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B682: A Recreational Study of the Upper St. John River Watershed

Jeffrey L. Hengsbach

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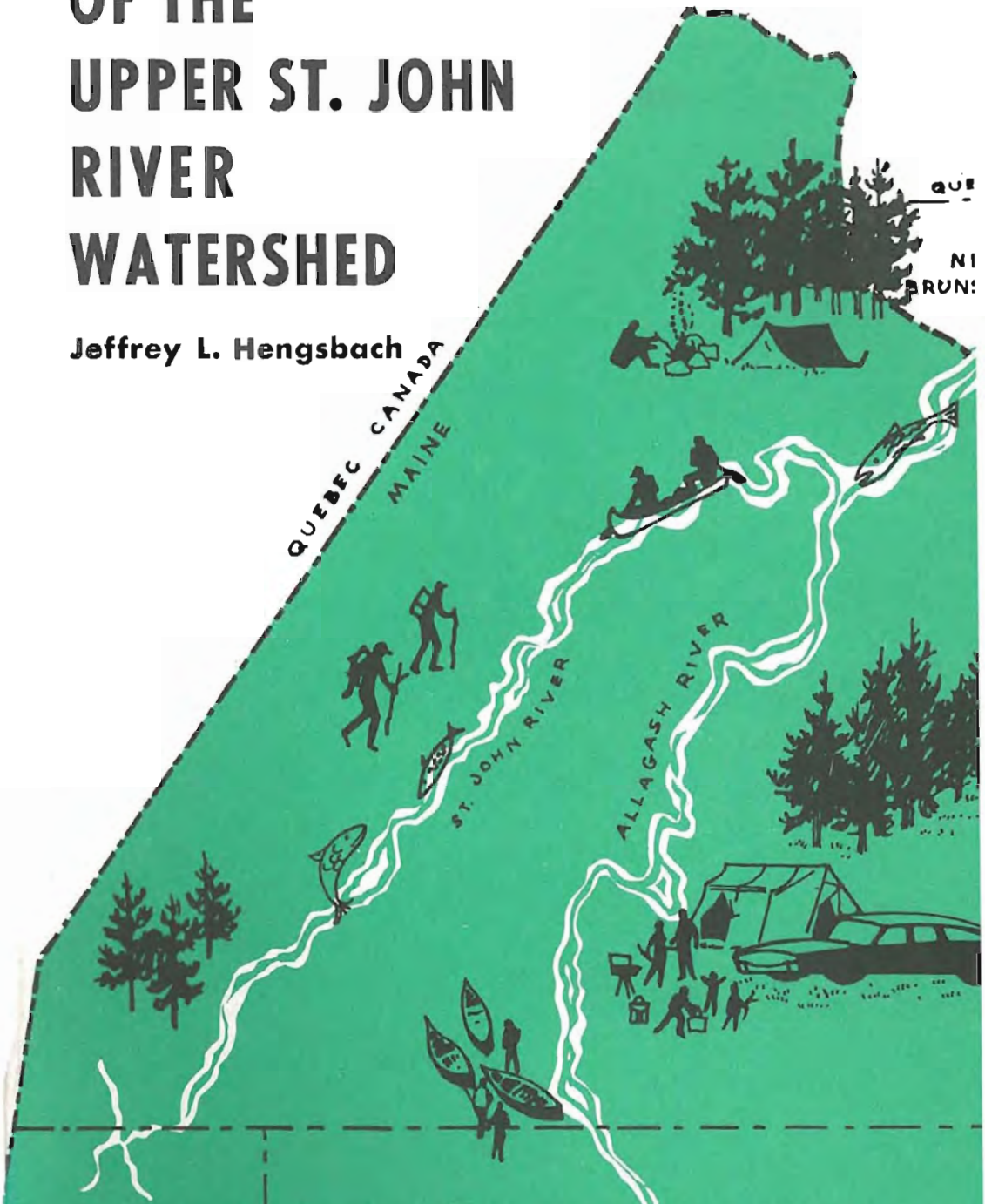

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FOREWORD

Out-of-doors forest recreation has been significant in the economy of Maine for about one hundred years. The recent population expansion coupled with increased recreation use of the vast forested area of Maine has made the University School of Forest Resources aware of the need for forest recreation research.

Since 1959 five graduate students, Bruce E. Stewart, A. Temple Bowen Jr., Robert Greenleaf, Edward I. Heath and Jeffrey Hengsbach, have conducted seven separate but related studies of the recreational use of forest land from the perspective of private land management under the direction of Professor Harold E. Young. These have been published as miscellaneous publications 658, 659, 663, bulletins 614, 616, and 628 and this publication, all by the Maine Agricultural Experiment Station.

The first six studies were supported by the Appalachian Mountain Club and the Maine Agricultural Experiment Station. The seven companies listed in the acknowledgments financed Mr. Hengsbach's salary and expenses, assisted in the field work, provided background information and scrupulously excluded themselves from all planning phases.

In 1968 Dr. James Whittaker joined the staff as a specialist in outdoor recreation. He is expanding course offerings within both the undergraduate and graduate programs and will conduct research into user-resource relationships.

Albert D. Nutting, Director
School of Forest Resources

A Recreational Study of the Upper St. John River Watershed

INTRODUCTION

JEFFREY L. HENGSBACH[1]

The recreational use of natural resources has been increasing for many years, but only during the past decade has our nation become alarmed about the manner in which these resources are being developed. The Outdoor Recreation Resources Review Commission (ORRRC) was created in 1958 to study recreation and prepare recommendations that would solve existing and anticipated problems in the United States. Data collected by the Commission indicated that current recreational use was at an all time high, all forms of outdoor recreation would continue to increase and outdoor recreational activity would triple by the year 2000 (ORRRC 1962a). A re-evaluation by the Bureau of Outdoor Recreation (BOR) indicated these predictions were too conservative for most activities (BOR 1965a). The current concern over recreational resource management has developed primarily from rapid growth of recreational activity due to the increased leisure time since World War II (Clawson 1963a, Larrabee and Meyersohn 1958).

Direction in evaluation, planning, design, development and integration of resource uses is essential in the private as well as the public sector to insure effective management of these resources. The challenge is formidable for the nation as a whole but it is most critical in certain regions. The Northeast is one of these regions (ORRRC 1962a). The lack of land resources, suitable for recreational use to satisfy the needs of a widespread urban population, appears to be the most limiting factor in meeting the challenge.

According to the ORRRC report (ORRRC 1962a) the accommodation of present and future needs will depend largely on the private sector. Maine, with 17 million acres of private forest land, can be expected to meet a disproportionately large share of these requirements (Outdoor Recreation Study Team (ORST 1966).

The lack of sufficient land for extensive, or wilderness use, has been of major concern, as indicated by Douglas (1960), Snyder (1966), and Burch (1966). Wilderness, as defined by Public Law 88-577 (U. S. 88th Cong. Spec. Sess. 1964), is "land retaining its primeval character and influence, without permanent improvement or human habitation, which is protected and managed so as to preserve its natural condi-

[1] Jeffrey Hengsbach, Second Lieutenant, United States Air Force.

tions . . . " A primitive area, as defined in this study, is similar to a wilderness area but is actively managed for timber resource utilization that periodically necessitates the use of a labor force in harvesting. In both types of areas, the recreational use is not intensive, but the amount of land required is great.

Virtually all forest land in Maine should be considered primitive by these standards due to timber harvesting practices over the last 250 years. Most of the interior forest land is similar with only local variations in topography and drainage. However, two areas are unique in the state and, in fact, the United States. These are all Allagash and St. John River watersheds that drain the northwestern part of Maine. There are only a few rivers in the United States that are undeveloped and of sufficient length to be desirable primitive or wilderness river recreation areas. The Allagash, through acts of the Maine Legislature (1966), has been designated a state park and a wilderness waterway. The demand for wilderness areas, and specifically wild river areas, emphasizes the value of these two rivers. However, recreational research (Stillman 1966), especially regarding wild rivers (BOR 1965b), must precede establishment of these areas.

The purpose of this study was to prepare a series of alternative plans for three time periods (1968, 1975, and 2000) for the Upper St. John River watershed. The plans contain proposals for a primitive type of recreational development based on private investment. One set of plans is an integration of recreational use with the existing timber use, and another set provides for recreational use of the area surrounding the reservoir in the event the proposed Dickey Dam is constructed.

REVIEW OF LITERATURE

Due to the subject matter knowledge needed to provide an adequate background for this study, a review of only one aspect of the voluminous literature on recreation would be insufficient. Therefore, segments of the literature relating to research problems, multiple use, wilderness use, and recreation on privately owned lands, will be included.

Identification of problem areas

Some of the more dynamic leaders in recreational resource management have anticipated the present recreational problems. Arnst (1954) and Lane (1959) foresaw the problems on private lands, but they also saw benefits for industry and society in correct solutions of these problems. Bates (1958) noted the growing controversy regarding wilderness, recreation, resourse use, and layman concern. Brockman (1959) pre-

sented an inventory and outline of our present resources, developments, and policies. Clawson (1959), prior to the ORRRC report (ORRRC 1962a), recognized and identified many of our crucial recreational issues.

ORRRC study report 27 (ORRRC 1962j) contained a synopsis of most of the recreational research that had previously been done, and the use and demand problems in recreation, especially in the Northeast, were emphasized in ORRRC study reports 8, 19, and 20 (ORRRC 1962d, h, i,). The ORRRC reports established the importance of recreation in America and encouraged an expanded recreation research effort. Shanklin (1963) specified 10 problem areas that should be reduced by future research and development. Bird (1963) and Sharpe (1964) stressed the need for better training in recreational management for foresters. Some of the early work concerning the validity of use projections and user statistics was criticized by Lucas (1963a) because of inadequate basic data. He too, outlined critical areas for study. LaPage (1964) and Tombaugh and Love (1964) specified the limitations of sociological research and indicated methods of improving them.

According to Burch (1964), two goals of forest recreational management should be public service and resource protection. His concern was typified by several studies and development plans (BOR 1966a, b, c, d; Wis. Dept. Res. Devel. 1966). Hall (1966) reported on future demands and trends in Canada and considered recreation an important part of Canada's future.

Multiple use of forest management alternatives

The interpretation of the multiple use concept has evolved with the development of the forestry profession. Pearson (1940) maintained that multiple use was not a product of planning but resulted from no planning at all, and that it rarely recognized the highest benefits from the resource. He implied that multiple use was primarily diversified use after the timber cut. Two decades later, ORRRC study report 17 (ORRRC 1962g) defined multiple use as: "the management of all the various renewable resources . . . so that they are utilized in the combination of uses that will meet the needs of the American people . . . and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output." This definition permits single use management and varied levels of multiple use management. For example, Merriam (1963) determined wilderness and timber production to be incompatible in the Bob Marshall Wilderness Area in Montana and recommended that wilderness be the single use.

Various authors have emphasized different types and modifications of multiple use. Sieker (1955), as well as Rosecrans (1957) and Merriam (1960), advocated logging in recreational areas with modifications considering season, method of harvest, aesthetics, economics, and salvage. Multiple use on private lands was discussed by Heacox (1955) and Adams (1955, 1956). They believed public relations benefits as well as forest resource improvements were inherent in a broad management program. Baldwin (1956) thought timber harvesting and recreation would be compatible if the cutting operations were limited to the winter months. Woodward (1957) analyzed a logging operation, in a former timber preserve in southern California, that required a sound public relations program before initiation to insure its success. He reported reduced stagnation and loss from disease in the forest stand and improved wildlife habitat. He believed additional recreational benefits would accrue if the timber was harvested with consideration for future recreational development. Morriss (1961) emphasized long range planning to obtain the best multiple use.

Amidon and Gould (1962) conducted a study on three national forests in California to determine the maximum conflict that could develop between simultaneous recreation and timber use. Five levels of recreational development were evaluated using sites ranging from present use areas to the poorest potential areas. Even at the highest level of development which would include all sites, only 10-12% of the forest would be taken out of timber production. It was assumed that timber would not be harvested on the recreational land. They calculated that each visitor-day of use would reduce the value of timber production 1.8 cents. They believed multiple use would reduce these estimated losses.

A number of studies related user satisfaction to site quality, development, and use (Wagar 1963, Shafer and Burke 1965). In the ORRRC study report 5 (ORRRC 1962c), areas, activities, design, and the corresponding user satisfaction were evaluated. LaPage (1962) and Magill (1963) found that recreational use caused a decline in growth, number of species, and density of vegetation, and an increase in soil compaction.

Tocher, Wagar, and Hunt (1965) and Wagar (1965) demonstrated site destruction could be prevented. This was accomplished by allowing only moderate use through education, control and distribution of recreationists. Site destruction was further reduced by ecological management including fertilization, watering, spacing of vegetation and the addition of organic matter. They recognized the high cost of this form of management but anticipated increased revenue would offset

the cost. LaPage (1967) concluded, from a three year study in Pennsylvania on the Allegheny National Forest, that increased intensity of use in a campsite area did not always cause a direct reduction in the density of ground cover. He noted that the remaining species might temporarily thrive in the reduced competition. Frome (1967), and Towell (1967) emphasized the dangers of over use of recreational areas.

As an indication of user satisfaction, Lucas (1963b) found that 92% of the canoeists in the Boundary Waters Canoe Area in Minnesota failed to notice the logging operations when a 400 foot wide buffer strip was maintained. He suggested that people are not very observant. Wagar (1966) pointed out that the judgment of site quality was a highly personal matter. Three ways of increasing user satisfaction were outlined by King (1965): 1) visitor information services; 2) public relations; and 3) campground development.

Wildlife management implications were explored by James, Johnson, and Barick (1964) and Stearns (1965). They found that timber harvesting increased access by the expanded road network and created a more favorable wildlife habitat. However, McGinnes and Ripley (1965), in a rare exception, found that deer did not respond to timber management in Virginia.

Area-oriented multiple use analysis based on economic and resource interrelationships was introduced by Ridd (1965) to help solve the land management issues by providing guidelines for the land manager. In 1965, the United States Forest Service (USFS) published a statement of multiple use policy. The need for broad land management on private as well as public lands was stressed by Duncan (1961) and Twiss (1966). They felt that the alternative plans should be simultaneously evaluated in an objective manner. Recreational land use planning and zoning were defined and supported by Keenen (1966). Vaux (1966) stressed recreational management of second growth forests under sustained yield management.

Controversies over multiple use persist (Prezioso 1967, Hillenbrand 1967). Walker (1967) stated that people of the future will "*want* parks, but they'll *need* lumber, plywood, and paper." Zivnuska (1961) said that:

> Decisions affecting the multiple uses of forest land cannot be made by the standard formulas or rules learned by rote. Neither will economists or other research specialists develop neat analyses providing all the answers. Instead, the forester must work in uncertainty and controversy, the heat of which will reflect the growing importance of the resource for which he is responsible. In this very real sense, multiple use is more the symbol of the problems we face than a simple method for their solution.

Extensive recreational management

Wilderness and primitive recreational management are of recent origin. A résumé of the development of wilderness concepts prior to 1950 was prepared by Wagar (1953). Concern regarding wilderness lands reached such intensity that Senator Hubert Humphrey proposed a National Wilderness Preservation Act (Anon. 1957). This was the birth of the bill that was finally passed by Congress in 1964. Prior to the passage of this bill, two opposing opinions had developed concerning wilderness: 1) preservation, or non-management that allows nature to take its course; and 2) conservation, involving various levels of management to maintain aesthetics, recreational, forest and other values. Discussion of the question regarding the level of management often provides materials for controversy. Chapman (1958) reviewed these two opposing opinions and then attacked preservationists. Bates (1958) advocated non-management and felt that the resulting environment would be natural and therefore more attractive. Gilligan (1959) stated that we had no land in our country that was true wilderness. Vaux (1959) saw psychological as well as recreational and aesthetic values in wilderness areas. A summary of these ideas was included in the ORRRC study report 3 (ORRRC 1962b).

Wilderness management research has explored use, quality and area capacity. In a study of buffer strips 300 feet in width in the Quetico Provincial Park in Ontario, Loucks (1957) found that natural zones were effective in maintaining aesthetic values. He found that blowdown could be minimized by removing high risk trees. According to the USFS (1962) distribution of use in wilderness areas was very important to site maintenance. Snyder (1960) Lucas (1964a), and Wagar (1964a) presented quite complete reports on the carrying capacities of wilderness areas. Lucas (1964a) was concerned about future over use while Snyder (1960) foresaw no immediate problems. Wagar (1964a) considered capacities as largely value judgments. All three, however, presented levels of acceptable heavy use intensity. Snyder (1960) considered 23,650 visitor-days of use permissible with existing management, in a 33,000 acre study area in northern California. That would be approximately 1.4 acres per visitor-day per 90 day season. Wagar (1964a) felt that three acres per visitor-day were necessary in Michigan, and Lucas (1964a) considered 1.75 acres per visitor-day of land and water adequate in the Boundary Waters Canoe Area. In terms of individual camp sites, but not related to acreage, Frissell and Duncan (1965) considered use heavy when it was 61 to 90 visitor-days per season, medium when 31 to 60 visitor-days, and light when it was 0 to 30 visitor-days.

Lucas (1964b) was critical of use levels and overcrowding in wilderness areas. Management policy statements were made by the USFS and National Park Service (NPS) to clarify their positions regarding over use (NPS 1963, Costly 1965, Anon. 1966a). Snyder (1966) and *Time Magazine* (Anon. 1966b) stressed the fact that wilderness areas serve only a minority of people and regarded over protection and preservation a distinct danger.

Several studies have been undertaken to determine use patterns and levels. Wagar (1964b) found that primitive area use follows the same patterns as supervised areas and that the two could be related through regression and ratio techniques. Wenger (1964) tested use of unmanned registration stations in the Three Sisters Wilderness Area in Oregon and estimated that 70 to 85% of the users registered, but that the percentage of people who registered was correlated with the adequacy of the explanatory signs. Ammons and Merriam (1966) used the personal interview method to record user opinions in Glacier National Park and two other primitive areas. They found that the wilderness experience was similar in all three areas.

Within the last three years, the wilderness controversy has greatly increased. Hughes (1965) listed 15 recurring issues and themes regarding wilderness use. Heinselman (1965) recommended that fire, insects and disease be allowed to take their natural courses with only controlled management of isolated areas previously destroyed by man. He listed three major values of wilderness areas: 1) recreational and aesthetic; 2) psychological; and 3) scientific. Duncan (1965) criticized Heinselman for regarding management for scientific reasons equal in importance with psychological and recreational values. Spurr (1966) and Thompson (1967) generally agreed with Heinselman but disagreed with the degree of management. Craig (1966a) discussed the compromise that must be made between conservation and preservation in wilderness area management. According to Raymond (1967) nonmanagement was an impossible concept; the land manager "must protect them [wilderness areas] *for* the public and at the same time *from* the public." Rice (1968) noted the "tremendous economical and political power" that the public possesses in the natural resources field and was concerned about the public's inadequate knowledge of the outdoors.

A summary of the wilderness controversy was given by Lucas (1966). He concluded that wilderness policy, to many people, was subject to opinion and was less capable of being guided by science. Public concern remains high (U. S. Dept. of Agr. 1967) and will continue to be as high as long as the concept of wilderness continues to be so intangible.

Recreational use on company owned lands

Company land use policy has largely been determined by the public and its desire to use privately owned lands for recreation. Forrest (1949) noted the defensive value to the landowners by permitting public use of private lands for recreation. He felt that companies could avoid federal intervention in this manner. Arnst (1954) and Billings (1958) emphasized the public relations advantages of maintaining a recreational program on private lands. *American Forests* (Anon. 1958) cited private recreational land use statistics. Powell (1961) believed that the private owner should be given protection against some of the adverse situations such as public liability that arise from public use. Paine (1966) and Fisher (1967) were concerned with public relations and safety regarding the user.

The private responsibility to society was also a factor in determining company land use policy. In the Forest Industry Symposium (AFPI 1965), several papers were given to outline the responsibilities of private landowners to provide outdoor recreation. In an editorial in *American Forests* (Anon. 1966c), recreation areas were listed as one of the four crucial sectors of future private ownership responsibility. The role of private recreation was defined in the ORRRC report (ORRRC 1962a) and the ORRRC study report 11 (ORRRC 1962e). Pomeroy(1962) discussed the controversy regarding public versus private management: "Ultimately it is up to the American public to decide just how this potential will be developed . . . .We have an opportunity . . . .to help inform the public . . . .that one day must support these decisions." Some of the legal problems, rights and tools that state, federal and local governments have to acquire private lands for recreational purposes were included in ORRRC study report 16 (ORRRC 1962f). Such acquisition would occur if the private land owning companies did not fulfill their land use responsibilities to the public.

Demeritt (1963) emphasized that much of what had been written concerning private recreation was very general. A few reports, however, did indicate what land owning companies have done in forest recreation (Crowther 1963, Jones 1963). Three surveys by the AFPI in 1956, 1960, and 1962, have been discussed (McClellan 1962). In 1962, 42% of the industrial forest lands in the United States were surveyed for recreational information. Hunting was allowed on 92 % of the lands, fishing was allowed on 97%, camping on 96%, and picnicking on 100%. Permits but no fees, were required on 43% of the land; 22 companies were charging fees (AFPI 1962). Scott Lumber Company, Inc. in northern California has had a recreational program for about seven years and has realized significant public relations assets, fire loss re-

duction, litter reduction and reduced problems of patrolling (Toler 1966, Scott Lumber Company, Inc. 1965).

The disparity between the economic circumstances of public and private recreation was discussed by Clawson (1963b) and Clawson and Knetsch (1966), and Carpenter[2]. The main contrast was the lower fees charged for the use of public recreational developments. Considering the problem, Carpenter felt that the companies had progressed well. Moody (1963) and Dube (1966) reported the progress made by their separate companies, and Lewis (1967) reviewed the progress of recreational use of private lands in Louisiana.

A statement by Forrest (1949) serves as an appropriate summary:

> We in this industry have a choice. Either we permit the public to use our land and thereby retain control over this use, or the public through legislative action will determine that the highest and best use of substantial tree farm lands is not growing timber—but for recreation . . . we are not so naive to think we can survive as a corporation or as a free-enterprise system without the support of the general public.

THE STUDY AREA

Location

The Upper St. John River Watershed is located in the extreme northwestern corner of Maine (figure 1). The actual study area is bounded on the north and west by Canada, on the east by the Allagash River, and on the south by the town line dividing townships 11 and 12 W.E.L.S. (figure 2). This area contains approximately 800,000 acres. The St. John and Allagash Rivers, characteristic of rivers in northern Maine, flow northerly.

The study area is somewhat distant from population centers at the present time. Figure 3 shows the town of Allagash in relation to the Northeastern United States and Canada. Table 1 shows the highway distance and automobile driving time to Allagash from selected northeastern metropolitan areas.

History of the Upper St. John River

Champlain, in 1612, was probably the first to explore the St. John River, but the first settlement, above Grand Falls, N. B., was not established until 1785. The French Acadians, who came from Bretagne, France, joined others from Normandy, France, enroute from Nova Scotia to New Brunswick. Some of these settlers established St. Anne,

[2] Carpenter, K. D. 1967. Industries' response to meeting public demand on private lands. Unpublished research paper in forestry on file, Oregon St. Univ., Corvallis.

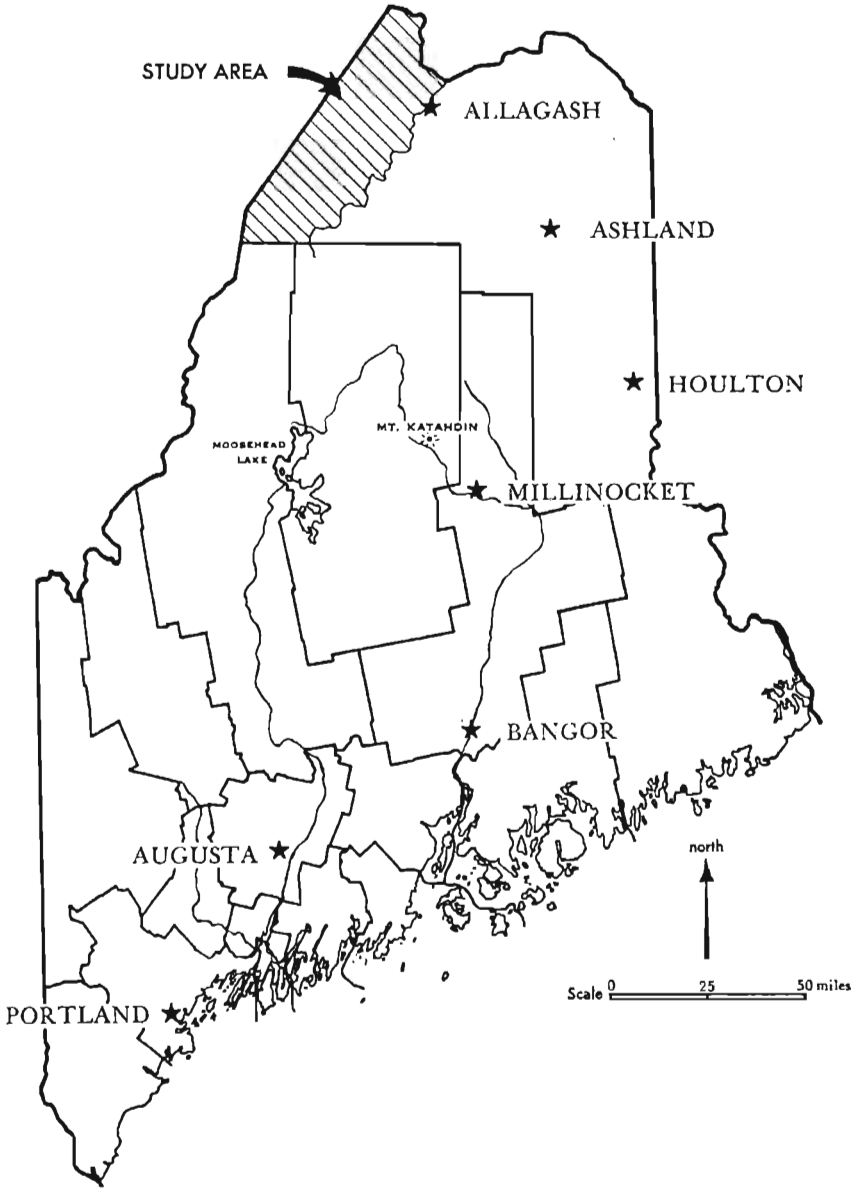

FIGURE 1. Location of study area in Maine.

N. B., but abandoned it to settle near what is now Madawaska, Maine, in the spring of 1785. This settlement expanded and eventually extended irregularly from Grand Falls, to Seven Islands, Maine (Nash 1938).

In 1793, Park Holland, a surveyor, was commissioned by the

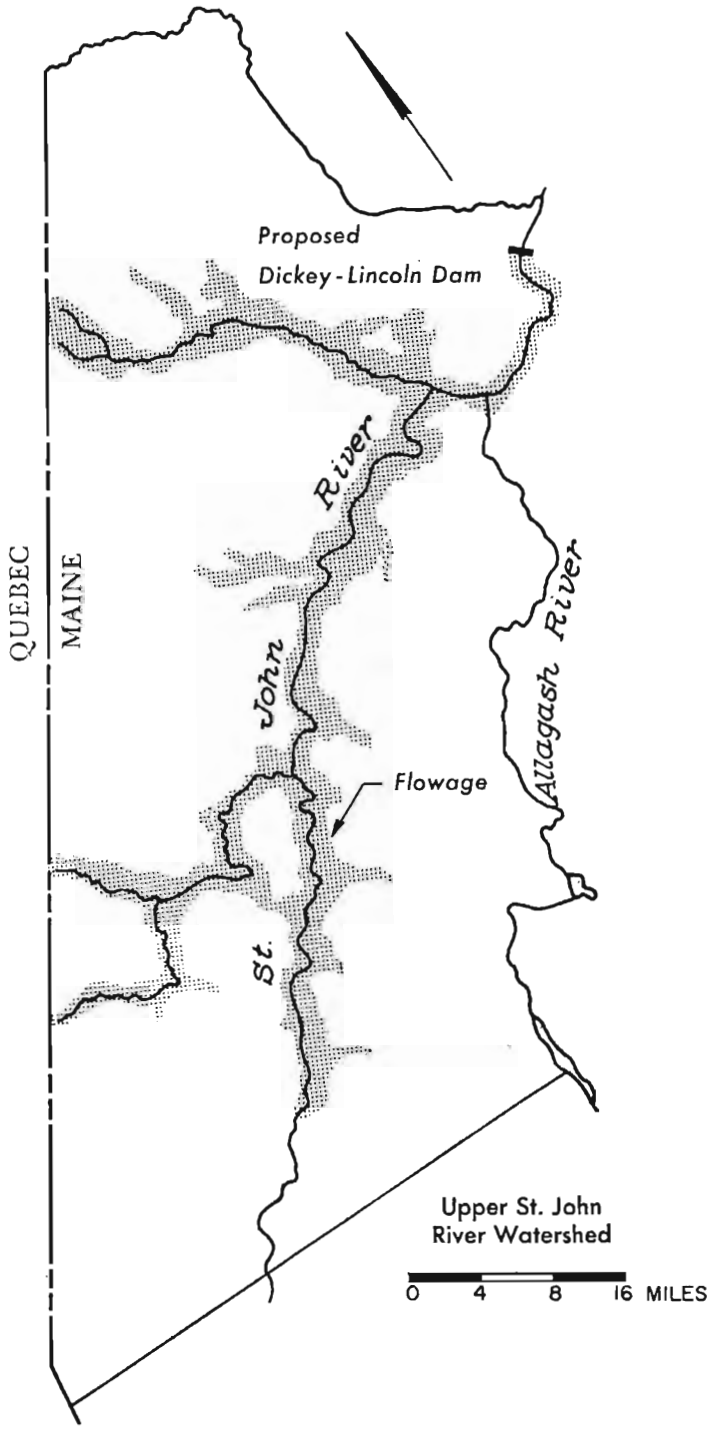

FIGURE 2. Study area boundaries and the Dickey Dam flowage.

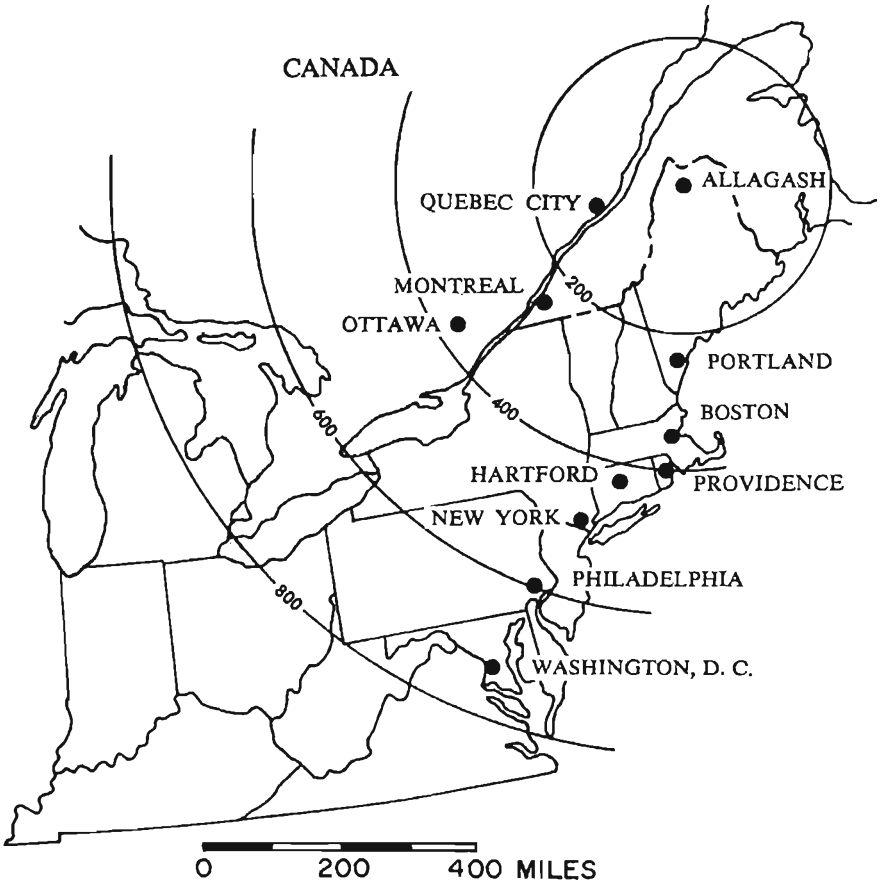

FIGURE 3. The town of Allagash in relation to the Northeastern United States and Canada.

TABLE 1. Mileage and approximate automobile driving time between Allagash and selected points in the Northeast.

Location	Mileage	Automobile driving time in hours[a]
Boston, Mass.	475	8.6
Hartford, Conn.	575	10.5
Montreal, Quebec	385	7.0
New York, N. Y.	690	12.5
Ottawa, Ontario	500	9.1
Philadelphia, Pa.	795	14.5
Portland, Maine	370	6.7
Providence, R. I.	520	9.5
Quebec City, Quebec	235	4.3
Washington, D. C.	915	16.6

a/ Based on 55 mph. average speed.

Commonwealth of Massachusetts to lay out one million acres for a land sale. He began near the eventual location of Lincoln, Maine and took a northerly course intending to travel as far as the St. Lawrence River. Due to errors in maps and other misinformation, he had traveled much further than anticipated when he encountered a French Acadian family three or four miles above Madawaska on the St. John River. Holland replenished his supplies and proceeded upstream to the Allagash River, and then up the Allagash River and eventually home by an over land route.

In the period between 1840 and 1843, the surveyors for the Webster-Ashburton Treaty found people living up river as far as Allagash. Most of tthe settlements on the river were French-Catholic, but Allagash was an exception. Its settlers were English-Protestants who had come from the mouth of the Restigouche River near the present location of Campbellton, N. B. about 1835. These were the Gardners, Haffords, Jacksons, Kellys, and McBreairtys; many of their descendants remain there today. The French gradually pushed up river, expanding development, which resulted in the present township grid which was laid out between 1845 and 1860. Settlements were gradually established along the Quebec border, mainly by people from the St. Lawrence, as access became easier following the border survey.[3]

Some of the earliest settlements on the Upper St. John River were farms that were cleared to produce hay and pasture for horses, and to provide a location for depot supply camps for timber operations. The most important of these were the Seven Islands Settlement (T13, R14 and 15), Simmons Farm (T14 R14), and Castonia Farm (T16 R12). These farms have been acquired from the previous operators by the present landowners, with the exception of the Caron Farm near Seven Islands, which is still owned by that family.

Because of its rich forest resource, timber harvesting has been a major operation in the St. John River area. Several sawmills were established at St. John, N. B. after the year 1600 and logs were driven down river to the mills. The Upper St. John River Watershed has been extensively operated for logs since 1840, first for pine, then for spruce, fir, and cedar. Tow boats, horses, and sleds were first used in harvesting, then about 1906, the Lombard steam log haulers appeared. They were last used in 1933.

At the beginning of the twentieth century, when the Bangor and Aroostook Railroad was extended to Ft. Kent, sawmills were established in the Van Buren-Madawaska area. This soon led to conflict between these American interests and the Canadian interests in St. John, N. B.,

[3] Personal communication with Frank Call.

regarding use of the river for log driving. An international commission was appointed to settle the disputes as they arose. At that time, the St. John Lumber Co.'s mill three miles above Van Buren was the biggest and most influential of the American interests. This company was by far the most important in the development of the St. John River as it was responsible for most of the organized river developments and improvements. Edward Lacroix of the Madawaska Company acquired control of the St. John Lumber Co. in 1926. He ceased operations in 1933, and there was little harvesting activity in the area until after World War II when pulpwood and sawlog operations began again (Nash 1938).

Presently, spruce is the most desired softwood species, both for pulpwood and sawlogs, however the other softwood species are also used. Hardwoods are cut mainly for sawlogs, some pulpwood, and veneer where the quality is particularly good.

Accessibility

Access to the area is possible at six points: the Realty Road via Ashland, and Allagash, in the United States; the Realty Road via Daaquam, and St. Pamphile, Estcourt, and Landry Siding, in Canada (figure 4). Access from points south and southeast is by the Realty Road from Ashland via Interstate 95 and route 11. Access from points south and west is either through Daaquam via Jackman and Quebec on U. S. routes 2 and 201 and Canadian routes 23 and 24; or through St. Pamphile via Quebec on routes, 9, 2, and 24. From northerly points, access is either through Estcourt via Quebec on routes 2, 10, and 51; or Landry Siding on the same routes. Access from the north and east is through Allagash via Ft. Kent on route 161. Ft. Kent can be approached via U. S. routes 11, 161, and 1, or by Canadian route 20. Each of these access points, except one of the two roads branching at Allagash, is controlled through a system of gates by the land owners (figure 4). At the present time, the Realty Road may be approached from the Telos area to the south, but with the gates maintained on that road and possible regulations forthcoming from the Allagash Wilderness Waterway Commission, it is doubtful that there will be much traffic over this road in the future. Presently, either a road use fee or a permit is required for entry and passage over the private road system. Access to places within the study area is achieved through a system of approximately 425 miles of gravel roads constructed for wood transportation purposes (figure 4).

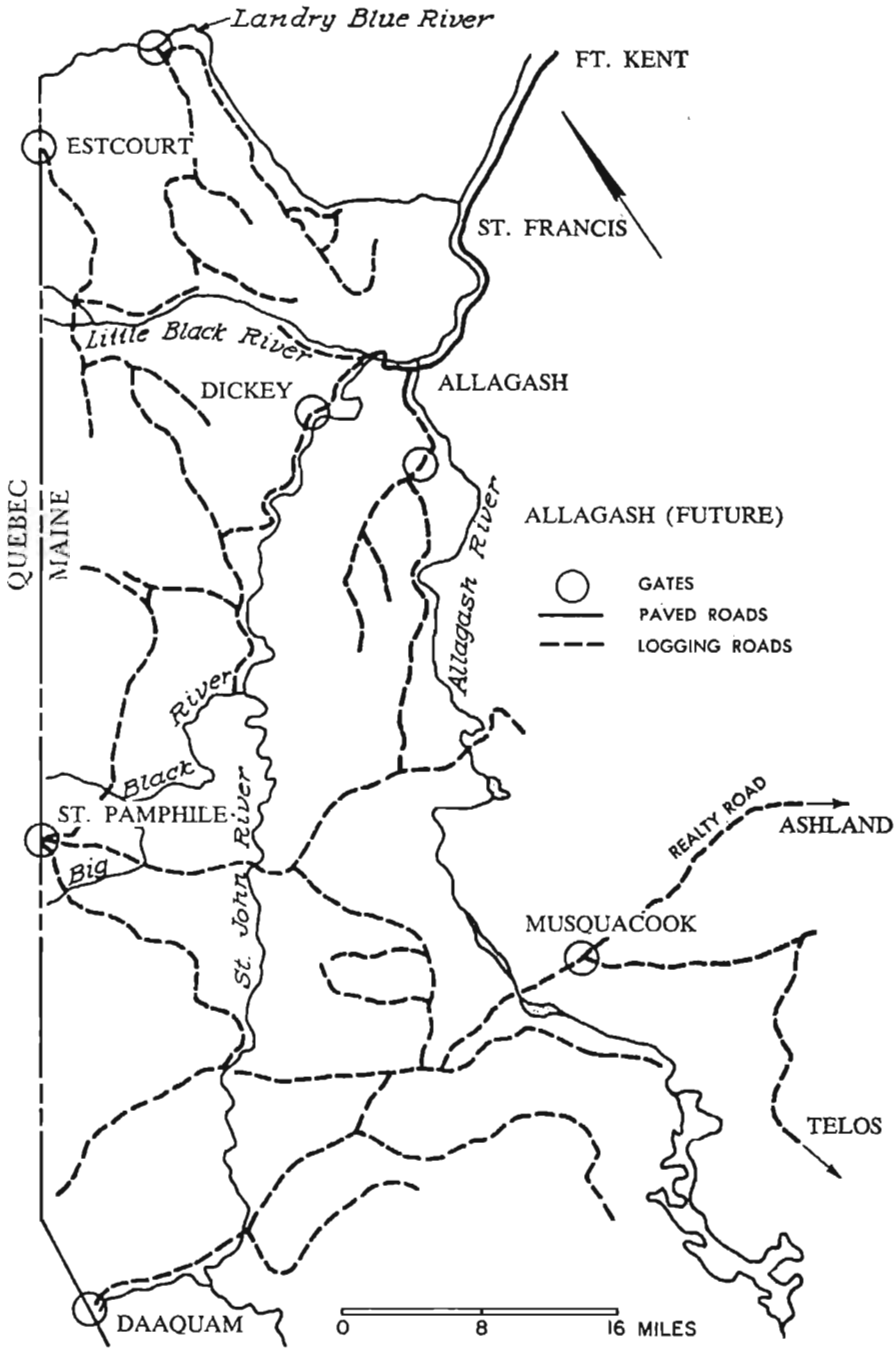

FIGURE 4. Study area access and gates.

Physical description

The St. John River Watershed is characterized by numerous ridges and spring-fed brooks. The Allagash, St. Francis, Big Black, and Little Black Rivers are the four main tributaries of the St. John River. There are few lakes in the region; low areas are often swampy. Elevation varies from about 1950 feet on Rocky Mountain (T18 R12), to about 580 feet near St. Francis (T17 R10).

The predominant forest type in the area is spruce-fir, but the northern hardwood type is also present primarily on the ridges. Major species are: white spruce[4], red spruce, black spruce, balsam fir, American beech, red maple and sugar maple. White pine, northern white cedar, white birch, yellow birch, balsam popular and quaking aspen are also commonly found.

Fishery resource

Due to the numerous sources of cold spring water and the generally cool summer temperatures, the St. John Watershed is a cold water fishery. The gravel bottoms of the brooks and spring-fed ponds provide excellent spawning habitat, and the ponds and rivers provide ample food and cover.

The eastern brook trout is the most common and most important sport fish. Lake trout, commonly called togue, and landlocked salmon are also frequently caught. Smelts in Long and Umsaskis Lakes are a valuable food fish. The most common trash fishes are the yellow perch, creek chub, and common shiner. White suckers are present in restricted areas. These trash fishes are distributed predominantly in the St. John, Big Black, and Little Black Rivers.

The study area was fished very little until about 1960 when the controversy over the Allagash (Craig 1966b) focused attention on northern Maine. Since then, the fishing use has steadily increased. No angling pressures have been calculated for the study area, but data collected in an area nearby is relevant (Warner and Fenderson 1963). Partial creel censuses were taken in 1954, 1957-59, and 1961 in the Fish River Lakes region east of the study area. An average angling pressure of 2.85 angler-hours per acre per year on the lakes was reported. The senior author suggested that this might be applied to some of the more heavily used ponds in the St. John River Region[5]. He further stated that the productive capacity of the St. John area is such that excessive fishing pressure is not a problem and is not likely to become one in the future.

[4] Scientific names of all species of trees, fishes, and game are listed in appendix B.

Game resource

As a result of intensive timber harvesting throughout most of the area during the last 20 years, game habitat has been greatly improved. The young forest growth of recently cutover areas is a major food source. Logging roads frequently seed into grass and clover which provide a sunning area as well as a source of food for game birds. Adequate cover for deer is available in dense, swampy stands and in alder and fir thickets. Winters are severe and high deer starvation rates sometimes occur. Consequently, game biologists claim underharvest of deer to be the most serious management problem of the region[6].

The white-tail deer and the ruffed grouse are the most important game species. The black bear is attracting an increased number of hunters each year and may develop into an important game species because the population and the biological potential can satisfy the increased hunting demand. A substantial moose population is supported by the area, but there is no open season on the animal in Maine.

Snowshoe hares are plentiful, some bobcats are present and an infrequent lynx may be found. Beaver, muskrat and mink are trapped in the winter. Several other small-game species such as the red fox, skunk and porcupine are present but are of little hunting importance. Waterfowl are not abundant because the region is not located in a major flyway.

Hunting data for the region is limited, but in recent years there has been a consistent increase in hunting. The legal deer kill in the study area has increased markedly since 1940 (table 2). The yearly legal deer kill in the area in 1967 averaged 0.65 deer per square mile and is significantly less than the 1.14 deer per square mile killed statewide[7]. Data collected by Blanchard and Gill (1962) were analyzed indicating that less than 1% of the Maine deer hunters chose to hunt within the study area, which comprises approximately 5% of the forest land of the state. It appears that the study area has the potential to satisfy a larger portion of the deer hunting pressure.

Ownership

The Upper St. John River Watershed is held, except for public lots and a few house lots in the Dickey area, by forest industries and private individuals in common undivided ownership within townships. The area is managed by professional management companies with all owners sharing management costs and profits.

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[5] Personal communication with Kendall Warner.

[6] Personal communication with Henry Carson.

[7] Data on file, Maine Department of Inland Fisheries and Game, Orono, Maine.

TABLE 2. Annual legal deer kill in selected townships within the study area in specific years from 1940[a].

Township	1940	1950	1960	1967
T12 R16	2	10	30	34
T12 R15	1	11	34	25
T13 R16	0	1	13	2
T13 R15	3	2	14	28
T13 R14	2	1	22	33
T14 R16	0	1	6	9
T14 R15	1	2	10	35
T14 R14	1	1	1	12
T15 R15	0	8	17	22
T15 R14	2	0	4	22
Totals	12	37	151	222

[a]/ Data on file, Maine Department of Inland Fisheries and Game, Orono, Maine.

Fire Control

The Maine Forestry Department (MFD) was organized in compliance with state law in 1909 to provide fire protection. Lookout towers are presently maintained, in the study area, on Depot Mountain (T14 R16) and Rocky Mountain (T18 R12). Fire wardens are located at Clayton Lake (T11 R14) and Daaquam (T11 R17) just outside the research area, and at Ninemile Bridge (T12 R15), St. Pamphile (T15 R15), Estcourt Station (T20 R11 & 12), Big Black (T15 R13), and Allagash (T16 R10), within the study area. From 1960 to 1967, there were 115 fires that burned 1012 acres. Of these, 61% were caused by lightning, 22% were incendiary, 12% recreational, and 5% were caused by wood operators. The MFD maintains 16 campsites throughout the area to minimize the possibility of recreationists starting forest fires.

Recreational use

Few quantitative data about the recreational use of the study area were available prior to the study. No gates existed in the study area prior to the project but several did exist adjacent to the study area. Data collected by the companies from these gates in 1964 and 1965, indicated that recreational use was at a low level but increased 8% per year. So little information was obtained about the background and activities of the recreational visitors that it was not possible to relate it to the study area.

Allagash Wilderness Waterway

The Allagash River is the eastern boundary of the study area. Since the river legally became a state park and wilderness waterway in December, 1966, it has not been considered in this study. Any indirect influence that it might have on the study area would be important and much can be learned from the past history and use of the Allagash River. Therefore, general information concerning this river is included.

Craig (1966b) summarized the controversy surrounding ultimate control and use of the river. This was followed by a recreational use survey of the Allagash River by the Maine State Park and Recreation Commission[8] in the summer of 1966. Some of the significant results were: 1) 72% of the use occurred in months of July and August; 2) 63% of the parties were from Maine; 3) 40% of the total use in visitor-days was by boys and girls camps; 4) 11% of the parties were led by a Registered Maine Guide; and 5) the average party consisted of 4.1 persons who stayed 5.0 days.

The controversy regarding control of the Allagash was settled in the fall of 1966 when the bond issue that provided for state control was ratified. A superintendent and ranger personnel have been hired to develop and control the waterway.

Proposed Dickey Dam

Because of the high power rates in Maine, and the existence of potential hydroelectric sites, several projects have been proposed over the last four decades. The Dickey-Lincoln School hydroelectric project originated from one of these projects 20 years ago, when the Passamaquoddy tidal power project was revived in a three million dollar study. This study raised the possibility of a joint St. John River-Quoddy development. In 1962, the Department of Interior proposed a study of the joint project which created the Dickey proposal (Anon. 1966d). Since 1962, almost two million dollars has been spent for engineering and planning, however, controversy surrounding the project caused the House of Representatives to eliminate the appropriations for 1968. There is considerable doubt that this project will ever be undertaken. If the project does receive the necessary funds in 1969, and could be returned to its time schedule without further interruptions, the dam could be in operation by 1980.

The construction project would take seven years, and then two years would be required to fill the reservoir. The total estimated cost

[8] Unpublished study. One file, Maine Park and Recreation Commission. 1962. Augusta, Maine.

would be $235 million. The Dickey Dam would flood, at the 910 foot contour, and 86,000 acre area approximately 40 miles long. The Lincoln School Dam, built to obtain additional power from the peak flows through the Dickey Dam, would flood an additional 2,000 acre area approximately 12 miles long, at the 610 foot contour. Figure 2 shows the flowage area. The maximum drawdown would be nine feet in the summer and 40 feet in the winter.

Upon completion of the project, the Corps of Engineers would turn the area over to the State of Maine for administration of the recreational developments. One of the established state agencies or one created for this purpose would probably fulfill this function. A 300 foot strip above the highwater mark would be retained by the controlling agency.

METHODS

The four progressive phases of this study were: 1) examination of the study area; 2) estimation of use projections; 3) preparation of alternative developmental plans; and 4) financial evaluation of the plans. Explanation of the methods in the use projections and financial evaluations will be found within those respective sections. To accomplish the aims of the study, the area was assumed to be under the ownership and management of one company.

Examination of the study area

The objective of the first summer's research was to familiarize the investigator with the physical and biotic characteristics of the area as well as its management and use. During a series of trips through the area, the investigator became acquainted with personnel of the land owning companies, MFD, Maine Department of Inland Fisheries and Game and logging operations. These informal visits were planned to acquaint the local people with the research project, to gain their confidence and support and to create a friendly relationship whereby they would be willing to provide future information. A car or jeep was used to travel over the logging roads within the area. A considerable amount of canoeing and walking was necessary to reach areas inaccessible by car and to experience those types of recreational activity. A broad aerial view of the study area was obtained during an extended airplane trip.

An outcome of the first field season was the preparation of a map of the Upper St. River Watershed. A set of aerial photo mosaics, at a scale of 1:31,680 taken in June, 1966, was obtained from the United

States Army Corps of Engineers. By field examination and information from people working in the area, the individual roads in the logging road network were classified on the mosaics as to possible vehicle use. A base map was made from the United States Geological Survey (USGS) maps at a scale of 1:62,500. The township grid, rivers, brooks, swamps, and heights of land were transferred from the USGS maps to this base map. In order to facilitate tracing of the logging roads to the base map, the Corps of Engineers reduced the original photo mosaic to the same scale as the base map. By direct tracing, the courses of the rivers and brooks were corrected. An ozalid print was made of the final map which included the locations of depots and camps. The ozalid print was photographically reduced to make half scale and quarter scale maps for convenient field use. Convenient map sizes were used for cutting records, campsite locations, planning and as a road map for the second field season. The map was revised and corrected to eliminate errors discovered in the field.

During the winter following the map preparation, preliminary use projections were prepared and the second field season was planned. A major aspect of the planning was the preparation of a site evaluation sheet for numerical rating of present and proposed recreational sites. A copy of the sheet and the explanation of the rating code is in appendix A. The actual number of areas chosen to be evaluated was determined after considering possible future use. Selection of the specific sites to be evaluated was based on observations of the first field season and information collected from the companies. This included past, present and future logging operations as well as estimates of present and future fishing and hunting.

There were three other aspects of the preliminary planning. Late spring canoeing was scheduled to observe the rivers, in the fishing-canoeing period. The three companies who operated gates in and near the area were requested to standardize their recreational data collection procedures, which they did. The data could then be used in the revision of the projections. In cooperation with one of these owners, a questionnaire was developed to investigate characteristics and opinions of recreationists for a region outside the study area for the 1967 summer season. Analysis of these data was used in the projection revisions.

The objectives of the second field season were to gather more background information and to evaluate the specific sites for possible future development. As each site was evaluated, a 126 color slide was taken and a rough 8½ by 11 inch sketch was made of the immediate area. The slide and sketch enabled quick identification of a site. A second

sketch was prepared on an onionskin overlay, of possible initial development. This procedure permitted a visual estimate of the magnitude, design and cost. The developmental sketch was made on an overlay rather than on the area sketch because future circumstances might dictate a different design. A site evaluation sheet, sketch, and overlay for one area are in appendix A.

Preparation of alternative development plans

A series of alternative developmental plans was prepared to enable management to make the most judicious decisions regarding future recreational development. Base use projections and plans were made for the years 1968, 1975, and 2000. For each of these time periods, a low, medium, and high level of development was planned. The base projections were used, with slight adjustments, as the low developmenal level for each time period. These projections were treated in this manner because their derivation was based on the minimal development that has been characteristic of the past and present. Therefore, if development continued to be minimal in the future, one could expect the use to be as projected. However, if management policy allowed improvements and increased development, one could expect use to be greater than the base by an amount, related to the number and kinds of improvements and the increased types of development. Thus, the medium and high levels were determined as increases over the base.

To contain the planning within reasonable limits, it was assumed that each level of development would be continued through all three time periods. It was also assumed that before the year 2000, the only possible major change in land use would be for hydroelectric power in the form of the Dickey Dam.

The alternative plans were based on: the site evaluation accomplished during the second field season; the timber harvesting records for the previous 20 years; accessibility within and without the area; and anticipated financial feasibility. As each plan was developed, the recreational areas and types of improvements were marked on a separate base map to aid in the illustration of the overall type of plan, and traffic and visitor control. All anticipated labor, materials and maintenance was included in the financial analysis.

POPULATION AND USE PROJECTIONS

The importance of population level, leisure time, disposable income and transportation in the projection of future recreational use has been demonstrated by the ORRRC report (ORRRC 1962a) and

the ORST report (1965). Due to insufficient data regarding past use and user characteristics, the projections in this study were based on only population increases and assumed general trends for the major recreational activities in the study area.

Data obtained in 1967 from three recreational gates in the research area showed that Quebec and Maine residents accounted, in equal amounts, for almost 90% of the recreational activity. The rest of the New England states, New Jersey, and Rhode Island accounted for another 9% and only 1% was from other states or provinces. Hunting accounted for 80% of the total recreational activity, with fishing, canoeing, and camping accounting for most of the remaining use. It was assumed that in the future, the composition of the recreationist's state or province of residence, and type of preferred use, would remain relatively the same. An expected moderate decrease in the importance of hunting, due to an anticipated increase in summer activities, was an exception.

Population projections

Population projections for the years 1975 and 2000 for New England, New Jersey, and Rhode Island were taken from the high series projections prepared by ORST (1965. Estimates for 1968 were obtained by interpolation between 1960 and 1975. The projections for Quebec were derived from Hood and Scott (1957) who used population statistics prior to 1952 to project population to 1981. Their data were graphed and extended to the year 2000 with the assumption that the birth-death ratio would slightly increase. The values for the years 1960, 1968, 1975, and 2000 were taken directly from the graph. To calculate the increases of the *other* catagory in the use projections for the years 1975 and 2000, the *total* values of the population projections were used. The population projections are listed in table 3.

TABLE 3. Population projections for New England, New Jersey, Rhode Island, and Quebec.[a]

States	1960	1968	1975	2000
Maine	969[b]	1047	1125	1595
Mass.	5149	5649	6150	9648
Conn.	2535	3140	3708	8007
Vt.	390	415	440	589
N. H.	607	705	803	1459
N. J.	6067	7371	8730	18302
R. I.	860	931	999	1429
Quebec	5140	6201	7100	12400
Totals	21716	25459	29056	53429

a/ From ORST report (1965), and Hood and Scott (1957).
b/ All figures are in thousands.

Use projections

Data obtained in 1967 from the three recreational gates in the study area included number of parties, number of persons in each party, vehicle registration and date but did not include length of stay. Therefore it was necessary to depend on estimates from a large tract to the south. There it was found that the average length of stay per person for the entire recreation season was 3.3 days, but the average during the hunting season was 4.8 days. Because there was more hunting in the St. John River area than in the other region, an average stay of 4.0 days per person was selected to estimate total use. Visitor-days of non-season permit holders were then calculated from the analysis of the data from the three gates in the research area. Visitor-days for season permit holders were estimated by employing a factor of five per permit. This factor was derived by assuming that the season permit holder would make at least five trips through the gate.

Two gates on the Realty Road were outside the study area, but some recreationists passed into the study area through these gates. It was assumed that 30% of the traffic passing through the Daaquam gate (T11 R17) and 20% of the traffic passing through the Musquacook gate (T11 R12) entered the study area. The gatekeepers manning these two gates were unable to collect all the desired data, which limited information to the number of vehicles and passengers, classified into hunting and non-hunting use. Therefore, to estimate residence of the user it was assumed that the composition of recreationists passing through the Musquacook gate was similar to that of the Estcourt which is predominantly used by residents of Maine. In a similar manner, the residence composition of recreationists passing through the Daaquam gate was correlated to the St. Pamphile gate which is predominantly used by residence of Quebec. An average of 4.0 days was again utilized for length of stay. These data were employed to estimate 1967 total use, classified by the previously mentioned states and the Province of Quebec.

During the 1966 recreation season, the two gatekeepers only recorded the number of vehicles admitted and gross receipts for their respective gates. Therefore, the residence proportions were assumed to be identical to the 1967 information for each gate. A factor of five was again used to calculate use from the season permits. An average of 2.5 passengers per vehicle, obtained from 1967 data, was employed to estimate the total number of people that entered each gate. Visitor-days and residence for recreationists who passed through the Daaquam and Musquacook gates for 1966 were calculated by the methods described above for 1967.

It was assumed that percentage increases from 1967 to 1968 would be identical with those from 1966 to 1967. Thus, the 1968 projected use (table 4) was estimated by calculating the percentage increase by state or province from 1966 to 1967 and applying it to the 1967 statistics.

The years 1975 and 2000 projections (table 4) were calculated from the analysis of population and recreation statistics. Predicted percentages of increase from 1965 to 1975 for hunting, fishing, canoeing and camping were obtained from BOR (1965a) and ORRRC (1962a) publications. Hunting was predicted to increase 10%, fishing 31%, canoeing 70% and camping 78%. Population percentage increases by the states and Quebec from 1968 to 1975 were calculated (table 5), with an overall average of 14%. It was apparent that the population increases, if used alone, would be too low due to: 1) anticipated increases in recreational activities; and 2) previously mentioned factors of increased leisure time, disposable income and mobility. The total expected increase for each use was given a weight according to its anticipated relative importance, as follows: hunting four; fishing two; canoeing one; and camping one. Each percentage increase was multiplied by its respective weight, and then divided by the total weight, eight. The weighted average is an estimated 29% recreational activity increase which is significantly greater than the 14% increase derived by population statistics alone. Consequently, the percentage population increase of each state or province was augmented by 15% to estimate the total use increase. The same procedure was followed for the year 2000, which caused a 5% increase for each state or province.

TABLE 4. Projected study area use by New England, New Jersey, Rhode Island, and Quebec residents.

Year		State or province									
		Maine	Mass.	Conn.	Vt.	N. H.	N. J.	R. I.	Quebec	Other	Totals
1966	vehicles	827	48	41	34	8	18	18	801	24	1819
	passengers	2156	135	96	79	23	46	41	2024	64	4664
	visitor-days	8624	540	384	316	92	184	164	8096	256	18656
1967	vehicles	845	61	44	41	7	21	16	945	25	2005
	per cent increase	2.2	27.1	7.3	20.6	−12	16.7	−11.	18.0	4.2	
	passengers	2159	169	115	99	20	52	39	2383	62	5098
	per cent increase	0.1	25.2	19.8	25.3	−13	13.0	−4.9	17.7	−3.1	
	visitor-days	8636	676	460	396	80	208	156	9532	248	20392
1968	vehicles	864	78	48	49	6	25	14	1115	26	2225
	passengers	2180	212	138	124	17	58	41	2804	60	5634
	visitor-days	8720	848	552	496	68	232	164	11216	240	22536
1975	vehicles	1058	97	64	59	8	33	17	1444	34	2814
	passengers	2671	263	184	150	22	77	50	3631	77	7125
	visitor-days	10684	1052	736	600	88	308	200	14524	308	28500
2000	vehicles	1360	137	125	72	13	63	22	2285	55	4132
	passengers	3431	373	358	181	36	147	65	5748	127	10466
	visitor-days	13724	1492	1432	724	144	588	260	22992	508	41864

TABLE 5. Percentage increases and adjusted increases of population projections for New England, New Jersey, Rhode Island, and Quebec.

States	1968	1975	1968 per cent increase	Adjusted per cent increase	2000	1968 per cent increase	Adjusted per cent increase
Maine	1047[a]	1125	7.5	22.5	1595	52.4	57.4
Mass.	5649	6150	8.9	23.9	9648	70.8	75.8
Conn.	3140	3708	18.1	33.1	8007	155.0	160.0
Vt.	415	440	5.9	20.9	589	41.7	46.7
N. H.	705	803	14.0	29.0	1459	107.0	112.0
N. J.	7371	8730	18.4	33.4	18302	148.3	153.3
R. I.	931	999	7.3	22.3	1429	53.6	58.6
Quebec	6201	7100	14.5	29.5	12400	100.0	105.0
Totals	25459	29056	14.1	29.1	53429	109.9	114.9

a/ Population numbers are in thousands.

RESULTS

The nine alternative plans are introduced by time periods in a series of three presentations: 1) specifications peculiar to a time period or a plan within a time period; 2) a table in which the number, types and characteristics of developments, as prepared in the three alternative plans, are listed[9]; and 3) a financial analysis of each plan. All nine alternatives are then compared through the use of a table and graph. Proposed policy and constraints for the financial analysis pertaining to all nine alternative plans is given preceding the presentations.

Proposed policy

1) Timber jobbers will build, maintain and leave clean logging camps which may then be leased to hunters.

2) Abandoned logging camps will be maintained in a good state of repair or razed.

3) Hunting camp leasees will maintain their own buildings.

4) Trailer lot leases as projected in the three medium and high alternative plans must be located inconspicuously off main roads or in camp or hunting camp lease areas. Only well-maintained vehicles will be permitted. A removal clause regarding the vehicles following termination of lease will be included.

5) All annual leases will include a car and trailer season permit.

6) Roads will be graded where necessary.

[9] A map and listing of individual developments for each plan are in Appendix C.

7) Gate hours will remain as at present, six a.m. to eight p.m. Monday through Saturday, in each plan for the year 1968, and the low and medium alternatives for the year 1975. The gates will be open daily during the same hours in the remaining plans.

8) MFD, Department of Inland Fisheries and Game, and company personnel, will have keys and free access to the area. No one else should be admitted unless he has business reasons.

9) A one-dollar service charge per party will be collected and retained by the gatekeeper for operation of the gate after hours. However, parties brought in or out by the fish and game or fire wardens on official business will not be charged.

10) The Daaquam and Musquacook gates will remain in operation as at present except for the year 2000 high alternative when they will be incorporated into that plan. The Dickey gate will be open for the full recreation season beginning in 1968.

Constraints

1) The calculated net loss or gain was before taxes, return on investment and payment of insurance premiums.

2) The expense of the gatekeepers wages included an additional 15% for social security and fringe benefits. The gatekeepers were allowed free housing in the gatehouses.

3) Acquisition of the present gates, present and future logging camps and use of the roads was assumed to be at no cost.

4) All expense estimates were made from current forest industry and MFD costs. Campsite development was according to MFD specifications.

5) It was assumed that the MFD campsites would be maintained similarly to the present by that agency except for the high alternative in the year 2000.

Alternatives for development in the year 1968

Specifications for the alternative plans are:

1) For the low use plan, all vehicles or trailers in the study area, as a result of previous policy, will be removed by their owners.

2) Logging camps will be cleaned and renovated for hunting camp leases for the medium and high use plans.

3) In the high use plan, a landowner campsite system will be inaugurated; two areas per year will be developed.

In table 6, the number, types and characteristics of developments proposed for the three alternative plans for the year 1968 are presented.

The financial analyses of the low, medium and high alternative plans are presented in tables 7, 8 and 9 respectively.

Alternatives for development in the year 1975

Specifications for the alternative plans are:

1) Gatehouses will be constructed, in all plans, at Estcourt, Dickey and St. Pamphile, and also at Landry-Blue River for the medium and high alternatives. The gatehouses will be similar to structures presently in operation south of the study area.

2) Landowner campsite development will begin as proposed in the medium alternative; 10 areas will be developed initially. After 1975, one area per year will be developed.

3) The landowner campsite development will be expanded for the high alternative; 10 areas will be developed initially, and following 1975, two areas per year will be developed. Fifty campsite areas will be in operation by the year 2000, assuming that campsite life will be 10 years.

In table 10, the number, types and characteristics of developments proposed for the three alternative plans for the year 1975 are presented. The financial analysis of the low, medium and high alternative plans are presented in tables 11, 12 and 13 respectively.

Alternatives for development in the year 2000

Specifications for the alternative plans are:

1) A landowner campsite will be initiated for the low alternative; 20 campsite areas will be developed.

2) The landowner campsite development program will continue, for the medium and high use plans with one area per year to be developed. In the high alternative, the MFD campsites will be incorporated into the landowner system. This incorporation is assumed at no cost because the sites were developed, with forest ownership tax revenue, on the privately owned land.

In table 14, the number, types and characteristics of developments proposed for the three alternative plans for the year 2000, are presented. The financial analysis of the low, medium and high alternative plans are presented in tables 15, 16, and 17 respectively.

Alternative Comparison

In table 18, the nine alternative plans are listed and compared in terms of the investment required, net gain or loss, number and types of leases, number of campsites areas and total number of campsites. Investments varied from $9,600 in the year 1968 low plan, to $55,942

Table 6. Number, types and characteristics of developments as presented in the three alternative plans for the year 1968.

Alternative plan	Gates in operation	Leases			Campsite areas		Daily entrance fee		Season entrance fee	
		camp	hunting	trailer	MFD	landowner	car	car & trailer	car	car & trailer
Low	Estcourt St. Pamphile Dickey	0	0	0	16	0	$2	$3	$10	$15
Medium	Estcourt St. Pamphile Dickey	15	0	10	16	0	2	3	10	15
High	Estcourt St. Pamphile Dickey	25	5	15	16	0	2	3	10	15

TABLE 7. Estimated revenues and expenses for the year 1968 low level.

Revenues:	Projected permit sales[a]	
	car 2030 @ $2 per permit	$ 4,060
	car and trailer 107 @ $3 per permit	321
	Total Revenues	$ 4,381
Expenses:	Gate keepers' wages	
	1 25 weeks @ $70 per week	$ 1,750
	2 25 weeks @ $135 per week	6,750
	Annual road maintenance[b]	1,000
	Miscellaneous expenses[c]	100
	Total Expenses	$ 9,600
	Net Loss	$ 5,219

[a] Calculated by adding to the base use (2225), 200 due to the increased operation of the Dickey gate, and subtracting 288 due to the Daaquam and Musquacook gates where no fees are charged.
[b] Based on a $35 per mile grading cost.
[c] Includes bookkeeping, minor maintenance, etc.

TABLE 8. Estimated revenues and expenses for the year 1968 medium level.

Revenues:	Projected permit sales	
	car 2030 @ $2 per permit	$ 4,060
	car and trailer 107 @ $3 per permit	321
	Anticipated annual trailer leases	
	10 @ $40 per lease	400
	Anticipated annual camp leases	
	15 @ $115 per lease	1,725
	Total Revenues	$ 6,506
Expenses:	Gate keepers' wages	$ 8,500
	Annual road maintenance	1,000
	Surveying costs for camp leases	
	15 leases @ $50 per lease	750
	Logging camp maintenance	
	$3000 amortized over 7 years @ 6%	538
	Miscellaneous expenses	150
	Total Expenses	$ 10,938
	Net Loss	$ 4,432

TABLE 9. Estimated revenues and expenses for the year 1968 high level.

Revenues:	Projected permit sales	
	car 2030 @ $2 per permit	$ 4,060
	car and trailer 107 @ $3 per permit	321
	Anticipated annual trailer leases	
	15 @ $40 per lease	600
	Anticipated annual camp leases	
	25 @ $115 per lease	2,875
	Anticipated annual hunting camp leases	
	5 @ $115 per lease	575
	Total Revenues	$ 8,431
Expenses:	Gate keepers' wages	$ 8,500
	Annual road maintenance	1,500
	Surveying costs for camp leases	
	25 leases @ $50 per lease	1,250
	Logging camp maintenance	
	$3000 amortized over 7 years @ 6%	407
	Annual campsite development[a]	400
	Annual campsite maintenance	600
	Miscellaneous expenses	200
	Total Expenses	$ 12,857
	Net Loss	$ 4,426

a/ Based on an average cost of $200 per area developed: $75 for 1 toilet, $40 for 2 tables, $30 for 2 stoves, and $55 for site preparation and installation.

in the year 2000 high plan. In the year 2000 high alternative, the most camp leases and campsite areas and sites of any level were proposed, but the least hunting camp leases were planned. No proposals were contained in the year 2000 low alternative for trailer or camp leases, and little campsite development was planned; however, the greatest number of hunting leases of any alternative were proposed. In every case, except between the year 1968 medium and high plans, as the investment increased the net gain increased.

In figure 5, the expenses and revenues are shown in graph form. Implementation of the low plan as a unit would result in a loss of approximately $43,000 before the year 1990 when the revenues would begin to exceed the expenses. Approximately $5,800 of the $43,000 would be returned before the year 2000. The medium plan would lose about $13,800 before the year 1975 when the revenues would begin to exceed the expenses. The loss would be recovered by 1979. The high plan would lose about $6,500 until the year 1971 when the revenues would begin to exceed the expenses. The loss would be recovered by 1974.

TABLE 10. Number, types and characteristics of developments as presented in the three alternative plans for the year 1975.

Alternative plan	Gates in operation	Leases			Campsite areas		Daily entrance fee		Season entrance fee	
		camp	hunting	trailer	MFD	land-owner	car	car & trailer	car	car & trailer
Low	Estcourt St. Pamphile Dickey	0	10	0	16	0	$3	$4.50	$12	$22.50
Medium	Estcourt St. Pamphile Dickey Landry-Blue River	50	10	25	16	8[a]	3	4.50	15	22.50
High	Estcourt St. Pamphile Dickey Landry-Blue River	75	15	25	16	22[b]	3.50	5	17.50	25

a/ Remaining 2 developed were MFD campsites in poor condition.
b/ Remaining 6 developed were MFD campsites in poor condition.

TABLE 11. Estimated revenues and expenses for the year 1975 low level.

Revenues:	Projected permit sales[a]	
	car 2568 @$3 per permit	$ 7,704
	car and trailer 135 @ $4.50 per permit	608
	Anticipated annual hunting camp leases	
	10 @ $225 per lease	2,225
	Total Revenues	$ 10,537
Expenses:	Gate keepers' wages	
	3 @ $135 per week for 25 weeks	$ 10,125
	Construction of 3 gatehouses @ $2000 each,	
	amortized over 25 years @ 6%	468
	annual depreciation	240
	Annual road maintenance	1,000
	Miscellaneous expenses	200
	Total Expenses	$ 12,033
	Net Loss	$ 1,496

[a]/ Calculated by adding to the base use (2814), 253 due to the Dickey gate, and substracting 364 due to the Musquacook and Daaquam gates.

Proposed Dickey Dam

Due to the incomplete preliminary master plan of the Corps of Engineers, a detailed developmental plan considering the proposed Dickey Dam cannot be prepared for the study area. General guidelines, therefore, can only be suggested:

1) The character of the study area would be changed significantly and the management policy undertaken should reflect this change. The type of recreationist will be much less "woods oriented" and the intensity of development will be much greater.

2) Most of the recreation within the study area will be adjacent to the reservoir because of the demand for water-oriented recreation.

3) Any private development for recreation should be done carefully and with complete knowledge of the plans of the Corps of Engineers and the administrative agency controlling recreational use of the reservoir.

4) Access within the area through the present logging road network will be limited due to the flowage. The present system of roads and gates would have to be altered significantly if transportation and control of forest resources and people were desired to be in the same manner as at present.

5) Leases, as illustrated in the financial analyses of the alternative plans, were a very lucrative form of investment. They would be in much greater demand near the reservoir. The leases and other types

TABLE 12. Estimated revenues and expenses for the year 1975 medium level.

Revenues:	Projected permit sales[a]	
	car 3211 @ $3 per permit	$ 9,633
	car and trailer 169 @ $4.50 per permit	761
	Anticipated annual trailer leases	
	15 additional for total of 25 @ $63 per lease	1,575
	Anticipated annual camp leases	
	15 existing leases @ $125 each[b]	1,875
	20 additional leases @ $150 each	3,000
	15 additional leases @ $200 each	3,000
	Anticipated annual hunting camp leases	
	10 leases @ $225 per lease	2,225
	Total Revenues	$ 22,069
Expenses:	Gate keepers' wages	
	4 @ $3375 per year	$ 13,500
	Construction of 4 gatehouses @ $2000 each,	
	amortized over 25 years @ 6%	624
	annual depreciation	320
	Annual road maintenance	1,175
	Supervision and planning	500
	Surveying costs for camp leases	
	35 leases @ $50 per lease	1,750
	Initial landowner campsite development	
	10 areas @ $200 per area,	
	amortized over 10 year @ 6%	271
	Annual campsite development[c]	600
	Annual campsite maintenance	2,000
	Miscellaneous expenses	400
	Total Expenses	$ 21,140
	Net Gain	$ 929

a/ Calculated by adding to the base use (2814), 676 due to the Landry-Blue River gate, 254 from the Dickey gate, and substracting 364 due to the Daaquam and Musquacook gates.
b/ Increased from 1968.
c/ Includes campsite replacement after 10 years.

of private recreational development would be permitted beyond the 300 foot strip above high water. Access to the water could not be denied.

6) Developments should be clustered in restricted areas similar to the medium and high use plans in the years 1975 and 2000. As a result, much of the surrounding area would remain undeveloped and available for public enjoyment.

7) The relative importance of hunting would be decreased due to the reduction of favorable food and cover habitat and the increased number of people in the area.

TABLE 13. Estimated revenues and expenses for the year 1975 high level.

Revenues:	Projected permit sales[a]	
	car 4131 @ $3.50 per permit	$ 14,459
	car and trailer 217 @ $5 per permit	1,085
	Anticipated annual trailer leases	
	10 additional for total of 25 @ $65 per lease	1,625
	Anticipated annual camp leases	
	25 existing leases @ $125 each	3,125
	25 additional leases @ $150 each	3,750
	25 additional leases @ $200 each	5,000
	Anticipated annual hunting camp leases	
	5 existing leases @ $125 each	625
	10 additional leases @ $225 each	2,225
	Total Revenues	$ 31,894
Expenses:	Gate keepers' wages	
	4 @ $3375 per year	$ 13,500
	Construction of 4 gatehouses @ $2000 each,	
	amortized over 25 years @ 6%	624
	annual depreciation	320
	Annual road maintenance	2,000
	Supervision and planning	1,000
	Surveying costs for leases	
	50 leases @ $50 per lease	2,500
	Initial landowner campsite development,	
	10 areas @ $200 per area,	
	amortized over 10 years @ 6%	271
	Annual campsite development	1,000
	Annual campsite maintenance[b]	4,000
	Miscellaneous expenses	500
	Total Expenses	$ 25,715
	Net Gain	$ 6,179

a/ Calculated by adding to the base use (2814), 338 due to Sunday use and 630 due to campsite development plus the increases and decrease shown for the medium level.

b/ Includes development and replacement of sites after 10 years.

DISCUSSION

Due to the recent emergence of recreation as an important land use, many recreational concepts and analytical tools are not yet well accepted. An attempt will be made to clarify the controversial aspects of these principles as they are related to this study.

Timber harvesting operations

Many persons within the forestry profession, and other professional groups related to resource use have considered logging operations

TABLE 14. Number, types and characteristics of developments as presented in the three alternative plans for the year 2000.

Alternative plan	Gates in operation	Leases			Campsite areas		Daily entrance fee		Season entrance fee	
		camp	hunting	trailer	MFD	land-owner	car	car & trailer	car	car & trailer
Low	Estcourt St. Pamphile Dickey Allagash Landry-Blue River	0	25	0	16	20	$4	$6	$20	$30
Medium	Estcourt St. Pamphile Dickey Allagash Landry-Blue River	100	15	45	16	27[a]	6	8	20	30
High	Estcourt St. Pamphile Dickey Allagash Daaquam Musquacook Landry-Blue River	150	20	25	0	50	2[b]	3[b]	30	40

a/ Remaining 8 developed were MFD campsites in poor condition.
b/ Per night.

TABLE 15. Estimated revenues and expenses for the year 2000 low level.

Revenues:	Projected permit sales[a]	
	car 6221 @ $4 per permit	$ 24,884
	car and trailer 327 @ $6 per permit	1,962
	Anticipated annual hunting leases	
	10 existing leases @ $230 per lease	2,300
	10 additional leases @ $300 per lease	3,000
	5 additional leases @ $500 per lease	2,500
	Total Revenues	$ 34,646
Expenses:	Gate keepers' wages	
	5 @ $5000 per season	$ 25,000
	Construction of 5 gatehouses @ $2200 each,	
	amortized over 25 years @ 6%	858
	annual depreciation	440
	Annual road maintenance	5,000
	Supervision and planning	1,000
	Campsite development, 20 sites @ $200 per site	
	amortized over 10 years @ 6%	678
	Annual campsite replacement	500
	Annual campsite maintenance	2,500
	Miscellaneous expenses	400
	Total Expenses	$ 36,376
	Net Gain	$ 1,730

a/ Calculated by adding to the base use (4132), 992 due to the Landry-Blue River gate, 992 due to the Allagash gate, 595 due to Sunday use, 371 due to Dickey gate, and substracting 534 due to the Musquacook and Daaquam gates.

and recreation generally to be incompatible. This conflict, however, can be eliminated through coordinated planning. Recreational use can be rotated much the same as timber operations. If the area is selectively cut, the recreational use can follow the timber harvest by approximately five years depending on the area, severity of cut and type of recreation. If the area is clear cut then the time lapse before recreational use will be greater, and the amount of recreational activity will be less.

This rotational concept would be especially well suited for camping and hunting in the area but would be unsatisfactory for the more permanent developments such as the camp leasing programs. In permanent recreation zones cutting should be very selective or should not be done as the value of the trees in such areas may be higher for recreation than for timber harvesting.

Aesthetic and recreational benefits, intangible values that have been slighted in the past, must be supported in the future. It is dif-

TABLE 16. Estimated revenues and expenses for the year 2000 medium level.

Revenues:	Projected permit sales[a] ($5/car average)	
	car 7635 @ $5 per permit	$ 38,175
	car and trailer 402 @ $7 per permit	2,814
	Anticipated annual trailer leases	
	20 additional for a total of 45 @ $85 per lease	3,825
	Anticipated annual camp leases	
	15 existing leases @ $135 per lease	2,025
	20 existing leases @ $165 per lease	3,300
	15 existing leases @ $200 per lease	3,000
	50 additional leases @ $200 per lease	$ 10,000
	Anticipated annual hunting camp leases	
	15 total leases @ $250 per lease	3,750
	Total Revenues	$ 66,889
Expenses:	Gate keepers' wages	
	5 @ $5,000 per season	$ 25,000
	Construction of 5 gatehouses @ $2,200 each,	
	amortized over 25 years @ 6%	1,298
	annual depreciation	440
	Annual road maintenance	3,000
	Surveying costs for leases	
	50 leases @ $55 per lease	2,750
	Annual campsite development and replacement	1,000
	Planning and Supervision	3,000
	Annual campsite maintenance	3,500
	Miscellaneous expense	800
	Total Expenses	$ 40,788
	Net Gain	$ 26,101

a/ Calculated by adding to the base use (4132), 1323 due to the Landry-Blue River gate, 992 due to the Allagash gate, 628 due to Sunday use, 1125 due to campsite development, 371 due to the Dickey gate, and substracting 534 due to the Musquacook and Daaquam gates.

ficult to assign a specific dollar value to these benefits, but as cutting plans are made present and potential recreational use must be considered, to optimize land use, and minimize damage to the vegetation.

Public relations

Perhaps the most critical problem facing forest landowning companies today is public relations. Harvesting practices in the last century created the problem which has been publicly exposed by conservation and preservation organizations. Operational planning that includes recreation is now common practice. Unfortunately, the general public is not aware of this and it does not understand all that is involved.

TABLE 17a. Estimated revenues for the year 2000 high level.

Projected permit sales[a]	
car 9718 @ $6 per permit	$ 58,308
car and trailer 512 @ $9 per permit	4,608
Anticipated annual trailer leases	
25 existing leases @ $90[b] per lease	2,250
Anticipated annual camp leases	
25 existing leases @ $140 per lease	3,500
25 existing leases @ $160 per lease	4,000
25 existing leases @ $200 per lease	5,000
75 additional leases @ $200 per lease	15,000
Anticipated annual hunting camp leases	
5 existing leases @ $150 per lease	750
10 existing leases @ $225 per lease	2,225
5 additional leases @ $250 per lease	1,250
Total Revenues	$ 96,891

a/ Calculated by adding to the base use (4132), 2,315 due to the operation of the Allagash and Blue River gates; 371 due to the full season operation of the Dickey gate; 628 due to Sunday use; 2,250 due to campsite development; and 534 due to the operation of the Daaquam and Musquacook gates.
b/ Includes season trailer permit.

TABLE 17b. Estimated expenses for the year 2000 high level.

Gate keepers' wages	
5 @ $5,000 per season	$ 25,000
1 @ 30% of $5,000[c]	1,500
1 @ 20% of $5,000[c]	1,000
Construction of 7 gatehouses @ $2,200 each,	
amortized over 25 years @ 6%	1,201
annual depreciation	616
Annual road maintenance	5,000
Surveying costs for leases	
75 leases @ $55 per lease	4,125
Annual campsite development[d]	1,500
Annual campsite maintenance	7,000
Planning and supervision	8,000
Miscellaneous expenses	1,000
Total Expenses	$ 55,942
Net Gain	$ 40,949

c/ Daaquam and Musquacook gates.
d/ Includes development of 1 new site per year and replacement of 6.5 per year based on a 10 year campsite life.

TABLE 18. Comparison of alternative plans.

Level	Investment	Net gain or loss	Camp leases	Hunting camp leases	Trailer leases	Landowner campsites		MFD campsites
						areas	sites	
1968 Low	9,600	−$ 5,219	0	0	0	0	0	16
Medium	10,938	− 4,432	15	0	10	0	0	16
High	12,857	− 4,426	25	5	15	0	0	16
1976 Low	12,033	− 1,496	0	10	0	0	0	16
Medium	21,140	+ 929	50	10	25	8	16	16
High	25,715	+ 6,179	75	15	25	22	46	16
2000 Low	36,376	+ 1,730	0	25	0	20	50	16
Medium	40,788	+ 26,101	100	15	45	27	65	16
High	55,942	+ 40,949	150	20	25	50	150	0

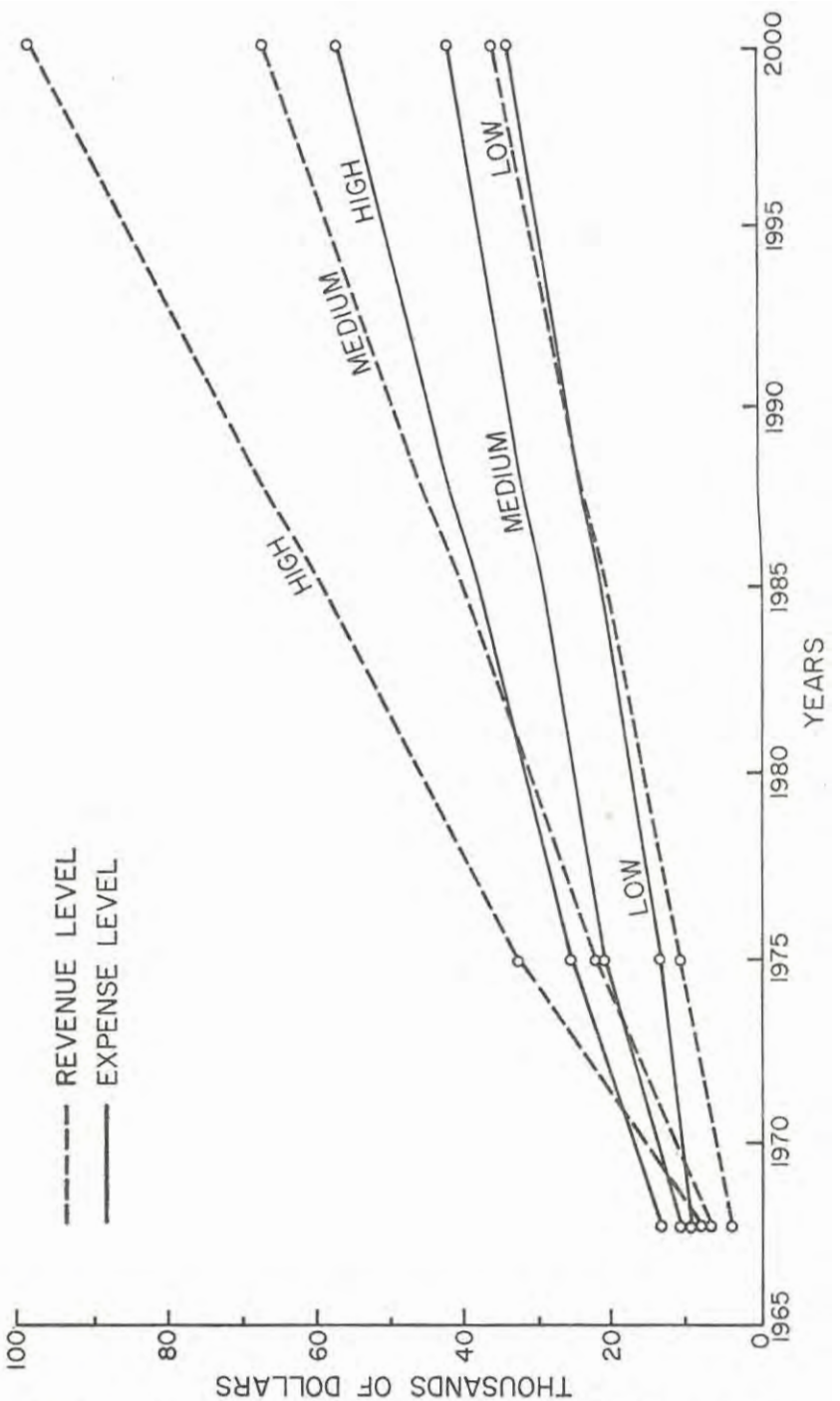

FIGURE 5. Graphic presentation of revenues and expenses of alternative plans.

The most important public relations steps to be taken by companies in land management today are: 1) the practice of sound multiple use management for the public good as well as the financial good of the company; 2) making the public aware of what good management involves; and 3) informing the public that the company is in fact performing sound multiple use.

Private land management compatible with public goals is becoming more common, because the financial success of a firm now depends upon sustained yield of the renewable resource. The existence of limited mature forests and the scarcity of forest land available for purchase has forced attention on the productivity of land already owned.

The public can be informed and educated in a variety of ways. One of the best methods would be recreational programs emphasizing outdoor education and information to explain and justify company policy. A program of this nature is costly, but if the company desires continued land ownership, the cost when compared with that of losing the land to a misinformed and dissatisfied public is small.

User fees

Recreational user fees have been associated with private enterprise while government facilities, because of tax support which may be considered an indirect type of fee, have been provided as a public service. Presently, this policy is subject to change. The Land and Water Conservation Fund Act provides for increased charges on the state and federal level. However, money from appropriations still supports most governmental recreational efforts as the fees are minimal and do not reflect the cost of acquisition, planning, development and maintenance. As a result, private enterprise has been at a distinct competitive disadvantage because it must charge a direct fee commensurate with expenses and desired profit.

Management could write off losses resulting from low or non-existent fees as a public relations cost, but if services are provided such as roads, good campsites and leases, the company has a right to require a fee. Some of the recreationists, particularly those of local origin, will not be pleased upon initiation of a fee system. But after the fee system is accepted the public relations value will rise to its former level.

In addition to return on investment, fees provide a means of quantitatively assessing the recreationists and are a valuable management tool to increase, decrease or distribute use. Fees elimate or reduce undesirables by admitting only persons who value the recreational experience at least as much as the fee. Under these conditions, vandalism

and other causes of high maintenance costs would be reduced and the life of the development increased.

Proposed Dickey Dam

Due to high power rates, Maine probably needs to increase electrical power production. This can be accomplished by hydroelectric or nuclear power.

The proposed Dickey-Lincoln School hydroelectric project may be a solution. It would be economically beneficial but would have effects on the natural resources. The following are some of the effects that the reservoir would have on the present uses of the resources:

1) A minimum of 37 deer yards containing 17,600 acres would be destroyed. At the rate of one deer per eight acres of yard, 2,200 fewer deer could be supported by the land.[10]

2) The 88,000 acre flowage area, when assumed to be 75% productive and growing 0.4 cords per acre per year of all species, at $25 per cord mill value, would have an average annual yield of $660,000 mill value that would be lost.

3) The brook trout fishery as it exists on the St. John River today would be destroyed, and the incidence of trash fish would greatly increase.

4) Access to timber resources not taken out of production as a result of the reservoir would be almost eliminated, and new roads would have to be constructed by the landowners at their expense.

5) One of the finest canoeing rivers in the northeast, and perhaps the country, would be destroyed. It is ironical that so much federal pressure has been applied to preserve wild rivers (for example, the Allagash River), and so little regard has been given the destruction of the St. John River.

Some of these losses can be diminished through management changes and modifications, but the whole character of the area will be changed. Once the dam is in operation the resource can never be returned to its present state.

Nuclear power may be another solution to the electrical power problem, but it also has a serious disadvantage in the form of thermal pollution. However, the effects seem much less far reaching than those of hydroelectric power because there seems to be less destruction of the natural resources. Before a decision is made to select an alternative all values, including timber and recreation, must be considered so that an economically beneficial solution will be chosen to minimize loss of natural resources.

[10] Personal communications with Henry Carson.

Projections and use statistics

One major weakness of this study was limited data concerning activities, characteristics and statistics regarding the recreationist. Consequently, the use projections were regarded as guidelines in the broad sense. Emphasis was placed on adequate recreational development for specific levels of recreational activity.

A base use projection was prepared to indicate the future under established policy. It was believed that a base use, adjusted in relation to proposed policy changes, would be a more appropriate projection method than that employed by ORRRC (1962a) or ORST (1965). The latter had more basic information available. It was assumed that if the policy changes provided for improvements and increased development use would be greater than the base by a related amount.

Financial analysis of alternative plans

Financial losses resulting from private recreational development could be regarded as a public relations cost, but if large investments are made the public relations cost would be prohibitive. The proper combination of outdoor recreational activities can satisfy both the financial and public relations demands. In regard to the study area, leases would be the most financially attractive form of development but would provide limited public use. Campsite development would be less attractive financially but would provide relatively high public use. Therefore, income from the leases would help pay for the campsite development which would satisfy public demand.

Implications of recreational development

Several details of the plans regarding fish and game, fire control, human control and multiple use require brief discussion.

Because the recreational activity of the area is predominantly related to the fish and game, it would be of great value to the landowning companies to work in close cooperation with the state fish and game biologists in habitat maintenance and improvement.

Fire control should be increased as a result of a recreational program. More and safer campsites, concentration of developments, increased detection by recreationists and predominance of responsible persons will result from recreational planning and development. Thus, even though there will be more people in the area there will be better control.

Alternative plans without control were not presented because control was considered essential in the study area for several reasons: 1) fees can be collected easily; 2) vandalism is decreased; 3) over use can be prevented; 4) traffic can be controlled and channeled away from

logging operations; and 5) controlled recreation can satisfy a higher demand than uncontrolled recreation and still satisfy the quality demands of the recreationist.

As the plan is implemented, the establishment of campsites must be closely correlated with the timber operations. Recreational activity may have to be discontinued for a short period on some sites and a few may require similar rotation to the timber harvest, with longer periods of non-use. This can be balanced by enlarging other areas. The need for a well trained recreational planner becomes more acute as development increases with time. A full-time person will be required for the year 2000 high alternative.

SUMMARY AND CONCLUSIONS

A series of alternative development plans for the extensive recreational development of the Upper St. John River Watershed, for the years 1968, 1975, and 2000, culminated a two year study. The significant financial implications were:

1) The high level development projected for the year 2000 showed the largest financial gain, and the low level development projected for the year 1968 showed the largest financial loss.

2) For the 32 year period ending in the year 2000, implementation of the low level development plan would result in a total loss of $37,000; implementation of the medium level development plan would result in a total gain of $345,000; and implementation of the high level development plan would result in a total gain of $720,000. For these computations, taxes, payment of insurance premiums, desired return on investment and interest on the gains and losses were not included.

From the analysis of all of the plans, it was concluded that:

1) A small amount of forest land would be required for recreational development.

2) Recreational use would be increased significantly by changes in policy that would not interfere with the timber management operations.

3) The largest cost incurred in all levels of development would be construction, maintenance and operation of the recreational control gates. As total revenues increased the initial proportional cost of operation decreased.

4) Leases would yield a high return on investment.

5) Recreation on private lands can be a financially attractive venture if added and expanded outdoor recreation facilities are provided so that additional people might be expected in the area.

6) Recreational use and development would be considerably different in the event the proposed Dickey Dam is constructed.

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APPENDIX A

ANALYSIS OF POTENTIAL PRIMITIVE RECREATION SITES*

Area Name ..... Controlling Landowner .....

Location .....

Accessibility ..... Distance from Public Road .....

Potential Recreational Activities .....

Time Since Timber Harvest ..... Timber Operations Nearby .....

Justification for Development .....

Ultimate Planned Capacity ..... Present or Future Potential .....

*Scenic Attraction (5) ( ) .....

*Remoteness (3) ( ) ..... *General Recreation Value (4) ( ) .....

*Geologic Value (1) ( ) ..... *Historic Value (1) ( ) .....

*Site Topography (3) ( ) ..... *Drainage (3) ( ) .....

*Water Body Value (4) ( ) .....

*Shoreline Slope (2) ( ) ..... *Shoreline Soil (2) ( ) .....

*Convenience and Accessibility to Values (3) ( ) .....

*Dominant Vegetation (3) ( ) ..... *Size and Density (3) ( ) .....

*Amount of Shaded Area (3) ( ) .....

*Soil Texture and Suitability (2) ( ) .....

*Ground Cover (3) ( ) ..... *Density (2) ( ) .....

*Access Road Quality (3) ( ) .....

*Design and Routing of Road (2) ( ) .....

*Visitor Control (3) ( ) .....

*Visitor Safety (2) ( ) ..... *Fire Hazard (2) ( ) .....

*Drinking Water Source (4) ( ) ..... *Temperature (4) ( ) .....

*Purity (5) ( ) .....

*Water Quantity (4) ( ) ..... *Distance from Site (4) ( ) .....

Further Remarks:

Date: ..... Final Rating .....

*Rating Code: 3 — Good, 2 — Fair, 1 — Poor

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EXPLANATION OF RATING CODE FOR PRIMITIVE SITE ANALYSIS

Weight

5 1. Scenic Attraction
- 3 — Good Pleasant environment with good vista of surrounding area.
- 2 — Fair Satisfactory environment with limited vista of area.
- 1 — Poor Mediocre environment with little or no vista of area.

3 2. Remoteness
- 3 — Good Area isolated from gravel roads requiring some difficulty for access.
- 2 — Fair May be accessible via gravel roads, but a good distance from a heavily travelled one.
- 1 — Poor Easily accessible over gravel roads near heavy traffic.

4 3. General Recreation Value
- 3 — Good Opportunity exists for most all forest recreation activities.
- 2 — Fair Potential for 1 or 2 activities non-existent.
- 1 — Poor Few opportunities for activities.

1 4. Geologic Value
- 3 — Good Good geologic features (outcrops, fossils, etc.) found in local area.
- 2 — Fair Rating not used here.
- 1 — Poor Not significant in area.

1 5. Historical Value
- 3 — Good Indian campsites, old logging relics, etc., found in local area.
- 2 — Fair Rating not used here.
- 1 — Poor Not significant in area.

3 6. Site Topography
- 3 — Good 0-3% grade, even ground surface.
- 2 — Fair 3+%-7% grade, or undulations in surface.
- 1 — Poor 7+% or very irregular surface.

3 7. Drainage
- 3 — Good Well-drained with no standing water on area.
- 2 — Fair Intermediate with little standing water.
- 1 — Poor Standing water found on area most all year.

4 8. Water Body Value
- 3 — Good Lake.
- 2 — Fair River or large stream.
- 1 — Poor Small stream or nothing.

2 9. Shoreline Slope
- 3 — Good Less than 15% and not susceptible to degeneration with use.
- 2 — Fair 15%-30% and possibly susceptible to some erosion.
- 1 — Poor 30%+ and susceptible to degeneration with use.

2 10. Shoreline Soil
- 3 — Good Sand and/or fine gravel.

Weight

2 — Fair Loam and/or coarse gravel and rocks.
1 — Poor Clay or muck.

3 11. Convenience and Accessibility to Values
3 — Good Drinking water, water body, trails, fishing, etc., near and easy to get to.
2 — Fair Values accessible only with some difficulty.
1 — Poor Values accessible only with a great deal of difficulty.

3 12. Dominant Vegetation
3 — Good Conifers and white birch.
2 — Fair Hardwoods.
1 — Poor Brush and shrubs.

3 13. Size and Density
3 — Good Medium-large, intermediate density.
2 — Fair Medium-large, high density; small, intermediate density.
1 — Poor Small, high or low density.

3 14. Amount of Shaded Area
3 — Good 50% with scattered open areas.
2 — Fair 25%-75%.
1 — Poor 0-25% or 75%-100% trees uniformly scattered.

2 15. Soil Texture and Suitability
3 — Good Sand, sandy-loam, or loam; not susceptible to compaction or excessive wear.
2 — Fair Clay and/or rocks present making area somewhat rough or susceptible to compaction and wear.
1 — Poor Largely clay and/or rocks, very rough or very likely to be eroded or compacted.

3 16. Ground Cover
3 — Good Grasses and other non-woody vegetation.
2 — Fair Some grasses, some woody shrub vegetation.
1 — Poor Mostly woody shrubs and small trees, little grass.

2 17. Density
3 — Good 75%-100%.
2 — Fair 50%-75%.
1 — Less than 50%.

3 18. Access Road Quality
3 — Good Well-graded, graveled, few ruts, no washouts.
2 — Fair Graveled, but some erosion present, needs grading.
1 — Poor Decaying rapidly or not well graveled, ruts and washouts present.

2 19. Design and Routing of Road
3 — Good Road kept away from streams, lakes, etc.; no steep grades and few sharp curves.

Weight

		2 — Fair	Generally kept away from values with some steep grades and curves.
		1 — Poor	Road on or adjacent to lakes and streams; overly steep grades and curves.
3	20.	Visitor Control	
		3 — Good	No problems concerning the public interfering with timber operations, fire control, fish and game operations, or other regulations.
		2 — Fair	Possibly a problem, but considered rectifiable.
		1 — Poor	A serious problem without an apparent solution.
2	21.	Visitor Safety	
		3 — Good	Nothing in immediate area that might endanger the recreationists (holes, poison ivy, dropoffs, etc.).
		2 — Fair	Some hazard present, but can be rectified.
		1 — Poor	Definite hazards in area difficult to modify.
2	22.	Fire Hazard	
		3 — Good	No slash or other flammable debris found in area your-round, little material in dry season.
		2 — Fair	Little material year-round, some in dry season.
		1 — Poor	Considerable debris in area causing large problem year-round or in dry season, difficult to rectify.
4	23.	Drinking Water Source	
		3 — Good	Spring or spring-fed small brook.
		2 — Fair	Large brook.
		1 — Poor	River or lake.
4	24.	Temperature	
		3 — Good	Cool year-round.
		2 — Fair	Not rated here.
		1 — Poor	Warms up in summer season, inadequate to quench thirst.
5	25.	Purity	
		I am drinking water from all sites and am assuming purity, unless I should keel over with "Upper St. John Sickness".	
4	26.	Water Quantity	
		3 — Good	Plenty for drinking, cooking and washing.
		2 — Fair	Generally okay, but may be inadequate for peak periods or drier parts of the year.
		1 — Poor	Not sufficient for all uses.
4	27.	Water, Distance from Site	
		3 — Good	150′ or less.
		2 — Fair	150+′-400′.
		1 — Poor	More than 400′.
—			
80	Total Weight		

Final rating is based on the weight of each category multiplied times its rating with the sum divided by 80.

ANALYSIS OF POTENTIAL PRIMITIVE RECREATION SITES*

Area Name *One cord bridge* Controlling Landowner *Irving*

Location *S.E. ¼ of 17-13 at intersection of road & East Branch of Pocwock*

Accessibility *Automobile* Distance from Public Road *28 mi. (Estcourt)*

Potential Recreational Activities *Fishing, camping, hiking, hunting*

Time Since Timber Harvest *20+ years* Timber Operations Nearby *None in area*

Justification for Development *Beautiful bubbling brook running through a tall timbered area*

Ultimate Planned Capacity *2 sites* Present or Future Potential *Present*

*Scenic Attraction (5) (*2*) *Timber alone is beautiful enough but brook is small*

*Remoteness (3) (*2*) *A ways in* *General Recreation Value (4) (*2*) *Good fishing & hunting*

*Geologic Value (1) (*1*) *None apparent* *Historic Value (1) (*1*) *None apparent*

*Site Topography (3) (*2*) *Needs some leveling* *Drainage (3) (*3*) *Should be O.K. all year*

*Water Body Value (4) (*1*) *It's small — but really nice*

*Shoreline Slope (2) (*3*) *Nicely sloping* *Shoreline Soil (2) (*2*) *Rocky with loam*

*Convenience and Accessibility to Values (3) (*3*) *But site needs careful development*

*Dominant Vegetation (3) (*3*) *Spruce-Fir* *Size and Density (3) (2) *Beautiful size, but too dense*

*Amount of Shaded Area (3) (*1*) *Biggest problem — needs some clearing work*

*Soil Texture and Suitability (2) (*3*) *Think organic layer will protect area ideally*

*Ground Cover (3) (*1*) *Non-existent* *Density (2) (*1*) *Ditto*

*Access Road Quality (3) (*2*) *Needs grading & culvert improvement*

*Design and Routing of Road (2) (*2*) *Steep on hills in places*

*Visitor Control (3) (*3*) *No foreseeable problems*

*Visitor Safety (2) (*3*) *Satisfactory* *Fire Hazard (2) (2) *O.M. must be cleared for fireplace*

*Drinking Water Source (4) (2) *Nice stream* *Temperature (4) (*3*) *Should stay cold* *Purity (5) (*3*) *Good*

*Water Quantity (4) (*3*) *Very adequate* *Distance from Site (4) (*3*) *On site*

Further Remarks: *Needs very careful development to maintain wonderful environment. Will cost some $ for leveling, clean up, & clearing to mineral soil for fireplace.*

Date *13 July, 1967* Final Rating *2.26 — Fair*

*Rating Code: 3 — Good, 2 — Fair, 1 — Poor

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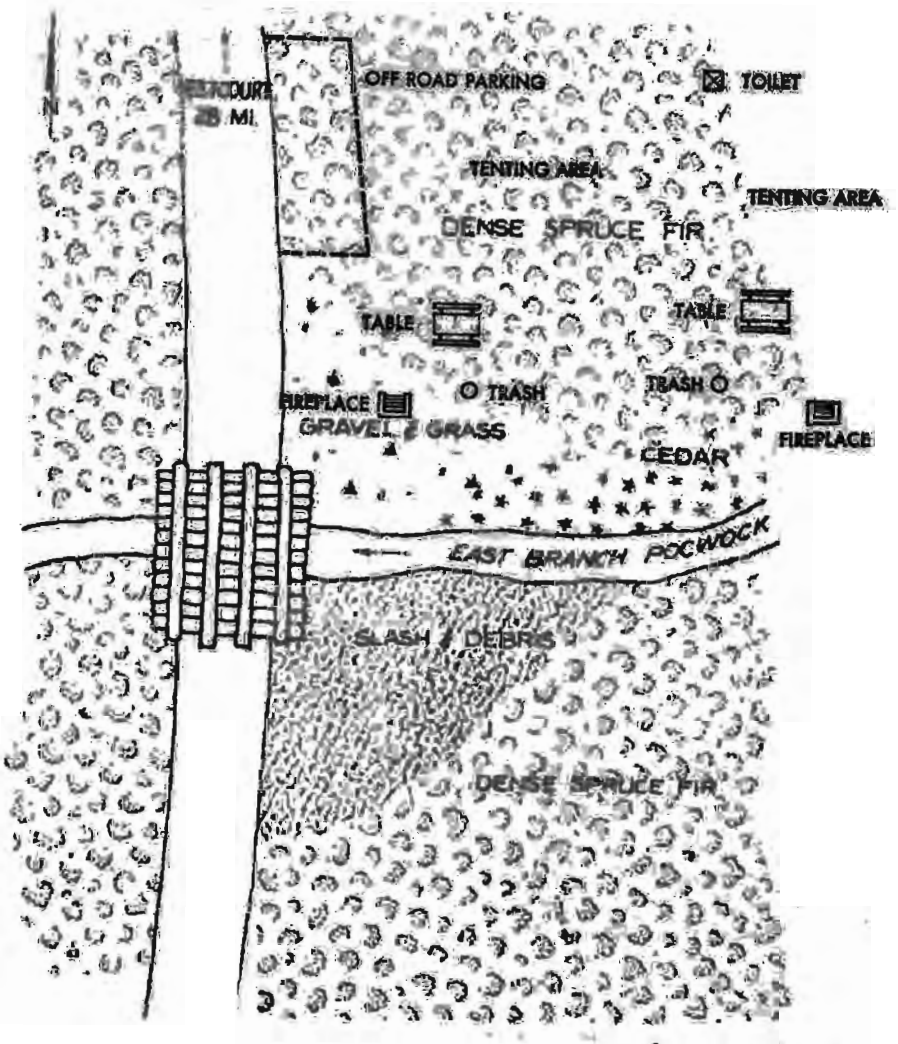
ONE CORD BRIDGE



APPENDIX B

Scientific Names

Fish[a]

Eastern brook trout *Salvelinus fontinalis* (Mitchill)
Lake trout *Salvelinus namaycush* (Walbam)
Landlocked salmon *Salmo salar* Linneaus
American smelt *Osmerus mordax* (Mitchill)
Yellow perch *Perca flavescens* (Mitchill)
Creek chub *Semotilus atromaculatus* (Mitchill)
Common shiner *Notropis cornutus* (Mitchill)
White sucker *Catostomus commersoni* (Lacepede)

Game[b]

White-tail deer *Odocoileus virginianus* (Zimmerman)
Ruffed grouse *Bonasa umbellus* Linneaus
Black bear *Euarctos americanus* Pallus
Moose *Alces americana* (Clinton)
Snowshoe hare *Lepus americanus* Harlan
Bobcat *Lynx rufus* (Schreber)
Lynx *Lynx canadensis* Kerr
Beaver *Castor canadensis* Rhoads
Muskrat *Ondatra zibethicus* (Linneaus)
Mink *Mustela vison* Peale and Palisot de Beauvoirs
Red fox *Vulpes fulva* (Desmarest)
Striped skunk *Mephitis mephitis* Richardson
Porcupine *Erethizon dorsatum* (Linneaus)

Trees[c]

White spruce *Picea glauca* (Moench) Voss
Red spruce *Picea rubens* Sarg.
Black spruce *Picea mariana* (Mill.) B.S.P.
Balsam fir *Abies balsamea* (L.) Mill.
American beech *Fagus grandifolia* Ehrh.
Red maple *Acer rubrum* L.
Sugar maple *Acer saccharum* Marsh.
White pine *Pinus strobus* L.
Northern white cedar *Thuja occidentalis* L.
White birch *Betula papyrifera* Marsh.
Yellow birch *Betula alleghaniensis* Britton
Balsam poplar *Populus balsamifera* L.
Quaking aspen *Populus tremuloides* Michx.

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a/ According to Lagler (1956).
b/ According to Miller and Kellog (1955), and Mosby (1963).
c/ According to Harlow and Harrar (1958).

APPENDIX C

TABLE 19. Existing MFD campsites as presented in figure 6.

Campsite area	Name	Number of sites existing	Number of sites potential	Required access
1	Ninemile	2	3	car or canoe
9	Seven Islands	1	3	canoe
12	Priestly	1	3	car or canoe
17	Simmons Farm	1	5	canoe
22	Two Mile	1	2	canoe or walk
23	Big Black	3	5	canoe
30	Jones Brook Falls	1	4	canoe or car
32	Pocwock	1	3	car or canoe
33	Ouellette Brook	1	3	car or canoe
34	Fox Brook	1	3	car or canoe
37	Walker Brook	1	3	car or canoe
38	Johnson Brook	1	3	car or canoe
39	Little Falls Pond	2	5	jeep or canoe
40	Falls Brook	1	5	canoe or walk
44	Boat Landing	1	2	canoe or car
47	Little Black	1	1	canoe or car

TABLE 20. Leases for camps in the year 1968 medium level as presented in figure 7.

Lease area	Name	Number of sites existing	Number of sites planned	Annual price
A	Shields Branch	-	5	$115
B	Johnson Brook	–	5	$115
C	Big Black T14 R16	–	5	$115

TABLE 21. High level development for the year 1968 as presented in figure 8.

Leases	Lease area	Name	Number of sites existing	Number of sites planned	Annual price
Camp	A	Johnson Brook	–	5	$115
	B	Shields Branch	–	5	$115
	C	Big Black T14 R15	–	5	$115
	D	Aroostook Flats	–	5	$115
	E	Little Black T19 R12	–	5	$115
Hunting camp	J	Chimenticook	–	2	$115
	K	101 T17 R13	–	1	$115
	L	102 T18 R12	–	2	$115

Campsites	Area	Name	Number of sites existing	Number of sites planned	Number of sites potential	Required access
	36	One Cord Bridge	–	2	2	car
	11	Depot Stream	–	2	4	car, canoe
	7	Ross Stream	–	2	5	car
	30	Jones Brook Falls	1	2	4	car, canoe
	27	South Branch	–	2	2	car
	35	Twin Brook	–	2	3	car
	13	Blue Pond	–	2	3	car
	25	Morrelshed	–	2	5	car, canoe
	41	Falls Pond Outlet	–	2	5	car
	19	Shields Branch	–	2	2	car, canoe
	4	Harding Brook	–	2	2	jeep, canoe
	44	Boat Landing	1	2	2	car, canoe
	15	Big Bend	–	2	3	car, canoe
	38	Johnson Brook	1	2	3	car, canoe

TABLE 22. Leases for hunting camps in the year 1975 low level as presented in figure 6.

Lease area	Name	Number of sites existing	Number of sites planned	Annual price
A	Beaver Branch	–	2	$225
B	Chimenticook	–	2	$225
C	Fourmile Brook	–	1	$225
D	Peters Place	–	2	$225
E	102 camp	–	3	$225

TABLE 23. Medium level development for the year 1975 as presented in figure 7.

Leases	Lease area	Name	Number of sites existing	Number of sites planned	Annual price
Camp	A	Shields Branch	5	0	$125[a]
	B	Johnson Brook	5	5	150[a]
	C	Big Black T14 R16	5	5	125[a]
	D	Big Black T14 R15	0	10	140
	E	Beau Lake	0	15	200
Hunting camp	H	Beaver Branch	–	3	225
	I	Peters Place	–	2	225
	J	Camp 102	–	3	225
	K	Camp 101	–	1	225
	L	Chimenticook	–	1	225

Campsites	Area	Name	Number of sites existing	Number of sites planned	Number of sites potential	Required access
Initial development	27	South Branch	–	2	2	car
	44	Boat Landing	1	2	2	car, canoe
	11	Depot Stream	–	2	4	car, canoe
	13	Blue Pond	–	2	3	car
	35	Twin Brook	–	2	3	car
	41	Falls Pond Outlet	–	2	5	car, walk
	36	One Cord Bridge	–	2	2	car
	30	Jones Brook Falls	1	2	4	car, canoe
	7	Ross Stream	–	2	5	car
	50	Beau Lake Turnout	–	2	3	car
Annual development before the year 2000	40	Falls Pond	1	2	5	walk
	52	Bear Bend	–	2	5	walk
	38	Johnson Brook	1	2	3	car, canoe
	39	Little Falls Pond	2	2	5	jeep
	42	Falls Brook	–	2	5	car
	29	Pocwock Stream	1	2	3	car
	19	Shields Branch	–	2	2	car, canoe
	31	Castonia Farm	–	4	10	car, canoe
	2	Conners Brook	–	2	3	car, canoe
	21	Fivemile Brook	–	2	2	car
	14	White-tail Spring	–	2	3	car, canoe
	4	Harding Brook	–	2	2	car
	3	Ugh Lake	–	2	3	walk
	5	Cunliffe camp	–	2	5	walk, canoe
	53	Dead Brook Dam	–	2	2	walk

[a]/ Existing leases were raised in price.

TABLE 24. High level development for the year 1975 as presented in figure 8.

Leases	Lease area	Name	Number of sites existing	Number of sites planned	Annual price
Camp	A	Johnson Brook	5	5	$125[a]
	B	Shields Branch	5	–	150[a]
	C	Big Black T14 R15	5	5	125[a]
	D	Aroostook Flats	5	5	150[a]
	E	Little Black T19 R12	5	5	150[a]
	F	Beau Lake	–	25	200
	G	Big Black T14 R16	–	5	125
Hunting camp	J	Chimenticook	2	2	125[a]
	K	101 T17 R13	1	–	125[a]
	L	102 T18 R12	2	1	225[a]
	M	Beaver Branch	–	3	225
	N	Red Camp	–	3	225
	O	T18 R10	–	1	225

Campsites	Area	Name	Number of sites existing	Number of sites planned	Number of sites potential	Required access
Initial development	50	Beau Lake Turnout	–	2	2	car
	42	Falls Brook	–	2	5	car
	40	Falls Pond	1	2	5	walk
	52	Bear Bend	–	2	5	walk
	14	White-tail Spring	–	2	3	car, canoe
	21	Fivemile Brook	–	2	2	car
	29	Pocwock Stream	–	2	3	car
	51	Jones Brook	–	2	2	car
	53	Dead Brook Dam	–	2	2	walk
	31	Castonia Farm	–	4	10	car, canoe
Annual development before the year 2000	2	Conners Brook	–	2	3	car, canoe
	3	Ugh Lake	–	2	3	walk
	5	Cunliffe Camp	–	2	5	walk, canoe
	32	Pocwock	1	2	3	car, canoe
	8	Maurice Brook	–	2	3	canoe
	17	Simmons Farm	1	2	5	canoe
	9	Seven Islands	1	2	3	canoe
	16	Fish Brook	–	2	2	canoe
	18	Nine-mile Dam	–	2	3	canoe
	24	Chase Brook	–	2	3	car, canoe
	26	Herb's Pond	–	2	3	jeep
	46	Campbell Stream	–	2	2	car
	28	North Branch	–	2	2	car

[a]/ Existing leases were raised in price.

TABLE 25. Low level development for the year 2000 as presented in figure 6.

Area	Name	Number of sites			Required access
		existing	planned	potential	
4	Harding Brook	–	2	2	jeep, canoe
7	Ross Stream	–	2	5	car
26	Herb's Pond	–	2	3	jeep
35	Twin Brook	–	2	3	car
13	Blue Pond	–	2	3	car
40	Falls Pond	1	2	5	walk
41	Falls Pond Outlet	–	2	5	car, walk
50	Beau Lake Turnout	–	2	3	car
46	Campbell Stream	–	2	2	car
44	Boat Landing	1	2	2	car, canoe
39	Little Falls Pond	2	2	5	jeep
3	Ugh Lake	–	2	3	walk
36	One Cord Bridge	–	2	2	car
30	Jones Brook Falls	1	2	4	car, canoe
2	Conners Brook	–	2	3	car, canoe
11	Depot Stream	–	2	4	car, canoe
5	Cunliffe Camp	–	2	5	walk, canoe
27	South Branch	–	2	2	car
21	Fivemile Brook	–	2	2	car
15	Big Bend	–	2	3	car, canoe

TABLE 26. Medium level development for the year 2000 as presented in figure 7.

Camp leases	Area	Name	Number of sites existing	Number of sites planned	Annual price
	A	Shields Branch	5	0	$135[a]
			–	5	165
	B	Johnson Brook	5	0	135[a]
			5	5	165[a]
	C	Big Black T14 R16	5	0	135[a]
			5	0	165[a]
	D	Big Black T14 R15	10	0	200[a]
	E	Beau Lake	15	15	200
	F	Glazier Lake	–	15	200
	G	Little Black T18 R12	–	10	200

a/ Existing leases were raised in price.

TABLE 27. High level development for the year 2000 as presented in figure 8.

Camp leases	Area	Name	Number of sites existing	Number of sites planned	Annual price
	A	Johnson Brook	10	–	$140[a]
	B	Shields Branch	5	–	160[a]
	C	Big Black T14 R15	10	–	140[a]
	D	Aroostook Flats	10	–	160[a]
	E	Little Black T19 R12	10	–	160[a]
	F	Beau Lake	25	25	200
	G	Big Black T14 R16	5	–	140[a]
	H	Mouth of Big Black	–	5	200
	I	Glazier Lake	–	20	200

a/ Existing leases were raised in price.

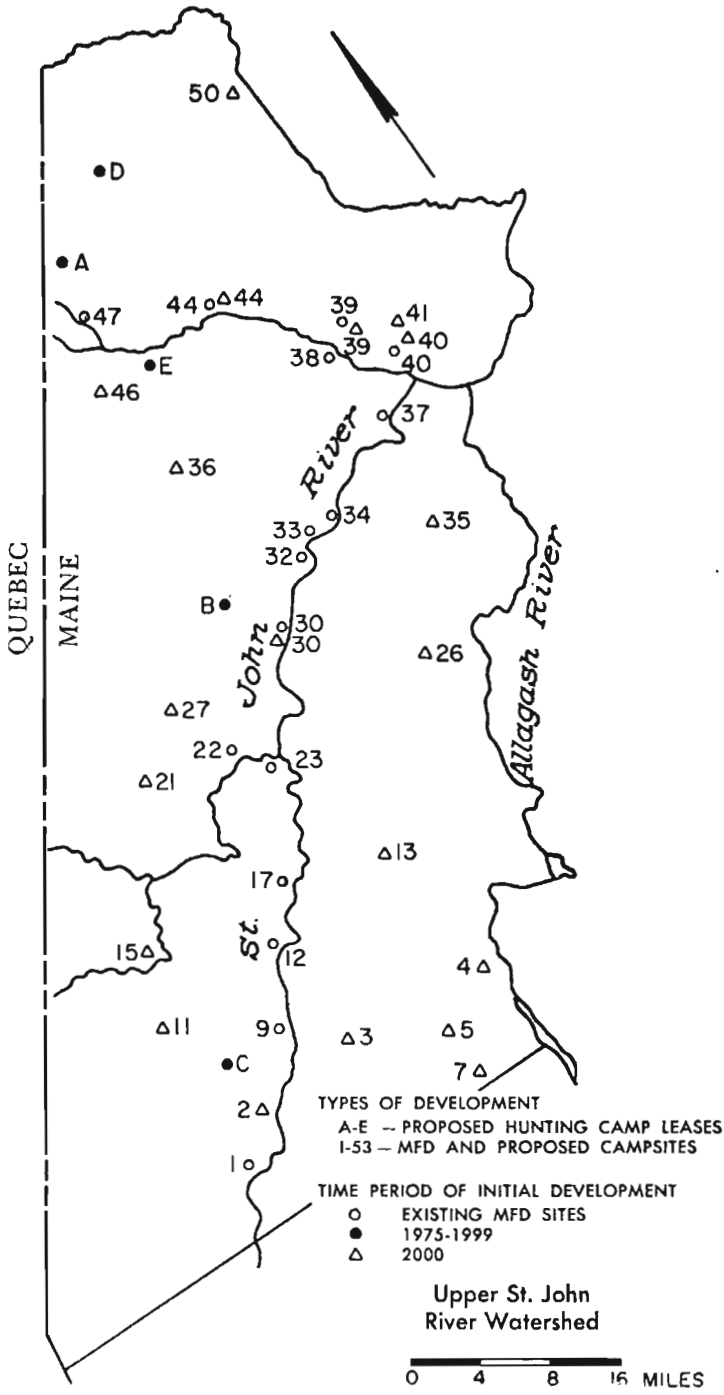

FIGURE 6. Existing MFD campsites and low level development for the years 1975 and 2000.

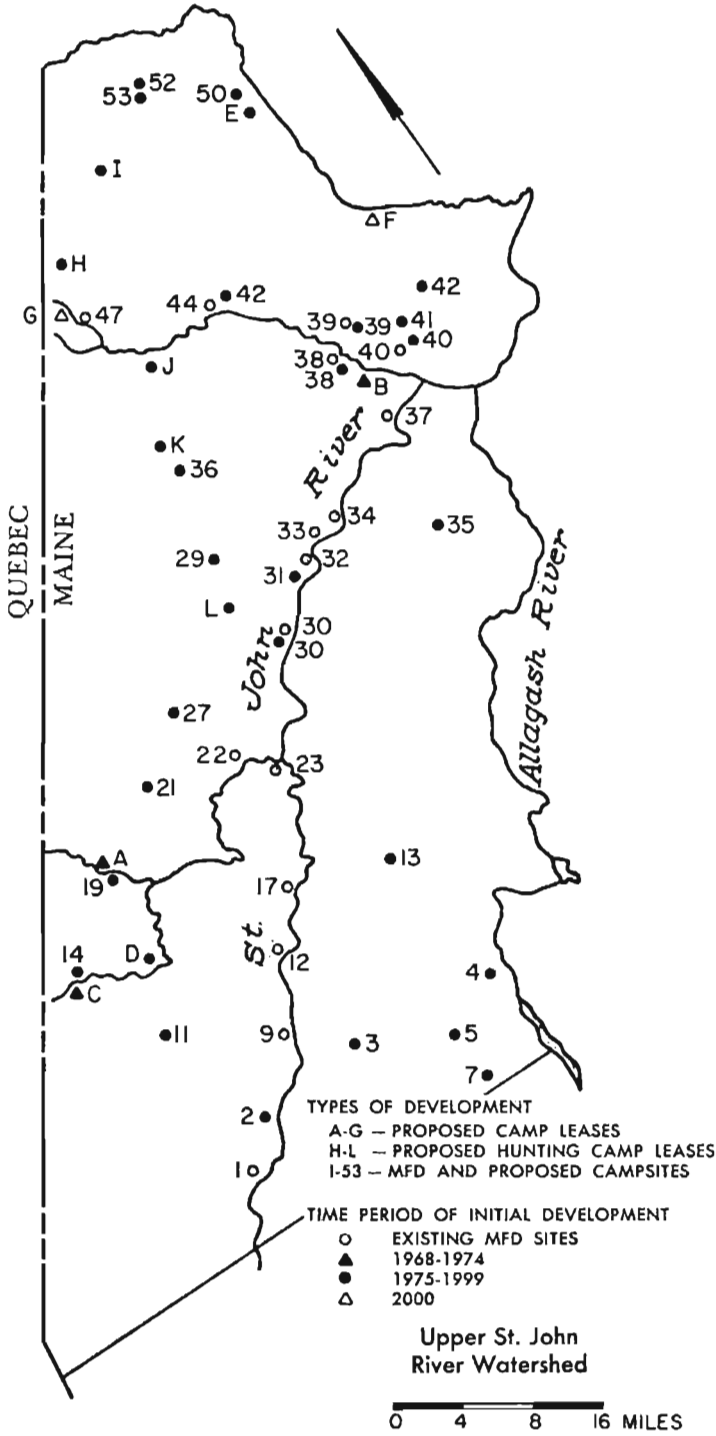

FIGURE 7. Existing MFD campsites and medium level development for the years 1968, 1975, and 2000.

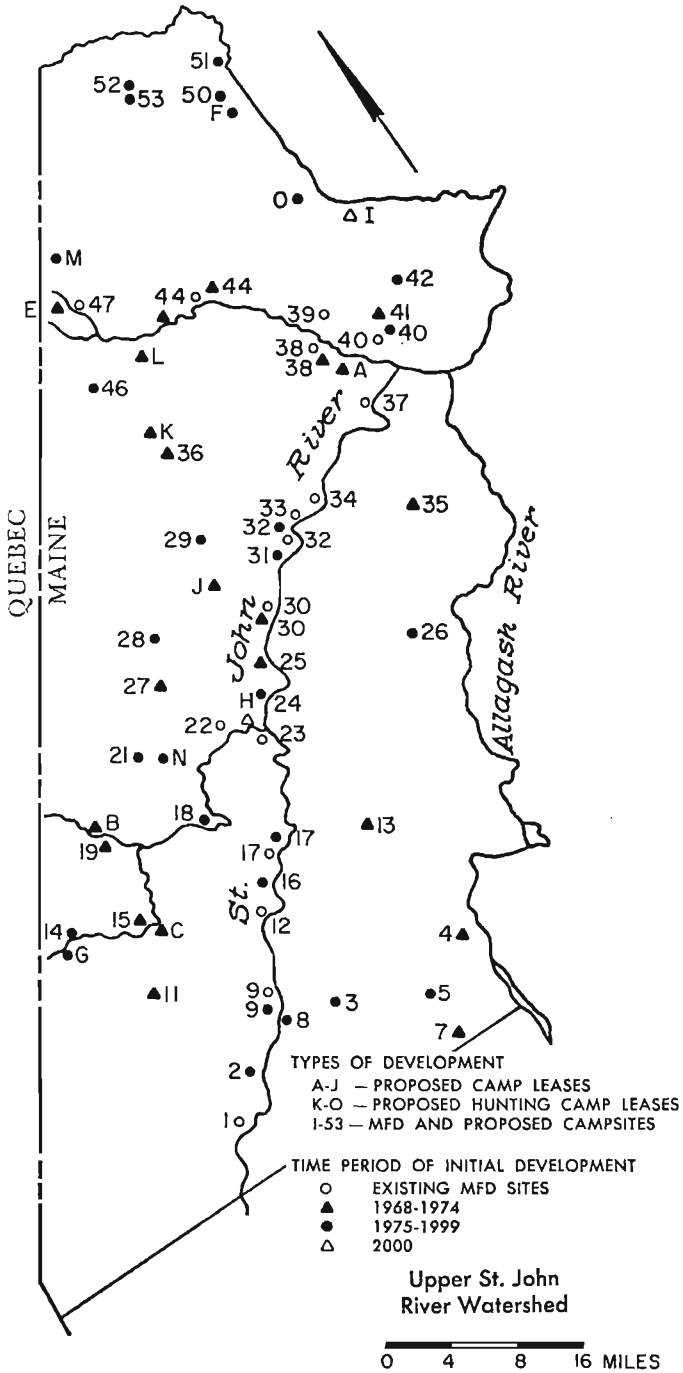

FIGURE 8. Existing MFD campsites and high level development for the years 1968, 1975, and 2000.