurred on parts of the area, but specific, definitive study is needed to determine the history of stand development on the area. The area size is also undetermined and probably lies between 300 and 500 acres. The 1903 fire produced a clear type change along the south and east and parts of the north sides of the area, but some parts of the perimeter are much more difficult to discern and will require further study in order to place a line of demarcation around the area. Interest in the area has been moderate since the mid-1990's.

In 1997, a one mile spur trail from the Wadleigh Brook Trail was constructed to the stand type change at the southwestern corner of the Boody Brook Natural Area. This trail provides reasonable access to the site for interested public, who are often surprised by what "old growth" really looks like in Maine. There are no plans to construct trail into the natural area for the next planning period. Management has discussed plans to extend the spur trail toward a final terminus at the Freezeout Trail near Trout Brook Farm, but any extension would avoid entering the natural area.

We believe that three objectives should guide our management of the BBNA over the next planning period: 1), it is unique, 2), we need additional study before we can define how we should manage the area over the long-term and 3), no intrusive management (harvesting, trail construction or significant destructive sampling) should take place for the planning period. Field study should continue over the next planning period to:

- develop criteria that define stand structures unique from those found normally on the SFMA so that the boundaries of the BBNA can be determined and demarcated in the field.
- encourage research in stand development history, flora and fauna inventory and ecological processes, matched with comparative work in other harvested and reserved (harvesting, trail construction or significant destructive sampling) areas of the SFMA.

E. FINANCIAL AND SOCIO-ECONOMIC CONSIDERATIONS

Percival Baxter never specified financial performance standards in his trust communications to the 97th legislature. Baxter did state that *“...all revenue derived from the sale of said products shall be used by said State for the care, management and protection of Baxter State Park as now or hereafter defined...”*

From the beginning of management efforts on the SFMA in the late 1970's, the Baxter State Park Authority has expended Trust Fund and operational revenues as deemed necessary and appropriate to conduct management on the SFMA in accordance with Percival Baxter's intentions as expressed in the Trust communications. Recognizing that Baxter did not specify SFMA revenue be dedicated to SFMA operations but instead to the *“care, management and protection of Baxter State Park”*, Park policy has been to view the fiscal operation of the SFMA, both revenues and expenditures, as a part of Baxter State Park as a whole. Consequently, the expenditure needs of the SFMA have been viewed as one of several operating units of the Park, and the scheduling of funds has been driven by the primary considerations that drive all Park budget expenditure decisions:

E.1. Financial Stability

Management strives to meet necessary expenditure levels by a combination of Park operational revenues (SFMA wood products revenues account for about 15% of the Park's operating budget) and Trust Fund revenues without :

- 1. placing an undue burden on the long-term earning power of the Trust Fund, or**
- 2. placing an undue burden on the ability of the average person to pay for the use of Park facilities.**

In the case of the SFMA, consideration 1. above is the principal concern.

Some final considerations; Percival Baxter stated that he wanted the SFMA to be *“...a showplace for those interested in forestry, an example and an inspiration to others.”* Most people would agree that an inspirational example of forest management would reasonably include some level of a positive net return on operations, *but that short term financial considerations should not imperil long term forest health and management success.*

Although Baxter described the idea of the SFMA as an *“experiment that can mean much for our future timber supply, which all admit is the chief natural resource of our State.”* it seems clear that he viewed the complete idea of the SFMA as an experiment and not that the SFMA should be an experimental forest in the sense of a research forest where the majority of harvests have some research basis and most operations are conducted primarily on a net cost basis.

So the questions are primarily how much profit, and over what period of time.

These questions can be answered in a general sense, with some reasonable expectation that the answers can be refined within the next 10 year planning period. The SFMA is currently in a

pioneering stage of forest management concerned primarily with developing access, gathering specific data on forest resources, and defining management approaches. This stage is expected to last another 10 years until access efforts have been completed and most or all forest acres on the SFMA have some recorded base of data and organization. Our priorities are:

- primarily to practice exemplary forestry and
- secondarily, to evaluate our profit levels over time.

In a general sense, most harvest operations during this initial stage of management could be characterized as conditioning cuts that attempt to improve the quality of existing growing stock. This is also a period of significant initial investments in road construction (approximately 40% of the SFMA annual budget), equipment for management (from field tools to decisions regarding contracted harvesting equipment) and the establishment of long term living quarters for contract and field crews. Although maintenance costs for these needs will be ongoing, most of the initial start-up costs will be absorbed by 2010.

Our experience to date through this initial phase has demonstrated that the SFMA can work near a break-even basis in the average year and most importantly, *does not place an undue burden on the long-term earning power of the Trust Funds*. During the next phase of SFMA management the following changes will affect the SFMA's profit margin:

- road construction costs will become road maintenance costs and shrink by an estimated 65%;
- production rates and piece size will increase with second entries into conditioned stands;
- the changing value of forest product prices relative to management costs based on market issues of supply, demand and quality.

Predicting the outcome of these considerations requires judgment but in general, SFMA profit margins are expected to rise based primarily on the reduction of road construction costs which currently account for such a significant portion of annual SFMA expenditures.

Over the 10 year planning period, SFMA annual revenues can be expected to grow to a level exceeding annual expenditures by 10-20%.

SFMA management has regarded the issue of marketing and cash flow as a priority over the last planning period. Major structural changes that have occurred include:

- The SFMA holds complete responsibility for the marketing of all wood products harvested from the SFMA.
- Contractors providing a harvest, load and hauling service are paid per unit for that service.
- The per unit service cost is a generic cost per unit negotiated according to anticipated production amounts and rates and without regard for any specific product market value.

The importance of these changes regarding determining forest management focus cannot be over-emphasized. Using equipment typical to an SFMA operation, the cost to a harvest contractor of harvesting 5 cords of hardwood pulp is very similar to the cost of harvesting 5 cords of spruce logs, but the market value is currently different by a factor of 3. The wide disparity in relative values of the range of wood products typically harvested in SFMA operations will always cause tension between the land owner and the contractor if harvest service prices reflect these market price disparities. By controlling market decisions, SFMA management can let silvicultural decisions drive market actions and not the reverse. In developing a harvest service payment system based on a generic per unit price, management has provided the operations contractor with a clear focus on the quality of the work and not the value of the product. It is management's firm position that the contractor should be encouraged to focus on quality

silvicultural performance and the relative profit or loss of the treatment should be solely the concern of SMFA management.

The implementation of such a system, including marketing of 30 to 40 million pounds of wood products per year, generates considerable cash flow, with most income passing through to pay for harvesting service costs. Gross revenues from a typical year of SFMA operations equal roughly 50% of the annual expenditure levels of the Baxter State Park operating budget. Until 1995, the SFMA was operating primarily on a stumpage basis and collected only revenues from the harvest contractor. These revenues were deposited directly into the Park's operating account and were reflected in the year-end financial reports. After the shift to a service cost contract in 1995, the large amounts of gross revenues inflated the Park's overall budget by 50%, mostly with pass-through money. To alleviate this situation, in fiscal year 1996 the Bureau of Budget established a new "Enterprise Fund" account to gather and distribute gross wood products revenues from mills and distribute service cost and road toll payments. At the end of each operating season and near the end of each fiscal year (usually in May) net revenues from SFMA operations are transferred from the Enterprise Fund to Baxter State Park's operating account.

Forester John Mills marking an aspen

Old-growth spruce in the Boody Brook Natural Area

E.2. Community and Public Involvement

Included in Percival Baxter's Trust Communications is the following passage:

**“We all love the State of Maine,
Her fair land and fine people,
Her mountains and her forests,
With the beasts and birds therein,
Her rugged shores and clear waters.
God has conferred upon us these blessings
For which we ever should be thankful.”**

The deep sentiments of this passage are clear, and Percival Baxter demonstrated his feelings toward his native state by using his personal funds and many years of his life to acquire and give what we now know as Baxter State Park to the People of Maine. It is within the spirit of this passage, and other Trust communications, that the business of the SFMA is conducted.

SFMA management shall strive to manage and operate the SFMA as a “good neighbor” to surrounding landowners in the same spirit of cooperation that marks the tradition of the North Maine Woods. The following standards and guidelines apply in the conduct of SFMA management and the application of local resources:

Forest Products

The SFMA is located in one of the most remote marketing regions in Maine. For the SFMA, all markets are far away (in excess of 60 miles). Traditionally, markets, culture and labor in northern Maine have commersed freely across national lines with Canada. Our approach to foreign markets for wood products has been and will continue to be:

- the long-term silvicultural needs of SFMA forest stands have a priority over short-term market conditions.
- in all situations, local domestic and then distant domestic markets will be considered prior to foreign markets.

Labor:

The people of northern Maine have a long tradition of woods work and a deep store of local knowledge and talent in all regard to forest management operations. As an on-going, long-term management operation, the SFMA has the opportunity to benefit from and contribute to the labor force of the area. In all situations, SFMA management will seek to utilize and invest in local and regional labor.

Recreation:

Percival Baxter was clear about his wishes that Baxter State Park be open for recreation but used in the “**right, unspoiled way**”. It is our mandate to provide appropriate recreation in perpetuity, in the format described by the donor.

Purchase of goods and services:

It is the practice of Baxter State Park in the purchase of materials, supplies and equipment, to seek out and price local vendors and, if in the best interests of Baxter State Park, to preferentially purchase from local vendors. In addition, when appropriate, Baxter State Park will seek to establish long-term relationships with local vendors in an effort to support the local economy.

Baxter State Park Volunteer Program

For the past 10 years, SFMA management has utilized the extensive BSP Volunteer Program in forest and recreational management efforts on the SFMA. Volunteers are based at the Webster Lake Camp located on the north shore of Webster Lake. The camp is accessed by foot from the north (1.5 miles from road closure on the Webster Ledge Road) or more commonly, from the south by hiking 650' from the Mid-Webster Road and using a 14' skiff and 15HP outboard provided by BSP. Access to the Mid-Webster Road is administrative only and is controlled by a gate at the point where the access road crosses into Baxter State Park. The camp itself is a 1970's era log camp (dimensions?) located on a ledge slab. During the last planning period volunteers have performed considerable maintenance on the camp including:

- jacking of the camp and replacement of sill logs
- installing a new roof,
- window and interior chaulking, painting and remodeling.

In addition, volunteers have supplied and assembled materials for three lean-tos, and assembled two 16' x 16' picnic shelters, two registration boxes and two entrance signs and performed countless hours of maintaining and constructing trails and campsites, inventorying forest stands and informing and educating users.

The success of the volunteer program in the SFMA is a result of productive work provided by a carefully selected crew of volunteers. *To the appropriate extent, SFMA management shall continue to utilize BSP volunteer efforts to work toward meeting the intent of Percival Baxter in the management of the SFMA*

E. 3. Public Use Management

Recreational Use

In his Trust Communications regarding the SFMA, Percival Baxter wrote:

“This....area will be available both for recreation and for scientific forestry management....This township...is what is termed by woodsmen ‘good growing land’. An area with an abundance of wildlife, especially moose. Fishing and hunting will be allowed under the general Fish and Game Laws of the State.”

In accordance with Percival Baxter's wishes, the SFMA has and will continue to provide opportunities for a traditional, remote and pristine backcountry experience in several ways:

Hiking:

The SFMA currently maintains 16 miles of hiking trails including all or most of the Freezeout Trail and the Wadleigh Brook Trail. This trail system provides access from a drive-in campground at Trout Brook Farm and a trailhead on the Park Tote Road just west of Trout Brook Crossing to a long loop hike through the heart of the SFMA. Trails provide Park hikers with access to campsites within the SFMA including a lean-to and a tent site at Webster Lake, a lean-to along Webster Stream, and a new lean-to at Hudson Pond. In addition to trail access sites, Baxter State Park/SFMA maintains and administers reservations for two additional tent sites on Webster Lake outside of the Park boundaries on land administered by the Bureau of Parks and Lands (through a formal agreement). Although the lean-to at Hudson Pond is moderately accessible from an SFMA forest management road, the primary purpose of all lean-tos and tent sites on the SFMA is to provide rustic stopover points as part of a 2 or 3 day backcountry trip. The SFMA

provides one of the few places in Baxter State Park that hikers can plan a multi-day loop trip in moderate terrain.

Canoeing:

Webster Stream is a moderate stream running from 90 to 600+ cubic feet of water per second and provides one of the best remote whitewater canoeing opportunities in Baxter State Park. The stream is roughly 9 miles in length, with 6 miles inside the SFMA boundary. Webster Stream offers a variety of canoeing water with the first 3 miles as class intermittent class 1 and 2 rock gardens grading to 3 miles of quickwater and then abruptly changing to a final 3 miles which includes 8 ledge drops up to class 4. Near the outlet of Webster Stream, at the confluence with the East Branch of the Penobscot and Second Lake Matagamon, exists an unrunnable falls known as Grand Pitch. Webster Stream is well known as a leg of Henry David Thoreau's trip in 1848 with Penobscot Indian guide Joe Poulis. Webster was a difficult enough endeavor that Poulis insisted that Thoreau walk while he canoed the stream with water he termed "ver strong"¹⁸.

Streamflow is influenced by rainfall and snowmelt and by gate adjustments at Telos Dam, which feeds 3 mile long Webster Lake from the west via the 1/2 mile long man-made Telos canal. The dam is controlled by the Bangor Hydroelectric Company and serves as the upper end of an extensive water storage system extending up the east branch of the Penobscot, through First and Second Matagamon Lakes, Webster Stream and Webster Lake. Water releases by Bangor Hydro usually occur predictably in the early fall (mid-September) and mid-winter (February). The length and degree of the release is heavily dependent on pond levels in Telos Lake and seasonal temperature and precipitation patterns. Heavy releases can produce flow rates in Webster Stream above 600 cf/sec and at these levels canoeing by any parties is strongly discouraged. In the past, Bangor Hydro maintained a dam keeper at the Telos site, and the gates would occasionally be opened slightly to provide water for passing canoe parties to make the run down Webster Stream during low flow periods in the summer. The residence at Telos Dam was vacated in 1993 since that time dam adjustments have been made by individual visits. Currently, typical summer practice is to maintain the flow at a stable, but minimal rate of between 90-130 cf/second. This flow rate approximates natural conditions in the watershed.

Canoeing use is greatest during the spring and early summer months. For many years, either the National or Maine High Adventure arm of the Boy Scouts of America has maintained a summer base lodge on Grand Lake Matagamon. The Telos-Webster Stream trip has been a regular and repeated trip for scout crews staying at Matagamon in July and August and this traffic comprises about 50% of the total summer recreational traffic on Webster Lake. Due to the regular and organized nature of the use and the fact that scout trips generally involve groups of 10-12, the Park Director responded to a request in the mid 1980's for a reserved site in the Webster watershed for High Adventure use by authorizing the High Adventure use of an old logging landing on the north shore of Webster Stream about 1 mile from the outlet of Webster Lake. This designated site was moved in the early 1990's to a former tentsite on the south shore of Webster Lake about 1/4 mile east of the Park boundary.

Traditionally, the Webster Stream canoe trip has been a remote trip of at least 2 days duration beginning on Telos Lake or at the "thoroughfare" between Telos and Chamberlain Lakes at Chamberlain bridge and ending at Matagamon landing near the eastern end of Grand Lake Matagamon. Longer trips could include the East Branch of the Penobscot and continue on to Medway. Current Park policy requires canoeists running Webster Stream to reserve a site on Webster Lake and begin running the stream no later than 10:00 am to ensure time to reach

¹⁸ Pg 180, The Maine Woods, Henry David Thoreau, Arranged with notes by Dudley C. Lunt, Bramhall House, 1950.

Matagamon Landing or a campsite on Matagamon Lake. This trip requires either guide service assistance or a day's time to shuttle equipment and vehicles at the beginning or end of a trip.

The development of forest management access on the SFMA presents a continuing opportunity to provide easier access to Webster Stream to reduce shuttling and trip time or provide a simpler day trip. This is a complicated issue concerning the intensity, type and orientation of recreational use as well as administrative access control of the watershed and has been the subject of considerable discussion by SFMA Advisors and Park staff. *Based on these discussions and the donor Percival Baxter's intentions regarding the use of Park resources, it is the intent of SFMA management to maintain the traditional, remote nature of Webster Stream and to provide only trail or foot traffic access to the Webster Stream corridor.*

Fishing

Webster Lake (338 acres BSP/188 acres DOC) and Stream provide popular destinations for anglers and are open to general law fishing with a length/species slot restriction on Webster Lake and a catch limit in Webster Stream. These regulations were developed in cooperation with IF&W fisheries biologists based on fish surveys and estimates of use levels with the objective of maintaining healthy native populations, species diversity, and a quality fishing experience for the user. Webster Lake holds healthy populations of brook trout and togue as well as cusk and other species(see data in appendix). Walk-in anglers and trail system hikers apply moderate pressure to Webster Lake and about the first 1/2 mile of Webster Stream during May, June and September.

Of increasing concern over the past 2-3 years has been the regular use of float planes to deliver guided clients to the outlet of Webster Stream for 6-10 hours of fishing before being picked up in the afternoon or evening. This use poses two distinct concerns:

- lack of registration of use by visitors as required under Park regulations.
- conflicts with camping use, especially at the Webster Outlet site where float planes often put ashore to off-load visitors.

Park policy requires floatplane pilots intending to access Baxter State Park via Matagamon, Webster or Nesowadnehunk Lakes to notify Park Headquarters 24 hours in advance of the visit. Adherence to this policy is not consistent and Park management will consider a variety of tools, including communication and enforcement, to improve compliance with this policy. SFMA management shall continue to evaluate the potential for conflicts with float plane and camping use at the Webster Outlet site and consider options for more appropriate float plane use that mitigates or eliminates these conflicts.

Forest management roads and the construction of the Wadleigh Brook Trail have improved the access to Hudson Pond (123 acres) and the potential is likely that fishing use on this formerly very remote pond will increase in the years ahead. Although stable native populations exist in Hudson Pond, the pond is not a naturally productive fishery and should be carefully monitored to evaluate the effect fishing pressure may have on the stability of natural populations. (See sec. D.3., Wildlife Management Actions)

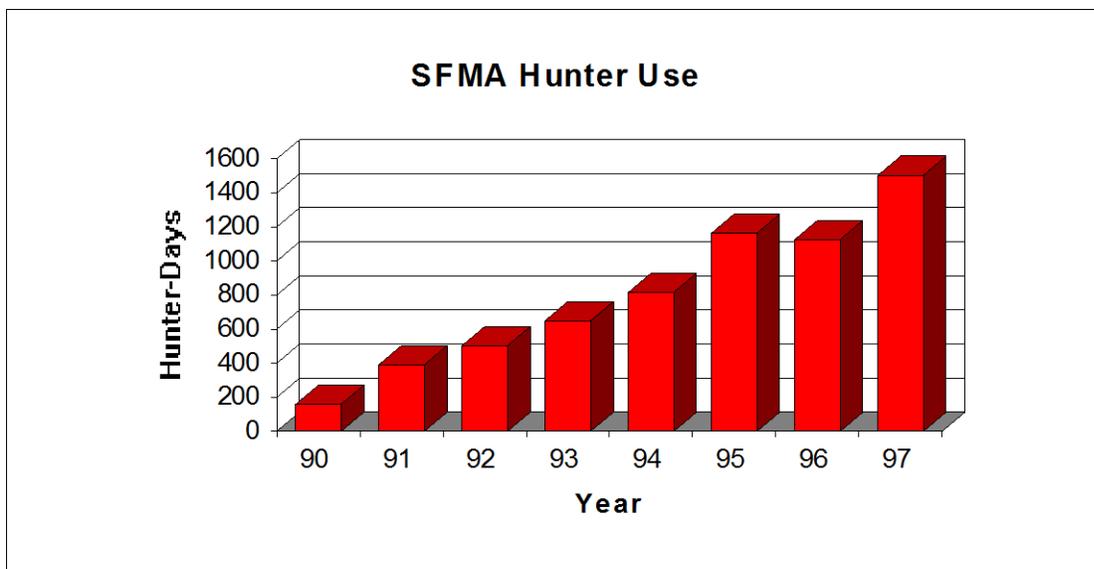
Remoteness, depth, and a lengthy period of brook trout stocking of over 20 years by IF&W of Frost Pond (41 acres), have combined to produce a high-quality fishery for brook trout. Frost Pond has limited reproductive habitat for brook trout and a break in the stocking schedule confirmed that the trout population would eventually collapse without stocking (Mike Smith, personal communication). The quality of the fishery and the proximity of Frost Pond to Grand Lake Matagamon have resulted in impromptu clearing and brushing for access trails from visitors

using boats or floatplanes to reach the departure point on Matagamon's south shore. Accordant with this use, the likelihood exists (based on observation of fire rings and tent use) that occasional illegal camping and fire use occurs along the shore of Frost Pond.

Concerns with the unregistered use and illegal fires on Frost Pond are issues that should be addressed in the planning period. Neither concern is unique to Frost Pond, and both uses occur on other remote Park ponds as well. The development of forest management roads will eventually increase the potential for foot or vehicle access to Frost Pond from the west. *It is the objective of SFMA management to maintain the remote character and quality of Frost Pond.* In this regard, road access will be terminated as far from the Frost Pond riparian zone as possible and the implementation of road blockages and/or winter only access roads will be utilized in the vicinity of Frost Pond.

Hunting/Trapping

On a user-day basis, hunting/trapping comprise the major recreational use of the SFMA. In 1990, a self-registration system was installed on the two vehicular access points on the western edge of the SFMA to monitor recreational use of the SFMA. Over the past eight years, hunting use has steadily increased on the SFMA with 1997 data reaching a record 1,503 hunter-days. We suspect that part of the increase is result of communication with users on the regulations requiring self-registration prior to entering the SFMA. In 1990, many users failed to register and had to be reminded of the requirement. Currently, as a result of persistent communication efforts by Park staff, today's users seldom fail to register. Registration problems notwithstanding, the bulk of the increase since 1990 reflects increasing access to areas within the SFMA and the growing popularity (coincident with probable increases in deer populations) of the SFMA with local hunters.



In 1995, in part to protect the resource from the rising rate of hunting use, Park administration moved to increase law enforcement capabilities by sending the SFMA Forest Technician to the Maine Criminal Justice Academy for training as a commissioned officer. This commission was obtained in the spring of 1997 and this position now is partially oriented toward law enforcement duties particularly during the fall months.

For most hunters using the SFMA, hunting use involves significant vehicle use. We have noted that even during busy periods of hunting use, it is rare to encounter a hunter in the forest more than 1/4 mile from an accessible road. Communication with hunters during the season has indicated that at least some percentage of the users would encourage management to consider closing a significant portion (10-20%) of the SFMA to vehicle access in order to provide an area for a remote, uncrowded hunting experience.

During hunting season, the significant use of personal vehicles poses a threat to new forest road construction completed during the summer months. Forest road construction completed earlier in the year usually softens substantially during the fall rains of November and becomes subject to substantial rutting and damage from unrestrained vehicle use. *To protect new road construction from damage from vehicle use, new road construction of the current year is closed to all access by October 1st.* Closure is effected by placing a large rock or a log across the road with a sign displaying the message "Road Open to Foot Traffic Only". Log truck traffic on new road construction during the following summer compacts the road surface and normally permits all season use of the road during the following fall.

Considering the relatively intensive use of the SFMA by hunters over the last 10 years, only minor instances of resource abuse have been noted involving occasional littering and illegal fires and a few instances of road closure violations. *As long as resource use remains appropriate, SFMA management will allow hunter use levels to stabilize at intensities determined by the tolerance levels of the users.*

Research

On occasion, requests will be made to conduct research in the SFMA. Although SFMA has a different trust mandate than the remainder of Baxter State Park and consequently, the standards for the conduct of research may also differ, the consideration of research proposals is handled from a Park-wide perspective. Requests, proposals or information regarding research projects or studies on the SFMA will be referred to the Director's Research Committee and subject to the process, timelines and requirements determined by that committee.

A pair of SFMA hunters on a sunny November day

E.4. Investment of Capital and Personnel

Employee Relations

In every final analysis, the success or failure of forest management endeavors depends upon the day-to-day efforts of individual people working on the land in pursuit of physical and spiritual fulfillment. Even with a complete evaluation of issues and intelligent coordination of data, the success of a management plan relies primarily on how well the plan motivates and enhances the human resource required to carry out each and every idea and strategy. The success of this plan requires that all the people involved understand the idea clearly and want it to succeed.

Management of the SFMA is accomplished by Park staff, in concert with contracted forest operations. Park staff consists of a Resource Manager, overseeing planning, contracting, marketing, budget and forest management. The Resource Manager reports to the Park Director and works as a member of an administrative team with the Park Director, Chief Ranger, Naturalist and Business Manager and some or all members of the team participate in SFMA management when necessary. The Resource Manager works with a Forest Technician who oversees forest operations including road layout and construction, harvesting and public use. In addition, the Forest Technician is commissioned in law enforcement and commits time during the hunting and fishing seasons to resource protection activities. The Forest Technician also serves as a roving ranger and as such may fill-in occasionally for unexpected vacancies in various Park-wide seasonal positions. A seasonal (12 week) Forestry Aide stationed at the Webster Lake Camp works with the Forest Technician. This position, initiated in 1998, is designed to assist with a wide variety of forest operational needs, primarily maintenance and forest measurement. The 12 week season is scheduled to fit with college schedules and the position duties are geared to provide a wide range of field experience in an operational forest setting.

For the SFMA staff, Baxter State Park provides a uniquely rewarding opportunity to practice forest management. Occasionally, comments have been offered by others about “forest management in a fishbowl” and “always under public scrutiny”. It’s true, the SFMA is under public scrutiny, and should be - it’s a public forest. Public scrutiny can be difficult, especially when the public disagrees about forest management issues but, for the most part, public scrutiny has been a positive influence toward the development of sound forest management. Most importantly for the SFMA, Percival Baxter’s vision, as expressed in the Deeds of Trust and related Communications, provide a foundation for the fundamental support of true long-term forest management by the Park Director and Baxter Park Authority. This support provides a rewarding opportunity for a committed forestry staff and the potential for job satisfaction is high.

This opportunity is enhanced by the relatively small staff of the Park and the general commitment to Baxter’s vision that is shared by most employees. The small size often leads to clear lines of communication and leadership has maintained a focus on the core mission of meeting the provisions of Baxter’s Trust. Compensation is reasonable and competitive in SFMA positions, with the exception of the Forest Technician position. *Because of the law enforcement and supervisory components of this position, efforts should be made in the planning period to increase the compensation of this position to a level commensurate with other positions on the Park with similar responsibilities.* Considered as a whole, all the factors regarding employment on the SFMA combine to make the SFMA a very good place to work.

Forest Technician Mac Browning leads a forestry tour discussion

Contractor Relations

Exemplary forest management requires exemplary forest operations. *A positive attitude and a high-quality work ethic are expected from contractors and employees involved in the SFMA. As the SFMA demands exemplary performance in operations, compensation should reflect the long-term value of good woods work.*

Operational work in forest stands has the unique quality of changing an already dynamic system. Every woodsman knows that the fundamental satisfaction of good forest work comes from the observation of the effects of forest work over time. Most importantly, we realize that after working on the same land for many years, one inevitably invests part of one's soul in the land and forest. We believe that the best management possible comes from this feeling - the type of management capable of producing *"...an example and inspiration to others"*. Woods workers often return to sites worked years before to see how the forest has changed. *SFMA management encourages a long-term approach by forest workers.* Our approach to harvesting and stand management will very likely provide a committed contractor the opportunity to re-enter stands harvested years before to experience the benefits of earlier management. The major hurdle in maintaining long-term employment of quality individuals is the remote location of the SFMA. This remoteness often requires an commitment of woods workers to reside away from their homes during the work week (3 to 4 nights/week). We have lost some of our most talented and committed individuals because their need to be with their families understandably outweighed their commitment to work on the SFMA. It is unlikely that we will ever overcome this conflict, but we can, and must, make a determined effort to minimize it.

Beginning in 1987, after an extensive survey of interested local contractors, the SFMA entered into an agreement with Randy Cyr and Sons of Sherman Mills, Maine, to provide forest

operational services including harvesting and forest road construction. Initially, harvesting was accomplished with two 2-person skidder crews. Wood was limbed at the stump, yarded roadside and cut to merchantable lengths with a commercial slasher. The wood was cooperatively marketed (SFMA management worked jointly with Cyr in determining markets and negotiating with buyers) but Cyr held the contracts to deliver wood products and paid Baxter State Park stumpages rates based on the market value of each product. Discussions between Cyr, woods crews and SFMA management were on-going in the late 1980's regarding methods to improve harvesting in the SFMA. In the summer of 1990 and the winter of 90/91, the Swedish firm Rottne provided a crew and single-grip cut-to-length system (processor and forwarder) to conduct test harvests in SFMA stands. The operations were closely evaluated for site impacts, protection of retention trees and regeneration, production, cost, labor benefits and the suitability of the system to expected SFMA silvicultural needs.

After evaluation and extensive discussions between Cyr and SFMA management, Cyr proceeded with the financing and purchase of a cut-to-length system. A training plan and new pricing schedules were developed for the system and in 1992 the system began working on the SFMA. By 1994, skidders were no longer utilized and all harvested volume on the SFMA was cut-to-length. The change to this system was a complex decision and weighed numerous silvicultural, operational, labor and environmental benefits against significantly increased costs. *Cost is only one of many factors in every forest management decision; and SFMA management shall strive to measure cost carefully against the benefits of long-term investment in stand management, site protection and improved working conditions.*

In 1995, illness prompted Cyr to sell his business. It was Cyr's intent to attempt to convey the business, as wholly as possible, to a new owner who would retain the commitment, personnel and infrastructure dedicated to the SFMA. Discussions between Cyr, Pelletier Brothers, Inc., of Millinocket, and SFMA management began in early 1995 and Cyr subsequently sold the business to Pelletier Bros., Inc.. In the spring of 1995, a one-year agreement was issued to Pelletier Bros. Inc. with payment negotiated on a service cost basis based on the market value of each product. In early 1996, this agreement was extended to five years. In 1997, the service cost rates were re-negotiated eliminating any differences based on individual forest products. From the perspective of field operations, the transition from Cyr to Pelletier Bros was nearly seamless, with nearly all the same personnel continuing to work on SMFA operations.

The history and philosophies related above describe the following considerations that guide SFMA management in contracting decisions:

- Communications and the fundamental mandate and ideals of SFMA management.
- Strive to build longevity and experience in the SFMA workforce.
- Encourage pride in work and ownership in forest operations.
- Encourage open discussion and suggestions regarding operations, silviculture and management decisions.
- Educate, inform and motivate all contractors and woods workers regarding Baxter's Trust Communications and the ideals of SFMA management.
- Encourage a cooperative approach in all contracting decisions.
- Recognize that exemplary work deserves fair compensation.
- Do what is necessary to provide safe, comfortable working and living conditions for contract personnel.
- Whenever possible, provide variety and challenge in forest operations.
- Constantly evaluate operations for the opportunity to improve.

Capital Investment

SFMA management realized during the last planning effort that the location of the SFMA will require local lodging for crews working on the SFMA. In 1988, construction work on two 16 x 20 log camps began at the former site of Great Northern Paper's Coffeelos Camps, up a short spur road at mile 53 on the Telos Road. The Coffeelos Camps site is now owned by the State of Maine and administered by the Bureau of Parks and Lands. The site is accessible year-round from a plowed road system and includes a septic system and drilled well. Initially, construction and maintenance of the camps was borne by SFMA operations contractor Randy Cyr of Sherman Mills. After illness prompted Cyr to sell his business in 1995, Baxter State Park purchased his interest and assumed full ownership of all facilities. Extensive work on lodging over the last planning period has resulted in a complete, comfortable and quiet (installation of a solar power system in 1996 has reduced generator use by over 90%) set of facilities for the use of contracting crews and other personnel. The facilities include:

- 2, 16 x 20 log camps (capacity 2 each)
- 1, 20 x 24 log camp with attached porch (capacity 2-4)
- 1, 8 x 10 generator shed w/ 10K propane generator
- 1, 8 x 10 pumphouse water pump with solar power system
- 1, 10 x 12 storage shed
- All camps have on-demand electric power (90+% solar), shower and toilet facilities, propane heat, range and refrigeration.
- Fuel facilities

Currently, specific investments into the resource are limited to CFI work, road construction and the lodging facilities discussed earlier in this section. As revenues develop through the planning period, strong consideration should be given to the investment of regular expenditures toward a more complete monitoring effort of forest resources. Our efforts have been oriented toward the measurement of gross forest structure (trees) and scant effort has been made to establish long term mechanisms for the monitoring of other resources such as non-woody flora, non-game fauna, selected invertebrate species and water quality. With careful preparation, it is likely that regular monitoring of many other resources could be accomplished without great expense. *The information gained, as a part of a complete Continuous Forest Inventory, will*

prove to be invaluable over the long-term. The completion of the CFI process should be provided a high priority for planning and implementation in the planning period.

A vehicle drives the Wadleigh Mountain Road

A vehicle traveling the Wadleigh Mountain Road

APPENDIX OF MAPS AND DATA