1978

Dickey-Lincoln School Lakes Project Environmental Impact Statement: Appendix G: Recreation Resources (Revised June 1978)

U.S. Army, Corps of Engineers

New England Division

Northern Maine Regional Planning Commission

Land Use Consultants, Inc.

ENVIRONMENTAL IMPACT STATEMENT

DICKEY-LINCOLN SCHOOL LAKES

APPENDIX G

RECREATION RESOURCES

(REVISED JUNE 1978)

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
02154

1978

RECREATION RESOURCES

(REVISED)

DICKEY-LINCOLN SCHOOL LAKES, MAINE

JUNE 6, 1978

Prepared by the

U.S. Army, Corps of Engineers
New England Division

In Cooperation with

NORTHERN MAINE REGIONAL PLANNING COMMISSION
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CHAPTER I

INTRODUCTION

1.0 Project Authorization

The Dickey-Lincoln School Project was authorized by the Flood Control Act of 1965, Public Law 89-298, 89th Congress, 27 October, 1965, which reads in part as follows:

> "The Dickey-Lincoln School project, St. John River, Maine, is hereby authorized as approved by the President on July 12, 1965, and sub-stantially in accordance with the plans included in the report of the Department of the Interior and the Corps of Engineers, dated, August, 1964....

1.1 Purpose and Scope

The purpose of this report is to evaluate and describe the existing recreational use and resources of the project area and the encompassing study area and to project the future use of those resources both with and without the Dickey-Lincoln School Lakes Project. The primary impact area of the proposed project (project area) includes the St. John River watershed upstream of the proposed damsites to the confluence of Nine-mile Brook. The area is bounded by the watershed divide with the Allagash River on the east and the Canadian Border on the west. Major tributaries of the St. John affected by the proposed dams and included in the project area are the Big Black River and Little Black River. Recreation use of the St. John River watershed above Nine-mile Brook would also be affected, and although this area is not contained in the project area, it is considered within the scope of this study. This study develops and evaluates a concept plan for the recreation potential of the Dickey-Lincoln School project and assesses the recreational impact of this recommended concept plan.

1.2 Study Limitations

Measurement of "demand" for outdoor recreation is still in its infancy. Because of the many factors influencing people's participation in outdoor recreation, there is no flawless method of predicting with absolute certitude the number of people who will utilize a given resource. The best that can be expected is that this study will provide decision makers with an indication of the order of magnitude of what can be expected to occur if the Dickey-Lincoln School Lakes are built.

Recreation planners have devised sophisticated multivariate models, which require large quantities of reliable data, and a whole range of other techniques for estimating demand. This study attempted to synthesize the significant features of several such methods and incorporate them into the Army Corps of Engineers methodology for estimating reservoir recreation use.

A report entitled Assessing Demand for Outdoor Recreation, prepared for the U.S. Department of the Interior, Bureau of Outdoor Recreation by the National Academy of Sciences (1975) clearly states that the problem with assessing recreation demand is not which method is better than the other, but which method is most appropriate to the situation or specific resource being evaluated.

1.3 Basic Assumptions

In the development of this appendix, it was necessary to make assumptions regarding the present and future recreational demand in Northern Maine. Following consultation with numerous sources, we submit that the following assumptions are justified.

1. The demand for recreational activities of the type presently found in the project area will increase with population growth, increasing amounts of leisure time, and increasing disposable income. Additionally, it appears likely that the number of recreationists desiring "wilderness" or "semi-wilderness" activities will increase significantly as resources capable of providing such activities become less available.

2. Commercial development of land at, or adjacent to the impoundment area would be prohibited by the ownership characteristics of that property.

3. The water quality of the proposed Dickey reservoir would meet State water quality standards for swimming.

4. Water quality and fisheries management would combine to provide a fishing experience in Dickey Lake, the quality which may equal those of other deep, cold, oligotrophic lakes in Maine.

5. Development of post-project recreational facilities would be guided by a policy of nondegradation of the quality of the existing environment.

1.4 History of Recreation in the Study Area

Until the mid-1900's, public recreational use of the unorganized areas of Maine, except for fringes around settlements, was very low in volume due to inaccessibility. Therefore, intensive management and administration for public recreation was not necessary.

In the latter part of the 1800's, the "Sportsmen's Lodge" became popular, offering comparatively luxurious remote hunting and fishing. Very often the sportsmen's lodge was sited on a remote woodland farm. Encouraged by the landowners, these establishments represented some "back country" people management whereby recreationists were concentrated in specific places, rather than dispersed throughout the woods.

In 1908 the Maine Forestry District was formed; this constituted a statutory approach to landowner self-taxation to support the activities of the Maine Forest Service in the unorganized lands. In the 1920's, the Forestry Authorized Campsite Program was initiated, providing campers with a confortable, fire-safe primitive campsite at popular, high-use spots, funded by the Maine Forestry District tax.

In 1947, the Fire Permit Law was initiated, giving the forestry rangers discretion in allowing fires at certain sites and at certain times, but requiring that everyone have a fire permit for a cooking and warming campfire in the Maine Forestry District.

All these rules, regulations, and programs were designed to accommodate growing numbers of people without increased fire hazard.

By the late 1960's, the logging road system had become extensive, and each individual forest landowner had a different policy regarding public access. The need for a cooperative system with uniform administrative practices led to the formation of the North Maine Woods Association. The function of the organization, funded entirely by the private landowners, is to oversee public use of the road system, along with the provision of designated campsites, on a fee basis, for recreationists desiring to enjoy this resource as the most extensive contiguous forest land area in the northeast.

In the 1960's, there was general recognition that State property such as public waters, fish and wildlife, must be cooperatively managed along with the commercial forest and public use of the private road system. In 1970, the responsible State agencies, such as the Department of Conservation, began participating in the North Maine Woods Association planning efforts.[1]

From this brief background, it can be seen that sophistication in the recreational use and management of the private timberland holdings encompassing the Maine "Big Woods" is in a formative process. At the present time, the North Maine Woods Association is proceeding to develop its own comprehensive recreation plan for the area.

It is necessary to interject the history of the proposed Dickey-Lincoln School Lakes Project and its recreational potential into the above scenario. Prior to the latest interest and efforts concerning Dickey-Lincoln, which began in the early 1960's, numerous reports and publications were produced considering several versions of a hydro-electric power facility on the Upper St. John River. Few dealt in detail with the recreational aspects of the impoundments. With the establishment of the National Environmental Policy Act in 1969, and the renewed funding of Dickey-Lincoln by the Public Works Appropriation Act for Fiscal Year 1975, a detailed study of the impacts upon recreation caused by the dams became necessary.

CHAPTER II

DESCRIPTION OF PROJECT AREA

2.0 General

The project area, as defined in the introduction of this report, is included in the largest stretch of uninhabited forest land in the northeastern United States. Non-mechanized, extensive recreational activities are the most common types occuring here. These are itemized below and include camping, canoeing, fishing, and hunting as major pursuits; day activities such as picnicking, hiking, swimming and sightseeing are secondary.

While the presence of roads and on-going logging activities prevent this area from being called a true wilderness, it has the potential for remaining an informal, "semi-wilderness" under continued wise management.

2.1 Geographic Boundaries

The Southwest Branch of the St. John River originates in Little St. John Lake on the international boundary between the Province of Quebec, and the State of Maine. The Baker Branch of the St. John River originates in First Upper St. John Pond in the United States. The two branches flow northerly to their junction 50 miles downstream of Little St. John Lake in the United States. From this confluence, the St. John River flows through northwestern Maine, into New Brunswick, and eventually empties into the Bay of Fundy at St. John, New Brunswick.

The portion of the St. John River above the confluence with the St. Francis River at St. Francis, Maine, is commonly referred to as the Upper St. John River. The Dickey Dam in Allagash, Maine, and the Lincoln School Dam in St. Francis, Maine, would be located on the Upper St. John River in northwestern Aroostook County, Maine. Portions of the Dickey reservoir would extend into Quebec along the Little Black River and Big Black River drainages. The St. John River drains approximately 2,725 square miles at the Dickey damsite which is located about 1 mile upstream from the mouth of the Allagash River. The drainage area at the Lincoln School damsite, about 11 miles further downstream from the Dickey site, is approximately 4,086 square miles. The entire project area lies within the Appalachian Highlands physiographic province. Figure 1 is a Location Plan showing the project's relationship to major United States and Canadian cities.

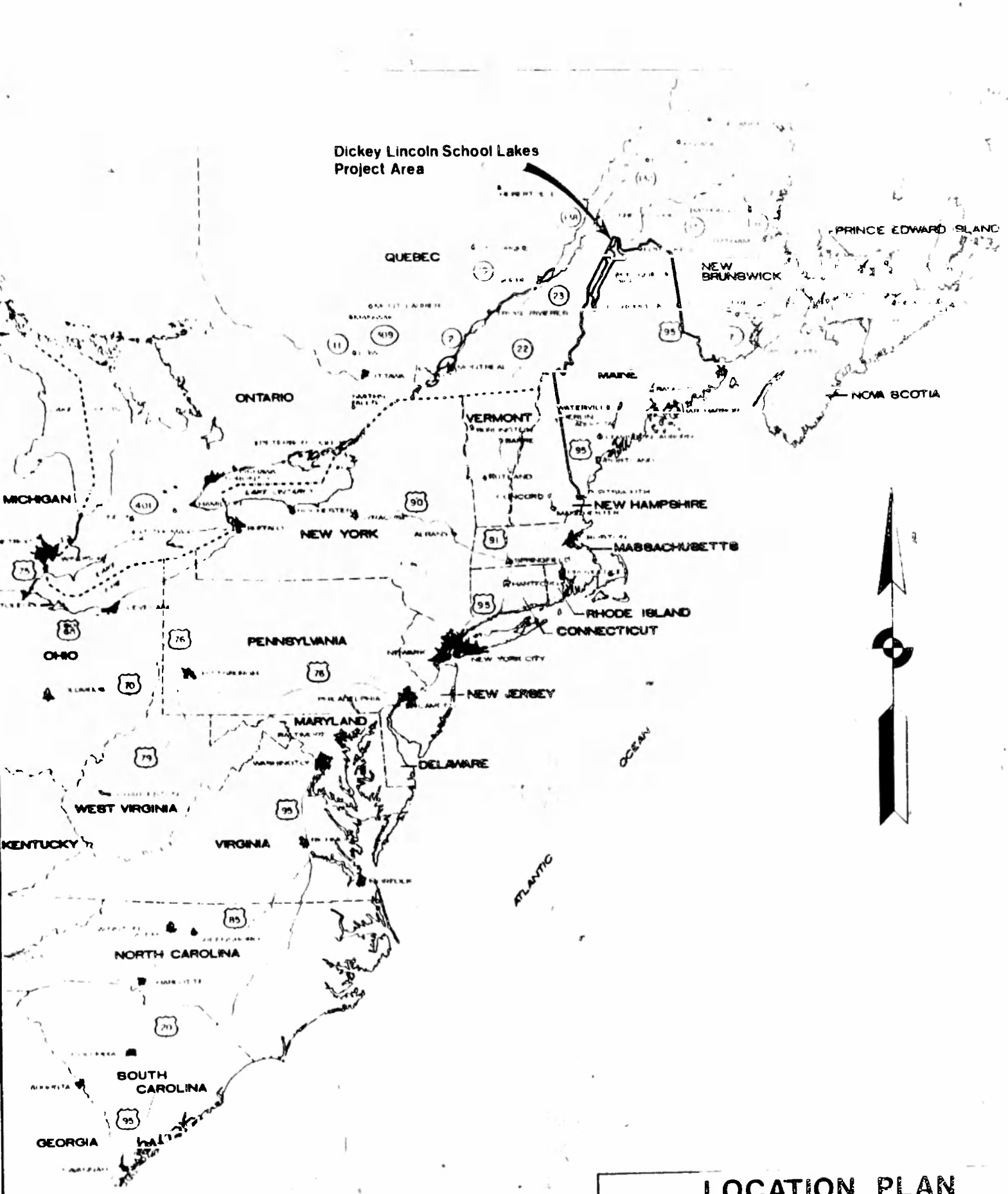
2.2 Climate

The project area has a humid continental climate generally typified

by short, cool summers and long, cold, windy winters. Summer daily temperatures average between 50° and 60° Fahrenheit (F) and winter temperatures average between 10° and 20° F. Recorded seasonal extremes in temperature range from -42° to 97° F. Subzero temperatures occur approximately 50 times each year.

Short, frequent periods of precipitation are distributed rather evenly throughout the year, averaging 2 to 4 inches per month and about 36 inches annually. A small but definite peak in precipitation occurs during June, July and August. Winter precipitation is nearly all in the form of snowfall, averaging near 100 inches per year. Snow cover may reach 40 inches by late March. A summary of monthly temperatures, precipitation, snowfall, and snow cover from Fort Kent, Maine, is presented in Table II-1.

Prevailing winds are from the west at 7 to 11 miles per hour. As a result, the project area is frequently affected by storms traveling down the St. Lawrence River from the Great Lakes. Less frequently, severe Atlantic coastal storms pass through the area from the south. Unsettled, windy weather may persist for several days as storms slow down near the Gulf of St. Lawrence.



LOCATION PLAN

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

Northern Maine Regional Planning Commission
Land Use Consultants Inc

TABLE II-1
SUMMARY OF MONTHLY CLIMATIC DATA
FOR FORT KENT, MAINE

Month	32 Yrs. of Record TEMPERATURE (°F) Mean	Maximum	Minimum	38 Yrs. of Record PRECIPITATION (inches) Mean	Maximum	Minimum	39 Yrs. AVERAGE SNOWFALL (inches)	AVERAGE SNOWCOVER (inches)
January	10.9	57	-42	2.17	4.63	0.38	20.8	30"
February	12.7	53	-42	2.12	4.09	0.88	21.0	30"
March	24.0	77	-31	2.37	5.86	0.55	16.5	24"
April	37.6	83	- 9	2.25	4.90	0.74	6.3	12 - 18"
May	51.4	91	17	2.82	5.87	0.81	0.6	4"
June	61.6	95	29	3.56	6.86	0.47	0	0
July	66.4	96	33	4.18	10.51	1.42	0	0
August	63.9	97	33	3.94	9.97	0.85	0	0
September	55.7	91	19	3.47	7.28	0.41	T	0
October	44.6	83	7	3.27	5.77	0.48	1.5	4"
November	30.9	73	-14	2.86	7.00	0.21	8.6	6 - 10"
December	16.2	56	-28	2.77	5.24	0.07	19.9	18 - 24"
Annual	39.7	97	-42	35.78	49.58	25.49	95.2	-----

2.3 Topography and Geology

The Upper St. John River basin is a maturely dissected upland area influenced by glaciation. The upstream portion of the project area falls in a region of low topographic relief, with a broad plain sloping gently upland from both sides of the river. Much of this area is poorly drained. Relief becomes increasingly complex downstream through the project area. The area near the two damsites, including the Little Black River and Allagash River drainages, is characterized by steep sided, irregularly shaped hills and ridgelines that confine the river to a deep, narrow valley.

The St. John River Valley itself is an alluvial flood plain bordered by low terraces of alluvial and glacial outwash materials, and higher terraces of gravel and glacial till. Side slopes are covered with varying depths of glacial till overlying bedrock. Exposed bedrock is frequently found on ridgetops and localized areas along the banks of the St. John River and its tributaries. Bedrock formations consist primarily of Devonian-Silurian rocks, namely: slate, graywacke, and arkose. Other formations found locally include: polymictic conglomerate, limestone, felsite, quartz-pebble conglomerate, orthoquartzite, and greenstone. Axes of folding in these formations are generally oriented northeasterly.

2.4 Biologic and Ecologic Features and Resources

2.4.1 Vegetation

Vegetation in the project area is a mixture of spruce-fir and northern deciduous forest types, typical of the transitional zone between the Boreal Forest Formation and Eastern Deciduous Formation. Distribution of vegetation in the project area is strongly influenced by soil and moisture conditions as well as past logging, insect and disease outbreaks and fire.

Pure red spruce and balsam fir stands typical of commercial forests in the region cover 67 percent of the project area.[2] Primary sites for the spruce-fir type are poorly drained soils, or thin glacial till soils. Little or no understory growth exists under dense spruce-fir canopies except for advanced spruce-fir regeneration. Ground cover species were found to be typical of spruce-fir forests elsewhere with mosses predominating. Other softwood associate species include northern white cedar, black spruce, and tamaracks which occur on even wetter sites, and remnant, mature white pine left during early timber harvesting in the region.

Spruce-northern hardwood communities composed of spruce-fir, sugar maple, yellow birch, beech, and white ash cover 10 percent of the project area. The yellow birch-spruce subtype occurs on fertile, moist, well drained soils of side-slopes bordering on the lowland spruce "flats". The sugar maple-spruce subtype is found even further upslope bordering on the northern hardwood covertype. Ground cover in this spruce-hardwood type tends to have more ferns and herbs and less moss than the spruce-fir type, plus a layer of

understory shrubs.

The northern hardwood, or maple-beech-birch cover type is found mainly on the well drained ridgelines and hilltops largely above the 910 foot Dickey Lake maximum pool elevation. This type only covers 1 percent of the project area.

The spruce-fir-pioneer hardwood type, which includes red spruce and balsam fir in association with white, gray and yellow birch, cherry, and aspen, covers another 8 percent of the project area. This type is an early to intermediate successional stage following forest disturbances. Another 2 percent of the project area is covered by the pure, pioneer hardwood type, dominated by aspen and birch. This aspen-birch type may be found in all but the wettest moisture conditions, but is almost always found in areas subject to recent logging or fire.

Speckled alder dominates the riparian shrub communities along portions of the Upper St. John River and its tributaries, with redosier dogwood as an associate species. Seasonally flooded flats, islands and embankments of the river are frequently covered by a border of grasses, sedges, herbs and small shrubs such as alder, sweet gale, leatherleaf and meadowsweet. These shrub and river types cover 9 percent of the project area. These same areas serve as habitat for several rare and endangered species. The Furbish lousewort (Pedicularis furbishiae) is endemic to the St. John River Valley. Once thought extinct, and known to be endangered, the plant was found at six locations within the project area.

Wetland vegetative types cover less than 2 percent of the project area. A variety of life-forms and species including submergents, floating emergents, and shrub and tree types occur in these wetlands. Clearcuts, abandoned and active logging activities, as well as waterbodies together cover the remaining 1% of the project area.

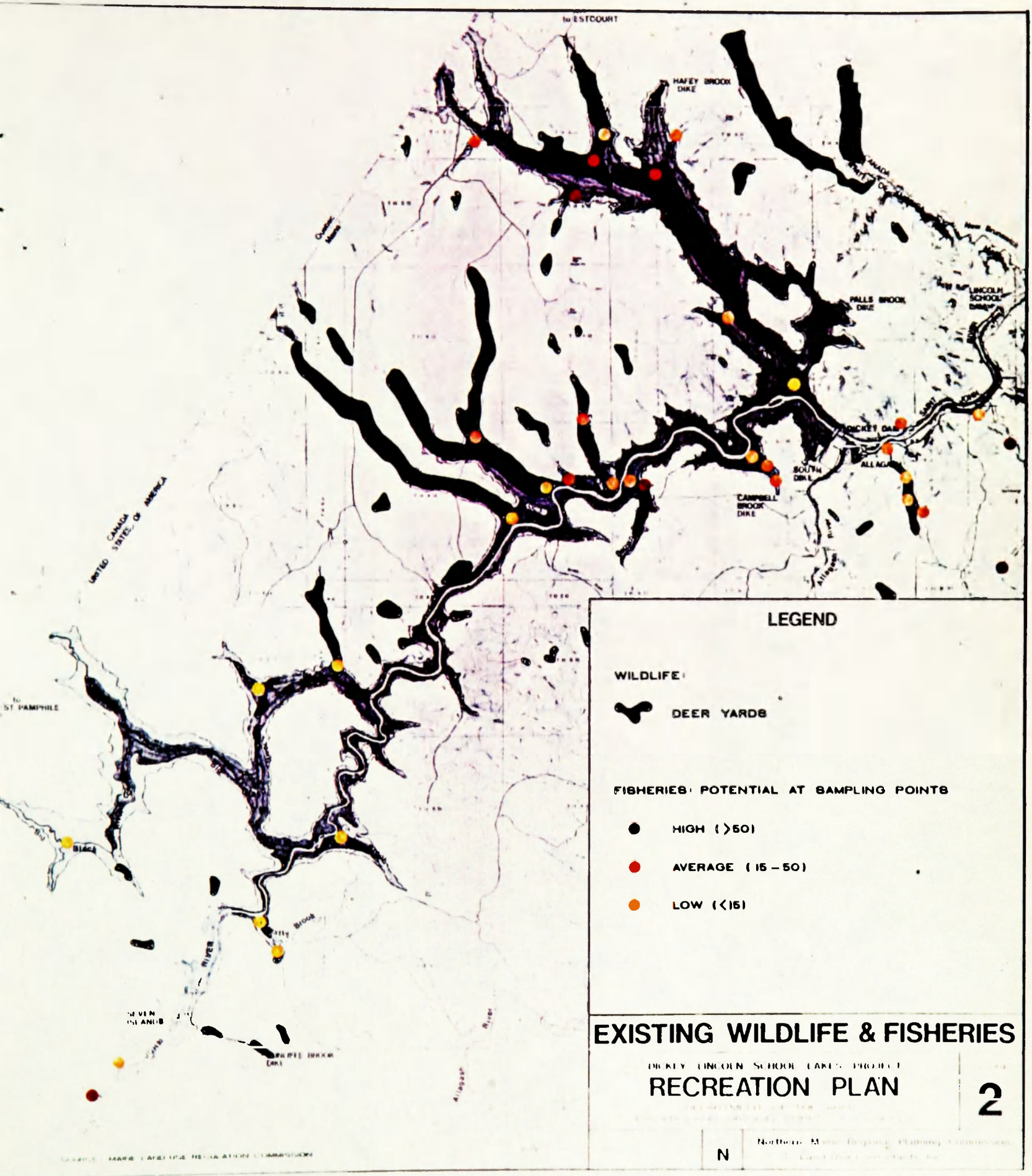
2.4.2 Terrestrial Wildlife

The dense, mature spruce-fir forests covering much of the project area favor "climax" type species such as marten, fisher, black bear, spruce grouse, and Canada jays. However, logging activities have opened up the forest canopy, and created habitat more favorable to "edge" species such as deer and ruffed grouse. Moose have also responded favorably to timber harvesting operations. The important game species within the project area include snowshoe hare, ruffed grouse, white tailed deer, moose, black bear, bobcat, beaver, otter, muskrat , mink, marten, and fisher. Other species in the project area include red squirrel, chipmunk, woodchuck, porcupine, skunk, weasels, the red fox, coyote, Canada Lynx, spruce grouse, several species of ducks including mergansers, and possibly the endangered eastern cougar. Several raptors use the area including the bald eagle, osprey, red shouldered hawk, Cooper's hawk, broad-winged hawk, sparrow hawk, goshawk, marsh hawk, barred owl, Saw-whet owl, and Great Horned owl. A wide variety of passerine birds in-

cluding warblers, finches, thrushes, chickadees, wrens, woodpeckers, jays and crows are present.

Important game species population densities tend to be low in Aroostook County compared to the rest of Maine. However, the St. John River region has densities for deer from 2.2-8.6 deer per square mile which is significantly above county averages for deer, estimated at 1.2-4.8 deer per square mile. Most available habitats within the project area are occupied at or near existing carrying capacity with the exception of moose.

Some 50 percent of the deer yards in the Upper St. John Region (27 townships) exist within the proposed flooded area[4]. Deer seek protection and cover in yarding areas for winter survival. Deer reproductive potential the following spring depends upon their condition in the yards during the winter. Figure 2 (Existing Wildlife and Fisheries Map) shows the locations of deer yards within the project area.[5]



LEGEND

WILDLIFE:

DEER YARDS

FISHERIES: POTENTIAL AT SAMPLING POINTS

- HIGH (>50)
- AVERAGE (15 – 50)
- LOW (<15)

EXISTING WILDLIFE & FISHERIES

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

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Northern Maine Regional Planning Commission

2.4.3 Existing Fishery

Excluding the Allagash River drainage, the St. John River watershed above the proposed Dickey-Lincoln School Lakes Project includes approximately 1,972 miles of intermittent and continuously flowing streams, numerous lakes and ponds, and many small ponds and beaver impoundments.[6]

During the summers of 1975-76, Normandeau Associates, Inc., studied streams and lakes in that portion of the St. John watershed lying between the proposed Lincoln School Dam site and Ninemile Bridge within the U.S., and also the reaches of the St. John River downstream to Fort Kent. The study included 135 miles of the 429 miles of named tributary streams and 10 of the 27 named lakes and ponds within the study area.[7]

Both cold and warm-water fish species were found in the St. John River watershed upstream and downstream of the damsites. Cold water species included brook trout, landlocked salmon, whitefish, dace and chubs. These were found primarily in major streams near cold inflows, in tributary stream headwaters, in lower portions of tributaries where sufficient cover was present to prevent excessive summer warming, and in deeper lakes. Warm-water forms, such as bullheads, perch, and suckers, were found in major streams, lower portions of tributaries, and in most of the lakes and ponds within the project area.

The brook trout was the most important game species of the eighteen fish species found. Because of the greater importance of the brook trout, the study looked at their population density, growth rates, food habits, and the physical and chemical features of habitats to evaluate the quality of brook trout habitat within the project area. This information is also valuable to the trout fisherman and in assessing the value of the fishery for recreation.

Stream brook trout in the project area are typical of trout from other under-exploited stream populations elsewhere in the Northeast. Brook trout from project area streams were generally small (averaging 3.9 in.), slow-growing (averaging about 2.0 in/year after one year), early maturing (most are mature following their second summer), and short lived (2-3 year life span) when compared with populations from larger water bodies with higher exploitation rates.

Typically, brook trout in the project area remain in larger streams and rivers until water temperatures warm to 70^{0} F., then the trout move upstream into portions of smaller tributary streams where vegetative cover and springs provide cooler water. Streams found to have especially high brook trout densities include: Conner's Brook, Ouellette Brook, Fox Brook, Brown Brook, Johnson Brook, Hafey Brook, Little Hafey Brook, Whitney Brook, and the upstream portions of Rocky and Campbell Brooks. Figure 2 (Existing Wildlife and Fisheries Map) shows fishing potential in the streams surveyed.

Brook trout were also captured from the Negro Lakes and Falls Pond which are the deepest lakes in the project area. Warm-water species, including minnows and chubs, which compete with trout for food, were also collected from many of the smaller ponds within the project area.

2.5 Hydrology

2.5.1 Existing River Hydrology

The St. John River Watershed upstream from Fort Kent has a rectangular shape, with a length of 115 miles and an average width of about 50 miles. Approximately 230 miles of river system wind through the Dickey-Lincoln project area, consisting of the St. John River and its major tributaries the Big Black River, Little Black River, Allagash River, and the St. Francis River. Numerous other small streams enter the St. John River at many locations within the project area.

The records from six gauging stations in the St. John River watershed provide stream flow data. Three stations are located on the St. John River at Ninemile Bridge, Dickey, and Fort Kent. The other three are at the mouths of the Allagash, St. Francis, and Fish Rivers. Peak discharges occur during April through June resulting from snowmelt or a combination of snowmelt and precipitation. Ice jams during this period contribute to peak river flows. The less frequent peak streamflows during the summer and fall months are usually associated with Atlantic coastal hurricanes. Fort Kent has experienced ten major floods since the U.S.G.S. gauging station was installed in 1930, the most recent occurring in May 1961, May 1969, April 1973, May 1974 and August 1976. However, the Corps has recently completed a dike in Fort Kent to protect against future flooding. Limited upstream water storage areas gives the St. John River a "flashy" nature. Unit hydrographs prepared by the U.S. Army Corps of Engineers for the St. John River at Nine-Mile Bridge show that peak flows during significant floods are reached from 24-60 hours after the most intense precipitation, and the return to pre-flood flows occurs 6-10 days after the start of precipitation.

2.5.2 Reservoir Hydrology

The Dickey Dam would create a lake on the St. John River about 55 miles long, averaging 1.2 miles wide, with about 390 miles of shoreline. The river's strength would be harnessed to provide peak period hydroelectric power. The Dickey Reservoir would also provide flood control for downstream areas, and lake oriented recreation opportunities.

A computer simulation study has been conducted to identify the extent of water level fluctuations in the reservoir. During a normal year, the reservoir would be allowed to fill rapidly from April to June to provide flood control. A minimum of 1,000,000 acre-feet of storage capacity would be available in the Dickey Reservoir each spring.

This is equivalent to more than 6 inches of runoff from the 2,725 square mile watershed. From June-October, the water level would normally drop between 1 to 2 feet, (about elevation 905-903). The maximum drawdown in any one year is projected to be 4.5 feet. This limited drawdown would minimize the amount of bare lake bottom exposed by the drawdown and thereby avoid detracting from water oriented recreational activities. Drawdown would continue more rapidly through the winter until the annual minimum pool level is reached, usually in March. This winter drawdown would average 23 feet (from elevation 905-882), ranging from 7-33 feet depending upon weather and power production conditions.

2.6 Land Use

2.6.1 Accessibility

The dams would be built about 28 miles west of Fort Kent, Maine. Access to the damsites over public roads is confined to State Route 161 via Fort Kent. Fort Kent is accessible from Clair, New Brunswick via Canadian Route 20, and from points in the U.S. via Interstate Route 95 and State Route 11 or by U.S. Route 1.

Access to other parts of the project area is limited to private, gravel logging roads leading from Ashland, Portage, and Deboullie Mountain in Maine, and St. Pamphile, Daaquam, Estcourt, and Landry Siding in Canada. Circulation within the project area is by means of these same logging roads with road use controlled on a fee basis. User fees are collected at gates operated and maintained by the North Maine Woods Association.

2.6.2 Cultural, Environmental and Recreational Conditions, Assets, and Attractions

Forestry is the primary land use of the project area. Much of the private forestland is under common and undivided ownership, and managed by foresters from both Canadian and United States timber interests. Forestry management is based upon selective harvesting and maintaining uneven aged timber growth. All species are harvested for a variety of wood products, with softwood pulp predominating.

Forest and river oriented recreation is the second most important land use in the project area. The Upper St. John River and Allagash Wilderness Waterway are the primary recreational attractions in the project area. Part of the enjoyment and attractiveness of recreational activities in the project area is attributed to an expansive, contiguous area remote from urbanization and capable of handling large numbers of users at relatively low densities. The Upper St. John River is the last lengthy segment of a large, free-flowing, near wilderness river remaining in the densely populated northeastern United States. Difficult access has and should continue to protect the remote character of this area. This combination of

wilderness, a free flowing wild river, and limited access near major northeastern population centers makes the Upper St. John River unique as a wilderness recreational opportunity.

The local economy is closely tied to forestry operations and outdoor recreation, with resulting seasonal employment and below average income levels. Emigration of young adults from the towns in search of more stable employment was observed by Ploch and LeRay (1968) during a study of the socio-economic impact of the Dickey-Lincoln School Lakes project.[8] This population decline has continued at least through 1970 according to the 1970 U.S. Census.[9]

Human populations in the project area are small (totaling 1,267 in the 1970 U.S. Census), centered in the Towns of Allagash (1970 population 456), and St. Francis (1970 population 811) along Route 161. The remainder of the project area includes nearly 800,000 acres of unpopulated forestland in a semi-wilderness state. True wilderness qualities have been eliminated by construction of a gravel logging road network, and timber harvesting activities. The project area may best be classified as a "Natural Environmental Area" of Outdoor Recreation in Maine.[10] Natural environmental areas are characterized as being remote from population centers, having extensive weekend and vacation recreation opportunities, and possessing a high quality, natural environment.

2.6.3 Land Ownership

The proposed project area lies within a larger area known as the North Maine Woods. A general overview of land ownership is necessary and beneficial to understanding this report on recreation.

2.6.3.1 Study Area

There are two and a half million acres included in the North Maine Woods, owned by approximately ten major landowners including large corporations, individuals and the State of Maine. The actual ownerships (% of total) are as follows:

Pingree Heirs (Managed by Seven Islands Land Co.)	27%
Irving Limited (Managed by Seven Islands Land Co.)	10%
Great Northern Paper Company	26%
International Paper Company	15%
Prentiss & Carlisle Timberlands	7%
Dunn Timberlands	5%
Diamond International	2%
Huber Corporation	1%
H.S. Coe	1%
State of Maine (Public Lots)	6%
	100%

Title to this large land mass results from a type of private ownership unique in the United States today. The "common and undivided ownership" of unorganized territories arose primarily because property values were

so low in the very early days of Maine's history that it was uneconomical to survey individual parcels of land. Each landowner in the unorganized townships has title to a percentage of the land. No mapped boundaries exist within the townships; the landowner with the greatest percentage of ownership manages the land for the others.[11] Today most unorganized townships continue to be owned by different combinations of owners, each sharing proportionate shares of the legal and taxation responsibilities.

This same cooperative ownership pattern prompted the organization of the North Maine Woods Association under the concept of multiple-use management of commercial forest lands. The organization's primary purpose is the management of public use within the area.

2.6.3.2 Project Area

At the present time, approximately 79% of the land area to be flooded is managed by Seven Islands Land Company. Their land holdings are concentrated in the Little Black River area and upstream on the main stem of the Upper St. John River from Longs Rapids to the head of the proposed Dickey-Lincoln Impoundment at Seven Islands. Also included in the flooded lands is the Big Black River area.

Great Northern Paper Company and International Paper Company are the two other primary landowners affected by the proposed impoundment. Their land holdings are concentrated in the area proposed for the damsites at the confluence of the Little Black River and the St. John, and that stretch of the river between Poplar Island Rapids and Chimenticook Stream.

The above landowners would also own or manage lands which would abut the boundaries of the Dickey-Lincoln impoundment area. Their policy with regard to recreation would be of particular importance to the recreation development plan proposed and the estimate of recreation use which is presented in this appendix.

2.6.4 Existing Recreational Use

Existing recreational use is typically non-mechanized, and extensive in nature. Primary activities include hunting, fishing, canoeing, and camping. Other activities within the project area are picnicking, hiking, sightseeing and swimming.

Table II-2 shows that recreational use in the project area during 1975 totaled 17,867 visitor-days. The recreational use data was compiled by the Northern Maine Regional Planning Commission and reflects the primary purpose of the recreation trip. This information was derived from a questionnaire utilized by the North Maine Woods Association.

TABLE II-2

1975 Recreation Use by Activity in the Project Area
(Visitor Days)

	Total	Camping	Fishing	Hunting	Canoeing	Day Activity
Non-Resident	9,442	817	1,592	4,914	1,881	238
Resident	8,425	892	2,821	3,378	447	887
Total	17,867	1,709	4,413	8,292	2,328	1,125

2.6.4.1 Hunting

Hunting is the most important recreational activity in the project area with 8,292 visitor-days during 1975. It is concentrated during October and November. Non-resident hunters, largely from Quebec and Massachusetts, accounted for 4,914 visitor days (59%). This high percentage of non-residents indicates the unique experience that can be found in the project area. Resident hunters accounted for the remaining 3,378 (41%) hunting visitor-days in 1975, of which 2,313 visitor-days (68%) were by Aroostook County residents.

Even though hunting is the most important recreational activity, according to Maine Inland Fisheries and Wildlife personnel, hunting pressure is light when compared with the rest of Maine. As a result, most of the important game species are underharvested. Hunting effort is directed primarily toward white-tailed deer, ruffed grouse and black bear. Snowshoe hare are also plentiful but kill estimates are low.[12] All of these species could withstand significantly increased harvests although the quality of the hunting experience may decline with increased hunting pressure.

2.6.4.2 Fishing and Canoeing

Fishing and canoeing, the second and third most important recreational activities in the project area during 1975, usually begin in May, peak in June, then taper off through the summer until ending with the colder weather of September and October. Fishing ends early in August with the closing of the legal trout season. Canoeing usually becomes difficult after late June as river levels drop.

The numerous gravel-bottomed, spring-fed brooks within the project area support abundant populations of native brook trout, the most popular sport fish in the project area. A creel census conducted during the 1976 fishing season (May-August) by the Maine Cooperative Fisheries Research Unit indicated that stream fishing for brook trout was preferred over all other types of fishing by anglers in the project area.[13]

Anglers were typically residents familiar with the project area through several years of experience. According to the Northern Maine Regional Planning Commission analysis of data for 1975, Aroostook County residents accounted for 1,637 (37%) of the 4,413 fishing visitor-days. Other Maine residents accounted for 1,184 (25%) fishing visitor-days, and the remaining 1,592 (36%) fishing visitor-days were by non-residents.

The remoteness and undisturbed character coupled with some of the most challenging whitewater river segments in the Northeast makes a canoe trip down the Upper St. John River a memorable experience. Canoeing useage figures for 1975 again illustrate the uniqueness of the canoeing experience afforded by the river with 1,881 (81%) of the 2,328 canoeing visitor-days accounted for by non-residents who must travel considerable distances just to get to the area. Maine residents from all over the state accounted for the remaining 447 (19%) canoeing visitor-days.

2.6.4.3 Camping

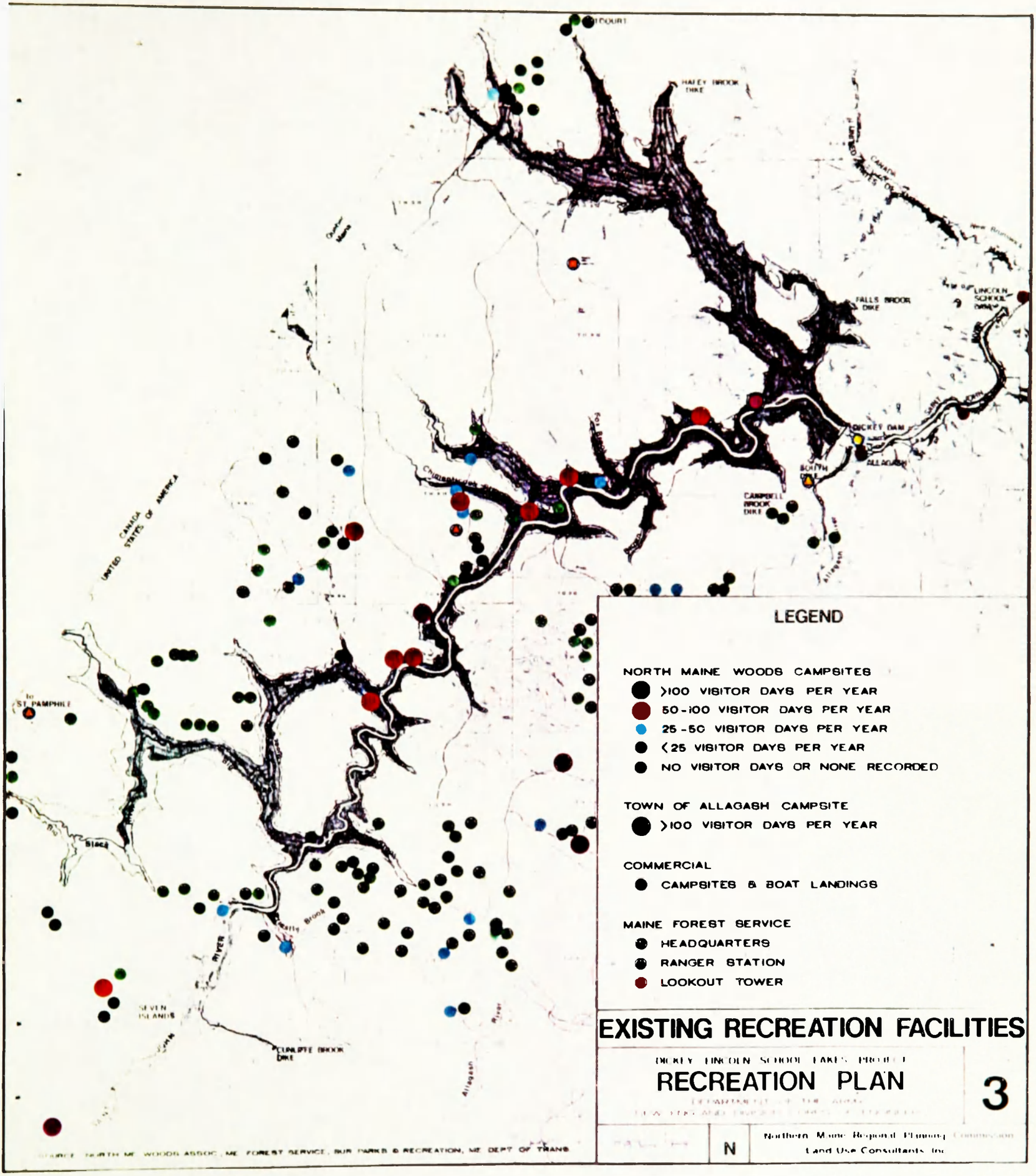
Camping use of the project area occurs throughout the May-November period in conjunction with other activities or as a separate activity, and dominates recreational uses during July and August. In 1975, camping use was split almost evenly between non-resident and resident campers. Non-residents accounted for 817 (48%) camping visitor-days, while residents accounted for 892 (52%) of the total 1,709 camping visitor-days during 1975. The North Maine Woods Association maintains 74 campsites within the project area, and nearly all of the camping activity in the project area occurred in these campsites. Figure 3 shows the locations of existing recreational facilities within the project area.[14]

2.6.4.4 Day Activities

Use figures for hiking, swimming, picnicking, and sightseeing totaled 1,125 visitor-days during 1975. Use data is not available by individual activities. Aroostook County residents accounted for 790 visitor-days (70%), other Maine residents for 97 visitor-days (9%), and non-residents for 238 visitor-days (21%) of the total for "day" activities.

Although no actual hiking trails exist within the project area, abandoned logging roads provide easy access into different areas. Hikers are generally seeking remoteness, and are often involved in nature study or photography. Most participants in these day use activities are local residents who travel over public roads to the northern portion of the project area to engage in their activity.

Extreme winter weather, and the availability of alternative winter recreation sites closer to major population centers limit winter recreational use of the project area, such as snowmobiling, snowshoeing, and cross-country skiing.


HALEY BROOK DIKE
FALLS BROOK DIKE
LINCOLN SCHOOL DAM
DICKEY DAM
ALLAGASH
SOUTH DIKE
CAMPBELL BROOK DIKE
CANADA
UNITED STATES OF AMERICA
to ST. PAMPHILE
SEVEN ISLANDS
PUBLIPTE BROOK DIKE
Allagash River
LEGEND
NORTH MAINE WOODS CAMPSITES
>100 VISITOR DAYS PER YEAR
50-100 VISITOR DAYS PER YEAR
25-50 VISITOR DAYS PER YEAR
<25 VISITOR DAYS PER YEAR
NO VISITOR DAYS OR NONE RECORDED
TOWN OF ALLAGASH CAMPSITE
>100 VISITOR DAYS PER YEAR
COMMERCIAL
CAMPSITES & BOAT LANDINGS
MAINE FOREST SERVICE
HEADQUARTERS
RANGER STATION
LOOKOUT TOWER
EXISTING RECREATION FACILITIES
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
3
N
Northern Maine Regional Planning Commission
Land Use Consultants Inc

2.7 Historic and Archaeological Features

Little data is available for pre-historic human activities within the project area although it is believed that Abnaki Indians did use this area on a transient basis. Early French settlers preferred to move up the St. Francis and Madawaska Rivers into Quebec rather than travel up the St. John. After the Civil War the need for new virgin forests generated interest in the region upstream from St. Francis.

Lumbering has been the major focus of human use since the early 19th century. A continuous settlement at Seven Islands existed until 1930 serving forest harvesting activities. The combination of good agricultural land and a location in the center of 19th century lumbering activities made this a natural focal point. At Seven Islands, agricultural products were grown to supply the lumbermen and their work animals. From Seven Islands, supplies and personnel moved up and down the St. John River on large barges drawn by horses walking on the river banks.[15] In addition, several homesteads were scattered along the St. John River including Castonia Farm, Ouellette Farm and Caron Farm.

In 1976 a study to identify and locate sites with historic and archaeological significance within the impoundment area was undertaken by the University of Maine at Orono.[16] The study found about 40 sites, most of which were of prehistoric age, located along the St. John River and the Big Black River. The majority of these sites were small with little variety indicating prehistoric use on an essentially transient basis. The St. John River was an important highway through the spruce-fir forest between the St. Lawrence River and the more populated, lower St. John Valley, and to the Penobscot and Kennebec River Valleys in the opposite direction. One site at the confluence of the Big Black and St. John River is thought to represent a major habitation and another such site probably existed at the mouth of the Allagash River. The Big Black site has already been placed on the National Register of Historic properties. Seven of the sites located during this study are felt to warrant National Register status, this including the Big Black site. In addition, the Seven Islands area collectively is felt to warrant nomination as a Historic District. Complete or partial excavation of individual sites within the reservoir area was recommended as mitigating measures.

2.8 Water Quality

A water quality sampling program was conducted in the Upper St. John River basin during 1976 to obtain data for inclusion in the Water Quality Design Memorandum No. 5 for the proposed Dickey-Lincoln project.

The data shows that water quality in the Upper St. John River basin is high due to limited industrial and human development within the watershed. Recreationists in the project area can generally drink the water safely from the small tributaries within the watershed. In addition,

the cool, clear, usually well oxygenated waters within the project area provide ideal conditions for a self-sustaining brook trout fishery, and a pleasant setting for other recreational activities such as camping, canoeing, hiking, and nature study. Thus the high quality water in the Upper St. John region is an asset to existing recreational use.

Logging activities within the watershed do occasionally result in stream sedimentation in localized areas. Spruce-budworm control activities may also cause pesticides to enter surface waters in generally small quantities.

The future water quality of the proposed Dickey Lake will be discussed in Chapter VI of this appendix in regards to its influence on recreational use at the project area.

CHAPTER III

PROJECT DATA

3.0 Project Data Description

The listing of project data which follows is based upon information contained in the various Design Memoranda prepared by the Corps of Engineers. The list includes highlights of data found to be particularly important to the recreation analysis. Much of this information has already been included in Chapter II, while more detailed explanations of the significance of this data to recreational use and development is contained in Chapter VI.

The project includes two major dams; one at Dickey, Maine, and the other near the Lincoln School in St. Francis, Maine. Five smaller dikes are associated with the Dickey impoundment. Dickey Dam and the Falls Brook, Hafey Brook, Campbell Brooks, Cunliffe Brook and South dikes will create a lake of 86,024 acres with 390 miles of shoreline (including islands) when at the 910 foot m.s.l. maximum pool elevation. The smaller Lincoln School Dam will create another lake immediately downstream from the Dickey Dam of 2,150 acres and 32 miles of shoreline when at the 620.0 foot m.s.l. maximum pool.

Dickey Dam would be 335 feet high and 10,300 feet long, making it one of the largest dams in the world. The five dikes on the Dickey impoundment would prevent flooding from extending into watersheds adjacent to the St. John watershed. The Lincoln School Dam would be 95 feet high and 2,200 feet long. The reservoir it creates would be to even out the otherwise erratic releases of water resulting from peak load hydro-electric power generation.

Current plans are to acquire land within and surrounding the Dickey and Lincoln School impoundments. This acquisition would involve all the land below the 915 foot m.s.l. elevation or within 300 feet horizontal distance of the 910 foot maximum pool elevation, whichever is greater. All the land within 300 feet of the maximum Lincoln School impoundment at elevation 620 or to elevation 625 m.s.l., whichever is greater would also be acquired in fee. Additional land needed for recreational development and fish and wildlife enhancement may also be acquired.

3.1 DRAINAGE AREA AT DAMSITES

Dickey Dam	2,725 sq. miles
Lincoln School Dam	4,086 sq. miles

3.2 RESERVOIR POOL DATA

Pool Stage	Pool Elevation	Acres	Shoreline Miles	Annual Chance of Occurance (%)
Dickey Reservoir				
Maximum Pool	910.0	86,024	390	50% (1X/2 yrs)
Minimum Pool	868.0	53,680	250	2.5% (1X/40 yrs)
Lincoln School Reservoir				
Ultimate Maximum Pool	620.0	2,619	32	100% (Each yr.)
Initial Maximum Pool	612.0	2,239	31	100% (Each yr.)

3.3 DICKEY RESERVOIR SEASONAL POOL ELEVATIONS BASED UPON A 30-YEAR SIMULATION PERIOD

Period	Pool Elevations Maximum	Minimum	Average
April - May	910.0	877.0	897.5
June - August	910.0	890.0	908.0
September - November	910.0	890.0	907.0
December - March	910.0	868.0	894.0

3.4 DAILY WATER LEVEL FLUCTUATIONS

Dickey Reservoir	1/4 inch
Lincoln School Reservoir	5 - 8 feet

3.5 CONSTRUCTION FEATURES

	Top Elevation (m.s.l.)	Maximum Height (ft)	Length (ft)
Dickey Dam			
North Dam	925.0	335	4,650
South Dam	925.0	260	5,050
South Dike	925.0	25	950
Lincoln School Dam	630.0	95	2,200
Dikes			
Falls Brook	925.0	145	1,500
Hafey Brook	924.0	70	2,300
Cunliffe Brook	924.0	25	900
Campbell Brook	925.0	5	550

3.6 ACQUISITION LINE (subject to purchase agreements)

Dickey Reservoir -	915' m.s.l. or 300' horizontal from maximum pool elevation
Lincoln School Reservoir -	625' m.s.l. or 300' horizontal from maximum pool elevation

CHAPTER IV

RECREATION MARKET AREA

4.0 Introduction

The purpose of this market area analysis is to delineate the characteristics of the region which will influence the magnitude of public demand for the recreation resources offered at the project area, either with or without construction of the Dickey-Lincoln School Lakes project.

4.1 Market Areas

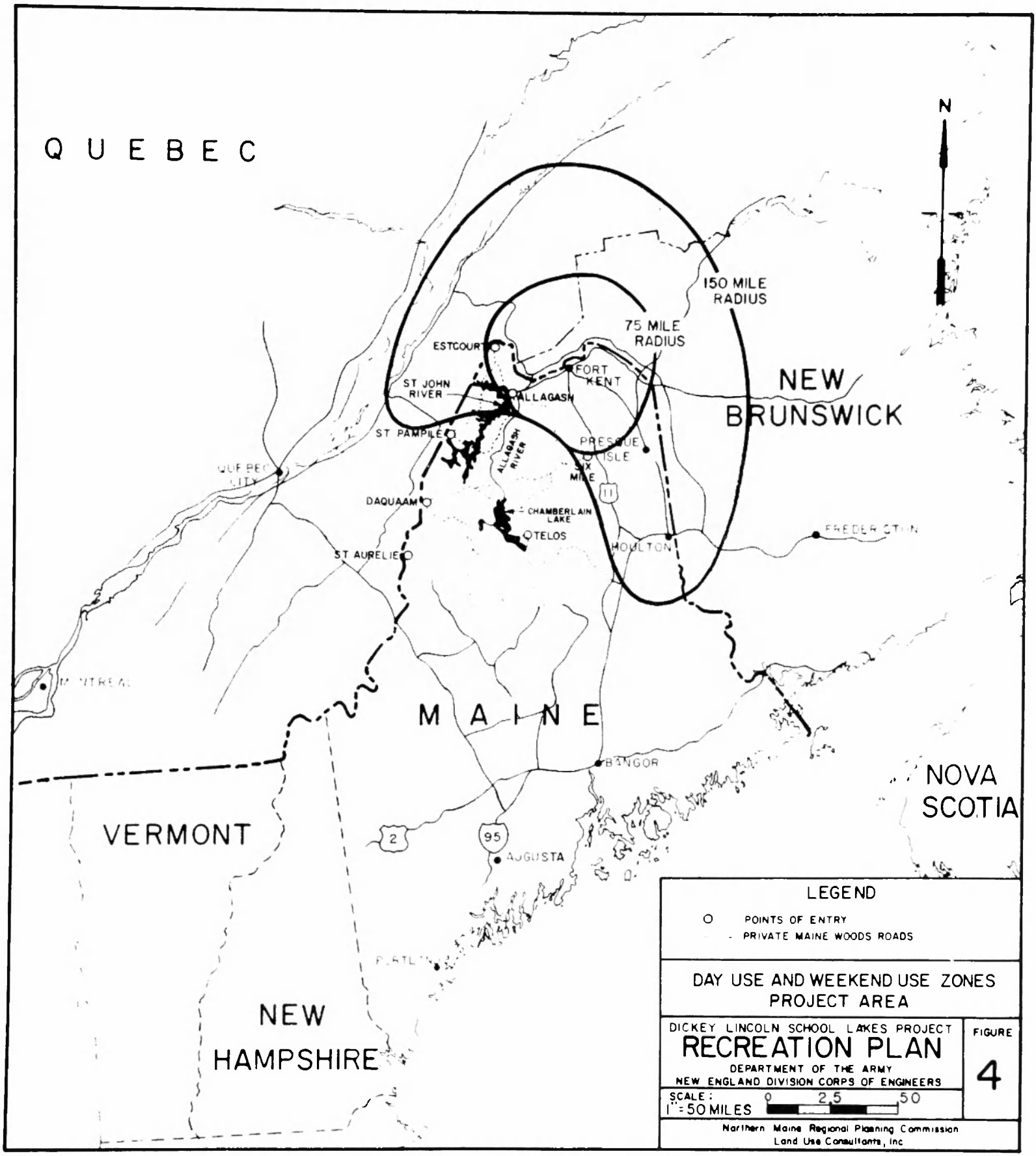
The recreation market area for the Dickey-Lincoln School Lakes project may be divided into three zones: a day-use zone, a weekend-use zone and an extended vacation-use zone. The day-use and weekend-use zones extend 75 and 150 highway miles, respectively, from the dam sites. The vacation-use zone extends 500 miles radially from an approximate center point in the project area.

4.1.1 Day-Use Zone

Day-use visitors are expected to come from communities within 75 miles highway distance from the dam sites. (See Figure 4) The day-use zone includes the northern part of Aroostook County, Maine, Madawaska County, New Brunswick and part of Temiscouata County, Quebec. The 1975 population within this zone is approximately 85,700. Residents of the State of Maine, the Province of New Brunswick and the Province of Quebec account for 39,300, 32,600 and 13,800 of the total, respectively. It is estimated that approximately 80 percent of the day-use visitors to the project area in 1975 originated from this zone.

4.1.2 Weekend-Use Zone

The range for weekend or other two and three-day visitors is expanded to a 150 mile highway distance zone from the project area. (See Figure 4). This zone includes all of Aroostook County, Maine, all of Madawaska, Carleton, Victoria and part of Restigouche County, New Brunswick, all of Temiscouata, Kamouraska, Riviere-du-Loup and part of L'Islet and Rimouski County, Quebec. The 1975 population within this zone is approximately 316,800. Residents of the State of Maine, the Province of New Brunswick and the Province of Quebec account for 94,500, 85,100 and 137,200 of the total, respectively.


QUEBEC
N
150 MILE RADIUS
75 MILE RADIUS
ESTCOURT
FORT KENT
ST JOHN RIVER
ALLAGASH
NEW BRUNSWICK
ST PAMPILE
ALLAGASH RIVER
PRESQUE ISLE
X MILE
DAQUAAM
CHAMBERLAIN LAKE
TELOS
HOULTON
ST AURELIE
FREDERICTON
MAINE
BANGOR
NOVA SCOTIA
VERMONT
2
95
AUGUSTA
NEW HAMPSHIRE
LEGEND
POINTS OF ENTRY
PRIVATE MAINE WOODS ROADS
DAY USE AND WEEKEND USE ZONES
PROJECT AREA
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
FIGURE
4
SCALE: 1" = 50 MILES
0 2.5 50
Northern Maine Regional Planning Commission
Land Use Consultants, Inc

4.1.3 Vacation-Use Zone

Extended visits of up to two weeks or longer can be expected to originate from a zone extending 500 miles west to the Province of Ontario, south to include all of Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, and part of New York, Pennsylvania and New Jersey, east to Cape Breton Island and Nova Scotia and north to Newfoundland. (See Figure 5). The 1975 population of these states and provinces is listed in Table IV-1.

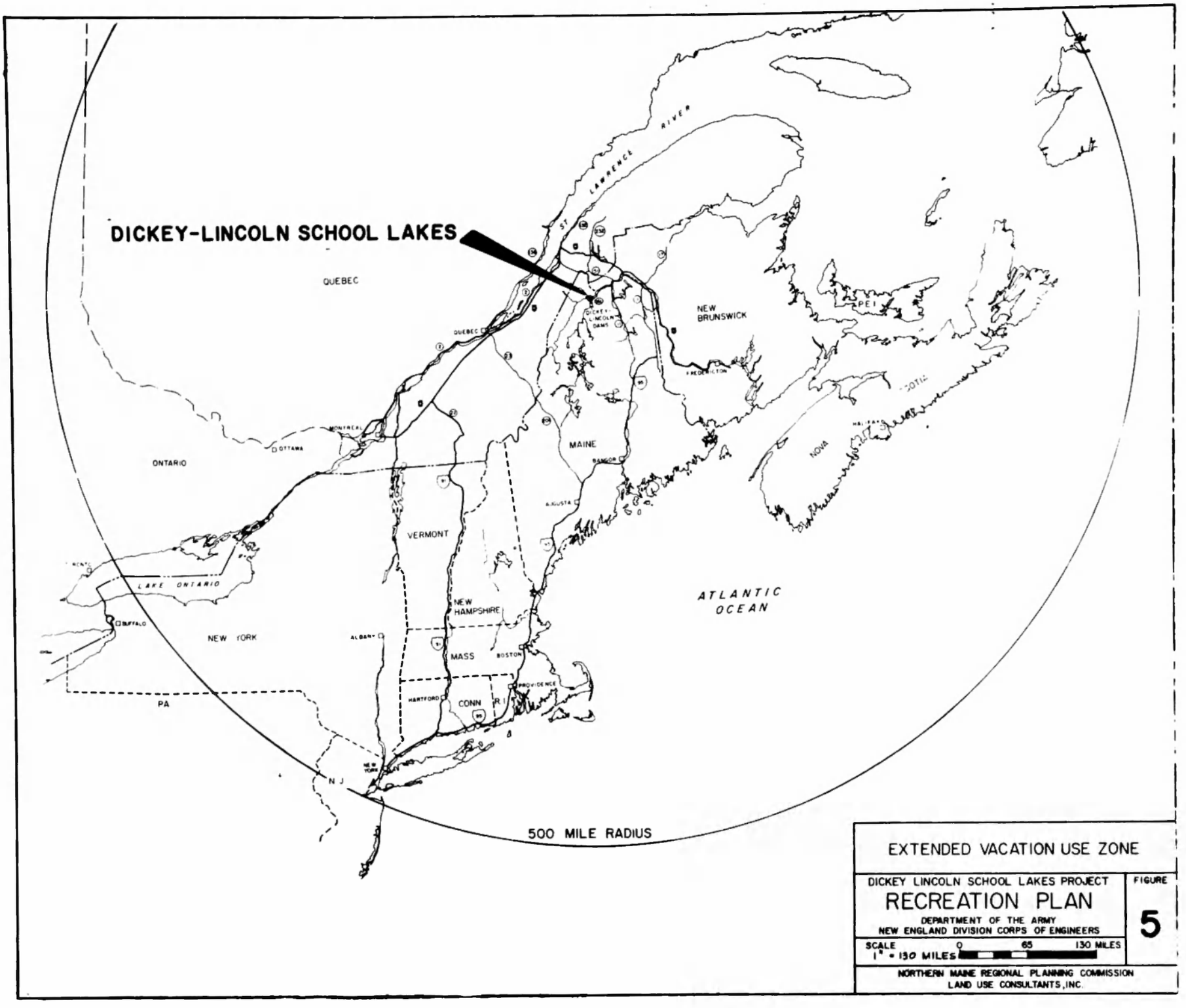
4.2 Population Growth Patterns

The population growth and distribution characteristics of the various market areas are of basic importance in estimating future recreation visitor attendance at the project area. The population within the day-use zone is projected to increase from 85,700 to 90,000 in the year 2000, representing about a 5 percent increase. Within the weekend-use zone population will increase from 316,800 to 332,600 in the year 2000, representing about a 5 percent increase. Population projections for the states and provinces included in the market area of potential vacation visitors are shown in Table IV-1.

TABLE IV-1

Population in Extended Vacation-Use Market Area

	1975[1]	2000[2]	% CHANGE
Vermont	471,000	550,000	17
New Hampshire	818,000	989,000	21
Massachusetts	5,828,000	7,457,000	28
Rhode Island	927,000	1,192,000	29
Connecticut	3,095,000	4,030,000	30
New York	18,120,000	22,438,000	24
Pennsylvania	11,827,000	13,994,000	18
New Jersey	7,316,000	9,694,000	32
Maine	1,025,000	1,122,000	9
Quebec	6,141,000	6,383,000	4
Ontario	8,343,000	11,629,000	39
Nova Scotia	799,000	804,000	1
New Brunswick	652,000	677,000	4
Prince Edward Island	114,000	123,000	8
TOTAL	57,133,000	69,453,000	22



EXTENDED VACATION USE ZONE

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

FIGURE 5

SCALE 1" = 130 MILES (0, 65, 130 MILES)

NORTHERN MAINE REGIONAL PLANNING COMMISSION
LAND USE CONSULTANTS, INC.

4.3 Socio-Economic Considerations

In addition to population growth, various demographic and socio-economic factors such as age, income, occupation and leisure time have been found to be correlated with participation in many outdoor recreation activities. It is expected that these factors will influence future levels of demand for recreation in the project area.

4.3.1 Age Characteristics of Day-Use And Weekend-Use Zone

The age characteristics of the population have a great influence on outdoor recreation participation. An area in which there is a high ratio of persons between the ages of 18 and 45 is usually considered to be one with a good potential preference for the less intensive forms of outdoor recreation, including camping, fishing, hunting, canoeing and day activities.[19]

The change in age distribution for Aroostook County to the year 1990 is given in Table IV-2. For the purpose of this study, the Aroostook County statistics are considered as a proxy measure of the day-use and weekend-use market areas.

TABLE IV-2

Population of Aroostook County by Age: 1970, 1980, 1990[20]

(Thousands of Persons)

Year	0-4 yrs.	5-17 yrs.	18-21 yrs.	22-24 yrs.	45-64 yrs.	65+ yrs.	Total
1970	9	28	7	26	16	8	94
1980	10	23	8	30	17	9	97
1990	10	26	7	34	15	10	102

A review of Table IV-2 indicates that the number of persons 18-21 is not expected to increase at the same rate as the population as a whole, resulting in a proportionate decline in this age group. This pattern is the result of the expected continued emigration of this age group from the area due in part to the limited employment opportunities available. Concurrently, the number of persons between the ages of 22 and 41 will increase faster than the total population. The net effect of these concurrent trends should result in a population group with a significant potential demand for the less intensive recreation activities mentioned previously.

4.3.2 Age Characteristics of Extended-Use Zone

The size and diversity of the geographic area encompassed by the extended vacation market area precludes a concise report of age distribution. It is assumed that national trends, as reported in the 1970 U.S. Census of Social and Economic Characteristics, and the 1972-2001 Population Projections for Canada and the Provinces will prevail. Also, this study's use of the National Recreation Survey, ORRRC Study Report 19, and the Canadian Outdoor Recreation Demand Study, CORD Technical Note 22, in projections of participation in outdoor recreation account for projected national trends indicating an increased demand for outdoor recreation. Such trends can be expected to prevail in the extended market area.

4.3.3 Income and Employment

As previously indicated, income and employment data add insight into an area's potential participation in outdoor recreation activities. People in lower income categories, for example, account for comparatively less participation than their share of total population, for some activities which require higher levels of expenditure.

4.3.3.1 Day-Use and Weekend Zone

Aroostook County income and employment data are indicative of conditions prevailing in the day-use and weekend-use market area. Employment in the agricultural and forestry sectors is prevalent in this area. Seasonal unemployment in these activities and the lack of a diversified economic base result in severe economic impacts. Aroostook's per capita income of $2,052 is the lowest of all Maine counties and is nearly 20 percent below the overall state average of $2,550. In Aroostook, 3,636 or 16.3 percent of all families have incomes below the poverty level. The county's total of 1,702 families receiving public assistance represents 12.7 percent of the Maine total of 13,362, although the county represents only 9 percent of the total state population.[21] State and regional planning forecasts indicate that these economic conditions will improve slightly, but not significantly, through the year 2000.

4.3.3.2 Extended-Use Zone

In the extended vacation market area, income, productivity, leisure time, and mobility are expected to increase with the dissolution of the recessionary trend of recent years. The initiation of certain energy conservation policies in both Canada and the United States may increase preferences for regionally accessible recreation opportunities. In conjunction with these policies, people may be expected to manifest a greater interest in activities which draw them to the natural environment, which they will perceive as a diminishing resource.[22]

4.3.4 Activity Preferences Day-Use Zone

A profile of activity preferences among residents of the day-use market area is available as a result of a survey conducted by the Edward C. Jordan Company in conjunction with their economic impact study of the Dickey-Lincoln School Lakes project. The E.C. Jordan Company survey provides an indication of local attitudes regarding outdoor recreation. Nearly half of the households surveyed indicated that they participated in outdoor recreation activities in the project area. Fishing and hunting were the most popular activities. A great number of the respondents expressed an attitude that the "natural environment" of the area was important to them. This sentiment is amplified in the common use of the area over the lifetime of many of these people.

4.3.5 Activity Preference of Other Potential Users

Out-of-state visitors and those from the weekend-market area most often travel to the project area to experience either of two special attractions: the St. John River canoe trip or the fall hunting season.

The remoteness and natural character of the Upper St. John River make the canoe trip memorable; tricky rapids and whitewater are a challenge. Fishing along the way at the mouths of the numerous small brooks which flow into the main stream often occurs in conjunction with canoeing. Recreation-related flying services in the area frequently ferry canoeing parties directly to designated launching sites along the river.

White-tailed deer are abundant in the project area due to the mixed habitat, food and cover opportunities afforded both by the timber harvesting operations and the natural land characteristics. The deer hunting season annually attracts sportsmen from more populated areas with sparse game resources. Increases in the out-of-state license fees, however, may affect future use of the area by this group.

4.4 Survey of Existing Alternative Recreation Areas

4.4.1 Introduction

Participation in recreation is, in part, a function of the availability of the particular recreational experience being sought. Analysis of this availability involves consideration of general socio-economic factors, the physical characteristics and supply of the recreational resources in the market area.

To examine the potential impact that the proposed Dickey-Lincoln School Lakes project might have on the overall recreation supply/demand system of Northern Maine, an analysis was made of alternative or intervening recreation resources in nearby areas of Canada and Northern Maine. This was undertaken in order to:

(i) Determine present and future rates of visitation to various recreation resources similar to the proposed Dickey-Lincoln School Lakes and in the same markets.

(ii) Estimate the number of visitor-days that the Dickey-Lincoln development may attract and the extent to which this use represents a shift in visitation from presently developed areas.

The emphasis of this analysis is upon those resources that provide types of recreation activities similar to those that may be expected at the Dickey-Lincoln School Lakes.

4.4.2 Survey of Alternative Recreation Areas

This portion of the study considers four significant alternative recreation areas. These include:

A. Formal and informal private and public recreation areas in Northern Maine, including the North Maine Woods and the Fish River Chain of lakes,

B. The Allagash Wilderness Waterway,

C. Moosehead Lake,

D. Nearby Canadian recreation areas, particularly Lac Temiscouata in Quebec, Canada.

Information on recreational utilization of these areas was gathered in detail wherever possible. Though analysis of all recreational supply/demand was made difficult by lack of accurate visitation records, it did lend valuable insight into this study.

4.4.3 Formal and Informal Private and Public Recreation Areas

In what has been defined earlier as the weekend-use market zone, encompassing all of Aroostook County, there exists a wealth of public and private recreational facilities ranging from motels and campgrounds with all conveniences and amenities, to semi-wilderness tenting sites, such as those located in the "North Maine Woods". There are an estimated six hundred designated camping sites available in the area.[23]

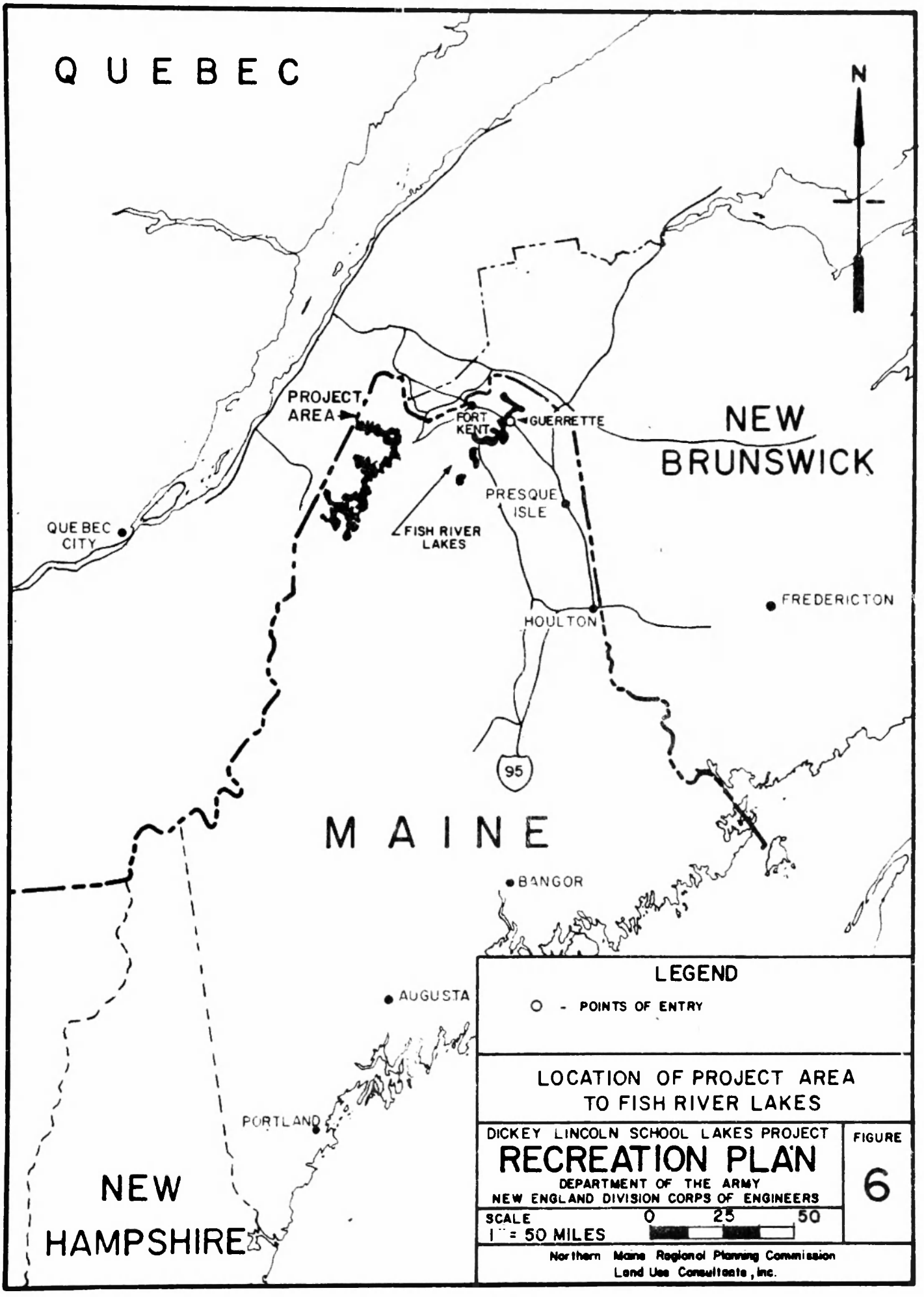
In the Northern Maine region, there exist over one hundred and six lakes of sufficient size to support some form of recreational use. The recreational development potential of these lakes is diverse, ranging from average to outstanding. An inventory of the lakes, is found in Exnibit I of this Appendix.[24] Twenty-six are deemed to have above average to outstanding recreational potential. An additional sixty are considered to have average potential for recreational development and 20 others are of sufficient size to support some form of recreational use. Improvements to the existing road system will significantly affect the future use of these resources. Those lakes adjacent to or accessible from paved roads will tend to be more highly used than those lakes accessible only by private gravel "logging roads". Yet, all of these lakes do serve as a considerable potential source of recreational supply when considered together.

The capacity of all, or any one, of these lakes for recreational use is difficult to quantify. It is necessary to rely on intuitive judgements derived from observation and discussions with individuals familiar with the area. Presently, the majority of these resources are under-utilized and over-crowding is unlikely to occur in the near future.

Within the scope of this study, a group of eight lakes known as the Fish River Chain of Lakes was selected for survey. These lakes are located approximately 50 miles east of the project area and lie within day-use driving distance of the primary population centers of Northern Maine. (See Figure 6). The Chain of Lakes is very popular with area residents and local day-use accounts for approximately 50 percent of all recreation visitor days.

Shoreline development at the more popular lakes in the chain, Long, Eagle, Cross, St. Froid and Portage, attracts participation in family-oriented activities such as swimming, powerboating and fishing. Public recreation facilities (picnic tables, boat launching areas, beaches, etc.) are available, but, there is evidence that the supply of these facilities needs to be expanded. Vacation homes and commercial campgrounds serve as modes of accommodation for overnight visitors.

Activities at the more inaccessible lakes in the chain tend towards such pursuits as sport fishing, hunting and canoeing. Their relative remoteness and lack of facilities render these lakes less desirable for family activities. Sportsmen's Camps and wilderness tenting sites are the primary source of overnight accommodations.


QUEBEC
N
PROJECT AREA
FORT KENT
GUERRETTE
NEW BRUNSWICK
PRESQUE ISLE
FISH RIVER LAKES
QUEBEC CITY
FREDERICTON
HOULTON
95
MAINE
BANGOR
AUGUSTA
PORTLAND
NEW HAMPSHIRE
LEGEND
O - POINTS OF ENTRY
LOCATION OF PROJECT AREA TO FISH RIVER LAKES
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
FIGURE
6
SCALE
1" = 50 MILES
0
25
50
Northern Maine Regional Planning Commission
Land Use Consultants, Inc.

The approximate distribution of all 1975 recreation visitor-days in Northern Maine is presented below:[25]

A.	Upper St. John River (Project Area)	17,867
B.	North Maine Woods (excluding Allagash Wilderness Waterway)	97,590
C.	Allagash Wilderness Waterway	43,507
D.	Fish River Chain of Lakes	233,240
E.	All Other Aroostook County	317,707
	TOTAL VISITOR-DAYS	709,911

4.4.4 Survey of Most Similar Recreation Resources

Having generally surveyed the recreation opportunities available in Northern Maine in the previous section, it is appropriate to now focus on a specific resource most similar to the Upper St. John River as it exists now without the dams, and then a resource which is expected to be most similar to the proposed impoundments.

The Allagash Wilderness Waterway was selected as a riverine system comparable to the Upper St. John River because of (a) its semi-wilderness character, (b) its locational setting in a remote section of Northern Maine, and (c) the similar characteristics of its user group.

In much the same manner, Moosehead Lake was selected to serve as a basis for comparison with the proposed Dickey-Lincoln School Lakes.

4.4.4.1 Existing Use of a Riverine-Type Resource

Visitation to the Allagash Wilderness Waterway, which is located just to the east of the project area, was analyzed and compared with that of the Upper St. John River. A review of the user characteristics and activity preferences of the Allagash group reveals significant similarities. In addition, the market area of the two rivers is the same. (See Figure 4).

Since its State designation in 1966 as a Wilderness Waterway, the Allagash River has accommodated an increasing demand for remote wilderness recreation pursuits. The primary activities for visitors to the Allagash are canoeing, fishing and camping. Table IV-3 shows a part of the historical trend in use of the Allagash and clearly indicates that the recent use of the area has been at or near its current maximum level of accommodation, which is 50,000 visitor days.[26]

It is not expected that the supply of facilities (canoe launching sites, group camping areas, etc.) at Allagash will be expanded in the future

TABLE IV-3

ALLAGASH PEAK SEASON USE HISTORY

YEAR	# PARTIES	PERCENT INCREASE OR DECREASE	AVERAGE PARTY SIZE	TOTAL # VISITORS	PERCENT INCREASE OR DECREASE	AVERAGE LENGTH OF STAY (DAYS)	TOTAL # VISITOR DAYS	PERCENT INCREASE OR DECREASE
1966	1,011	-	4.09	4,141	-	6.52	27,008	-
1967	1,065	+5	4.26	4,539	+10	5.91	26,831	-1
1968	884	-16	4.28	3,786	-17	6.85	25,921	-3
1969	1,134	+22	4.25	4,820	+27	6.17	29,720	+15
1970	1,251	+9	4.36	5,460	+13	6.83	37,303	+26
1971	1,492	+19	4.25	6,345	+16	5.72	36,274	-3
1972	1,579	+6	5.23	8,258	+30	5.20	49,952	+18
1973	1,877	+19	4.43	8,315	+1	6.06	50,361	+17
1974	1,672	-11	4.26	7,128	-14	6.07	43,292	-14
1975	2,430	+45	3.89	9,447	+32	4.61	43,507	+1

SOURCE: Allagash Peak Season Use History, Maine Bureau of Parks and Recreation, 1975.

so as to accommodate an increasing demand. Therefore, excess demand may be expected to shift to the Upper St. John River.

4.4.4.2 Existing Use of a Large Lakes Resource

Moosehead Lake is located on the border of Somerset and Piscataquis Counties, approximately 150 miles south of the Project Area. It also lies relatively closer to the New England market area. (See Figure 7). The physical characteristics of the lake, a maximum of 40 miles long, 20 miles wide and 246 feet in depth, are comparatively similar to those of the proposed Dickey Lake.

Good fishing and beautiful scenery have attracted vacationers to Moosehead for nearly fifty years. The lake is wooded all around, with the towns of Greenville and Rockwood located near the south end. The numerous commercial facilities established in these communities to accommodate tourism are a primary economic resource in the area. The relatively undeveloped northern end of the lake is the setting for remote camping and extended fishing and hunting trips.

Unlike the situation at the Fish River Chain of Lakes, the local population accounts for only 15-percent of the recreation use at Moosehead.[27] Day-use facilities are limited and alternative recreation resources are available. Baxter State Park and the Allagash Wilderness Waterway are located less than 50 miles to the northeast. Lily Bay State Park, which is located on the eastern shore of Moosehead, is near its camping capacity on weekends and peak holidays, but is generally under-utilized on weekdays. The park accounted for 37,700 visitor-days in 1976, down slightly from previous years.

The greater part of recreation use at Moosehead appears to be generated by non-local visitors, who may also be attracted by the other outstanding recreation resources in the area. In recent years, many of the overnight lodging places previously favored by this group, have suffered financially due to the increased popularity and cost attractiveness of camping.

The Moosehead Lake area accounted for approximately 210,000 recreation visitor-days in 1976.

4.4.5 Nearby Canadian Recreational Areas

Although Canadian visitation to the project area, in any significant amount, is now evident only during the early spring fishing season and the late fall hunting season, it is possible that a significant number of Canadians traveling on the Trans-Canada Highway will be potential visitors to the Dickey-Lincoln School Lakes. The Trans-Canada Highway is the major artery connecting central and western Canada with the Maritimes, and it passes within 50 miles of the project area.

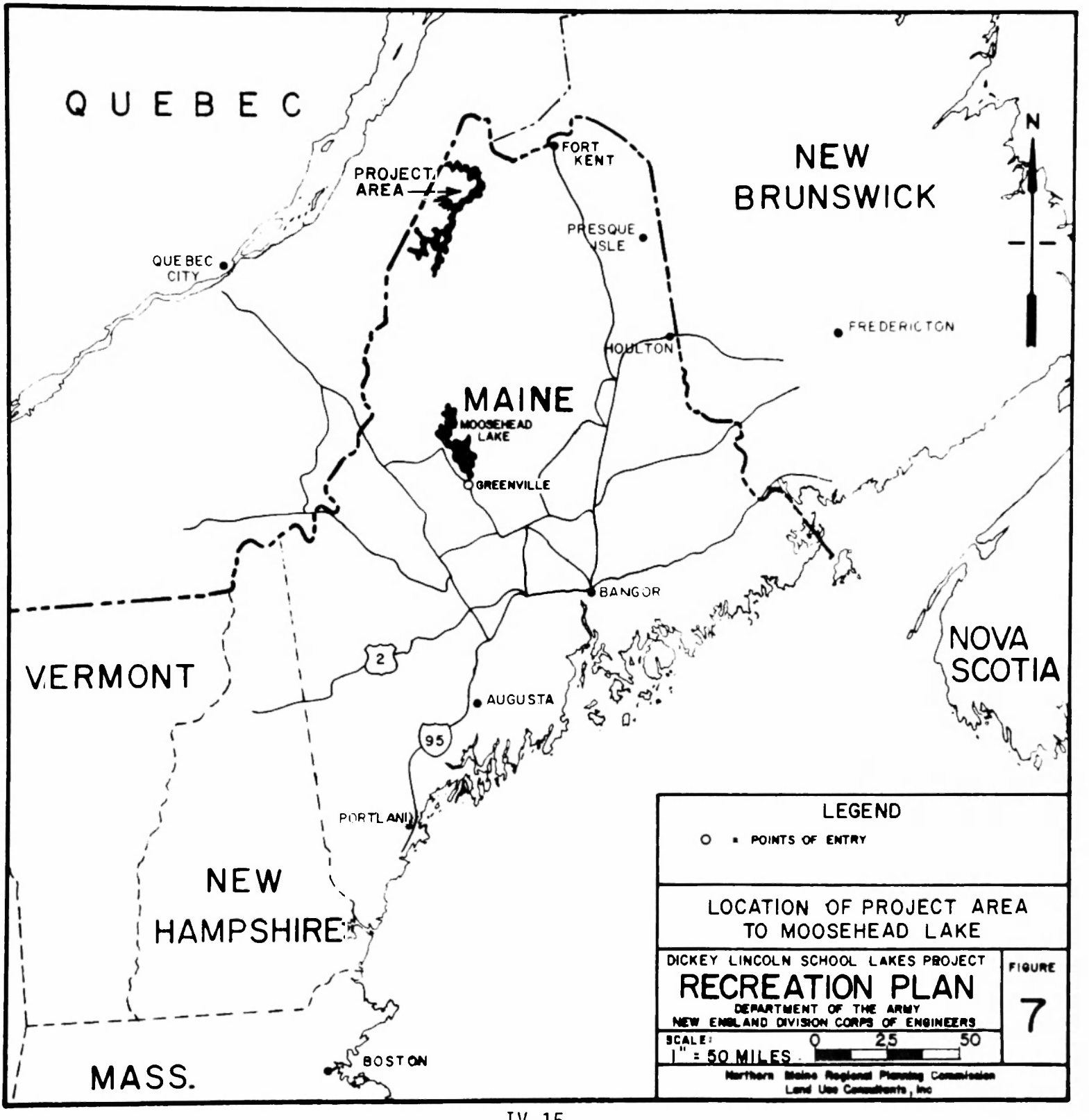
To estimate the demand that could be expected from this Canadian group, a survey of recreation use at the Lac Temiscouata Reservoir was undertaken. Lac Temiscouata is located approximately 70 miles north of the project area in Quebec Province and it lies adjacent to the Trans-Canada Highway. There is little recreational development except near the Town of Cabano.

Few travelers on the Trans-Canada have either Lac Temiscouata or Northern Maine as their primary destination.[28] However, many "enroute" vacation travelers stop at Cabano for a short time and make use of the available recreation facilities. The area is serviced by approximately 150 camping sites for both camper trailers and tents, and a small number of boat access and picnic facilities.

In addition to the facilities available at Lac Temiscouata, there are four New Brunswick provincial parks which are located within the day-use market of the project area. These parks also offer "enroute" travelers and local residents various recreation opportunities and camping facilities. A total of 180 camping sites are available at these areas.

Visitation to the Cabano municipal campground and four New Brunswick provincial parks in 1975 is presented below:[29]

A.	Cabano	11,500
B.	St. Leonard	66,900
C.	St. Basile	51,800
D.	Les Jardins	29,300
E.	Lac Baker	56,000
	TOTAL VISITOR-DAYS	215,500


QUEBEC
PROJECT AREA
FORT KENT
NEW BRUNSWICK
PRESQUE ISLE
QUEBEC CITY
FREDERICTON
HOULTON
MAINE
MOOSEHEAD LAKE
GREENVILLE
BANGOR
NOVA SCOTIA
VERMONT
2
AUGUSTA
95
PORTLAND
NEW HAMPSHIRE
BOSTON
MASS.
N
LEGEND
O = POINTS OF ENTRY
LOCATION OF PROJECT AREA TO MOOSEHEAD LAKE
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
FIGURE
7
SCALE: 1" = 50 MILES
0 25 50
Northern Maine Regional Planning Commission
Land Use Consultants, Inc

CHAPTER V

ESTIMATING OUTDOOR RECREATION ATTENDANCE

5.0 Introduction

Models for projecting the level of participation at a specific recreation area vary in complexity from very simple linear trend forecast to multivariate regression analysis. Often it is possible to submit collected data to a programmed technique which has been standardized through the application of similar data from other research efforts. The choice, however, of an appropriate methodology rests on the identification of those factors which distinguish one research project from another. If data is scarce or unreliable, then use of a sophisticated multivariate analysis may result in forecasts which are not valid. Furthermore, if the parameters of the study area deviate significantly from those incorporated in a predictive model, then the use of that model is not justified.

5.1 Analysis of the Corps of Engineers Procedure for Estimating Recreation Use

The U.S. Army Corps of Engineers' "most similar project" concept is a standardized methodology for estimating initial recreational use of reservoir areas. It is clearly described in ER 1120-2-403, and in essence it consists of the following steps:

1. Identifying a similar Corps project,
2. Obtaining its per capita visitation/distance rate for day users,
3. Determining the populations of counties within the day-use market area and the road distances of their population centers from the project,
4. Estimating day-use attendance by applying the per capita visitation rates obtained from the similar project to the population/distance statistics of the project day-use area itself,
5. Estimating over-night use as a percentage of day-use.

This is a simple and pragmatic methodology which has "evolved from a concentration on standardization in order to avoid undesirable variation in collecting similar kinds of data" .

Aroostook County is clearly a unique location, however, and does not easily conform to any standard schemes.

The "most similar project" method involves identifying an existing reservoir that is most comparable in size, operation, and anticipated recreation-use characteristics. Relating recreation-use rates from an existing reservoir to a reservoir under study, provides the basis for the use estimating technique.

The Corps of Engineers' methodology provides comparative data for existing reservoir projects in only three geographic regions. These are: (1) Middle South - seven projects in Georgia, South Carolina, Tennessee, Kentucky; (2) Southwest - 31 projects in Texas, Oklahoma, Arkansas, Missouri, Kansas; (3) West - 14 projects in California, Oregon.

Although geographical location in itself should not preclude the use of this methodology, it does create serious constraints to the methodology's application in this research effort. Also, the majority ot the Corps projects are within day-use range of major regional cities, such as Nashville, Fort Worth and Sacramento, and a majority of the water-oriented recreation areas which are competitive with the Corps projects, are similar man-made reservoirs. Aroostook County is relatively remote from any large urban centers and is abundant with uncrowded natural water areas. This latter feature is significant because some categories of recreation users may show a preference for natural and wilderness areas, rather than man-made sites.

An important feature of the Corps methodology is its emphasis on day-users of recreation areas. An estimate of over-night use is derived, but it is simply calculated as a percentage of day-use. In fact, three primary categories of outdoor recreation participants in Aroostook County may be delineated, specifically day-use visitors, weekend visitors, and extended-stay vacation visitors.

Because day-use visitors represent only a part of the recreation group, the conventional Corps methodology is likely to produce an unrealistic estimate of total user demand and, therefore, total recreation benefits. A revised methodology has been instituted which will more accurately predict visits to the proposed reservoirs by a diverse group of recreation users, and which is more sensitive to the unique characteristics of Aroostook County, thus minimizing bias in the estimates.

5.2 Methodology

The general methodology employed to estimate the future level of demand for outdoor recreation in the project area is composed of three phases. Phase One establishes the existing recreation use in the project area and serves as a base for future estimates. Phase Two is a projection of recreation demand in the project area which would be expected without construction of the dams. Phase Three is a projection of recreation demand expected in the project area with construction of the dams and creation of the Dickey-Lincoln School Lakes. A detailed explanation of each phase follows.

5.3 Existing Demand for Outdoor Recreation

This phase consists of simply compiling data on existing recreation use in the project area. Statistical information regarding visitation to the project area in 1975 has been derived from three sources:

1. North Maine Woods Visitation Data
2. International Paper Company Visitation Data
3. Survey of Northern Maine Flying Services

The project area is included within the 2.5 million acres of forest land which is managed by the North Maine Woods Association. A computer tabulation of visitation data collected from questionnaires distributed at entrance gates was provided by the Association. Data was presented in the form of visitor days of participation by origin and by primary purpose of recreation trip.

Some visitors gain access to the project area via the International Paper Company's St. Aurelie Gate. Visitation data collected at this site in 1975 provided an additional count of visitors and their primary recreation purpose.

Finally, information regarding visitors who fly in to the project area via seaplane, was obtained from a survey of nine flying services in the Northern Maine region. The survey was conducted within the scope of this study. An approximate count of visitors, their origin and their primary recreation purpose was derived from the survey.

A summary of recreation use in the project area in 1975 is presented in Table V-1 and discussed in Chapter II.

TABLE V-1

1975 Recreation Use by Activity in the Project Area
(Visitor Days)

	Total	Camping	Fishing	Hunting	Canoeing	Day Activities
Non-Resident	9,442	817	1,592	4,914	1,881	238
Resident	8,425	892	2,821	3,378	447	887
Total	17,867	1,709	4,413	8,292	2,328	1,125

5.4 Demand Projections: Without Dickey-Lincoln School Lakes

These visitation projections are estimates of outdoor recreation use at the project area if the proposed dams are not constructed.

The basic approach of this projection is to estimate the future level of demand as a function of current demand for the particular recreation activities offered at the project area. In calculating this estimate, it is assumed that rates of participation in outdoor recreation will increase and that the project area will receive a part of this increase proportional to its current share of the market. Table V-2 shows the estimated recreation demand projections through the year 2030. These projections are based on the following annual growth rates which have been discussed with and considered to be reasonable by the Maine Bureau of Parks and Recreation and the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation).

Annual Growth Rates	(1975-1988)	(1988-2030)
Camping	3%	2%
Fishing	3%	3%
Hunting	1%	1%
Canoeing	5%	3%
Day Activities	3%	2%

5.5 Demand Projections: With Dickey-Lincoln School Lakes

These visitation projections are estimates of outdoor recreation use at the project area if the proposed dams are constructed and an optimum development of full recreation facilities are provided for the public. It should be noted, however, that only minimal recreation facilities necessary for the public health and safety of visitors and consisting of a visitor center, scenic overlook and two canoe take-out areas, are

now planned should the proposed project be constructed. These facilities would be part of the project costs and not subject to cost sharing with a non-Federal agency, such as the State of Maine, as would the full recreation development.

The future level of demand for the particular recreation activities which could be offered at the project is a function of current demand in the region. It is assumed that rates of participation in outdoor recreation will increase and that the project area will receive a proportional share of this increase. Table V-3 shows the estimated recreation demand projections through the year 2030. These projections are based on the following annual growth rates which have been discussed with and considered to be reasonable by the Maine Bureau of Parks and Recreation and the Heritage, Conservation and Recreation Service.

Annual Growth Rates (1988-2030)	
Camping	3%
Fishing	2%
Hunting	1%
Canoeing	--
Day Activities	3%

The growth rates for these activities prior to project construction would be the same as without the project. Except for hunting, recreational use in 1985 would be considerably reduced due to construction activity. It is expected that camping and day activities would have slightly higher growth rates with the project than without due to greater availability of facilities, while fishing growth rates may be slightly less due to the loss of some popular stream fishing and replacement with less popular lake fishing. Hunting growth rates are not expected to change while canoeing would be virtually eliminated in the project area after 1985 due to the impoundment. The base year for projecting recreational use in the project area with full facility development is 1988. The estimated visitation for 1988 is based on discussions with the previously mentioned agencies as well as available data from local recreational planning and management organizations. Consideration has also been given to other recreation facilities available in the region and potential demand in the northeastern United States and southeastern Canada.

The formula that is used for interpolating future recreation demand, both with and without the project, is: $S = P\ (1+i)^n$

where S represents a future level of demand at the end of n years.
P represents a present level of demand in 1975.
i represents an annual growth rate.
n represents a number of years.

All of the preceding projections and growth rates are based on recent trends in outdoor recreation, as well as the professional judgment and experience of the Corps of Engineers, the State of Maine and the Heritage Conservation and Recreation Service.

TABLE V-2

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITHOUT
DICKEY-LINCOLN SCHOOL LAKES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	2,300	2,500	2,600	2,900	3,200	3,500	3,900	4,300	4,700	5,200	5,700
Fishing	4,400	5,100	5,900	6,500	6,900	7,900	9,200	10,700	12,400	14,400	16,600	19,300	22,400
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	3,700	4,300	4,600	5,300	6,100	7,100	8,200	9,600	11,100	12,800	14,900
Day Activities	1,100	1,300	1,500	1,600	1,700	1,800	2,000	2,200	2,500	2,700	3,000	3,300	3,700
TOTAL	17,800	20,000	22,600	24,300	25,400	28,000	31,100	34,700	38,800	43,400	48,400	54,300	61,000

NOTE: 1975 is the base year for which the visitor day projections were made, with the 1975 visitor days being the actual recorded visitation by the North Maine Woods Association.

TABLE V-3

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITH
DICKEY-LINCOLN SCHOOL LAKES

WITH FULL RECREATION FACILITIES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	800	5,000	5,300	6,100	7,100	8,300	9,600	11,100	12,900	14,900	17,300
Fishing	4,400	5,100	2,000	2,000	2,100	2,300	2,500	2,800	3,100	3,400	3,800	4,200	4,600
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	---	---	---	---	---	---	---	---	---	---	---
Day Activities	1,100	1,300	1,500	13,000	13,800	16,000	18,500	21,500	24,900	28,900	33,500	38,800	45,000
TOTAL	17,800	20,000	13,700	29,400	30,800	34,500	38,700	43,800	49,400	55,800	63,200	71,600	81,200

NOTE: Impoundment commences in 1985, with project expected to be on line in 1988.

CHAPTER VI

RECOMMENDED DEVELOPMENT PLAN

6.0 Significance of Physical Resources to Recreation Use and Development

6.1 Geographic Boundaries

The proposed project would be remote from major U.S. and Canadian cities. The only point of entry to the project area over public roads would be from Fort Kent, Maine unless access is provided to the lake over private, gravel roads controlled by the North Maine Woods Association. This remoteness factor could limit recreational use of the project area, especially day use activities such as picnicking, swimming and sightseeing. Although access would also exist over private, gravel logging roads, it is expected that their use would be insignificant.

6.2 Climate

The cool climate in the project area causes the summer recreation season to be short. Activities such as boating, swimming, picnicking, camping, and sightseeing would occur primarily from late June through July and August when there is reasonable assurance that nighttime temperatures would stay above freezing.

Primitive campsites may be necessary near remote portions of the lake to accommodate boaters that become stranded because of unsafe water conditions during stormy weather. Probable wind and wave conditions are discussed in Section 6.5.2.

6.3 Topography and Geology

The generally flat, often poorly drained area upstream of Blue Brook, and in the upstream reaches of the Big Black and Little Black River drainages is not conducive to recreational development. In contrast, downstream areas are more conducive to recreational use as they are generally better drained and have topographic and shoreline variability which contribute to scenic quality. Localized steep slopes and poor soil conditions in this downstream area are significant considerations in determining the location of recreational facilities.

6.4 Biologic and Ecologic Features and Resources

6.4.1 Vegetation

Forest vegetation would provide the setting for camping, picnicking, hiking, nature study, hunting and sightseeing in the project area. Unique or unusual plant species hold special value for nature study

and photography. Vegetation also provides valuable food and cover for wildlife.

The spruce-fir stands found on flat, lower slopes indicate poor soil drainage conditions that would limit development of campsites, picnic areas, restroom facilities, pit privies, hiking trails, roads, and boat launch areas. The spruce-fir stands found on ridgetops indicate shallow soils and steep slopes where automobile access would be difficult if not impossible, erosion hazards are present, and excavations would be difficult and expensive. The hardwood stands occurring on upper slopes indicate favorable soil depth and drainage conditions, exposure, air circulation, and light penetration conducive to recreational development. Therefore, hardwood stands are to be favored in selecting recreational development sites. Mixed wood stands indicate marginal conditions for recreation facility development and therefore, should be examined as secondary recreational development areas.

6.4.2 Terrestrial Wildlife

During the fall and winter seasons, hunters would be seeking whitetail deer, black bear, ruffed grouse, woodcock, and snowshoe hare in forested portions of the project area; and ducks and perhaps geese in wetlands and along streams and lake shores. In the event that the Maine Legislature establishes a moose season in the state, the St. John region would certainly attract a sizeable number of moose hunters.

Additionally, all recreationists can enjoy observing both game and non-game wildlife species throughout the year. Those species of birds and mammals such as the bald eagle, osprey, moose, black bear, bobcat, lynx, spruce grouse, Canada Jay, jarten, fisher, beaver, and otter which generally avoid human population concentrations would be of special interest. Wildlife observation and photography is likely to be an important secondary activity for project area recreationists.

Important wildlife habitats such as deer yards, waterfowl nesting areas, osprey and potential eagle nesting sites, and den trees should be avoided whenever possible during construction of recreation facilities. Light recreational use near such habitats can be encouraged with hiking trails. Heavy use, especially during winter stress periods or spring nesting seasons, should be discouraged so that wildlife would not be subjected to additional, undue stress during these periods. Because of potential conflicts between native wildlife and domestic pets owned by recreationists, all pets must be either leashed, under direct owner control, or excluded from the project area entirely. Also, trash disposal regulations and techniques must be strictly enforced to avoid potentially damaging man-wildlife encounters.

6.4.3 Fishery

Fishermen in the project area would be able to enjoy both stream and lake fishing for native brook trout in the project area. In addition, the deep water landlocked salmon and/or lake trout fishery that is likely to be established will provide an additional fishing opportunity

during the spring and summer seasons. Winter ice-fishing for smelt on Dickey Lake could also become possible. It would take several years to grow catchable size salmon or lake trout in Dickey Lake. Therefore salmon and/or lake trout fishing may not be allowed during the first several years of project operation.

Brook trout fishermen could use existing logging roads and developed hiking trails, or walk along the lake shore to their fishing site. These fishermen would only require a safe place to park their car before starting out on foot. Boat access sites would be required for deep-water fishermen so that they can launch their boats easily. Tributary streams would have to be kept clear of obstructions and the gravel bottom stream segments used for trout spawning must be protected from damage.

6.5 Hydrology

Recreational canoeists seeking the challenges offered by the large size and flashy, uncontrolled hydrology of the Upper St. John River are attracted to the river as it now exists. In fact, anyone venturing near the river can sense its power and wildness. Harnessing this power by the Dickey-Lincoln project would eliminate those hydrologic features which attract canoeists during the spring and early summer when water levels remain high enough for canoeing. The river would be replaced by an expansive lake with its own recreation attractions.

Reservoir water level fluctuations, and wind and wave action on the lake would partially determine the type and quality of recreation that would occur on the lake, and where and how recreational facilities are to be provided.

6.5.1 Drawdown and Shoreline Character

The impact of reservoir drawdown is a function of shoreline slope. Table VI-1 shows that the steeper the shoreline, the less the area exposed; and the less the shoreline slope, the greater the area exposed. In Table VI-1, the 2-foot and 4-foot drawdowns are what may occur during the summer recreation season. In any one summer, the 2-foot drawdown may be from 910' - 908' m.s.l. while the following summer it may be from 904' - 902' m.s.l. because of variations in the annual maximum pool elevation in successive years. This would give the impression of an 8-foot drawdown rather than just a 2-foot drawdown. Obviously, with greater drawdowns and variations in successive annual maximum pool levels, the effects of summer drawdown could limit recreational use of Dickey Lake periodically.

Abrasion of the shoreline by ice and waves would prevent the establishment of woody vegetation in this periodically flooded zone, leaving bare soil exposed. The soils present in this zone of flooding would therefore determine the shoreline character in a given area. Wave action and periodic flooding on glacial till and bedrock deposits would leave a stony and bouldery shoreline mixed with exposed bedrock outcroppings. Wave action on glacial outwash, poorly drained till, and alluvial soils would produce muddy shoreline conditions. The

area near the dam would have a steeply sloping, stone and bouldery shoreline where drawdown would be little noticed. Conversely, the upstream portions of the reservoir near Seven Islands, upstream reaches of the Little Black and Big Black arms of Dickey Lake, and coves at the mouths of tributary streams would likely have unattractive mud flats exposed even during the recreation season from June to September when drawdown is being minimized.

TABLE VI-1

Width of Area Exposed Along Shoreline During Reservoir Drawdown

Reservoir Drawdown (in feet)	1% Slope	5% Slope	20% Slope
2	200'	40'	10'
5	500'	100'	25'

6.5.2 Wind and Wave Action

Because of Dickey Lake's large size, periodic windy weather could create hazardous boating conditions, particularly for small craft such as canoes, small sailboats, and car-top outboard motor boats. Canoeists on the St. John River upstream from the reservoir should be discouraged from entering the impoundment area to avoid the necessity of ending their trip with many miles of potentially dangerous flat water paddling. Only localized canoeing along the lake shoreline would be appropriate on Dickey Lake. It is predicted that winds during June and July averaging 11-13 m.p.h. would create waves of 1-2 feet in height. Small craft operation under these conditions would be possible, but difficult. Stormy weather such as summer thunderstorms would create waves from 2 to 4 feet in height that are dangerous for small craft including high-powered motor boats. Table VI-2, illustrates wave heights under varying wind velocities.

The impact of waves on the shoreline would cause some shoreline erosion and muddying of water in shoreline areas exposed to the prevailing winds, which may be unattractive to some recreationists. In addition, trees growing along the shoreline of the reservoir would be affected by erosion, wind, and root sytem saturation that could result in blowdown. Clearing to 3 feet above the 910' maximum pool elevation should significantly reduce the chances of blowdown, however.

Table VI-2

Determination of Wave Heights for Dickey Lake

	Average Wind Velocity and Direction		Required Wind Duration For Wave Stabilization		Stabilized Wave Height (feet)	
	June (WSW)	July (WNW)	June	July	June	July
Seven Islands	10 mph	10 mph	40 min	--	0.5	0.5
Big Black	10 mph	10 mph	95 min	120 min	1.1	1.3
Dickey Dam	10 mph	10 mph	200 min	80 min	1.8	0.95
Little Black	10 mph	10 mph	100 min	170 min	1.1	1.6

	Maximum Wind Velocity and Direction		Required Wind Duration For Wave Stabilization		Stabilized Wave Height (feet)	
	June (WSW)	July (WNW)	June	July	June	July
Seven Islands	40 mph	40 mph	--	18 min	--	2.3
Big Black	40 mph	40 mph	50 min	65 min	4.2	5.5
Dickey Dam	40 mph	40 mph	110 min	45 min	7.5	4.0
Little Black	40 mph	40 mph	--	95 min	--	7.0

6.6 Floating Debris and Reservoir Clearing

Floating debris resulting from reservoir clearing operations during construction could limit recreation, especially power boating, during the first 3-4 years of project operation. Intensive debris removal operations would be undertaken to minimize this problem during reservoir filling. Trees growing along tributary streams may be washed into the reservoir during the annual spring freshet. This debris may represent an annual but temporary hazard to recreation which could be reduced with annual location and removal of debris accumulations in the lake.

Trees left standing below the minimum pool elevation would be an obstacle to fishermen in shoreline portions of the reservoir, particularly during seasons of low water level. During the summer recreation season, there would normally be at least 40-50 feet of water covering the trees, and salmon or lake trout would remain well above the submerged trees in the water column throughout the year. Submerged trees would be closest to the surface near the shoreline. The distance out from the lakeshore that submerged trees could be a problem to fishermen increases with decreasing shoreline slope. Although these submerged trees may discourage fishermen who are reluctant to snag their lines, these same trees would provide productive fish habitat in shoreline areas. These submerged trees would provide cover for fish, and a substrate for attaching algae which would in turn attract animal forage species used by brook trout and other fish.

6.7 Access

Remoteness of the project, travel time involved in getting there, and population levels within the market radius of the project suggest that day use of the site would be limited and destination oriented. Those who travel to and from the project on a day use basis would have a specific purpose for making the trip: boating, fishing, hunting, swimming or sightseeing. Because of the nature of access over Route 161, the only public road with a distance of approximately thirty miles from Fort Kent, it is expected that most day use of the project would be concentrated in and around the immediate area of the Dickey Dam. Therefore, in order to be attractive to as many people as possible, it is important that day use facilities be easily accessible in the least amount of time after entering the project area.

The limited potential for large volumes of day use, and the scale of the project itself, indicate that recreational use of the project would likely be more attractive for weekend and longer periods of stay with users participating in a wide range of activities during their visit. Thus, for the project to be a significant recreation resource, development of recreation facilities must focus upon high quality destination facilities with a variety of supporting day use activities.

6.8 Water Quality in Dickey Lake

The water-oriented recreation expected to occur at the proposed Dickey

Lake would be influenced by water quality. Water quality is important in maintaining fish populations, determining whether the water would remain clean enough to drink or even to swim in, whether the water would be warm enough for swimming, and whether the water would appear visually attractive to the recreationist.

The greatest changes in water quality at Dickey Lake would occur during and for 6-9 years following the filling of the reservoir. During this period, suspended terrestrial materials such as soil particles and organic matter would begin to settle or would decompose. As this occurs, the apparent color of the water in Dickey Lake would change from a yellowish-brown to yellow to greenish-yellow. Thus, over time, the water would become more visually attractive to recreationists. The dissolved oxygen content of the water in Dickey Lake is expected to increase to 5 mg/l in the hypolimnian by two years after complete filling of the reservoir. This is the minimum concentration needed for the survival of most cold water fish species. This increase would result from a reduction in the Biological Oxygen Demand of organic matter in Dickey Lake, and more complete mixing and stratification of lake waters. Water temperature likewise is not expected to exceed 70^{o} F. in the hypolimnion after a few years of filling, so a coldwater fishery would probably not be limited by water quality once the reservoir is filled.

Water quality in the reservoir is expected to stabilize within 6-9 years after filling of Dickey Lake. Once stabilized, water color (apparent) in Dickey Lake would vary seasonally with changes in suspended materials such as clay, silica, and phytoplankton from greenish-yellow to greenish-blue. This range of color is generally visually attractive. Spring and fall blooms of diatoms would produce increases in the apparent yellowish color of the water while summer blooms of green and blue-green algae would produce the greenish-yellow to greenish-blue colors. Dissolved oxygen in Dickey Lake once stabilized, is expected to be near saturation in the epilimnion, and at or above 6 mg/l in the hypolimnion at the end of the summer stratification period which should be adequate to maintain a productive cold water fishery. However, the dissolved oxygen content may be lower in shallow coves and embayments dependent upon weather conditions which may influence the distribution of fish within Dickey Lake at certain times in the summer.

Water temperature and bacteria levels of the water influence swimming. The cool waters of Dickey Lake may discourage some recreationists from swimming. Fecal colliform bacteria counts are expected to be well within the 1,000 colonies/100 m.l. limit suggested for contact and non-contact recreational uses of water. The water quality sampling program conducted in 1976 showed that with the exception of just two stations in the Big Black River watershed, maximum total colliform counts in the water that would enter Dickey Lake are well within 1,000 colonies/100 m.l. Furthermore, the effects of impounding water are usually beneficial from a public health and recreational standpoint, since bacterial concentrations are significantly reduced during storage. Mean bacterial levels would be different for open water areas than for coves and embayments. Open water areas would have lower bacteria levels than coves and embayments affected by littoral influences of the

shoreline and tributary streams.

6.9 Recreation Potential Analysis

6.9.1 General

Analysis of the recreation potential of Dickey Lake is based upon site investigation, analysis of available natural resource data, and upon the Northern Maine Regional Planning Commission's investigation and analysis of the natural resource base for outdoor recreation. The scale of this project and of available resource data was such that only broad area assessments were possible. Selection of specific sites for selected recreational facilities must take place during future site planning activities when more site specific data can be obtained.

To facilitate quantitative and qualitative analysis necessary to this Recreation Plan, a methodology was developed which enabled a systematic and consistent analysis of the recreational significance of available data. The nature of that methodology and the results obtained follow.

6.9.2 Analysis of Recreation Potential

The land mass surrounding the proposed Dickey Lake was divided into twenty-eight areas of similar physiographic character. Each of these areas were then evaluated on the basis of their potential for recreational use.

Available data enabled the isolation of eight natural resource components as being primary determinants of an areas potential for recreational use and development. These components are: ground slope, vegetation, horizontal drawdown, surficial geology, shoreline composition, scenic potential, exposure to the sun, and potential deer yard conflicts.

Criteria were then established based upon the suitability of the varying characteristics of each resource component to outdoor recreation. Those characteristics were then assigned "quality points" ranging from one to three depending upon whether a favorable, average or unfavorable condition for recreation were to exist. Table VI-3 contains the criteria established for each resource component and the quality points assigned.

Quality points were then assigned to each resource component based upon its predominant character in each of the twenty-eight areas. Table VI-4 contains distribution of quality points and the total quality points for each area.

As a means of ranking the areas as to their relative suitability for recreational use, a frequency distribution was performed of the total quality points for each area. Table VI-5 indicates the results of the frequency distribution and the resulting categories.

The results of the above analysis are illustrated graphically in Figure 8, Recreational Potential.

TABLE VI-3

RECREATION POTENTIAL ANALYSIS
CRITERIA FOR RECREATIONAL QUALITY POINTS

Resource Component	Quality Points 1	2	3
Slope	5-20%	Variable	<5% >20%
Vegetation	Hardwood	Mixed Wood	Softwood
Horizontal drawdown	<250'	250-500'	500'
Surficial geology	Eskers, Kames Kame terraces	Outwash Till	Wet Till Alluvium Bedrock
Shoreline Composition	Cobble, Boulders	Intermediate or Bedrock Outcrop	Mud
Scenic Potential	Good Topo Variability Very Irregular Shoreline	Moderate Variability Irregular Shoreline	Little Variability Uniform Shoreline
Exposure	South	East West	North
Deeryards	None Identifiable	Small Yards	Extensive Yards

Each area was then evaluated as to its suitability for the various types of public outdoor recreation included in the 1977 Maine Statewide Comprehensive Outdoor Recreation Plan and in keeping with this project. Table VI-6 contains an assessment of the recreational facilities appropriate to each of the twenty-eight areas on Dickey Lake.

An explanation of the terms used in Table VI-6 and as used in subsequent sections of this report follows:

Access

Road - Access by public road or summer private roads as designated on maps published by Seven Islands Land Company.

Water - Potential for boat access.

Visitor Center - Visitor information center.

Overlook - Points of high elevation offering especially good points of view of the dam and the impoundment.

Camping

Destination - Destination campground with the general characteristics of a State Park campground and providing those facilities and utilities necessary to relatively intensive levels of use.

Primitive - Remote campsite with tent site or lean-to, fireplace, table, and pit privy.

Swimming Beach - Improved beach with restrooms and picnic tables.

Boat Launch - Developed ramp for launching boats and related parking.

Boat Landing - Cleared space on shore or logs placed on shoreline to enable loading and unloading of boats at primitive campsites.

Trails - Cleared trail with minimal alteration for erosion control and safety.

Scenic - Scenic character of area as evidenced by topography and shoreline variability.

Picnic - Sites with road access to shoreline or at trail heads where day use picnicking is likely.

Wildlife - Potential for wildlife viewing. Usually confined to shallow areas providing habitat for waterfowl and moose.

TABLE VI-4

RECREATION POTENTIAL ANALYSIS
QUALITY POINT DISTRIBUTION

Area	Quality Points								
	Slope	Vegetation	Drawdown	Geology	Shoreline Composition	Scenic Potential	Exposure	Potential Deeryard Conflicts	Total
1	1	2	1	2	1	1	2	1	11
2	2	1	1	2	1	1	3	1	12
3	2	1	1	2	2	1	2	1	12
4	1	2	1	2	1	2	2	2	13
5	2	2	2	2	1	1	2	1	13
6	1	2	2	2	2	2	2	1	14
7	1	2	2	2	2	2	3	1	15
8	2	2	3	2	3	3	3	2	20
9	3	3	3	3	3	3	3	2	23
10	3	3	3	3	3	3	2	2	22
11	2	2	2	2	3	2	3	2	18
12	1	3	3	3	3	3	2	1	19
13	2	3	3	3	3	3	1	1	19
14	1	2	2	2	2	2	2	1	14
15	1	3	3	2	3	2	1	2	17
16	1	2	2	2	1	2	1	3	14
17	1	1	2	2	2	1	1	3	13
18	2	3	3	2	2	3	1	3	19
19	1	2	2	2	1	1	1	3	13
20	2	2	1	2	1	1	2	2	13
21	1	2	2	2	1	1	2	2	13
22	2	3	2	2	3	2	3	2	19
23	1	1	1	2	2	2	1	3	13
24	1	3	2	2	1	2	1	2	14
25	2	1	1	3	2	1	1	1	12
26	1	2	1	2	1	1	1	2	11
27	1	1	1	2	1	1	1	2	10
28	3	1	1	2	1	1	2	1	12

TABLE VI-5

RECREATION POTENTIAL ANALYSIS
QUALITY POINT FREQUENCY DISTRIBUTION

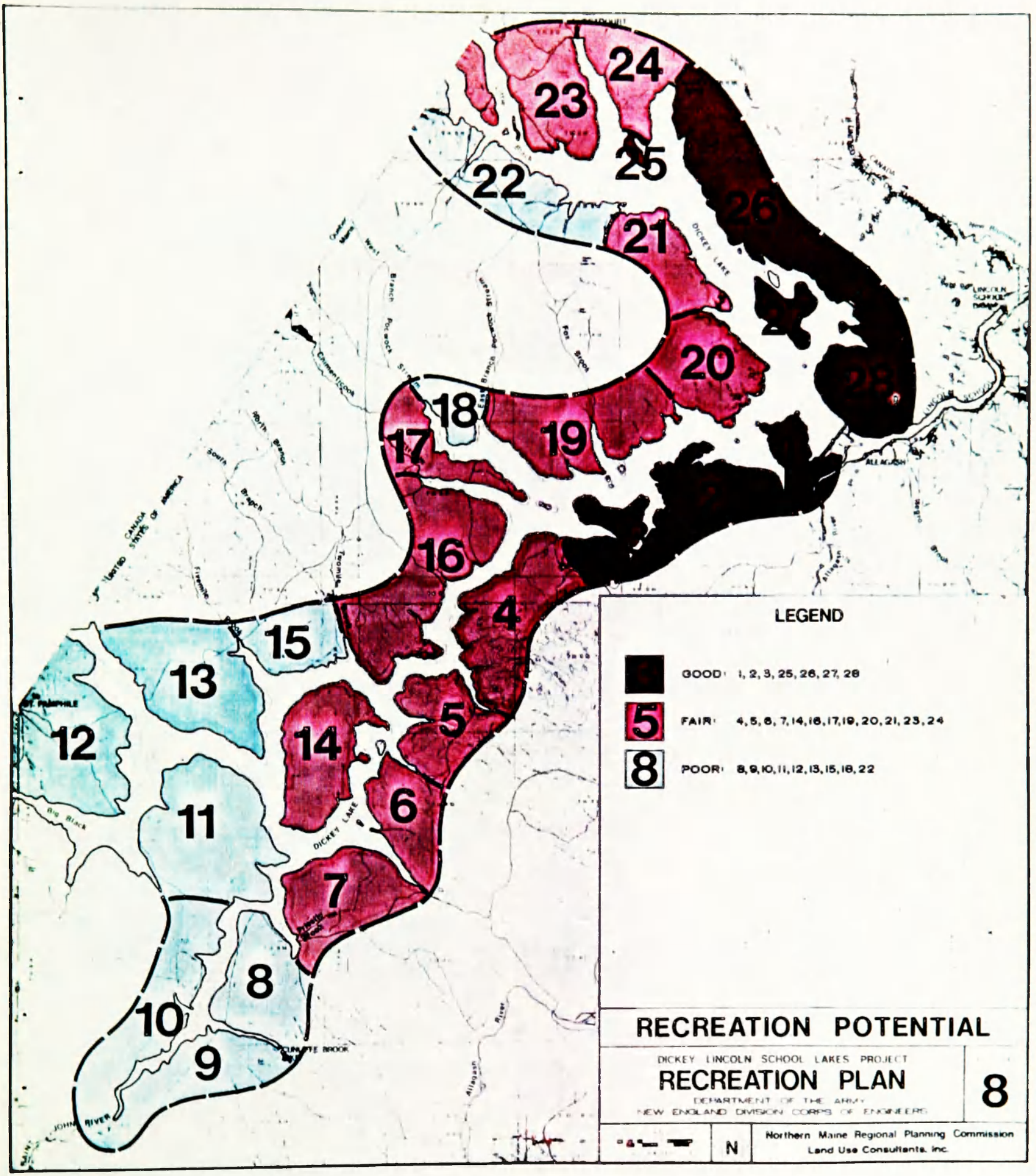
Quality Points	Area	Recreation Potential
9		
10	27	
11	1,26	Good
12	2,3,25,28	
13	4,5,17,19,20,21,23	
14	6,14,16,24	Fair
15	7	
16		
17	15	
18	11	
19	12,13,18,22	Poor
20	8	
21		
22	10	
23	9	
24		

Table VI-6

RECREATION POTENTIAL ANALYSIS
RECREATION USE POTENTIAL

+ Prime Potential
- Secondary or Conditional Potential

Areas	Access	Facilities-Activities												Comments
	Road	Water	Visitor Center	Overlook	Camping/Destination	Camping/Primitive	Swimming Beach	Boat Launch	Boat Landing	Trails	Scenic	Picnic	Wildlife	
Good Potential														Area 1 Prime site for Visitor Center and Destination Camping.
1	+	+	+	+	+	-	+	+	-	+	+	+		
2	-	+	-	+	-	+	-	-	+	+	+	+		
3		+				+			+	+	+	-		
25		+				+			+	-	+			
26		+		+		+			+	+	+	-		
27		+		-		+			+	+	+	-		
28		+		+		-			-	+	+	-		
Fair Potential														Area 2 Best alternative to Area 1 for Destination Camping and related facilities
4	-	+	-		-	+	-	-	-	-	-	-		
5	-	+				-			-	-	-	-		
6	-	-				-			-		-		-	
7	+	-				-			-		-		-	Area 25 Road Access from Estcourt
14		+				+			+		-			
16	-	+	-			+		-	+	-	-	-		
17	-	+				+			+	+	-			Area 28 With Road Access across dam, prime location for Overlook
19	-	+				+			+	-	+	-		
20		+				+			+	+	+	-		
21		+				+			+	+	+	-		
23	+	+				+		-	+	-	-	-		Areas 4 & 16 Ferry to West Side might necessitate contact station and related facilities
24	+	+				-		-	-		-			
Poor Potential														Areas 13, 15-22 Relocation of road from St. Pamphile or Estcourt would provide road access to West Side.
8	+	-				-			-			-	-	
9	-	-										-	-	
10	+	-							-			-	-	
11		-				-			-		-		-	
12	+	-				-		-	-			-	-	
13	-	-											-	
15	-	-				-			-		-			
18	-	-												Area 16 Ferry to West Side might necessitate contact station and some Intensive Facilities
22	-	-				-			-		-			
														Area 23-24 Road Access from Estcourt


LEGEND
GOOD: 1, 2, 3, 25, 26, 27, 28
FAIR: 4, 5, 6, 7, 14, 16, 17, 19, 20, 21, 23, 24
POOR: 8, 9, 10, 11, 12, 13, 15, 18, 22
RECREATION POTENTIAL
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
8
N
Northern Maine Regional Planning Commission
Land Use Consultants, inc.

6.10 Cultural and Demand Determinants for Recreational Facilities

6.10.1 Forestry

Forestry is generally very compatible with outdoor recreation, and is often associated with many recreational activities. Ownership and management of project area lands by timber interests has, and would continue, to preserve the remote character of the project area which is so important to all forms of recreation within the area. The selective harvesting method of forest regeneration now used in the project area is one of the most compatible methods that can be used on and near recreation lands. Overall recreational use in the project area is not likely to be limited by forest harvesting operations. On-going cutting operations at specific sites would limit recreational use on a local basis for safety reasons.

Because of the importance of the forest industry to the culture and economy of Northern Maine, a forest management demonstration area is planned as part of the trail system in the intensive use area. Its primary purpose would be to familiarize project visitors with sound forest management principles and techniques employed in professional forest management. This would be accomplished by dividing an area of forest into blocks of approximately equal size (2-5 acre blocks). Different types of timber cutting practices would be prescribed for selected blocks, such as selective cutting, clearcutting, shelter-wood, and seed tree cutting systems. These management techniques and appropriate cutting schedules would then be applied in selected demonstration blocks so that visitors could easily observe and compare the results. The visitors should be able to see the effect which the various practices have and to observe natural ecological succession. This would serve as an important interpretation of forestry in Northern Maine. Descriptive signs and brochures would be necessary to help visitors interpret what they are seeing.

6.10.2 Projected Recreation Use

Existing patterns in recreational use of the project area would change to a considerable degree if the proposed dams are built. With the recommended minimal facility development, uses such as hunting, stream fishing, primitive camping, and canoeing would be less than if the project were not constructed. Water-oriented activities such as lake fishing, pleasure boating, swimming, picnicking, family camping, and sightseeing would attract visitors if the full recreation facility development were to be provided in the future. If this was the case, the day activities of sightseeing, picnicking and recreational boating would occur primarily from June - August on Dickey Lake. The main

attractions for these recreationists would include the large, deep lake, and one of the largest dams in the world. A large proportion of these recreationists would engage in the above activities as part of an extended vacation trip during which they would stay for one or more nights at the project before leaving for their next destination. Therefore, a sizeable number of recreationists engaged in day use activities may in fact live well outside the boundaries of the day use market area.

Camping use would shift from the existing primitive type of camping toward the "family" type of camping, although both primitive and family camping would occur in the project area. Camping use would also peak in the June - August period, but would begin in May and extend through November because it would provide an important means of accomodation for fishermen in the spring and summer, and hunters during the fall.

Fishing would be more lake oriented than at present, with many fishermen using boats. Stream fishing for native brook trout would still be likely to remain popular even though stream fishing opportunities would be reduced as streams are flooded by the impoundment. Early season fishing would be likely to increase slightly, associated with ice-out on the lake.

Hunting would remain similar in character to that presently existing with upland game species such as deer, bear, grouse and woodcock preferred. Waterfowl hunting may increase in importance as waterfowl habitat is created in shallow, shoreline portions of Dickey Lake. The loss of over 86,000 acres of forestland including nearly half of the existing deer yards and the corresponding reductions in wildlife populations would result in the concentration of hunters in a smaller area, competing for less game than is now available. The reduction in the quality of the hunting experience due to the impoundment would offset the normally expected increase in hunting visitor-days.

White-water canoeing as it now exists would virtually be eliminated within the project area. Limited but relatively insignificant canoe tripping may continue to exist on the St. John River above Nine-Mile Bridge. Dickey Lake would be unsuited to canoe tripping, and only localized, in-shore use of canoes would be safe.

With the increased recreational use which could be anticipated if the full recreation facility development is built, recreation facilities should be provided to meet the demand. An information area and easily accessible scenic overlook areas would be needed to accommodate sightseers, and picnic tables, parking lots, hiking and nature interpretation trails would be needed to support these other facilities. Swimmers would need a beach area with toilet and changing areas, and recreational boaters and fishermen would need boat ramps and parking to gain access to the lake. A destination campground would be needed to serve the family type of campers including the conveniences of restrooms, hot and cold running water, electrical hookups, and solid waste stations.

Remote or outpost campsites would also be needed to serve wilderness enthusiasts, replace lost North Maine Woods Association campsites and provide emergency shelter during stormy weather. These remote sites should be sited on or near the lake shoreline so they are readily accessible by boat. All of these facilities would be designed to protect the health and safety of the general public while minimizing potential environmental impacts.

6.11 Determination of Recreation Facility Needs

6.11.1 Introduction

Recreational facility needs, in addition to the recommended minimal facilities, should the full recreation development be desired in the future, have been determined based upon recreational use projections agreed to and coordinated with the State of Maine and the Heritage Conservation and Recreation Service. Facilities are designed to support the maximum number of users expected at any one time on an average peak day during the recreation season, that is the peak number of users. A peak day is that day when participation is at a maximum. There may be several peak or near-peak days during any one season.

This approach to recreation facility planning is consistent with that utilized by the Maine Bureau of Parks and Recreation in its Statewide Comprehensive Outdoor Recreation Plan (S.C.O.R.P.) for Maine. The method assumes that it is unreasonable to try to meet the maximum possible use of a particular facility, but that it is practical to meet the expected peak use on an average peak day. This way, the facilities would only be crowded on a very few days during the season. A detailed description of how the methodology works and the rationale behind it can be found in the Maine Statewide Comprehensive Outdoor Recreation Plan published by the Bureau of Parks and Recreation.

6.11.2 Determining the Peak Number of Users

The peak number of users for a given facility depends upon the projected number of visitor-days for the season, the percentage of visitors using a given facility, the number of peak days in the season, the percentage of seasonal use which occurs on peak days, and the daily turnover factor for that facility or activity. The daily turnover factor is the number of times during a day that the user population at a facility is replaced by new individuals. Table VI-7 gives the values for the number of peak days, percent of use on peak days, and daily turnover factors by activity. These were the values used to determine the peak number of users expected at project area facilities.

TABLE VI-7

PEAK DAY USE ASSUMPTIONS BY ACTIVITY

Activity	Number of Peak Days	Percent of Use on Peak Days	Daily Turn-Over Factor
Camping	25	35	1.0
Swimming	7	34	1.2
Boating	10	33	2.0
Sightseeing	10	25	6.0
Picnicking	10	25	2.0

No peak use assumptions were provided for hiking because projected hiking use could not be isolated from the "Day Activities" category in the recreation use projections with the impoundment. Those hiking facilities proposed are intended to provide safe, well marked routes for foot travel between developed recreation facilities rather than to meet a projected demand for hiking trails.

No peak season standards were available for hunting from the Maine Statewide Comprehensive Outdoor Recreation Plan or the Maine Department of Inland Fisheries and Wildlife. Therefore, hunting was not included as part of these facility need projections. However, because hunting occurs during the fall season after the summer recreation peak, and hunters would require only camping and perhaps boat launching facilities already provided for other recreationists, leaving hunters out of the analysis does not affect the final facility need projections.

Peak number of users were determined for project facilities by using the above values in the following general equation:

$$\text{Peak Number of Users} = \frac{\text{Projected Use for the Activity} \times \text{Percent of Recreationists Using the Facility} \times \text{Percent of Use on Peak Days}}{\text{Number of Peak Days} \times \text{Daily Turnover Factor}}$$

The percent of recreationists using the facility is 100% for camping, 33% of the day activity projected visitation for swimming, 10% of day activities for recreational boating, 57% of fishing for fishermen boating, 57% of day activities for sightseeing and 25% of sightseeing for picnicking (14.25% of day activities). The peak day assumptions used generally conform to those presented in the most recent 1977 Statewide Comprehensive Outdoor Recreation Plan for Maine. In a few instances, daily turnover factors were adjusted from those provided in the S.C.O.R.P. to meet conditions which would prevail at the project area if conditions are

significantly different from the average for Maine.

Table VI-8 gives the projected peak day number of users by activity for the project area. Those activities considered in this table are the activities for which adequate data were available to make projections.

TABLE VI-8

PEAK DAY NUMBER OF USERS BY ACTIVITY

Activity	1990	2000	2010	2020	2030
Camping	74	99	134	181	242
Swimming	184	247	333	447	601
Boating:					
Recreational	23	31	41	55	74
Fishermen	20	24	29	36	43
Sightseeing (Visitor Center & Overlook)	33	44	59	80	107
Picnicking	25	33	44	60	80

6.11.3 Design Criteria

Once the peak number of users is known, the actual facility requirements to satisfy the recreation needs at the project area could be calculated by applying the Bureau of Parks and Recreation design criteria contained in the S.C.O.R.P.

The criteria used in determining project area facility requirements are as follows:

Activity	Standard
Camping	4.0 campers/site 3.5 campsites/acre

Activity	Standard
Camping (Cont.)	20 supporting acres per developed acre
Swimming	1.0 swimmers/foot of beach 4.0 swimmers/car 450 sq. ft./car 25% swimmers will use picnic tables 1.5 turnover factor on picnic tables near beach 4.0 acres of land/100 ft. of beach
Boating	3.0 recreational boaters/boat 80% of fishermen will use boats 2.5 fishermen/boat 40 cars or boats/ramp 1.0 acres/ramp (minimum)
Visitor Center and Overlook Area	3.3 sightseers/car
Picnicking	25% of sightseers will picnic 3.3 picnickers/car 450 sq. ft./car 1 picnic unit/car 10 picnic units/developed acre 10 supporting acres/developed acre

The above design criteria were used in the equations shown in Table VI-9 to calculate facility needs for selected years at the proposed Dickey-Lincoln project.

6.11.4 Recreation Facilities Needed

The results of the equations used to convert peak number of users to facility requirements with the preceeding design criteria are presented as follows:

TABLE VI-9

FACILITY NEED CALCULATIONS

A. Camping Facilities

(1) Design No. Campers = $\dfrac{\text{Projected Camping Use} \times 0.35 \quad \text{(percent of activity on peak days)}}{25 \text{ peak days}}$

A. Camping Facilities (cont.)

(2) No. Campsites Needed = $\frac{\text{Design No. Campers}}{\text{4 campers/campsite}}$

(3) No. Developed Acres = $\frac{\text{No. Campsites needed}}{\text{3.5 campsites/acre}}$

(4) No. Supporting Acres = No. Developed Acres X 20 Supporting Acres per developed acre

(5) Total Acres Needed = No. Developed Acres + No. Supporting Acres

B. Swimming Facilities

(1) Design No. Swimmers = $\frac{\text{Projected Swimming Use} \times 0.34 \text{ (percent of activity on peak days)}}{\text{7 Peak days} \times 1.2 \text{ Daily Turnover Factor}}$

(2) Feet of Beach Needed = $\frac{\text{Design No. Swimmers}}{\text{1 swimmer/foot of beach}}$

(3) Parking Spaces = $\frac{\text{Design No. Swimmers}}{\text{4 swimmers/car}}$

(4) Picnic Units = $\frac{\text{Parking Spaces} \times 0.25 \text{ (percent of swimmers to use picnic tables)}}{\text{1.5 picnic table turnover factor}}$

(5) Acres Beach Area Needed = Feet of Beach Needed X $\frac{\text{4 acres land}}{\text{100 Ft. of Beach}}$

(6) Acres Parking Area = $\frac{\text{Parking spaces x 450 sq. ft./space}}{\text{43,560 sq. ft./acre}}$

(7) Total Acres Needed = Acres Beach Area Needed + Acres Parking Area

C. Boating Facility Need Calculations

(1) Design No. Rec. Boaters = $\frac{\text{Projected Boating Use} \times 0.33 \text{ (percent of activity on peak days)}}{\text{10 peak days} \times 2.0 \text{ daily turnover factor}}$

(2) Design No. Boat Fishermen = $\frac{\text{Projected Fishing Use} \times 0.80 \text{ (percent of fishermen using boats)} \times 0.33 \text{ (Percent of activity on peak days)}}{\text{14 peak days x 2.0 daily turnover factor}}$

C. Boating Facility Need Calculations (Cont.)

(3) Parking Spaces = $\frac{\text{Design \# Boaters}}{\text{3.0 boaters/car or boat}} + \frac{\text{Design No. Boat Fishermen}}{\text{2.5 Fishermen/car or boat}}$

(4) Boat Launch Ramps = $\frac{\text{Parking Spaces}}{\text{40 cars or boats/boat ramp}}$

(5) Acres Needed Minimum = Boat Launch Ramps X 1.0 Acres (minimum) boat ramp

D. Visitor Center and Overlook Area Facilities

(1) Design No. Sightseers = $\frac{\text{Projected Sightseeing Use X 0.25 (percent of activity on peak days)}}{\text{10 peak days x 6.0 daily turnover factor}}$

(2) Parking Spaces = $\frac{\text{Design No. Sightseers}}{\text{3.3 sightseers/car}}$

E. Picnic Area Facility Need Calculations

(1) Design No. Picnickers = $\frac{\text{Projected Sightseeing Use X 0.25 (percent of sightseers that will picnic) X 0.25 (percent of activity on peak days)}}{\text{10 peak days x 2.0 daily turnover factor}}$

(2) Parking Spaces or Picnic Units = $\frac{\text{Design No. Picnickers}}{\text{3.3 picnickers/car}}$

(3) Developed Acres = $\frac{\text{Picnic Units}}{\text{10 picnic units/acre}}$

(4) Supporting Acres = Developed Acres X 10 supporting acres/developed acre

(5) Total Acres = Developed Acres + Supporting Acres

The results of the facility needs calculations for the proposed Dickey Lincoln project are presented in Table VI-10. These facility need projections are summarized for selected years following impoundment.

TABLE VI-10

Recreation Facility Needs for Selected Years

Year		1990	2000	2010	2020	2030
Type Facility	Formula No.					
A. Campground						
Total Visitor Days		5,300	7,100	9,600	12,900	17,300
Design No. Campers*	(1)	74	99	134	181	242
No. Campsites Needed	(2)	19	25	34	45	61
No. Developed Acres	(3)	6	7	10	13	17
No. Supporting Acres	(4)	120	140	200	260	340
Total Acres Needed	(5)	126	147	210	273	357
B. Swimming						
Total Visitor Days		4,554	6,105	8,217	11,055	14,850
Design No. Swimmers*	(1)	184	247	333	447	601
Feet of Beach Needed	(2)	184	247	333	447	601
Parking Spaces	(3)	46	62	83	112	150
Picnic Units	(4)	8	10	14	19	25
Acres Beach Area	(5)	7	10	13	18	24
Acres Parking Area	(6)	1	1	1	1	2
Total Acres Needed	(7)	8	11	14	19	26
C. Boating						
Total Boating Visitor Days		1,380	1,850	2,490	3,350	4,500
Total Fishing Visitor Days		2,100	2,500	3,100	3,800	4,600
Design No. Rec. Boaters*	(1)	23	31	41	55	74
Design No. Boat Fishermen*	(2)	20	24	29	36	43
Parking Spaces	(3)	16	20	26	32	42
Boat Launch Ramps	(4)	1	1	1	1	1
Acres needed (minimum)	(5)	1	1	1	1	1
D. Visitor Center						
Total Visitor Days		7,866	10,545	14,193	19,095	25,650
Design No. Sightseers*	(1)	33	44	59	80	107
Parking Spaces	(2)	10	13	18	24	32

Recreation Facility Needs for Selected Years (Cont.)

Year		1990	2000	2010	2020	2030
Type Facility	Formula No.					
E. Picnicking						
Total Visitor Days		1,967	2,636	3,548	4,774	6,413
Design No. Picnickers*	(1)	25	33	44	60	80
Parking Spaces	(2)	8	10	13	18	24
Picnic Units	(2)	8	10	13	18	24
Developed Acres	(3)	0.8	1.0	1.3	1.8	2.4
Supporting Acres	(4)	8	10	13	18	24
Total Acres Needed	(5)	9	11	14	20	26

* Design Number = peak number expected to use given facilities at any one time on an average peak day during the peak season

6.12 Recommended Development Plan

As the character of the St. John River would change within the project area, so would its recreational potential. Recreation would change from "roughing it with the boys" and meeting nature on its own terms to more family activities utilizing the technology and projects of an urban society. Recreationists would still be able to enjoy the remoteness and solitude of the Maine woods, but with the assurance that the amenities of civilization are close at hand. Canoeing and stream fishing would be replaced by power boating and lake fishing, and hunting grounds would be relocated. Located at the confluence of the St. John and the Little Black arms of the lake, the dam and public access would become a natural focal point for virtually all recreation activities except perhaps for hunting and stream fishing. Motor boats would make any point on the lake accessible within the span of a single day. And, the highly irregular character of the lake shoreline would offer a wide range of new opportunities to both recreational boaters and boat fishermen.

6.12.1 Recreation Concept

The recreation concept as illustrated in Figure 9, Recreation Concept, is a function of the inherent characteristics of the proposed impoundment together with its surrounding land mass, and of the recreational use projections as contained in Chapter V. The concept plan reflects the following conclusions relative to recreational uses:

a. The dam site and the peninsula adjoining and northwest of the dam would become the focal points for most all recreational uses other than for hunting and stream fishing should the full recreational development be proposed in the future. Only minimal recreation facilities are recommended at this time.

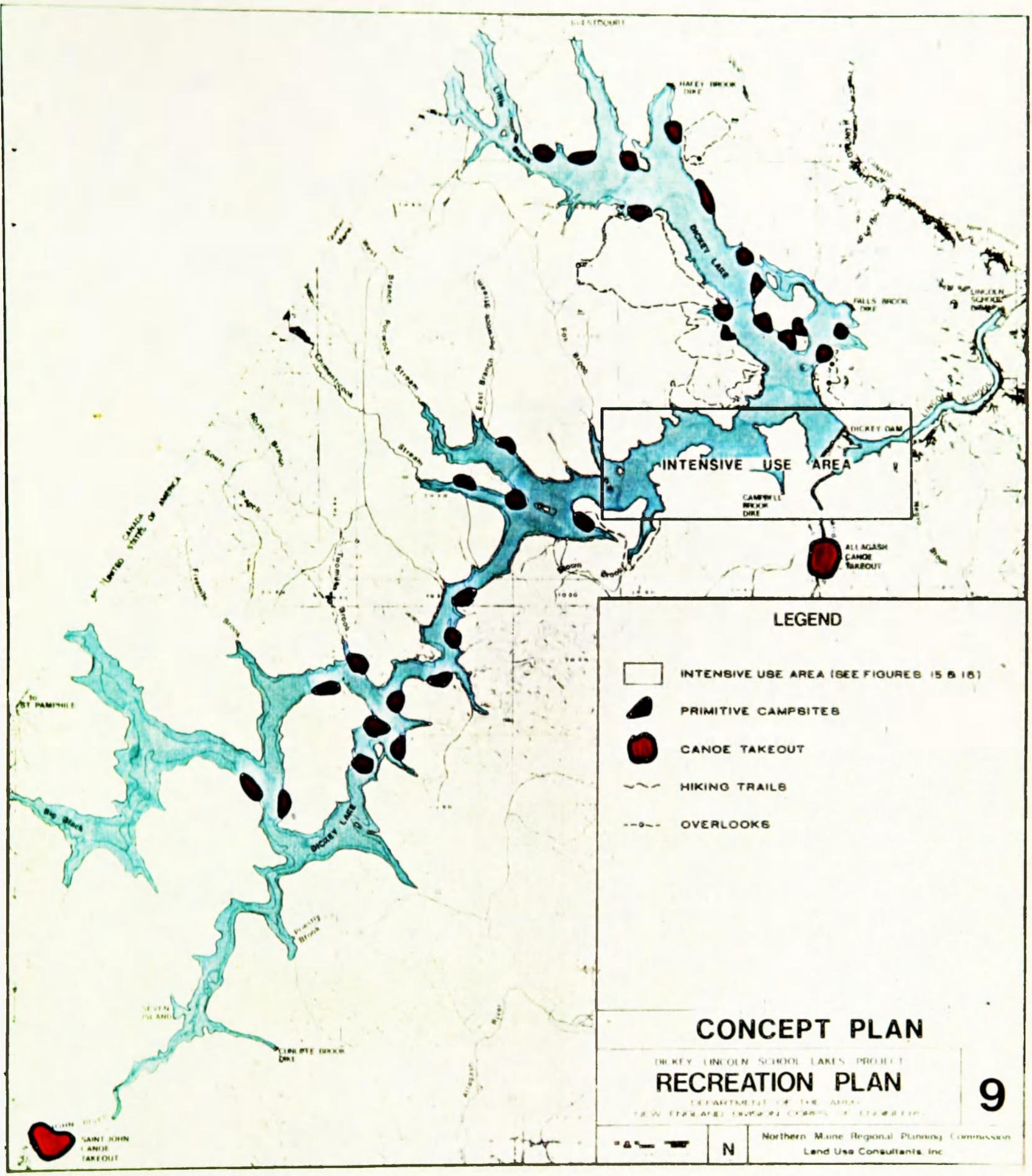
b. With the construction of Dickey Lake, primary recreational uses would consist of day activities including sightseeing, picnicking and motor boating with the full recreation development.

c. Although picnicking, swimming, hiking, nature viewing, casual fishing from both the shore and boats, and sightseeing may account for a significant percentage of total recreational use within the project area, they are likely to occur as incidental to or in support of those activities listed in "b" above if the full recreation development should be undertaken at some time in the future.

Based upon the above conclusions, the Recreational Concept Plan includes four major components for the potential full recreation development.

a. Intensive Use Area

The intensive use area is proposed to be located at and adjacent to the Dickey Dam and contain these facilities:


INTENSIVE USE AREA
DICKEY DAM
ALLAGASH CANOE TAKEOUT
SAINT JOHN CANOE TAKEOUT
DICKEY LAKE
LINCOLN SCHOOL LAKES
LEGEND
INTENSIVE USE AREA (SEE FIGURES 15 & 16)
PRIMITIVE CAMPSITES
CANOE TAKEOUT
HIKING TRAILS
OVERLOOKS
CONCEPT PLAN
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
N
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Visitor Center
Scenic Overlooks
Picnic Facilities
Boat Launch
Swimming Beach
Destination Campground
Trails
Demonstration Forest

b. Group Camping Facilities

These would be apart from the destination campground yet readily accessible by boat or haul roads. Group facilities would include tent pads or lean-tos, picnic shelter, well point and/or hand pump, a large common fireplace, privies, and boat landing.

c. Primitive Campsites

Primitive campsites would be remote from the intensive use area, accessible by boat or trail and designed to provide a remote wilderness environment to those seeking that experience. Facilities would include a tent-site or lean-to, picnic table, fireplace, privy and boat landing.

d. Canoe Take-Out Facilities

Canoe take-out facilities would be necessary to get canoeists off both the Allagash and the St. John Rivers before entering the impounded area. Facilities would include those similar to primitive campsites, plus road access and parking area.

The proposed minimal recreation facility development recommended at this time should the project be constructed consists of only the visitor center, scenic overlook and the two canoe take-out areas.

6.12.2 Alternative Plans

The range of alternatives with respect to the types of activities and facilities at the project are limited due to land ownership patterns, access to the impoundment, and non-commercial public outdoor recreation activities which are consistent with the 1977 Maine Statewide Comprehensive Outdoor Recreation Plan. Alternatives do exist, however, with respect to the location of facilities for the full recreation development within the intensive use area.

Three alternative plans for the intensive use area were considered. They are shown in Figure 10, Intensive Use Alternatives. Alternate A is the preferred plan of development. A comparison of the advantages and disadvantages of each alternate plan is contained in Table VI-11.

6.12.3 Recommended Full Recreation Development Plan

6.12.3.1 Intensive Use Area Plan

The recommended plan for full recreation facilities within the intensive use area is shown in Figure 11, Intensive Use Area Plan. This plan was selected as being the optimal balance among the relative advantages and disadvantages of the alternate plans and their various combinations. The locations indicated for the various facilities are those most generally propitious to the facilities provided.

The visitor center presents the most difficult siting problem. There is no site which could be considered clearly the best location as to access, proximity to dam operations, view potential, and which also has ample space and slopes suitable for the structure itself, parking, and related facilities. The area between the South Dike and the South Dam was selected as the best of available alternatives, subject to the following conditions:

A. Construction of an observation platform, presumably integral to the visitor center itself, from which views of the entire damsite area are possible. This site offers the best vantage point for views of both sides of the dam, the lake and of the valley below the dam.

B. A mini-bus to transport sightseers across the dam to and from the area of the intake, spillway and powerhouse. In addition to offering a truly dramatic visual experience as the bus crosses the dam, this arrangement would provide an effective means of visitor control away from the powerhouse.

6.12.3.2 Development Plan

The preferred Development Plan, Figure 12, places the intensive use area plan in context with the concept plan contained in Figure 9 and integrates all activities for which facilities would be constructed.

The Development Plan responds to the projected recreational use discussed in Chapter V. It also provides:

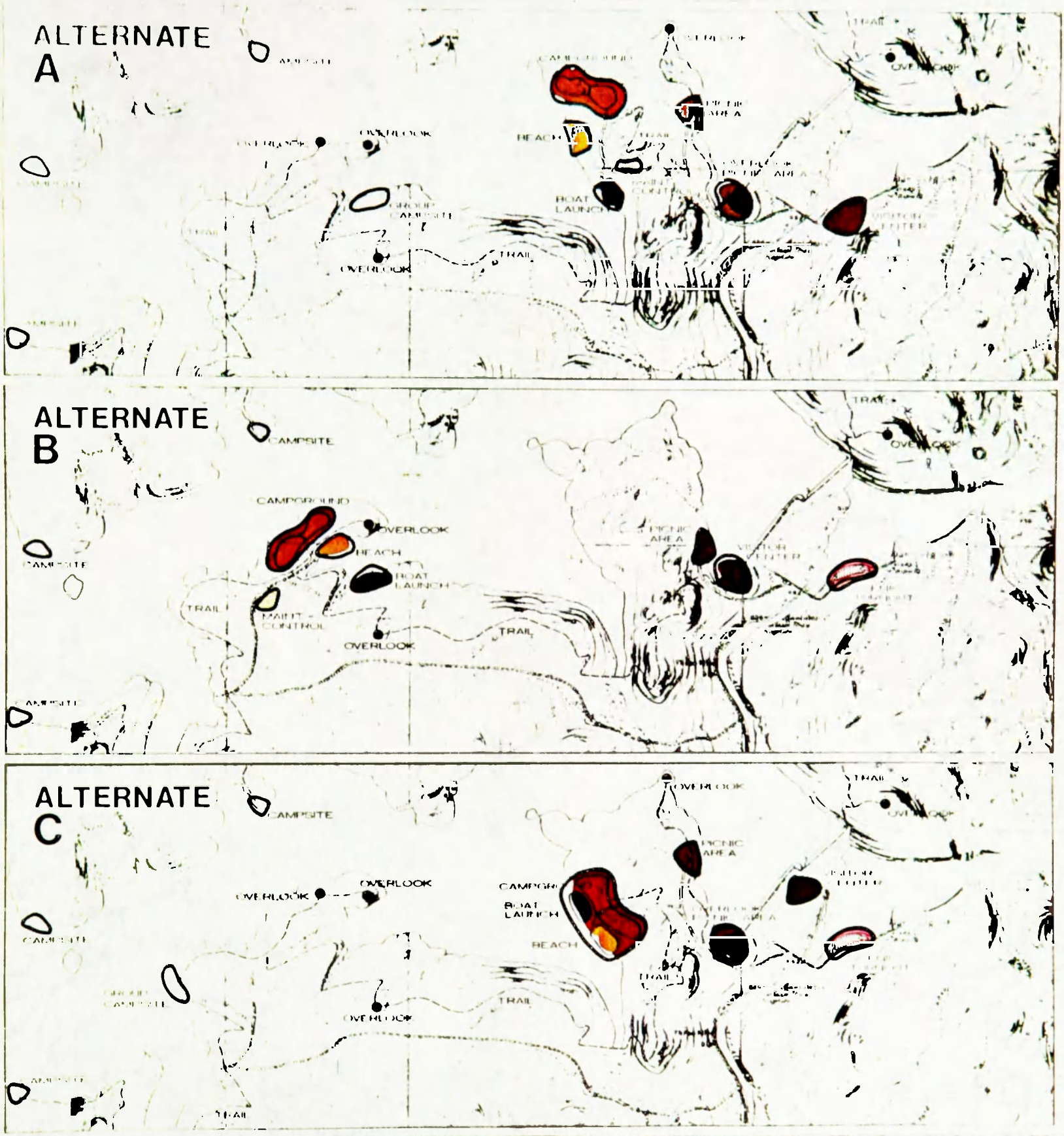
a. Efficiency of operation and management.

b. Appeal to the wide range of recreational users indicated by market and use projections.

c. Dispersion of facilities to avoid the appearance of congestion.

d. Harmonious siting of facilities in keeping with a semi-wilderness setting.

e. A retention of the essential values to be derived from the quiet solitude of woods and water far removed from the intrusion of the transient moods and pressures of modern society.



LEGEND

- EXISTING ROADS TO BE USED
- NEW OR IMPROVED ROADS
- ACTIVITY SITE
- PARKING
- HIKING TRAIL
- OVERLOOK

INTENSIVE USE ALTERNATIVES

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

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TABLE VI - 11

COMPARISON OF ALTERNATE PLANS

Advantages	Disadvantages
Alternative A	
Visitor Center Affords Full View of Dam	Distance of Visitor Center from Dam
Visitor Center Located on Major Access Road	Visitor Center Poorly located for Dam Tours
Good Exposure for Beach and Camping	Visitor Center Conflicts with Proposed Relocation of Town
Dispersed but Integrated Facilities	Land Acquisition
Sun Exposure for Beach and Campground	Poor Visitor Control
Group Campsite in Sheltered Cove	Boat Launch and Beach Exposure to Wind
Alternative B	
Views from Visitor Center	Potential Siting Constraints for Visitor Center
Visitor Center Well Located for Tours	Distance of Visitor Center from Operational Center of Dam
Sun Exposure for Beach	Land Acquisition
Protected Cove for Boat Launch and Beach	Conflicts with Logging Haul Road
Route 161 Scenic Turnout Full View of Dam	Dispersion and Lack of Visitor Control
	Cost of Road Improvement and Maintenance
Alternative C	
Good Visitor Control	Siting Constraints for Visitor Center and Related Parking Facilities
Clustered Facilities	Poor View of Dam from Visitor Center
Visitor Center Centrally Located for Tours	Potential Conflicts between Dam Operations and Visitors
Cost of Visitor Center Shared with Operational Facilities	Potential Conflicts from Over-Concentration of Facilities
Route 161 Scenic Turnout Full View of Dam	Site Modification to Accommodate Concentrated Facilities
Sun Exposure for Beach and Campground	Limited Potential for Future Expansion
*Land Acquisition	Boat Launch and Beach Exposure to WIND
Minimum Road and Utility Construction	

* Land acquisition is an advantage because less land must be acquired in fee than for the other alternatives.

LEGEND

- EXISTING ROADS TO BE USED
- NEW OR IMPROVED ROADS
- ACTIVITY SITE
- PARKING
- HIKING TRAIL
- OVERLOOK

INTENSIVE USE AREA PLAN

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

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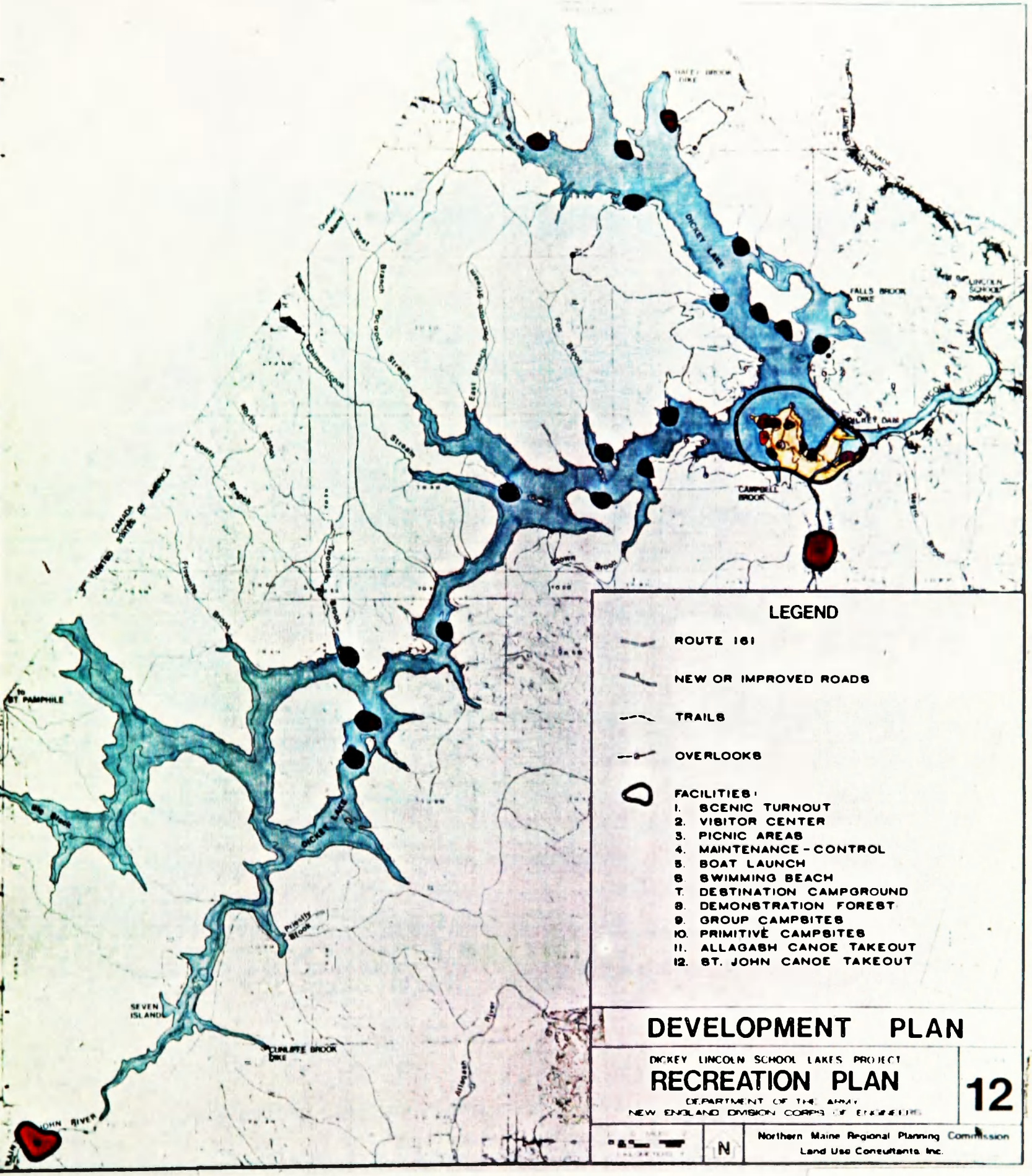
LEGEND
ROUTE 161
NEW OR IMPROVED ROADS
TRAILS
OVERLOOKS
FACILITIES:
1. SCENIC TURNOUT
2. VISITOR CENTER
3. PICNIC AREAS
4. MAINTENANCE - CONTROL
5. BOAT LAUNCH
6. SWIMMING BEACH
7. DESTINATION CAMPGROUND
8. DEMONSTRATION FOREST
9. GROUP CAMPSITES
10. PRIMITIVE CAMPSITES
11. ALLAGASH CANOE TAKEOUT
12. ST. JOHN CANOE TAKEOUT
DEVELOPMENT PLAN
DICKEY LINCOLN SCHOOL LAKES PROJECT
RECREATION PLAN
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS
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N
Northern Maine Regional Planning Commission
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DICKEY LAKE
FALLS BROOK DIKE
CAMPBELL BROOK
SEVEN ISLAND
CARLISLE BROOK DIKE
ST JOHN RIVER
CANADA
UNITED STATES OF AMERICA

Chapter XI contains a detailed breakdown of the supporting elements and utilities needed for the proposed facilities.

In the final analysis, various agreements between and among private landowners, the Federal Government and the State of Maine would determine the nature and extent of facilities to be provided, and the management policies and responsibilities by which they would be administered. This recommended development plan would serve to provide a framework for those decisions and for the more intensive recreational site planning which may follow.

6.13 Land Acquisition for Recreation

The following recommendations are made relative to acquisition of land and/or cooperative arrangements between land owners, the State and the Federal government. Figure 13, Acquisition Map, illustrates these recommendations.

6.13.1 Intensive Use Area

Purchase in fee simple of the peninsula adjacent to and northwest of the Dickey Dam. The recommended purchase encompasses approximately 2,080 acres which would be needed if the full recreation development were to be implemented.

6.13.2 Primitive and Group Campsites

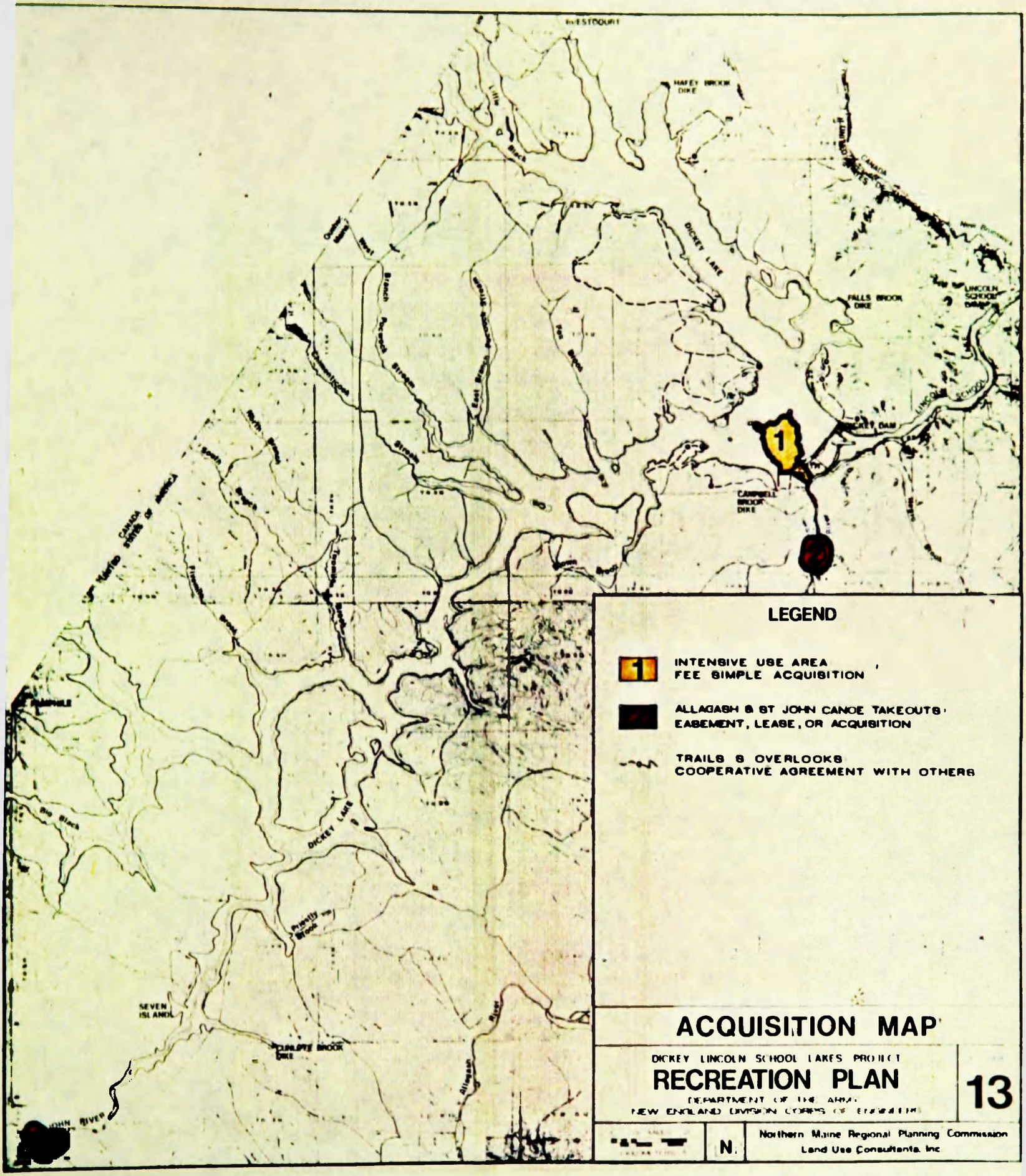
These facilities can all be accommodated within the normal acquisition line of the project. No additional purchases are recommended.

6.13.3 St. John and Allagash Canoe Take-Out Areas

It is recommended that these two take-out areas be located at Nine-Mile Bridge and near the upper end of the Lincoln School impoundment on the Allagash River. Some sort of cooperative agreements must be made with the landowners for the development, maintenance, and use of these take-out areas. The costs of these two take-outs are included as "Project Costs" (minimal facilities) in the cost estimates provided in Chapter XI.

6.13.4 Trails and Overlooks on Private Land

It is recommended that the Federal government enter into cooperative agreements with landowners, North Maine Woods, the State, and possibly with organizations such as the Appalachian Mountain Club, relative to the construction and maintenance of trails and overlooks which are located other than on land acquired by the Federal government. The cost of initial construction has been included in the cost estimates contained in Chapter XI.



LEGEND

1 INTENSIVE USE AREA
FEE SIMPLE ACQUISITION

ALLAGASH & ST JOHN CANOE TAKEOUTS
EASEMENT, LEASE, OR ACQUISITION

TRAILS & OVERLOOKS
COOPERATIVE AGREEMENT WITH OTHERS

ACQUISITION MAP

DICKEY LINCOLN SCHOOL LAKES PROJECT

RECREATION PLAN

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION CORPS OF ENGINEERS

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N.

Northern Maine Regional Planning Commission
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6.14 Fish and Wildlife Enhancement

6.14.1 General

All recreational development in the project area should be designed to promote a maximum level of enjoyment of the fish and wildlife resources. The U.S. Fish and Wildlife Service (USFWS) is planning to prepare a detailed fish and wildlife management plan for the project in cooperation with the agency assigned to manage the lands and waters of the project after the extent and nature of mitigation lands is known.

Currently, little active fish and wildlife habitat management is carried out in the project area because of the large area and low density of recreation use. Perhaps the most influential factor on fish and wildlife in the project area is timber harvesting. The intensity of recreational use associated with Dickey Lake might justify implementation of a more active management plan which works within the limits of the available fish and wildlife habitat. The primary objective of the plan and of all management practices should be to promote as high a level of habitat diversity as is practicable with the existing condition of the land and water resources.

Management of fish and wildlife resources includes more than just preserving wildlife habitat in its natural state. Other management considerations must include artificial propogation and stocking of landlocked salmon or lake trout, cuttings, prescribed burning, and plantings. Habitat protection and preservation is generally employed to favor climax successional stage wildlife species such as moose, woodpeckers, spruce grouse, bear, fisher, marten, bobcat, and lynx. Cutting, burning, and planting are usually done to favor the early successional stage wildlife such as ruffed grouse, songbirds, deer, and snowshoe hare.

6.14.2 Fish Hatchery and Stocking

One of the most urgent management decisions that must be made is which fisheries management alternative to pursue at the project area. As already mentioned, a landlocked salmon fishery would require the construction of a fish hatchery and annual stocking of smolts in order to maintain the fishery. Either landlocked salmon or lake trout must be introduced if the lake fishery is to be enhanced and the project's full recreational potential realized.

6.14.3 Inventory and Regulation of Important Habitats

Efforts should be made to continuously inventory and map all critical fish and wildlife habitats such as: trout spawning and nursery areas, waterfowl and marsh bird nesting and brood rearing areas, heron rookeries, nesting sites of predatory birds, particularly the bald eagle and osprey, deer wintering areas, and both active and inactive beaver flowages. All recreation facility planning, siting, construction and regulation will avoid such areas and discourage detrimental man-wildlife encounters. Regulations may include, but are not limited to adequate trash removal, pet leashing laws, and seasonal restriction of individual

road or trail use during stressful seasons. This could include fall trout spawning seasons, winter deer yarding periods, and spring bird nesting seasons. Prior to any vegetation removal activities such as clearing or thinning, efforts must be made to identify and mark all den or nest trees so that they would not be removed or damaged during the cutting.

6.14.4 Cuttings and Plantings

Measures to favor production of mast and browse producing species such as oak, beech, cherry, ash, dogwood, birch, maple, the conifers, raspberry, blackberry, blueberry, and viburnums should be taken on lands adjacent to development areas. This would be to attract wildlife, particularly songbirds and small game species near the more intensively used facilities such as the visitor center, picnic area, parking lots, roads and trails in order to increase the chances that visitors see native wildlife in a natural setting. Larger game species such as deer, moose and bear should not be encouraged near these areas, however, so that potentially detrimental man-wildlife encounters are avoided. Browse and mast production enhancement could also be employed immediately adjacent to yet not encroaching on known deer wintering areas to improve winter food supplies in these areas. Measures should include release cuttings, to favor mature mast producing trees, plus clearing and/or prescribed burning of blocks or strips of land to favor sprout growth of browse species, and establishment of mast producing species.

Plantings are to be used only in areas disturbed during development activities as part of landscaping and reforestation programs. Hedgerows and buffer strips are to be left or planted whenever possible in and around these areas to provide escape, refuge and travel lanes for songbirds and game birds and mammals. Dense, shrubby thickets should be established along gulleys and drainage swales whenever possible as part of the overall landscaping plan.

6.14.5 Waterfowl Enhancement Opportunities

Because of the possible variation in water level conditions in early spring in the Dickey impoundment, enhancement methods must be utilized to increase waterfowl use of the lake for nesting and feeding. The numerous beaver impoundments and marsh areas located on tributary streams also offer opportunities for enhancement. Nesting boxes could be placed in these areas and possibly even plantings of submergent aquatics made to provide food and cover for waterfowl. Diking of shallow embayments would reduce the variations in water levels within the periodically inundated zone.

6.14.6 Recreational Facilities and Use

Educational displays and programs covering native wildlife species might be provided at the visitor center. In addition, both hunting and fishing will be permitted under State and Federal regulations on those lands not designated for intensive recreational use. This will

allow maximum realization of the project's recreational potential and provide a population regulation tool. Boat access sites will provide fishermen and possibly a few hunters access to Dickey Lake. Roads and trails will allow hunters and stream fishermen access to project area lands and streams.

6.15 Forest Management Opportunities

Any forest management plan developed for the project area lands acquired in fee simple should be directed toward perpetuating aesthetic, ecological, and recreational land values rather than profit oriented sustained yield timber management. The narrow, approximately 300 foot wide band of land acquired along the shoreline of the Dickey and Lincoln School Reservoirs would not lend itself to commercial sustained yield timber management. The value of these lands in retaining soil stability, preventing siltation, providing wildlife habitat and ecological diversity, and preserving visual quality outweigh their value as commercial timber lands.

Vegetation removal, living or dead, on project lands should be done only when the intent is for: urgent disease or insect pest control, fire hazard reduction, construction of project facilities, enhancing wildlife habitat, improving the health and vigor of mature timber stands, insuring public health and safety, or when specific essential uses justify it. Areas designed for low density recreational use would be managed so as to maintain plant species diversity and age structure variability and to preserve or enhance wildlife habitat diversity so that the probability of complete losses from natural causes would be minimized. In areas designated for intensive recreational use, efforts would be made to protect large and interesting trees from damage, and prolong their life. Artificial reforestation of disturbed land areas would be undertaken if natural regeneration is deemed inadequate. Generally, natural regeneration on cutover lands in the project area proves to be more than adequate, however.

The Maine Land Use Regulation Commission would be responsible for regulating forest harvesting practices on lands which are adjacent to the project. Control of cutting practices on land adjacent to project area access roads, and near water courses and water bodies would be especially important to the maintenance of visual, aesthetic, and ecological qualities of the land and water resources in and around the project area.

CHAPTER VII

INDIVIDUAL AND AGENCY COORDINATION

7.0 Introduction

During the preparation of this appendix on the recreational potential of the proposed Dickey-Lincoln School Lakes Project, efforts were made to maintain communications with various Federal, State and local agencies, private organizations and individuals familiar with the project area.

7.1 Citizen Participation

A group of local citizens organized as the Recreation Advisory Committee to the Northern Maine Regional Planning Commission and representing a diverse cross-section of interests in Northern Maine was consulted during the study. This group of approximately 30 people met two times between August of 1976 and January of 1977. At these meetings, the group was provided an opportunity to review the work of the research team. Comments were received regarding the projections of visitation to the project area and the recommended recreational development plan. Those Committee members in attendance endorsed, in principle, the development plan and proposed a phased development process contingent on actual use of the reservoir and its facilities.

Contacts were also made with the forestland owners or their representatives, and the North Maine Woods Association. These parties reviewed the method of assessing the recreational impacts of the project and they offered valuable insights regarding the research work. It should also be mentioned that these individuals provided invaluable statistical data for the projections in this appendix.

7.2 State of Maine

As this study considered all forms of outdoor recreation activities in Northern Maine, it was necessary that the research team develop communications with the various State agencies having expertise in this field. Discussions were held with the Maine Department of Inland Fisheries and Wildlife, both regional and State level personnel, in an attempt to transpose their knowledge of the project area into quantitative figures that would most accurately depict the fish and wildlife resources that would be available in the future.

In the same manner, staff personnel from the Maine Bureau of Parks and Recreation were contacted in order to obtain information regarding participation in outdoor recreation activities in Maine. The 1977 Maine Statewide Comprehensive Outdoor Recreation Plan which has been produced by this agency serves as an important reference in the estimates of recreation demand contained in this report. Communications were also maintained with the Maine Land Use Regulation Commission

and the Bureau of Forestry on specific topics as dictated by the research effort.

7.3 Federal Government

Discussions were held with staff members of the Bureau of Outdoor Recreation (now known as the Heritage, Conservation and Recreation Service) and the U.S. Fish and Wildlife Service, who provided input to this recreation resource appendix.

CHAPTER VIII

SPECIAL PROBLEMS, RECOMMENDATIONS

and

ADDITIONAL CONSIDERATIONS

8.0 Introduction

Preceding chapters dealt in detail with numerous factors that could influence the potential usage of the Upper St. John River for recreational purposes. Until now no effort has been made to present special problems or other considerations as they relate to the recreational development of Dickey-Lincoln School Lakes, nor have recommendations been put forth concerning these potential developments.

Due to the erratic and drastic changes that have occurred within the recreation field in the last two decades, exemplified with the major shift from hotel and motel vacationers to family camping, it is difficult to project what may occur in the next twenty to fifty years. Many of the items to be discussed in this chapter are design considerations that should be dealt with in detail in the final recreation design plans. Other considerations which are outlined in this chapter deal with activities under consideration by the various sections of our economy which would affect the projections stated elsewhere in this appendix.

It should be clear that intent of this chapter is solely to point out special problems and considerations.

8.1 Impact on the Allagash Wilderness Waterway

Throughout the debate on the proposed Dickey-Lincoln School Lakes project, there has been a concern that flooding the St. John River to create Dickey-Lincoln School Lakes may adversely affect the Allagash Wilderness Waterway. As mentioned earlier in Chapter IV, use of the Allagash Wilderness Waterway is presently at or near its institutionally fixed capacity of 50,000 visitor-days per year.

Because the Allagash is so near its capacity, the transfer of any proportion of canoeists to it from the St. John River would force the Allagash to reach its optimum use sooner than it would if the dams were not built. Even though Table IV-3 indicates the Allagash Wilderness Waterway nearly reached capacity in 1972 and 1973, significant drops occurred in 1974 and 1975, which allowed the State of Maine to maintain the status-quo with regards to camping facilities.

Therefore a plan would have to be made by the Allagash Wilderness Waterway Authority for accommodation of more users or limitation of use. In any case, excess visitor-days of canoeing would have to be provided for at alternate resources or they would be lost.

8.2 Canadian Access from Quebec Province

With the impoundment of waters on the Little Black River, flooding would occur back into the province of Quebec, Canada, for a distance of approximately six miles at the occurrence of high water. This situation could have an effect on recreational use by making water access to primary fishing, hunting, and semi-wilderness camping facilities easier. This situation could potentially limit facilities available to recreationists entering the project at Allagash in that assigned sites may be taken by others who have failed to register. Due to the erratic cycle of this occurrence, it appears probable that a method for managing this possible access would far outweigh its benefits, but it should be considered in a management plan. This problem would most appropriately be addressed by working together with the North Maine Woods Association, which would control land access to the western side of the impoundment by means of control gates at Daaquam, Lac Frontiere, St. Pamphile and Estcourt, Quebec.

8.3 Lincoln School Lake Fluctuations

Because of the large water level fluctuations associated with the Lincoln School Lake, there exists no feasible recreational use of that impoundment, and therefore, no recreational development or use is proposed.

Because recreational usage of this portion of the St. John is so informal at the present time, no records are available as to its current usage. It would be necessary to obtain data on current use in order to determine proper mitigation.

8.4 Probable Alternative Recreational Developments

When examining the viability of a project like the proposed Dickey-Lincoln School Lakes, it is also necessary to look at alternative developments that are presently under consideration to determine whether or not these alternate resource developments might also fill the recreation void which could be filled by Dickey-Lincoln School Lakes.

At the present time, the State of Maine through the Department of Conservation, has acquired partial ownership of 7500-8800 acres of land on Squa Pan Lake which is located approximately fifteen miles west of the City of Presque Isle, Maine. Although no definite plans have been made for the development of this resource, consideration is being given to developing it as a major day-use facility, with the possibility of some camping. Any development of this site could substantially affect the potential visitation to the proposed Dickey-

Lincoln School Lakes from the day-use and weekend-use zone.

Additionally, the State of Maine has recognized the need for a major state park facility for Aroostook County and is considering various concepts for the type, location and intensity of any such development. The eventual outcome of this issue is unknown at this time. It is important to note that if such a facility is proposed at a location other than the Dickey-Lincoln Reservoir, it would detract from the projections stated in Chapter IV.

Also, consideration should be given to any expansion plans anticipated for existing state parks located further south in the State of Maine. Because of the project area's unusual distance from major markets, any significant enlargement of intervening facilities would tend to detract from recreational attendance to this more remote area.

8.5 Conflict with other Plans

At the present time the North Maine Woods Association is independently preparing plans for the recreational use of the entire North Maine Woods Area. These plans and others such as the Land Use Regulation Commission's adopted plan for the unorganized areas of Maine are being conducted exclusive of the proposed Dickey-Lincoln School Lakes. The imposition of the Dickey-Lincoln project on their plans could lead to management conflicts.

8.6 Other Issues for Consideration in Final Recreation Design Plans

8.6.1 Traffic Movement

The movement of visitors to the Dickey-Lincoln School Lakes project would be complicated by the fact that there would be essentially only one formal access point, that being by means of Route 161. It is possible that there could be some traffic congestion at intersections near the Dickey Dam.

In the event that formal recreation facilities over and above those minimal facilities initially proposed are desired in the future, then consideration should be given to the separation of day-users from those recreationists intending to utilize the Dickey-Lincoln facilities for destination activities. Proper road design and control booth location would enable the management personnel to collect fees easily and permit even traffic circulation throughout the area.

For several reasons, such as fire control, public security, etc., consideration should be given to restrictions on access to the impoundment via discontinued timber hauling roads which now exist. In a similar manner, restrictions should be placed on off-road vehicular use consistent with the management policies of the North Maine Woods Association.

Special consideration should also be given to the provision of a potential ferry facility at a suitable location to provide access for visitors and forestland owners to the western side of the impoundment.

8.6.2 Security Measures

Due to the immense size of the surface water acreage, miles of shoreline, plus the potential construction of a major "state park" type facility, security and enforcement could be a potential problem. Again, proper design of facilities and access to the impoundment would ease potential man/wildlife conflicts, vandalism, forest fires, floating debris, etc. Special waterway patrol personnel would be essential. Responsibilities and liability would have to be addressed in management discussions between the State of Maine and other appropriate Federal agencies.

8.6.3 Protection of Resources

Because of observations and experience at the Allagash Wilderness Waterway, located adjacent to the Upper St. John River, it is recommended that the use of recreational sites and facilities such as trails and campsites be on a rotational basis to minimize damage to vegetation resulting from recreational use.

8.6.4 Provisions for the Handicapped and Elderly

During the final design studies, recreational facilities should be designed to accommodate the handicapped and elderly, with special attention being given to the dam areas and the intensive recreation area.

CHAPTER IX

MANAGEMENT AND COST SHARING

Management, maintenance and operation of Dickey-Lincoln School Lakes for its authorized purposes will be the responsibility of the Corps of Engineers. Project facilities recommended in the development plan which are considered to be the minimal development necessary for the public health and safety, and which would be provided at Federal cost, include the scenic turnout along the relocated Route 161, the project visitor center and the two canoe takeout areas on the St. John and Allagash Rivers. These facilities would also be operated by the Corps of Engineers and are the only recreation facilities proposed at this time.

The recreation facilities which P.L. 89-72 requires to be cost shared with a non-Federal interest include the picnic area, beach area, destination campground, group campsites, primitive campsites, boat launching area, trails and land acquisition. In 1969, the Governor of the State of Maine indicated a willingness to consider cost sharing recreation facilities. However, the present Governor of Maine's position on the project is awaiting the completion and review of current engineering, economic and environmental impact studies. A positive indication of the State's willingness to participate in the recreational plan is dependent upon the Governor's future position, consideration of the then prevailing State priorities, and availability of funds.

Operation and maintenance of the proposed recreation facilities to be cost shared would also be the responsibility of the State, however, some of the State's recreational development costs may be partially recovered through user fees. A detailed breakdown of costs is contained in Chapter XI.

CHAPTER X

ENVIRONMENTAL QUALITY

10.0 Introduction

The project as a whole affects environmental quality at two levels:

a. Construction of the dam and the impoundment and the resulting effects upon existing and traditional recreational values and uses.

b. Construction and use of recreational facilities intended to replace those destroyed by the project, plus other facilities and uses intended to enhance the recreational values to be derived from the changed environment.

This chapter addresses the environmental impacts resulting from the construction and use of recreational facilities developed pursuant to the project. When taken in context, it is clear that any environmental impacts resulting from the recommended recreation facilities are insignificant indeed when compared with the impact of the project as a whole. The following section discusses measures by which these impacts may be mitigated. As a matter of policy, maintenance of environmental quality would be emphasized in all aspects of planning, development, and operation of project lands and facilities. All buildings, structures, roads, and walkways or trails would be sited and landscaped to follow natural contours and blend with existing terrain. Disturbance of vegetation and soil would be minimized as far as possible. Development and operation must also be planned so as to maximize public utilization of the project land and facilities.

10.1 Siting Considerations

Natural conditions of the land are to be preferred over artificially developed conditions whenever the option is available. Disturbance of natural vegetation and soil always increases the risk of causing excessive runoff and resulting soil erosion. This is particularly true in the project area near Dickey Dam where steep slopes and shallow soils are common. Therefore, all roads, walkways and trails would be constructed as near to natural grade as is possible in order to avoid excessive earth cuts and fills, removal or damage to native vegetation, and excavation for drainage ditches. Drainage diversions must be provided along roads and trails to avoid excessive carrying capacities of ditches or other channelization of runoff.

10.2 Treatment of Disturbed Areas

All disturbed areas must be graded and landscaped to represent natural landforms, and re-seeded, mulched or re-forested as rapidly as possible to stablize slopes and reduce the possibility of stream sedimentation. Vegetated ditches, swales, and subsurface drainage structures would be used before, during and after construction to provide adequate drainage. Natural drainageways would be used whenever possible, and grading would be undertaken to restore proper drainage where it has been altered. Utilities would be placed below ground in intensive use areas such as the campground, visitor center, and swimming areas, and alignments selected to remain compatible with the aesthetics of non-intensive use areas such as along roads and in open space areas.

10.3 Vegetation

Native vegetation contributes to visual quality, reduces surface runoff rates, thus protecting the soil and also provides wildlife habitat. Therefore forestry resources would be retained whenever possible for the benefit of recreationists, and wildlife. Every effort possible would be made to protect trees from unnecessary damage during construction and operation of the project. This may include thinning and pruning of trees in intensive use areas such as campgrounds, picnic areas, and along trails and paths. Adequate buffer strips of natural vegetation would be retained along roads and between intensive use areas, and around parking areas to preserve scenic quality and reduce noise pollution. All landscaping would use native species where possible. Open space areas would be designated and protected from encroachment.

10.4 User Traffic

The thin, glacial till soils found throughout most of the proposed recreational development areas generally cannot withstand heavy vehicular or foot traffic by recreationists. Heavy traffic on such soils often leads to soil compaction and deterioration of vegetation, and possibly would result in serious erosion problems. Therefore placement of gravel or artificial surfaces should be made in areas anticipated to be subjected to heavy user traffic such as: campsites, trails and walkways near the visitor center, paths from parking lots to the picnic area and swimming beach and within picnic areas, paths leading to toilet or bathhouse facilities, around drinking fountains and water faucets, and on any nature interpretive trails. Appropriate measures such as constructing vegetative or artificial fencing and railings in strategic locations would be taken to control visitor circulation and insure that these artificial surfaces are used.

10.5 Architecture

In order that buildings and structures blend with the natural terrain, architectural themes should be primarily rustic, and utilize native materials whenever possible. Signs would also be rustic in character, and limited to the minimum necessary for information, education, and direction of users.

CHAPTER XI

COST ESTIMATE

The following tables are preliminary construction cost estimates for development of the potential recreation facilities considered to be adequate to serve visitors through the year 2000. The tables are summarized according to facility proposed, construction item, unit cost, quantity, and total cost. In the following tables, the abbreviations appear as L.F. (linear feet), L.S. (lump sum) and S.Y. (square yard). A 15-percent increase for construction contingencies and a 20-percent increase for engineering and design (E & D) and supervision and administration (S & A) have been added to the total cost.

Recreation facility costs are grouped according to whether they are "project costs", Tables XI-1 to XI-4, or "recreation costs", Tables XI-5 to XI-12. Those classified as project costs are the minimal facilities necessary to protect human health and safety, and will be paid for by the Federal government in full. Recreation costs are those facilities felt to be an enhancement of existing recreational facilities and are therefore subject to cost-sharing between the Federal government and probably the State of Maine. The only recreation development proposed at this time, should the project be implemented, are the minimal facilities shown as project costs.

Unit cost estimates have been prepared from prevailing 1976-1977 construction costs in northern Maine. Due to the conceptual level of design, cost estimates are "order of magnitude" and do not incorporate cost effective techniques. Economies might be achieved by substituting alternate materials or designs without substantial loss in the overall design intent. Where possible, estimates incorporate the use of native materials and local labor.

Development of full recreation facilities on a cost sharing basis would require acquisition of 2,080 acres of land on the peninsula northwest of the South Dam. An item for land acquisition cost is therefore included in the following tables.

TABLE XI - 1

SCENIC TURNOUT

Item	Unit	Unit Cost	Total Qty.	Total Cost
Parking (Paved)	S.Y.	6	1,167	$ 7,000
Interpretive Sign	L.S.	1,500	1	1,500
Trash Receptacle	Each	50	3	150
Landscaping	L.S.	4,000	1	4,000
Wood Timber Guard Rail	L.F.	5	1	1,500
SUB-TOTAL				$14,150
Contingencies				2,100
1977 Construction Cost				16,250
E. & D. and S. & A.				2,800
TOTAL COST				$19,100

TABLE XI - 2

VISITOR CENTER

Item	Unit	Unit Cost	Total Qty.	Total Cost
Road Improvements	L.S.	10,000	1	$ 10,000
Road Construction (Paved)	L.F.	20	1,600	32,000
Parking (Paved)	S.Y.	6	1,600	9,600
Wood Timber Guard Rail	L.F.	5	875	4,400
Signs	Each	250	3	750
Landscaping	L.S.	10,000	2	15,000
Overlook	L.S.	4,000	1	4,000
Visitor Center Building	S.F.	70	2,150	150,500
Water Supply (drilled well and pressure tank)	L.S.	2,000	1	2,000
Sewage Disposal	L.S.	30,000	2	50,000
Trash Receptacles	Each	50	8	400
Interpretive Signs	Each	1,500	1	1,500
Bituminous Walk	L.F.	3	300	900
Gravel Walk	L.F.	2	500	1,000
SUB-TOTAL				$282,050
Contingencies				42,300
1977 Construction Cost				324,350
E. & D. and S. & A.				56,400
TOTAL COST				$380,700

TABLE XI - 3

ST. JOHN CANOE TAKEOUT

Item	Unit	Unit Cost	Total Qty.	Total Cost
Tent Pads	Each	$ 150	4	$ 600
Picnic Tables	Each	200	8	1,600
Parking (Gravel)	S.Y.	3	700	2,100
Trash Receptacles	Each	50	4	200
Water Supply (Dug well and hand pump)	L.S.	600	1	600
Pit Privy	Each	400	2	800
Fireplaces	Each	100	8	800
Shoreline Clearing	L.F.	4	200	800
Signs	Each	250	3	750
Road Improvements	L.S.	20,000	1	20,000
Landing Area Prep.	S.Y.	2	100	200
SUB-TOTAL				$28,450
Contingencies				4,250
1977 Construction Costs				32,700
E. & D. and S. & A.				5,700
TOTAL COST				$38,400

TABLE XI - 4

ALLAGASH CANOE TAKEOUT

Item	Unit	Unit Cost	Total Qty.	Total Cost
Tent Pads	Each	$ 150	10	$ 1,500
Picnic Tables	Each	200	15	3,000
Trash Receptacles	Each	50	7	350
Fireplaces	Each	100	15	1,500
Water Supply (Dug well and hand pump)	L.S.	600	1	600
Pit Privies	Each	600	4	2,400
Shoreline Clearing	L.F.	4	400	1,600
Landing Area Prep.	S.Y.	2	200	400
Signs	Each	250	3	750
Parking (Gravel)	S.Y.	3	1,400	4,200
Road Construction	L.F.	8	600	4,800
Road Improvements	L.S.	5,000	1	5,000
SUB-TOTAL				$26,100
Contingencies				3,900
1977 Construction Costs				30,000
E. & D. and S. & A.				5,200
TOTAL COST				35,200

TABLE XI - 5

PICNIC AREA

Item	Unit	Unit Cost	Total Qty.	Total Cost
Road Construction (Paved)	L.F.	$ 15	500	$ 7,500
Parking (Paved)	S.Y.	6	500	3,000
Selective Shoreline Clearing	L.F.	4	500	2,000
Picnic Table Site Prep.	Each	50	10	500
Picnic Tables	Each	200	10	2,000
Trash Receptacles	Each	50	10	500
Raised Charcoal Grills	Each	100	10	1,000
Signs	Each	250	2	500
Gravel Walkways	L.F.	2	800	1,600
Water Supply (Drilled well and pressure pump)	L.S.	3,600	1	3,600
Rest rooms	L.S.	14,000	1	14,000
Sewage Disposal System	L.S.	5,000	1	5,000
SUB-TOTAL				$41,200
Contingencies				6,200
1977 Construction Costs				47,400
E. & D. and S. & A.				9,500
TOTAL COST				$56,900

TABLE XI - 6

DESTINATION CAMPGROUND

Item	Unit	Unit Cost	Total Qty.	Total Cost
Paved Access Road	L.F.	$ 20	8,800	$176,000
Gravel Access Road	L.F.	8	5,000	40,000
Campground Road (Paved)	L.F.	15	3,660	54,900
Campsite w/o Elec.	Each	500	9	4,500
Campsite w/ Elec.	Each	900	5	4,500
Picnic Tables	Each	200	14	2,800
Selective Shoreline Clearing	L.F.	4	1,000	4,000
Contact Station (with lights)	L.S.	1,500	1	1,500
Water Supply (drilled well and pressure tank)	L.S.	6,000	1	6,000
Water Lines and Fountains	Per Site	200	14	2,800
Trailer Sanitary Disposal Station	L.S.	9,000	1	9,000
Rest Rooms	Each	30,000	1	30,000
Playfield	S.Y.	4	4,200	16,800
Trash Receptacles	Each	50	14	700
Signs	Each	250	2	500
Electrical Distribution System	L.F.	3	7,000	21,000
Caretaker's House and Service Building	L.S.	45,000	1	45,000
Sewage Disposal System	L.S.	10,000	1	10,000
SUB-TOTAL				$431,500
Contingencies				64,700
1977 Construction Costs				496,200
E. & D. and S. & A.				99,200
TOTAL COST				$595,400

TABLE XI - 7

GROUP CAMPSITES

Item	Unit	Unit Cost	Total Qty.	Total Cost
Tent Pads	Each	$ 150	3	$ 450
Large Masonry Fireplaces	Each	600	1	600
Shelter	Each	1,000	1	1,000
Pit Privy	Each	500	1	500
Water Supply (Drilled well and pressure pump)	Each	3,000	1	3,000
Signs	Each	300	1	300
Picnic Tables	Each	200	3	600
Selective Shoreline Clearing	Per Area	100	3	300
Boat Landing	Per Area	2,000	1	2,000
Road Construction	L.F.	8	4,400	35,200
Leantos	Each	1,600	3	4,800
Trash Receptacles	Each	50	3	150
SUB-TOTAL				$48,900
Contingencies				7,300
1977 Construction Costs				56,200
E. & D. and S. & A.				11,200
TOTAL COST				$67,400

TABLE XI - 8

PRIMITIVE CAMPSITES (In groups of two)

Item	Unit	Unit Cost	Total Qty.	Total Cost
Tent Site Preparation	Each	$ 150	8	$ 1,200
Picnic Tables	Each	200	8	1,600
Fireplace and Grill	Each	100	8	800
Sign	Each	300	4	1,200
Pit Privy	Each	1,800	4	7,200
Water Supply (dug well and hand pump)	Each	700	4	2,800
Boat Landing	Per Site	600	8	4,800
Selective Shoreline Clearing	Per Site	100	8	800
Leantos	Each	1,600	4	6,400
SUB-TOTAL				$26,800
Contingencies				4,000
1977 Construction Costs				30,800
E. & D. and S. & A.				6,200
TOTAL COST				$37,000

TABLE XI - 9

BOAT LAUNCH RAMP & FACILITIES

Item	Unit	Unit Cost	Total Qty.	Cost
Access Road	L.F.	$ 20	2,000	$ 40,000
Parking (Paved)	S.Y.	6	1,500	9,000
Boat Launch Ramps	Each	8,000	1	8,000
Floating Dock	S.F.	12	750	9,000
Signs	Each	250	2	500
Water Supply (drilled well and pressure tank)	L.S.	3,000	1	3,000
Rest Rooms	L.S.	14,000	1	14,000
Trash Receptacles	Each	50	2	100
Sewage Disposal System	L.S.	5,000	1	5,000
SUB-TOTAL				$ 83,600
Contingencies				12,500
1977 Construction Costs				96,100
E. & D. and S. & A.				19,200
TOTAL COST				$115,300

TABLE XI - 10

BEACH AREA

Item	Unit	Unit Cost	Qty.	Total Cost
Access Road	L.F.	$ 8	1,800	$ 14,400
Parking (Gravel	S.Y.	3	3,500	10,500
Timber Guard Rail	L.F.	5	200	1,000
Selective Shoreline Clearing	L.F.	4	100	400
Beach Construction	S.Y.	3	7,000	21,000
Picnic Table Area Prep.	Per Site	50	10	500
Gravel Walkways	L.F.	2	150	300
Picnic Tables	Each	200	10	2,000
Raised Charcoal Grills	Each	100	10	1,000
Trash Receptacles	Each	50	16	800
Water Supply (drilled well and pressure tank)	L.S.	3,000	1	3,000
Signs	Each	250	2	500
Rest Rooms	Each	30,000	1	30,000
Sewage Disposal System	L.S.	10,000	1	10,000
SUB-TOTAL				$ 95,400
Contingencies				14,300
1977 Construction Costs				109,700
E. & D. and S. & A.				21,900
TOTAL COST				$131,600

TABLE XI - 11

HIKING TRAIL CONSTRUCTION

Item	Unit	Unit Cost	Qty.	Total Cost
Visitor Center to				
Lake Overlook	Mile	$1,000	2.7	$ 2,700
Signs	Each	150	4	600
Overlook	Each	500	1	500
Destination Campground to				
Visitor Center	Mile	1,000	3.5	3,500
Signs	Each	150	5	750
Visitor Center to				
Group Campsite	Mile	1,000	11	11,000
Signs	Each	150	5	750
Overlook	Each	500	3	1,500
SUB-TOTAL				$21,300
Contingencies				3,200
1977 Construction Costs				24,500
E. & D. and S. & A.				4,300
TOTAL COST				$28,800

TABLE XI - 12

LAND COST

Item	Unit	Unit Cost	Total Qty.	Total Cost
Real Estate Costs	L.S.	$315,000	1	$315,000
TOTAL COST		$315,000		$315,000

TABLE XI - 13

COST SUMMARY OF RECREATION PLAN

FOR

DICKEY-LINCOLN SCHOOL LAKES

Item	Total Cost
PROJECT COSTS (Minimal Facilities)	
Scenic Turnout	$ 19,100
Visitor Center	380,700
St. John Canoe Takeout	38,400
Allagash Canoe Takeout	35,200
Total Project Costs	$ 473,400
RECREATION COSTS (Cost Shared)	
Picnic Area	$ 56,900
Destination Campground	595,400
Group Campsites	67,400
Primitive Campsites	37,000
Boat Launch Ramp & Fac.	115,300
Beach Area	131,600
Hiking Trail Const.	28,800
Real Estate Costs	315,000
Total Recreation Costs	$1,347,400
TOTALS	$1,820,800

CHAPTER XII

BENEFITS

12.0 Estimating Benefits

Recreation benefits have been derived by applying a monetary value to each of the expected activities in the project area. A single unit value is assigned per visitor-day of recreation use for each activity. Table XII-1 shows the range of values which have been assigned. These values are consistent with the U.S. Water Resources Council's "Principles and Standards", even though it is recognized that they may not be totally realistic in every case. However, it is considered that these values are relatively accurate in relation to each other.

TABLE XII-1

Value of Recreation Activities

Recreation Activity	Unit Value Per Visitor Day Prior to 1988	Unit Value Per Visitor Day After 1988
Camping (Primitive, Group)	$7.00	$9.00
Camping (Destination)	--	2.00
Fishing	6.00	6.00
Hunting	9.00	9.00
Canoeing	9.00	--
Day Activities	1.00	2.00

An average annual recreation benefit is calculated for each activity for selected periods by applying the monetary values to an estimate of the average annual attendance in the selected period. Table XII-2 and Table XII-3 show the average annual attendance/benefit figures without and with the project, respectively. Recreation benefits without the project are calculated using only the monetary unit values effective prior to 1988. Recreation benefits with the project are calculated using the monetary unit values effective prior to 1988 and also those values effective after 1988 for the full facility development case, even though at this time only minimal recreation facilities are being recommended.

Future recreation benefits have been discounted to their present value in 1977 using the interest rate authorized for this project (3.25%) and the prevailing rate for federal water resource projects (6.675%). By summing the discounted benefits to the year 2087, a value of total recreation benefits is derived. A comparative summary of recreation benefits without and with the project is presented in Table XII-4.

TABLE XII-2

Average Yearly Recreation Use and Benefits Per Period
Without
Dickey-Lincoln School Lakes

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping (Primitive, Group)	1,800/$12,600	2,100/$ 14,700	2,400/$ 16,800	2,500/$ 17,500	2,700/$ 18,900	3,000/$ 21,000
Fishing	4,700/$28,200	5,500/$ 33,000	6,200/$ 37,200	6,700/$ 40,200	7,400/$ 44,400	8,500/$ 51,000
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,400/$ 30,600	4,000/$ 36,000	4,400/$ 39,600	4,900/$ 44,100	5,700/$ 51,300
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	1,600/$ 1,600	1,700/$ 1,700	1,900/$ 1,900

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030
Camping (Primitive, Group)	3,300/$23,100	3,700/$ 25,900	4,100/$ 28,700	4,500/$ 31,500	4,900/$ 34,300	5,400/$ 37,800
Fishing	9,900/$59,400	11,500/$ 69,000	13,400/$ 80,400	15,500/$ 93,000	17,900/$107,400	20,800/$124,800
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000
Canoeing	6,600/$59,400	7,600/$ 68,400	8,900/$ 80,100	10,300/$ 92,700	11,900/$107,100	13,800/$124,200
Day Activities	2,100/$ 2,100	2,300/$ 2,300	2,600/$ 2,600	2,800/$ 2,800	3,100/$ 3,100	3,500/$ 3,500

TABLE XII-3

Average Yearly Recreation Use and Benefits Per Period
With
Dickey-Lincoln School Lakes

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping: Primitive, Group	1,800/$12,600	2,100/$ 14,700	800/$ 5,600	2,000/$ 18,000	2,300/$ 20,700	2,600/$ 23,400
Destination	------	------	------	3,100/$ 6,200	3,400/$ 6,800	4,000/$ 8,000
Fishing	4,700/$28,200	3,500/$ 21,000	2,000/$ 12,000	2,000/$ 12,000	2,200/$ 13,200	2,400/$ 14,400
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,000/$ 27,000	------	------	------	------
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	13,400/$ 26,800	14,900/$ 29,800	17,200/$ 34,400

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030
Camping: Primitive, Group	3,100/$27,900	3,600/$ 32,400	4,100/$ 36,900	4,800/$ 43,200	5,600/$ 50,400	6,400/$ 57,600
Destination	4,600/$ 9,200	5,300/$ 10,600	6,200/$ 12,400	7,200/$ 14,400	8,300/$ 16,600	9,700/$ 19,400
Fishing	2,600/$15,600	2,900/$ 17,400	3,200/$ 19,200	3,600/$ 21,600	4,000/$ 24,000	4,400/$ 26,400
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000
Canoeing	------	------	------	------	------	------
Day Activities	20,000/$ 40,000	23,200/$ 46,400	26,900/$ 53,800	31,200/$ 62,400	36,100/$ 72,200	41,900/$ 83,800

TABLE XII-4

Comparison of Recreation Benefits

	Present Value of Total Benefits Discounted at 3.25%	Present Value of Total Benefits Discounted at 6.675%
Without Dickey-Lincoln School Lakes	8,952,000	3,802,000
With Dickey-Lincoln School Lakes (Full Facility Development)	6,783,000	2,879,000
Net Loss to Dickey-Lincoln School Lakes	2,169,000	923,000

EXHIBIT I

NORTHERN MAINE REGIONAL PLANNING COMMISSION
LAKES STUDY - PHASE I REPORT

EXHIBIT I

Excerpted from

NORTHERN MAINE REGIONAL PLANNING COMMISSION

LAKES STUDY

PHASE I REPORT

INTRODUCTION

The Colonial Ordinance of 1641 taken from the 1814 Edition of Ancient Chapters and Laws of the Colony and Province of Massachusetts Bay guarantees free public access to all great ponds of ten or more acres in size. A widespread demand by modern society for water-based recreation has been generated by increased affluence, greater mobility, more leisure time, and a burgeoning population. The right of free public access to great ponds coupled with the need for more water based recreation facilities prompted the Northern Maine Regional Planning Commission to engage the Edward C. Jordan Co., Inc., Engineers and Planners, to undertake a physical inventory of the great ponds falling within the bounds of Commission members, including all of Aroostook County and the communities of Mt. Chase, Patten, and Staceyville in Penobscot County.

The purpose of this study is to provide the basic data necessary for water oriented outdoor recreation planning at county, regional and state levels. The scope of this study includes identification of existing ponds within the region, physical characteristics of the ponds and adjacent land areas; existing use of ponds and adjacent land areas, with emphasis on shoreline land use and development.

The information gained by this study can provide a fundamental ingredient for the planning of the Region's recreational and economic development consistent with the capabilities of its natural resources. Sensible use of the Region's resources is based upon understanding of the natural characteristics and carrying capacities of land and water resources. Development of given sites consistent with these capabilities will enable public access and economic progress without destruction of the natural environment.

The benefit of this initial study will be the compilation of basic data to guide in selection of those lakes offering the greatest potential for public access and recreational development. Future study would identify specific access sites to be developed and recommend the type and extent of development best suited to these sites. In this way, public access and recreational use of great ponds can be integrated with regional economic and development plans.

LAKES SURVEY

The lakes survey consisted of two parts: an inventory of all Great Ponds and an aerial survey.

As there was no available comprehensive listing of lakes by size and depth, it was necessary to prepare an inventory of the lakes to be included in the survey. It was decided to include all lakes in the study area of ten acres or more in size and ten feet or more in depth. Lakes and ponds of smaller size and depth are considered to have limited capacities unsuited to development for intensive recreational use.

The following data were used to determine the lakes meeting size and depth criteria; topographic maps, lake surveys conducted by the Maine Department of Inland Fisheries and Game, and the Maine General Highway Atlas published by the State Highway Commission.

The aerial survey was conducted during the week of October 21,1968 after decidous leaves had fallen and prior to the first snowfall. A total of 172 lakes were included in the aerial survey. Data was subsequently compiled relative to the observable characteristics for the 106 lakes which met size and depth criteria. Recorded data included the natural character of each lake and its surrounding land area, the type and extent of physical development, and existing public access.

To facilitate the aerial survey and data handling, the study area was divided into three regions: Northwest, Northeast, and Southeast.

CLASSIFICATION OF LAKES

Upon completion of the areial survey, the recorded data were compiled and analyzed to classify the lakes according to their potential for public access and recreational development. The following classifications were established: Lakes with Outstanding Recreation Potential, and Lakes Not Meeting Size Criteria.

A list of the lakes within each classification is as follows:

LAKES WITH OUTSTANDING RECREATION POTENTIAL

Deboullie Mountain Area
Eagle Lake
Grand Lake
Pleasant Lake

LAKES WITH ABOVE AVERAGE RECREATION POTENTIAL

Beau Lake
Beaver Tail Pond
Blake Lake
Carr Pond
Chandler Lake
Chase Ponds
Clayton Lake
Collins Pond
Cross Lake
Glazier Lake
Horseshoe Pond
Long Lake
Madawaska Lake
Mattawamkeag Lake
Meduxnekeag Lake
Molunkus Lake
Musquacook Lakes
Nickerson Lake
Rowe Lake
Skitacook Lake
Square Lake
Wallagrass Lakes

LAKES WITH AVERAGE POTENTIAL

Northwest Region	Northeast Region	Southeast Region
Allagash Lakes*	Bennett Lake	Bradbury Lake
Harvey Pond	Black Lake	Carry Lake
Long Lake	Cross Lake	Cochrane Lake
Round Pond	Daigle Pond	Conroy Lake
Umsaskis Lake	Ferguson Pond	County Road Lake
Bic Machias Lake	Hanson Pond	Crystal Lake
Cunliff Lake	Impoundment at Easton	Faulkner Lake
First Negro Brook Lake	Island Pond	Flinn Pond
Fish River Lake	Little Machias Lake	Green Pond
Hunnewell Lake	Moccasin Pond	Hale Pond
Lower McNally Pond	Mud Lake	Haywire Pond
McKeen Lake	Portage Lake	Long Lake
McLean Lake	Round Pond	Longfellow Lake
Pratt Lake	Silver Lake	Lower Macwahoc Lake
Round Mountain Pond	Sly Brook Lakes	Lower Shin Pond
Squirrel Pond	Soldier Pond	Mattaseunk Lake
Third Negro Brook Pond	Squapan Lake	Mud Pond
Upper Hudson Pond	St. Froid Lake	Mud Lake
Upper McNally Pond	Wheelock Lake	Number Nine Lake

(Continued on next page)

* Included in Allagash Wilderness Area, therefore, not considered for development within the context of this report.

Southeast Region (continued)

Plunkett Pond
Portland Lake
Reed Lake
Rockabema Lake
Ross Lake
Spaulding Lake
Timoney Lake
Upper Shin Pond
Umcolcus Lake
Wytopitlock Lake

LAKES NOT MEETING SIZE CRITERIA

Northwest Region

Bean Pond
Big Brook Lake
Burntland Pond
Clayton Lake
Cunliffe Pond
Depot Lake
Ed Jones Pond
Glazier Pond
Grey Pond
Jones Pond
Linscott Pond
Little Presley Lake
Mink Pond
Mud Pond
(Beaver Pond Quad)
Mud Pond
(Beau Lake Quad)
Mud Pond
(Connors Brook Quad)
Pete's Pond
Presley Pond
Robbins Brook Pond
Sag Pond
Sweeney Pond
Ugh Lake
Weeks Pond
Yankeetuladi Pond

Northeast Region

Ben Lake
Bishop Pond
Black Pond
California Pond
Carr Pond
Echo Lake
Hewes Brook Pond
Marcial Lake
Mars Hill Lake
Mud Pond
(Winterville Quad)
Violette Pond
Winslow Lake
Youngs Lake

Southeast Region

Alerton Lake
Beaver Brook Lake
Brackett Lake
Brandy Lake
Caribou Lake
Cold Brook Lake
Davidson Pond
Deep Lake
Duck Pond
(Island Falls Quad)
Duck Pond
(Smyrna Mills Quad)
Gilman Pond
Green Pond
Hidden Pond
Hocter Pond
Longley Lake
Lost Pond
Monson Lake
Mud Pond
(Sherman Quad)
Otter Pond
Rideout Lake
Rush Pond
Scott Pond
St. Croix Lake
Ten Mile Lake
Whitehead Lake

EXHIBIT II

BENEFIT-COST ANALYSIS
FOR FULL RECREATION DEVELOPMENT

PREPARED BY
U.S. ARMY, CORPS OF ENGINEERS

EXHIBIT II

BENEFIT-COST ANALYSIS

FOR FULL RECREATION DEVELOPMENT

INTRODUCTION

Under Corps of Engineers guidelines regarding multiple purpose projects such as Dickey-Lincoln School Lakes, each project purpose must be separately justified. It is therefore necessary to expand the benefit analysis presented in Chapter XII. Specifically, these guidelines require that the development of recreation facilities above the level required for the general health and safety of the visiting public be justified by a "Separable Cost-Remaining Benefit (SCRB)" analysis.

PROJECTIONS

In addition to the two conditions for which recreation usage has been projected, the without project condition (Table 1) and with project condition (Table 4) (henceforth called the full facility development case), two other conditions are examined: with project - no facility development (Table 2), and with project - minimal facility development (Table 3). The no development condition represents a theoretical case and is used to establish a baseline for the determination of recreation benefits accruing to further development. Minimal facility development, consisting of two canoe takeout areas, a scenic turnout and a visitors center, would be provided as part of the basic project development and is now the recommended recreation plan should the project be constructed.

These projections, made in conjunction with the State of Maine and the Heritage, Conservation and Recreation Service, follow the basic methodology outlined in Chapter 5 of this Appendix. The four cases are set out in Tables 1-4. The following specific assumptions were made:

Day Activities: Minimal recreation facility projections are 40% of the projected visitation with full facility development. This is based on past experience at other Corps of Engineers water resource projects in New England.

The no facility development projections are the same as those under the without project condition.

Camping: In both the minimal facility and no facility cases the camping projections are 20% of the projected visitation without construction of the project. This is based on the assumption that the present 32 campsites that would not be inundated would be utilized about one half of the time.

TABLE 1

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITHOUT
DICKEY-LINCOLN SCHOOL LAKES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	2,300	2,500	2,600	2,900	3,200	3,500	3,900	4,300	4,700	5,200	5,700
Fishing	4,400	5,100	5,900	6,500	6,900	7,900	9,200	10,700	12,400	14,400	16,600	19,300	22,400
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	3,700	4,300	4,600	5,300	6,100	7,100	8,200	9,600	11,100	12,800	14,900
Day Activities	1,100	1,300	1,500	1,600	1,700	1,800	2,000	2,200	2,500	2,700	3,000	3,300	3,700
TOTAL	17,800	20,000	22,600	24,300	25,400	28,000	31,100	34,700	38,800	43,400	48,400	54,300	61,000

NOTE: 1975 is the base year for which the visitor day projections were made, with the 1975 visitor days being the actual recorded visitation by the North Maine Woods Association.

EX 2-2

TABLE 2

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITH
DICKEY-LINCOLN SCHOOL LAKES
WITH NO RECREATION FACILITIES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	800	500	500	600	600	700	800	900	900	1,000	1,100
Fishing	4,400	5,100	2,000	2,000	2,100	2,300	2,500	2,800	3,100	3,400	3,800	4,200	4,600
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	-	-	-	-	-	-	-	-	-	-	-
Day Activities	1,100	1,300	1,500	1,600	1,700	1,800	2,000	2,200	2,500	2,700	3,000	3,300	3,700
TOTAL	17,800	20,000	13,500	13,500	13,900	14,800	15,700	16,900	18,200	19,400	20,700	22,200	23,700

NOTE: Impoundment commences in 1985, with project expected to be on line in 1988.

TABLE 3

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITH
DICKEY-LINCOLN SCHOOL LAKES
WITH MINIMAL RECREATION FACILITIES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	800	500	500	600	600	700	800	900	900	1,000	1,100
Fishing	4,400	5,100	2,000	2,000	2,100	2,300	2,500	2,800	3,100	3,400	3,800	4,200	4,600
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	-	-	-	-	-	-	-	-	-	-	-
Day Activities	1,100	500	600	5,200	5,500	6,400	7,400	8,600	10,000	11,600	13,400	15,500	18,000
TOTAL	17,800	19,200	12,600	17,100	17,700	19,400	21,100	23,300	25,700	28,300	31,100	34,400	38,000

NOTE: Impoundment commences in 1985, with project expected to be on line in 1988.

TABLE 4

Recreation Demand Projections

VISITOR DAYS OF RECREATION
WITH
DICKEY-LINCOLN SCHOOL LAKES
WITH FULL RECREATION FACILITIES

	1975	1980	1985	1988	1990	1995	2000	2005	2010	2015	2020	2025	2030
Camping	1,700	2,000	800	5,000	5,300	6,100	7,100	8,300	9,600	11,100	12,900	14,900	17,300
Fishing	4,400	5,100	2,000	2,000	2,100	2,300	2,500	2,800	3,100	3,400	3,800	4,200	4,600
Hunting	8,300	8,700	9,200	9,400	9,600	10,100	10,600	11,200	11,800	12,400	13,000	13,700	14,300
Canoeing	2,300	2,900	-	-	-	-	-	-	-	-	-	-	-
Day Activities	1,100	1,300	1,500	13,000	13,800	16,000	18,500	21,500	24,900	28,900	33,500	38,800	45,000
TOTAL	17,800	20,000	13,700	29,400	30,800	34,500	38,700	43,800	49,400	55,800	63,200	71,600	81,200

NOTE: Impoundment commences in 1985, with project expected to be on line in 1988.

Fishing: Fishing usage is projected to be the same in the minimal facility and no facility case as it is in the full facility projection, since access to the lake would always be available.

Hunting: Projections for the minimal facility, no facility, and full development cases are the same, since hunting would not be significantly affected by the amount of recreational development.

BENEFIT ANALYSIS

For the purposes of the following benefit calculations, recreation usages projected under the four conditions for the year 2030 have been assumed to hold over the remaining life of the project.

To calculate the monetary value of the recreation activities which would be realized under the four project conditions, the visitation projections in Tables 1-4, were multiplied by a unit value per visitor day of recreation use, which was derived for each recreation activity. These unit values, Table 5, are consistent with the U.S. Water Resources Council's "Principles and Standards", even though it is recognized that they may not be totally realistic in every case. However, it is considered that these values are relatively accurate in relation to each other.

The results of the above computations are detailed in Tables 6 to 9, which present both the average projected visitation and the average dollar value per year of each recreation activity during the specified time periods under each of the four conditions.

TABLE 5

Value of Recreation Activities

(Dollar Unit Value Per Visitor Day)

Recreation Activity	Without Dickey-Lincoln	With Dickey-Lincoln-No Development	With Dickey-Lincoln-Minimal Facilities	With Dickey-Lincoln-Full Development
Camping (Primitive, Group)	$7.00	$7.00	$7.00	$9.00
Camping (Destination)	-	-	-	2.00
Fishing	6.00	6.00	6.00	6.00
Hunting	9.00	9.00	9.00	9.00
Canoeing	9.00	-	-	-
Day Activities	1.00	1.00	1.25	2.00

TABLE 6

Average Yearly Recreation Attendance and Benefits Per Period
Without
Dickey-Lincoln School Lakes

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping (Primitive, Group)	1,800/$12,600	2,100/$ 14,700	2,400/$ 16,800	2,500/$ 17,500	2,700/$ 18,900	3,000/$ 21,000
Fishing	4,700/$28,200	5,500/$ 33,000	6,200/$ 37,200	6,700/$ 40,200	7,400/$ 44,400	8,500/$ 51,000
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,400/$ 30,600	4,000/$ 36,000	4,400/$ 39,600	4,900/$ 44,100	5,700/$ 51,300
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	1,600/$ 1,600	1,700/$ 1,700	1,900/$ 1,900

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Camping (Primitive, Group)	3,300/$23,100	3,700/$ 25,900	4,100/$ 28,700	4,500/$ 31,500	4,900/$ 34,300	5,400/$ 37,800	5,700/$ 39,900
Fishing	9,900/$59,400	11,500/$ 69,000	13,400/$ 80,400	15,500/$ 93,000	17,900/$107,400	20,800/$124,800	22,400/$134,400
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000	14,300/$128,700
Canoeing	6,600/$59,400	7,600/$ 68,400	8,900/$ 80,100	10,300/$ 92,700	11,900/$107,100	13,800/$124,200	14,900/$134,100
Day Activities	2,100/ 2,100	2,300/$ 2,300	2,600/$ 2,600	2,800/$ 2,800	3,100/$ 3,100	3,500/$ 3,500	3,700/$ 3,700

TABLE 7

Average Yearly Recreation Attendance and Benefits Per Period
With
Dickey-Lincoln School Lakes - No Facilities

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping (Primitive, Group)	1,800/$12,600	2,100/$ 14,700	800/$ 5,600	500/$ 3,500	500/$ 3,500	600/$ 4,200
Fishing	4,700/$28,200	3,500/$ 21,000	2,000/$ 12,000	2,000/$ 12,000	2,200/$ 13,200	2,400/$ 14,400
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,000/$ 27,000	---	---	---	---
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	1,600/$ 1,600	1,700/$ 1,700	1,900/$ 1,900

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Camping (Primitive, Group)	700/$ 4,900	700/$ 4,900	800/$ 5,600	900/$ 6,300	1,000/$ 7,000	1,100/$ 7,700	1,200/$ 8,400
Fishing	2,600/$15,600	2,900/$ 17,400	3,200/$ 19,200	3,600/$ 21,600	4,000/$ 24,000	4,400/$ 26,400	4,600/$ 27,600
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000	14,300/$128,700
Canoeing	---	---	---	---	---	---	---
Day Activities	2,100/$ 2,100	2,300/$ 2,300	2,600/$ 2,600	2,800/$ 2,800	3,100/$ 3,100	3,500/$ 3,500	3,700/$ 3,700

TABLE 3

Average Yearly Recreation Attendance and Benefits Per Period
With
Dickey-Lincoln School Lakes - Minimal Facilities

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping (Primitive, Group)	1,800/$12,600	2,100/$ 14,700	800/$ 5,600	500/$ 3,500	500/$ 3,500	600/$ 4,200
Fishing	4,700/$28,200	3,500/$ 21,000	2,000/$ 12,000	2,000/$ 12,000	2,200/$ 13,200	2,400/$ 14,400
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,000/$ 27,000	---	---	---	---
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	5,400/$ 6,750	6,000/$ 7,500	6,900/$ 8,625

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Camping (Primitive, Group)	700/$ 4,900	700/$ 4,900	800/$ 5,600	900/$ 6,300	1,000/$ 7,000	1,100/$ 7,700	1,200/$ 8,400
Fishing	2,600/$15,600	2,900/$ 17,400	3,200/$ 19,200	3,600/$ 21,600	4,000/$ 24,000	4,400/$ 26,400	4,600/$ 27,600
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000	14,300/$128,700
Canoeing	---	---	---	---	---	---	---
Day Activities	8,000/$10,000	9,300/$ 11,625	10,800/$ 13,500	12,500/$ 15,625	14,400/$ 18,000	16,800/$ 21,000	18,000/$ 22,500

TABLE 9

Average Yearly Recreation Attendance and Benefits Per Period
With
Dickey-Lincoln School Lakes - Full Facilities

	1975-1979	1980-1984	1985-1987	1988-1989	1990-1994	1995-1999
Camping: Primitive, Group	1,800/$12,600	2,100/$ 14,700	800/$ 5,600	2,000/$ 18,000	2,300/$ 20,700	2,600/$ 23,400
Destination	---	---	---	3,100/$ 6,200	3,400/$ 6,800	4,000/$ 8,000
Fishing	4,700/$28,200	3,500/$ 21,000	2,000/$ 12,000	2,000/$ 12,000	2,200/$ 13,200	2,400/$ 14,400
Hunting	8,500/$76,500	8,900/$ 80,100	9,300/$ 83,700	9,500/$ 85,500	9,800/$ 88,200	10,300/$ 92,700
Canoeing	2,600/$23,400	3,000/$ 27,000	---	---	---	---
Day Activities	1,200/$ 1,200	1,400/$ 1,400	1,500/$ 1,500	13,400/$ 26,800	14,900/$ 29,800	17,200/$ 34,400

	2000-2004	2005-2009	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Camping: Primitive, Group	3,100/$27,900	3,600/$ 32,400	4,100/$ 36,900	4,800/$ 43,200	5,600/$ 50,400	6,400/$ 57,600	6,900/$ 62,100
Destination	4,600/$ 9,200	5,300/$ 10,600	6,200/$ 12,400	7,200/$ 14,400	8,300/$ 16,600	9,700/$ 19,400	10,400/$ 20,800
Fishing	2,600/$15,600	2,900/$ 17,400	3,200/$ 19,200	3,600/$ 21,600	4,000/$ 24,000	4,400/$ 26,400	4,600/$ 27,600
Hunting	10,900/$98,100	11,500/$103,500	12,100/$108,900	12,700/$114,300	13,300/$119,700	14,000/$126,000	14,300/$128,700
Canoeing	---	---	---	---	---	---	---
Day Activities	20,000/$40,000	23,200/$ 46,400	26,900/$ 53,800	31,200/$ 62,400	36,100/$ 72,200	41,900/$ 83,800	45,000/$ 90,000

The average dollar values per year were aggregated for all activities and these amounts are presented in Tables 10 to 13 as the average recreation benefit per year during the various periods under each of the four project conditions. To compare the benefit streams which occur under the different conditions, two calculations were required. First, the benefits which would be experienced had to be discounted to obtain their present value. It was assumed for this analysis that: (1) benefits and costs are realized at the end of the year; (2) the end of 1987 is the project completion date and present values are expressed as of that point; and (3) project life is one hundred years. The present values of the recreation benefits per period are shown in Tables 10 to 13. The second calculation required converts the sum of the present values, for a given condition, into an average annual benefit stream. This was done by multiplying the sum of the present values by the capital recovery factor for the 100 year project period. The average annual benefits which different project conditions accrue, detailed below, were compared to determine the net benefits provided by the proposed facility development.

Average Annual Recreation Benefits

	3 1/4%	6 5/8%
Without Dickey-Lincoln School Lakes	303,000	252,000
With Dickey-Lincoln School Lakes		
No Facilities	135,000	121,000
Minimal Facilities	146,000	129,000
Full Facilities	230,000	191,000

The cost side of the benefit-cost ratio consists of three facets. First, there is the basic cost of recreational development as detailed in Chapter XI of this Appendix. Second, operation and maintenance costs were derived for the different conditions. Third, during the period from 1985 to 1987, while the reservoir is being filled, some recreational opportunities would be foregone. This foregone recreation represents a cost and the sum of the lost benefits, or the difference between the with and without Dickey-Lincoln School Lakes project conditions, was capitalized to yield an average annual cost to the project. These costs are shown in Table 14.

TABLE 10

Present Worth of Recreation Benefits Per Period
Without
Dickey-Lincoln School Lakes

	1985-1987	1988-1989	1990-1994	1995-1999	2000-2004	2005-2009
Yearly Average Recreation Benefit($)	175,200	184,400	197,300	223,900	242,100	269,100
Discount Factor[1] 3 1/4%	3.00000	1.90656	4.26544	3.63508	3.09787	2.64005
PW of Recreation Benefits 3 1/4%($)	525,600	351,570	841,571	813,894	749,994	710,437
Discount Factor[1] 6 5/8%	3.00000	1.81745	3.64299	2.64339	1.91806	1.39177
PW of Recreation Benefits 6 5/8%($)	525,600	335,138	718,762	591,855	464,362	374,525

	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Yearly Average Recreation Benefit($)	300,700	334,300	371,600	416,300	440,800
Discount Factor[1] 3 1/4%	2.24989	1.91740	1.63404	1.64532	6.52122
PW of Recreation Benefits 3 1/4%($)	676,542	640,987	607,209	684,947	2,874,554
Discount Factor[1] 6 5/8%	1.00987	.73279	.53171	.38580	.93212
PW of Recreation Benefits 6 5/8%($)	303,668	244,972	197,583	160,609	410,878

[1] The Discount factor is the product of the present worth of one dollar per period during a specified time period and the present worth of one dollar X number of years in the future.

TABLE 11

Present Worth of Recreation Benefits Per Period
With
Dickey-Lincoln School Lakes - No Facilities

	1985-1987	1988-1989	1990-1994	1995-1999	2000-2004	2005-2009
Yearly Average Recreation Benefit($)	102,800	102,600	106,600	113,200	120,700	128,100
Discount Factor[1] 3 1/4%	3.00000	1.90656	4.26544	3.63508	3.09787	2.64005
PW of Recreation Benefits 3 1/4%($)	308,400	195,613	454,696	411,491	373,913	338,190
Discount Factor[1] 6 5/8%	3.00000	1.81745	3.64299	2.64339	1.91806	1.39177
PW of Recreation Benefits 6 5/8%($)	308,400	186,470	388,343	299,232	231,510	178,286

	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Yearly Average Recreation Benefit($)	136,300	145,000	153,800	163,600	168,400
Discount Factor[1] 3 1/4%	2.24989	1.91740	1.63404	1.64532	6.52122
PW of Recreation Benefits 3 1/4%($)	306,660	278,023	251,315	269,174	1,098,173
Discount Factor[1] 6 5/8%	1.00987	.73279	.53171	.38580	.93212
PW of Recreation Benefits 6 5/8%($)	137,645	106,255	81,777	63,117	156,969

[1]The Discount factor is the product of the present worth of one dollar per period during a specified time period and the present worth of one dollar X number of years in the future.

TABLE 12

Present Worth of Recreation Benefits Per Period
With
Dickey-Lincoln School Lakes - Minimal Facilities

	1985-1987	1988-1989	1990-1994	1995-1999	2000-2004	2005-2009
Yearly Average Recreation Benefit($)	102,800	102,600	112,400	119,925	128,600	137,425
Discount Factor[1] 3 1/4%	3.00000	1.90656	4.26544	3.63508	3.09787	2.64005
PW of Recreation Benefits 3 1/4%($)	308,400	195,613	479,435	435,937	398,386	362,809
Discount Factor[1] 6 5/8%	3.00000	1.81745	3.64299	2.64339	1.91806	1.39177
PW of Recreation Benefits 6 5/8%($)	308,400	186,470	409,472	317,009	246,663	191,264

	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Yearly Average Recreation Benefit($)	147,200	157,825	168,700	181,100	187,200
Discount Factor[1] 3 1/4%	2.24989	1.91740	1.63404	1.64532	6.52122
PW of Recreation Benefits 3 1/4%($)	331,184	302,614	275,663	297,967	1,220,772
Discount Factor[1] 6 5/8%	1.00987	.73279	.53171	.38580	.93212
PW of Recreation Benefits 6 5/8%($)	148,653	115,653	89,699	69,868	174,493

[1]The Discount factor is the product of the present worth of one dollar per period during a specified time period and the present worth of one dollar X number of years in the future.

TABLE 13

Present Worth of Recreation Benefits Per Period
With
Dickey-Lincoln School Lakes - Full Facilities

	1985-1987	1988-1989	1990-1994	1995-1999	2000-2004	2005-2009
Yearly Average Recreation Benefit($)	102,800	102,600	158,700	172,900	190,800	210,300
Discount Factor[1] 3 1/4%	3.00000	1.90656	4.26544	3.63508	3.09787	2.64005
PW of Recreation Benefits 3 1/4%($)	308,400	195,613	676,925	628,505	591,074	555,203
Discount Factor[1] 6 5/8%	3.00000	1.81745	3.64299	2.64339	1.91806	1.39177
PW of Recreation Benefits 6 5/8%($)	308,400	186,470	578,143	457,042	365,966	292,689

	2010-2014	2015-2019	2020-2024	2025-2030	2031-2087
Yearly Average Recreation Benefit($)	231,200	255,900	282,900	313,200	329,200
Discount Factor[1] 3 1/4%	2.24989	1.91740	1.63404	1.64532	6.52122
PW of Recreation Benefits 3 1/4%($)	520,175	490,663	462,270	515,314	2,146,786
Discount Factor[1] 6 5/8%	1.00987	.73279	.53171	.38580	.93212
PW of Recreation Benefits 6 5/8%($)	233,482	187,521	150,421	120,833	306,854

[1]The Discount factor is the product of the present worth of one dollar per period during a specified time period and the present worth of one dollar X number of years in the future.

TABLE 14

Recreation Development Costs

	3 1/4%			6 5/8%		
	Minimal Development	Full Development	Net	Minimal Development	Full Development	Net
Basic Cost	$473,000	$1,821,000	$1,348,000	$473,000	$1,821,000	$1,348,000
Foregone Benefits[1]	$217,000	$ 217,000	$ 0	$217,000	$ 217,000	$ 0
Sub-total	$690,000	$2,038,000	$1,348,000	$690,000	$2,038,000	$1,348,000
Average Annual Cost	$ 23,000	$ 69,000	$ 46,000	$ 46,000	$ 135,000	$ 89,000
Operation and Maintenance	$ 15,000	$ 60,000	$ 45,000	$ 15,000	$ 60,000	$ 45,000
Total Average Annual Costs	$ 38,000	$ 129,000	$ 91,000	$ 61,000	$ 195,000	$ 134,000

[1]On an average annual basis, these foregone benefits are $7,000 at 3 1/4% and $14,000 at 6 5/8%.

Combining the benefit and cost information for development above the minimal facility level yields a benefit-cost ratio less than unity as presented in the following tabulation.

	3 1/4%	6 5/8%
Benefits	$84,000	$ 62,000
Costs	$91,000	$134,000
Benefit/Cost Ratio	.92	.46

Therefore, development of full recreation facilities is not justified.

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A CANOEIST'S REFLECTION OF THE ST. JOHN RIVER

A CANOEIST'S REFLECTIONS OF THE ST. JOHN RIVER

The first explorers to this country called the canoe the "craft of the savage". However they soon discovered there was no easier or more practical way to travel into the interiors than by the rivers, and so the "craft of the savage" also became the whiteman's means of exploration and discovery.

Since that time, the canoe has been used for transportation, trading and hunting, until now its usefulness is mainly for recreation. But much of the recreation is a re-enactment of those early days. Travel by river over long distances is commonplace, simply for the experience, and canoeists find excitement, satisfaction and meaning in taking longer and more difficult trips into remote wilderness areas. It was the search of such an experience that brought me to the St. John River.

Having been on most of Maine's popular canoeing rivers, the St. John was the next logical step. The warning in the guidebook that the upper river was long and dangerous, that canoeists had been killed in its rapids, and that once begun, there was no turning back, did not discourage me. I also knew that as a canoeing experience, it offered a challenge found no place else in Maine, or New England, or maybe the Eastern United States.

I had read that the St. John is the largest river to empty into the Atlantic between the St. Lawrence and the Gulf of Mexico, but when first seen from Moody Bridge on the American Reality Road the river seemed gentle and harmless. Like many other rivers, it was boulder strewn without clear channels and the water was low. Less than a mile of the river was visible from the bridge, where the four of us had chosen to put in, and although it may have appeared gentle, I was aware that it would be the challenge we expected.

The St. John is remote. Moody Bridge is over two hours into the Maine woods from the nearest organized township and as I stood in that distant place, I could appreciate the importance early explorers and settlers placed on the discovery of a river. This river was a natural and significant artery of travel and commerce into this vast lumbering region of northwestern Maine. As our canoes slipped under Moody Bridge on our way downstream, we also realized the river's significance as an artery through the wilderness. Eighty miles down the St. John was our only way out.

Those next eighty miles left many impressions on me, the first and most distinct being the complete freedom of the river itself. Very wide, sliding downhill in a broad basin, the St. John would disappear between two walls of Maine spruce forest, reappear around a bend, and

duck from view again. The river flowed in the bottom of the basin and, with evidence of the high water levels etched dramatically into the shoreline far above our heads. I felt like we were playing hide and seek with a liberated and playful giant. It was free to follow its own course and to carry us with it. In this wilderness above the confluence of the Big Black River, the signs of man are few and the river provided us companionship. We played the game of hide-and-seek and waited for landmarks.

I recognized Nine Mile when I saw it. The single concrete faced pier looked exactly like Helen Hamlin described it in NINE MILE BRIDGE, her story of life there in the 1930's with her game warden husband. The pier was rebuilt during a summer she was at Nine Mile by a cement mixing crew who stayed at the Hamlin cabin and ate the fresh bread and black tea she fed the workmen. It was all that remained of the historic bridge.

We camped on the Hamlin front lawn, which she had kept mowed to reduce the black fly population. Around the campfire that night we talked about Mrs. Hamlin and it was as if she were there telling us the stories, stories of lonely winters 40° below, of frying doughnuts at 3:00 a.m. for something to do, and of "ice-out" and how she could hear it thundering around the bend before it came into sight, a ten-foot wall gathering momentum and size as it approached the bridge, splitting against that new cement faced pier and reforming on the other side before regaining momentum. She would also tell us about the day a couple of trappers from Houlton, who had camped across the river, were shaving in her cabin when the thundering was heard. They grabbed their overcoats and with faces half-lathered and suspenders flying sprinted across the bridge so as not to be caught on the wrong side if the bridge went out with the ice. Today the pier, a survivor of earlier ice-outs, stands alone an historical landmark for the St. John canoeist. Bill Gordon who once lived in a camp up river at Knowles Brook and came to Nine Mile twice a year to pick up his mail would like it better as it is today. He damned the building of the bridge, calling the automobile an instrument of the Devil. We left early the next morning and Nine Mile was out of site before the mist was gone.

Approaching Seven Islands along the river is like stepping outside into the open. From a river winding its way through the bottom of an ice-gouged basin, we were suddenly in the center of hundreds of acres of open fields in the Maine wilderness. The most remote settlement on the St. John River, Seven Islands, was settled by French Canadian squatters as a small farming village, an oasis in the wilderness, providing food and shelter for the woodsmen, hay and oats for the horses, and loggers for the forests. We stopped to look around and found the remains of the settlement, long since abandoned, slowly being overgrown with scrub growth and raspberries where the rotted cabins had collapsed.

The river channels were shallow and braided through Seven Islands and we had to search for water deep enough for poling. I wondered how those French Canadians, living on this flood plain, reacted when they got Mrs. Hamlin's telephone call that the ice was coming.

Strangely, the remains of other settlers and settlements are also scattered along the banks of the Upper St. John. We camped one night at Simmons Farm below Priestly Rapids where open fields, obviously cleared by the back-breaking sweat of an early settler, still remain ready to be tilled again. An apple tree, a cherry tree and old farm machinery were signs of human life. We also found signs of death back in the forest where two flat stones had been placed upright on end. The markings, although visible, were illegible but the sunken place in the ground between the stones told a story.

That night I gazed into the smoke of the campfire and my minds eye saw young man Simmons working his way upstream with his new young bride, all their belongings in the tow-boat, looking left and right for that one spot and finally, at this wide bend in the broad river saying, "this looks like a good place". Now it's a rusty hay press and a hollow between two upright stones in the woods.

Castonia was further downstream. An old settlement of tough, hard-drinking French Canadian lumberjacks, it also disappeared with the changing times. But its memory remains with the others, testimony to that day long ago when there was life along the river, when it was Main Street, with horse drawn tow-boats heavy laden with supplies and equipment working their way upstream between the settlements, when the river was the thread of life connecting its people to the world outside. It's all there now for the canoeist to see, and appreciate - the rotted logs, rusty iron, cleared fields, and visions in the campfire smoke.

The buzz of a chainsaw and the whack of an axe driving spikes interruped the normal river noises when we stopped mid-day at the confluence with the Big Black River. The campsite was being "improved" by employees of North Maine Woods, a recreational consortium of northern Maine landowners and State agencies now responsible for recreational supervision of the river. It was the only "improved" campsite we encountered on the upper river and, although we appreciated the efforts to make our life more comfortable, I can get along without picnic tables and privys on a wilderness canoe trip.

But we were ready for rest and relaxation, having just run Big Black Rapids, and we camped there that night on a grassy bluff above the junction of the two rivers, a grassy bluff that overlooks some of the first signs of scenery we had seen on this trip. It had become noticeable near Big Black that we had moved out of the flat country of the upper river into a rolling topography of hills and landscape.

This new landscape also played games with us. The river wedging around sharp bends, rolls off the haunches of intruding hills, drops from view, and emerges laughingly below. We still played hide-and-seek. But the rapids were heavier and the game more fun.

One afternoon we poled up Big Black River. The struggle up through those gentle rapids was accompanied by the music of our setting poles clanking against the rocky bottom and more than once we had to jump into the river to lift over a shoal. The water so clear we couldn't always tell how deep it was. Consequently, we would run aground - like trying to find a door in a maze of mirrors.

Above Two Mile Brook the water was deeper and we could relax and look around. Here, and on the float trip back down to the campsite, we enjoyed the best scenery of the trip so far, from the river bottom east to the Deboullie Mountains, including Musquacook and the Allagash watershed. Reflecting the afternoon sun, the gravel and stones of the river bottom sparkled like a showcase at Tiffanys. In that clear, clear wilderness water we seemed suspended among a myriad of colors, riding on a cushion of air over a patchwork of pastels, and the soft summer landsacpe stretching out before us. For a few minutes we were, literally, out of this world.

Our grassy bluff was once an Indian camping and burying ground and is said to be haunted. Formerly named Chinkaza-ook, the Big Black had been renamed by the lumbermen, as had been such other tributary streams as Fivemile, Halfway, Niremile, and Little Black, names whose origin is obvious, but certainly not comparable to Wallastook or Chemquassabamticook. The name changes were probably to remove any reminder of evil spirits from the lumberman's imagination, although when I left that grassy bluff I felt I was leaving the scene of an untold story, a legend that no one really knew.

Most rapids on this trip are of moderate difficulty to an experienced canoeist and would not usually require a second thought. But we were eighty miles from civilization, the canoe was our only means of travel, and any mistake or lapse in concentration could cost us our canoes, our gear, our food, and we knew it. That was our challenge - to travel safely and comfortable out of the wilderness by canoe. At low water many of the rapids are braided and have more than one entrance channel although usually only one exit. So we were careful, concentrating on each one as we came to it. Priestly, Longs, Schoolhouse, Fox Brook, Poplar Island, and all the other unnamed rapids. We scouted when we felt it necessary. We poled for greater control because we knew that rapids that are easy in an urban setting can be disastrous in the wilderness. In fact, we four helped two others from Philadelphia get a swamped and badly damaged canoe out of the river above Nine Mile. So we knew the consequences of a split second of indecision. We concentrated on the river, even when it looked easy.

There are two rapids on the St. John, however, that are not easy. Although they can be run safely with care, men have been killed in both of them. Big Black Rapids, is one and one-half miles of white-water dropping fast over boulders and ledge outcrops. It's a problem. We solved it by careful scouting and an intense effort to keep the boat under complete control.

Big Rapids, the most difficult on the entire upper river, occurs near the end and the pressure of waiting was evident by our extreme concentration as we entered it. It's not overrated. Two full miles of white river caught in a twisting bouldery canyon thrashing from bank to bank like a tiger in a cage, before it makes its final glorious exit into the quiet water above Dickey. Although I was pleased when we ran it safely, and felt a deep personal satisfaction that we had come this far, guided by the river and controlled by the action of our own hands, I did not feel exhilaration. To a canoeist, a river trip is not the paddling, not running through the rapids, not the scenery, but it is the experiencing. The satisfied feeling of a difficult river passage, the psychic feeling of exploration, and the intrinsic rewards of attaining a personal goal. I've read that Big Rapids may be under three hundred feet of water in a few years. That will be sad. But if it happens, I won't go back for one last fling. I'll remember it as I experienced it, before it was placed in bondage. When it was free.

As a really large river, the St. John begins below Dickey at the confluence with the Allagash River. The upper river is big, perhaps a thousand feet wide at Poplar Island, but below the Allagash it nas volume and power it didn't have before. As we ran to St. Francis, we felt it. Heavy water in the rapids, powerful current and eddies, a lot of fun. But it was somehow different. The valley is developed. Farms sprinkle the landscape. A public road parallels the river. The psychic kick of the wilderness travel is gone. But we enjoyed it, confidently running the heavy water of Golden Rapids, Cross Rock Rapids and Rankin Rapids, making mental note of Lincoln School, and idly wondering if we would get back to the upper river again. Take-out was at St. Francis and, as it always is, was anti-climatic. The joy is in the doing, in the challenge, in the success we had.

So now that it's over, I think back about the St. John. I think about the difficulty, and the danger, and the challenge of "no turning back". I think about what we did and what we saw. I try to explain it and words are inadequate.

To a canoeist, a wilderness river is more than a river - it is an experience. I think of other rivers I've canoed. The Moose, Dead, Upper Androscoggin, Little Ossipee, Saco, Allagash. Occasionally there is water comparable to the St. John and I use those examples to explain what St. John rapids are like. Occasionally there is

scenery to match the St. John. Elsewhere there is history to match the St. John. And I use these examples too, to describe where I've been. But I find no examples to compare the total experience.

The total experience is found only on the St. John. It alone encompasses the full range of our canoeing experiences. It alone is distinctive of our feelings. It is unique. As long as the Upper River is there, we can share a kinship with those who have canoed it, a kinship born on a free river, a river that has known no bondage, no socialization, no exploitation, and a river that recreates for us the time when it was the life of her people.

CREEL CENSUS AND FISHERIES UTILIZATION STUDY, DICKEY-LINCOLN SCHOOL LAKES PROJECT, MAINE

For the Period

26 May 1976 to 15 August 1976

Final Report to U.S. Army Corps. of Engineers

(Contract No. DACW 33-76-C-0091)

by

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Submitted: October 1976

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1.0 Introduction

Construction of the hydroelectric project proposed for the Dickey-Lincoln School sites in northern Maine would create an 88,000 acre lake inundating 47 miles of the St. John River, 23 miles of the Big Black River, 25 miles of the Little Black River and nearly 40 miles in aggregate of smaller tributary streams. The objective of this report is to describe the utilization of the existing fishery resource within the project area during the summer of 1976. Information collected between Memorial Day and August 15, 1976 is used to estimate angler use of the area, total catch and economic value of angler use and to profile the user group.

Three factors operated during the summer of 1976 to make this year atypical as far as angler usage is concerned and thus considerable care should be used in drawing inferences from this study for more typical years. First, 1976 was an extremely wet year. Although rainfall and runoff figures for the summer are not available at this writing, it was obvious in the field that water levels in the main stem and tributaries were higher than normal throughout the summer, considerably increasing access opportunities by canoe for anglers. Access by road, on the other hand, was probably more limited than usual. Early season washouts at several locations were not repaired until late June and rains preceding hurricane Belle (August 6 and 7) resulted in additional washouts including the main road between the towns of Allagash and St. Francis. Access by road from Quebec was also limited by a change in policy by the landowner's management organization, North Maine Woods, whereby full season registration was

not available to non-residents of Maine until quite late in the season. Full season registrations had been available to non-residents in prior years but these users were required to pay daily use fees during most of the 1976 angling season.

The third factor making 1976 different from preceding years involved changes in fishing seasons and fishing license fees. The cost of a non-resident fishing license rose from $15.50 in 1975 to $25.50 for 1976 while cost for residents went from $6.50 to $7.50. We feel that the increased license fee, combined with unavailability of full season entrance registration, significantly decreased Canadian usage of the fishery resources of the area in 1976 (see 3.2.1). A second change in fishing regulations extended the fishing season in brooks and streams in Aroostook County until September 15; in previous years the closing date for brooks and streams had been August 15. No sampling was carried out during the new last month and we have no estimate of utilization of the resource during the extra period.

2.0 Methods

2.1 Study Area and Access: The impact area of the proposed project includes the main stem of the St. John River from Ninemile Brook to Fort Kent, Maine, the Big Black River drainage from the Quebec-Maine border to its confluence with the St. John (except for most of Depot Stream), a major portion of the Little Black River drainage, and varying portions of all lesser St. John tributaries between Ninemile Brook and St. Francis. Major emphasis in this study was placed on that portion of the area to be affected by the dam at Dickey; very little direct information on the area to be affected by

the dam at Lincoln School was collected.

The vast majority of anglers utilizing the area enter by motor vehicle or canoe. Access by motor vehicle is controlled by gates operated by North Maine Woods (Figure 1) except that the lower portion of the Little Black drainage, the Falls Ponds and that portion of the main stem downstream from Poplar Island Rapids can be fished without passing through a gate. Canoeists enter the area either by paddling down the main stem from well above Ninemile Brook or down the Big Black River from Quebec. In either case, canoeists would not pass through a North Maine Woods gate unless they take out upstream from Poplar Island Rapids. Canoe parties passing this point could take out almost anywhere between Big Rapids and Fort Kent since roads closely parallel the river most of the way.

2.2 Sampling Plan:

2.2.1: The Population Sampled: Stratified random sampling was utilized to collect data so that estimates of total usage and catch could be made. In order to design a random survey procedure, the population from which the sample is to be drawn must be definable and enumerable before the sample is drawn. The number of anglers fishing during the season and distribution of their effort through the season is unknown but the number of days in the season is known. Thus the sampling unit in this survey is a calendar day which is subdivided into a morning (0700-1400) and an evening (1400-2100) half day for purposes of scheduling samples. A maximum amount of information can be obtained from the angler if he is contacted at the end of his fishing trip. The gates controlling access by road into and out of

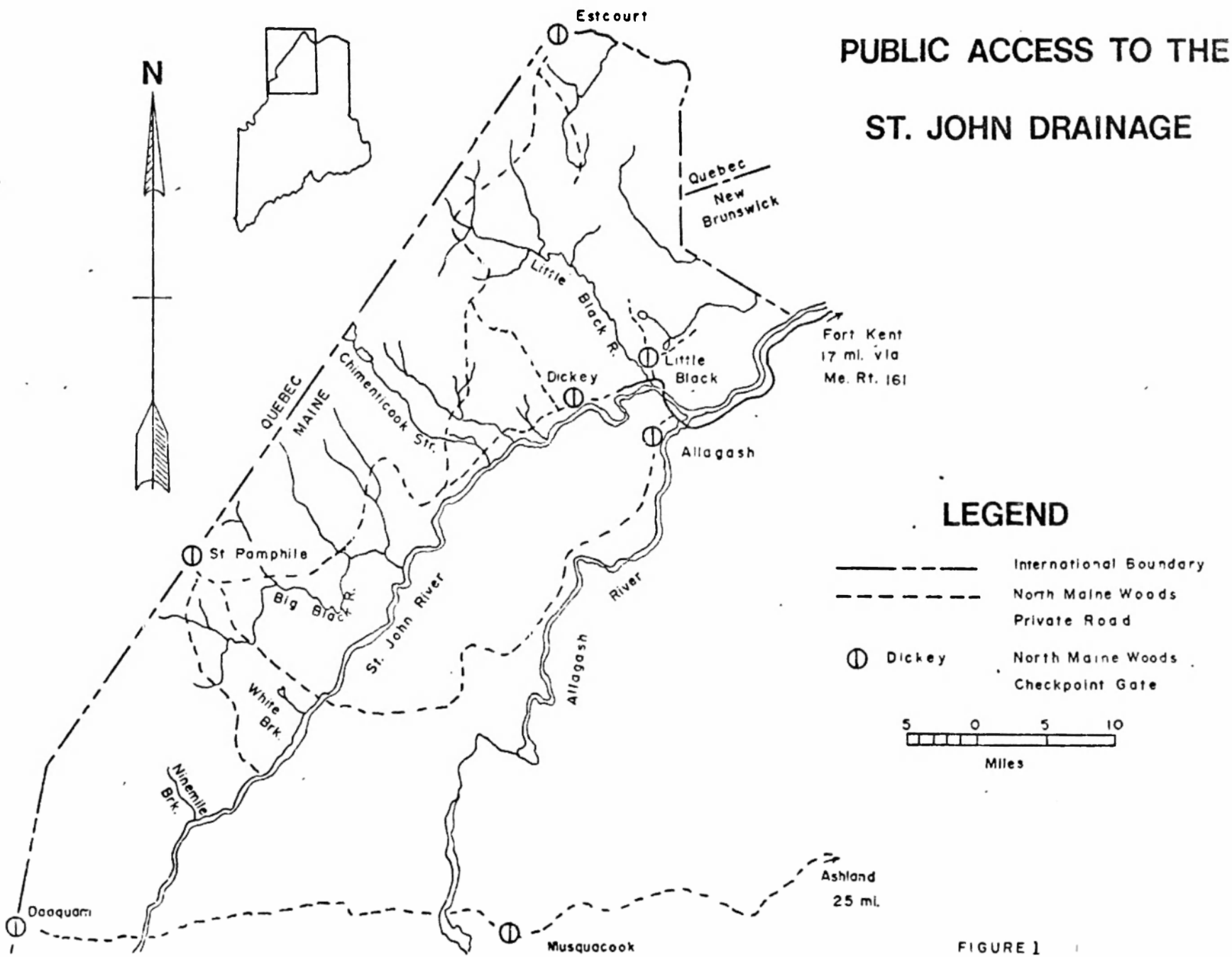

PUBLIC ACCESS TO THE
ST. JOHN DRAINAGE
N
Estcourt
Quebec
New
Brunswick
Little Black R.
Fort Kent
17 mi. via
Me. Rt. 161
Little
Black
Dickey
Chimenticook Str.
QUEBEC
MAINE
Allagash
St Pamphile
Big Black R.
St. John River
Allagash
River
White
Brk.
Ninemile
Brk.
Daaquam
Musquacook
Ashland
25 mi.
LEGEND
International Boundary
North Maine Woods
Private Road
Dickey
North Maine Woods
Checkpoint Gate
5 0 5 10
Miles

FIGURE 1

the project area provide an ideal place to contact anglers departing from the area by road after fishing. The sampling unit is thus defined as an Access Point Half-Day--all anglers passing through a randomly selected access point on a randomly selected half-day are contacted to collect information.

The sampling period extended from May 26 thrcugh August 15, 1976, a total of 82 days or 164 half-days. Seven North Maine Woods gates (Dickey, Little Black, Estcourt, St. Pamphile, Daaquam, Musquacook and Allagash) control access to a major portion of the impact area. This combination of time and space units provided a total of 1148 Access Point Half-Days (APHD) available in the sampling population. There was a loss in availability of 62 APHD because certain access points were closed on Sundays, others on Sundays and holidays, some on Saturday afternoons and because some roads were impassable to anglers on certain days because of washed out bridges. The net available number of APHD for sampling anglers leaving the impact area by road was 1086.

It was impossible to assign a space dimension to the population of days for canoe anglers passing down the river since they could take out at any point along the river downstream from Poplar Rapids without passing through a control gate. Three methods were used to obtain some estimates of fishery utilization by canoe parties. Eighteen of the APHD assigned to gate sampling that were lost because of washouts or Sunday closures were utilized to sample canoeing parties at two of the most popular take out points, Allagash Landing and Chamberlain

Landing. Aerial surveys were conducted on randomly selected half-days to provide information on the number of canoe anglers. A roving survey by road from Ouellette Brook to St. Francis and evening contacts with canoe parties camping overnight at Ouellette Farm were also utilized. These latter contacts were not randomized, however, so estimates can not be extended to the entire canoeing population.

2.2.2 Stratification: Utilization of manpower in conducting a survey of this sort can be improved if the sampling population can be divided into strata to be sampled at different rates roughly proportioned to their importance. Lacking any prior estimates of variance, stratification was subjective. The major criterion used was expected number of parties passing through a gate in a given time span. For example, more parties were expected to depart during the evening half day than during the morning half day, so evening half days were sampled at a higher rate than mornings. Similarly, more parties were expected to depart on weekends and holidays than on weekdays, so sampling was more intense on weekends and holidays than on weekdays. Information available before the start of the season indicated that much more fishing effort would be expended in the area during June than later in the season (because of normally decreasing water levels), so the season was divided into an early portion from Memorial Day through July 11 which was sampled more heavily than the late season extending from July 12 through August 15.

Access gates were divided into major access (Estcourt, St. Pamphile, Dickey and Little Black) and lesser access (Allagash, Daaquam and Musquacook) strata on the basis of the area of project

impact served by roads from each gate. This classification was made on the basis of information available before the season. As it turned out, the Little Black gate was never installed so there was no control of access on that road. However, the road from Dickey up the Little Black River towards Estcourt was not passable for two-wheel drive vehicles between Dead Brook and Little Falls Pond. Thus a predicted major access route was in fact, relatively unimportant. A station was established on the road for voluntary angler contact but some of the sampling periods anticipated at the Little Black gate were reassigned to Allagash and Chamberlain Landings for contacting canoeing parties. The number of angling parties passing through the Musquacook gate after fishing in the project impact area turned out to be nil. Some of the sampling times assigned to Musquacook were reassigned (especially in the late season) to the Allagash gate which turned out to be utilized more than expected, especially by parties fishing the Brown Brook drainage.

Combinations of time and place that formed the population were thus divided into 16 strata containing variable numbers of APHD. The proportion of APHD to be sampled within each stratum was predetermined and actual APHD to be sampled were drawn at random before the start of the season with the restriction that no more than six APHD could be sampled on a given calendar day in the early season or three in the late season because of manpower available. The proposed sampling proportions and the actual rates achieved for each stratum are listed in Table 1. Reduction in sampling effort from proposed proportions resulted mainly from samplers' inability to reach certain access

points on certain days due to road conditions or vehicle failure. If roads were completely impassable to all vehicles, a reduction in APHD was made, but if the possibility of some fishing parties using the area could not be ruled out no adjustment was made. In many cases, substitution of other sampling sites or days could not be made without destroying the random nature of the sampling plan. This problem was particularly acute for weekend and holiday APHD because of Sunday and holiday closures at the St. Pamphile and Daaquam gates.

2.3 Data Collection: A member of our field crew personally interviewed each party containing anglers as it departed from the project area through a selected access point during a selected half-day. Only parties containing anglers were interviewed; we collected no data on parties which had not fished in the area. Data were collected on a party rather than an angler basis with one person, usually the driver, serving as spokesperson for the party. The interview was a standardized procedure; a copy of the interview form is appended to this report. The same procedure was followed with canoeists contacted at the two landings; again data was collected on a party basis. Each party was asked to pinpoint the area fished, but it was usually impossible to determine whether all effort and catch were confined to streams projected for inundation unless the party had fished only the main stem of the St. John or the Big Black Rivers. Data collected during an interview were subsequently coded for automatic data processing according to the standardized form used by the Maine Department of Inland Fisheries and Wildlife.

2.4 Analysis of Data

2.4.1 Selection of a Statistic for the Sampling Average:

The median (mid-point of the frequency distribution of responses) was selected to describe the sample average in most instances because of the asymmetric distribution of values. The median is not affected by extreme values to the same extent as the mean (Sokal and Rohlf, 1969). An alternative procedure involving normalizing the data by transformations would require more time and might not improve the results appreciably.

2.4.2 Estimation of Population Parameters: Population parameters estimated from sample statistics include the mean value (with 95% confidence interval) for the variables: total catch by species, number of anglers utilizing the area, total angler days expended in the area and money expended by the using public. Standard procedure (Snedecor and Cochran, 1967) for estimating a population mean ($\bar{y}_{st}$) from sample statistics in a stratified random sampling design is:

$$\bar{y}_{st} = \frac{\Sigma N_h \bar{y}_h}{N}$$

where, N_h is the size of the h th stratum, $\bar{y}_h$ is the sample mean within the h th stratum, and N is the size of the population. A confidence interval can be placed around the estimated population mean ($\bar{y}_{st}$) having calculated the standard error, $s(\bar{y}_{st})$, using the following equation:

$$s(\bar{y}_{st}) = \sqrt{\frac{\Sigma W_h^2 \; s_h^2}{n_h}(1 - \phi_h)}$$

where, $W_h = N_h/N$, the relative weight attached to the h th stratum, s_h^2 = sample variance of the h th stratum, n_h = sample size within the h th stratum, and ϕ_h = sampling proportion within the h th stratum.

Because the basic sampling unit is the Access Point Half-Day (APHD), estimates from the samples are means per APHD. The total value for any particular variable is simply the sum of stratum sub-totals, $\Sigma N_h \bar{y}_h$.

3.0 Results

3.1 Treatment of Data: A total of 306 angling parties were interviewed at the seven gates and two canoe landing areas. Eighty-six percent of these parties had fished almost exclusively in waters anticipated to be inundated by the construction of Dickey Dam. (This figure is a subjective estimate because it was usually impossible to pinpoint the location fished on the smaller brooks. Decisions were based primarily on locations of access points to the brook in question.) The remaining 14% of the parties had either fished in several different areas, some within the flooding area and some not, or had fished streams with access both above and below the point of maximum flooding, i.e. Campbell Brook (Little Black drainage) or Chementicook Stream. It was not possible to separate the catch or effort of the latter groups into portions for each type of water; all data acquired from these parties are included in the tabulations.

Sample sizes for some categories of results are less than 306 because of incomplete interviews. These resulted from an angling party's refusal to answer certain questions, an interviewer's failure

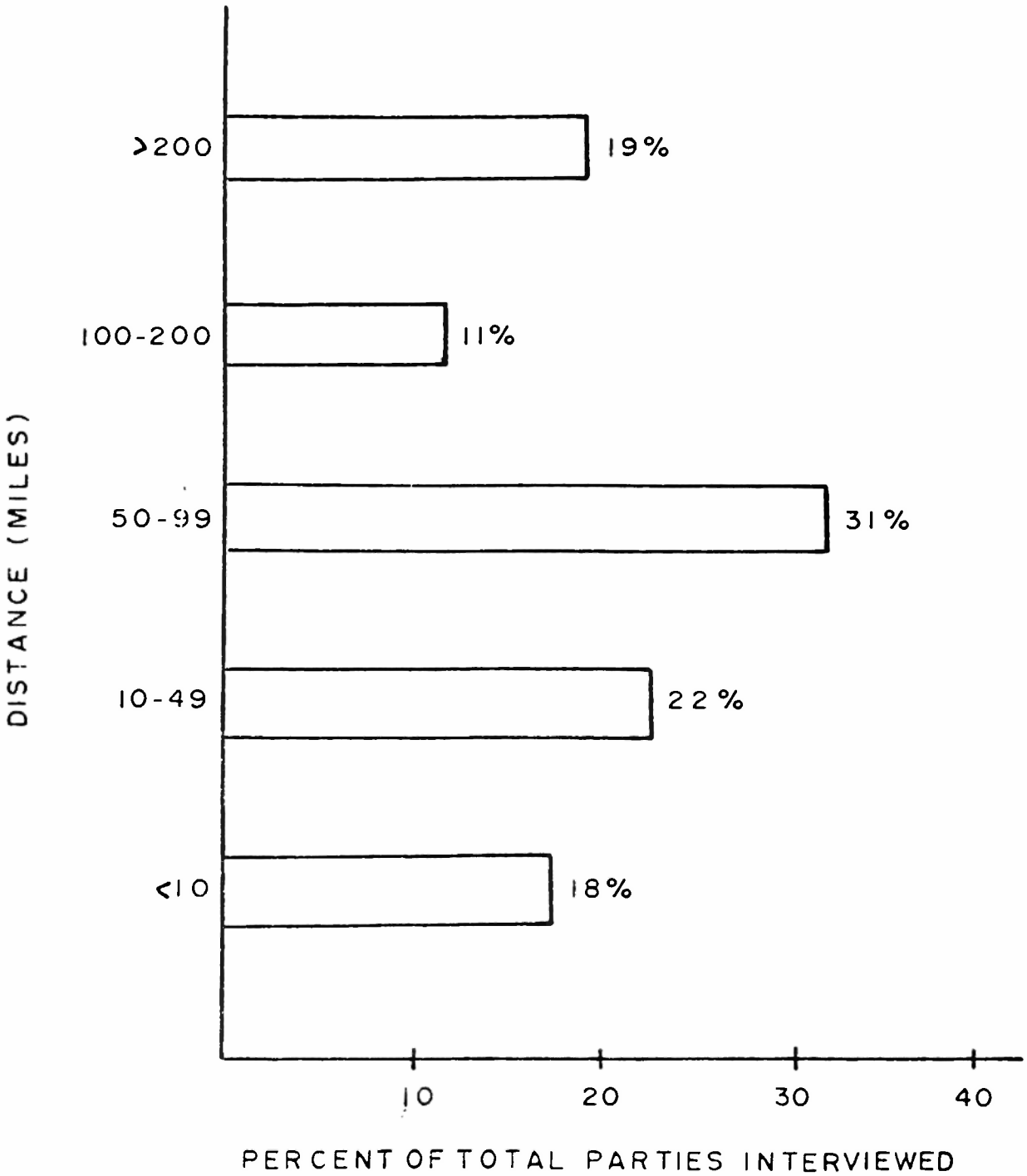
to ask one or more questions or a language barrier (French-English) between the party and interviewers. These incomplete interviews are included wherever possible in order to obtain maximum information from the data.

3.2 Description of the User Group

3.2.1 Residence: Maine residents made up 87 per cent of the 306 parties interviewed and 85 per cent of the resident anglers had permanent homes in Aroostook County. Other U.S. residents accounted for 8 per cent of the total while Canadian angling parties totalled 5 per cent. The total of 13 per cent for nonresident anglers differs substantially from visitor data reported by North Maine Woods for the years 1974 and 1975 (data provided by Mr. Tom Dickens, NMW). Between 35 and 40 per cent of all visitors in 1974 and 1975 (both fishing and hunting seasons combined) were nonresidents of Maine.

3.2.2 Seasonal Residence: Only 36 fishing trips originated from a seasonal residence. In all but one instance this seasonal residence was located in Maine, the exception being a Canadian party from a seasonal residence in Estcourt, Quebec. Furthermore, the location of the seasonal residence in Maine was in northern Aroostook County in all but one case.

3.2.3 Distances Travelled from Residence: Angling parties interviewed travelled a total of 36,563 miles from permanent residence to their fishing areas in the St. John valley. Parties most commonly drove between 50 to 100 miles (Figure 2); the median distance was 70 miles. Other than Allagash itself (58 parties), the most frequently



DISTANCES TRAVELLED BY ANGLING PARTIES FROM PERMANENT RESIDENCES

FIGURE 2

listed residence locations were Caribou (55 parties), Ft. Kent (24), St. Francis (19), New Sweden (18) and Madawaska (16). Angling trips originating from a seasonal residence were commonly 10 miles or less in distance travelled originating in Allagash, Estcourt Station or the unorganized townships within the St. John Valley for the most part.

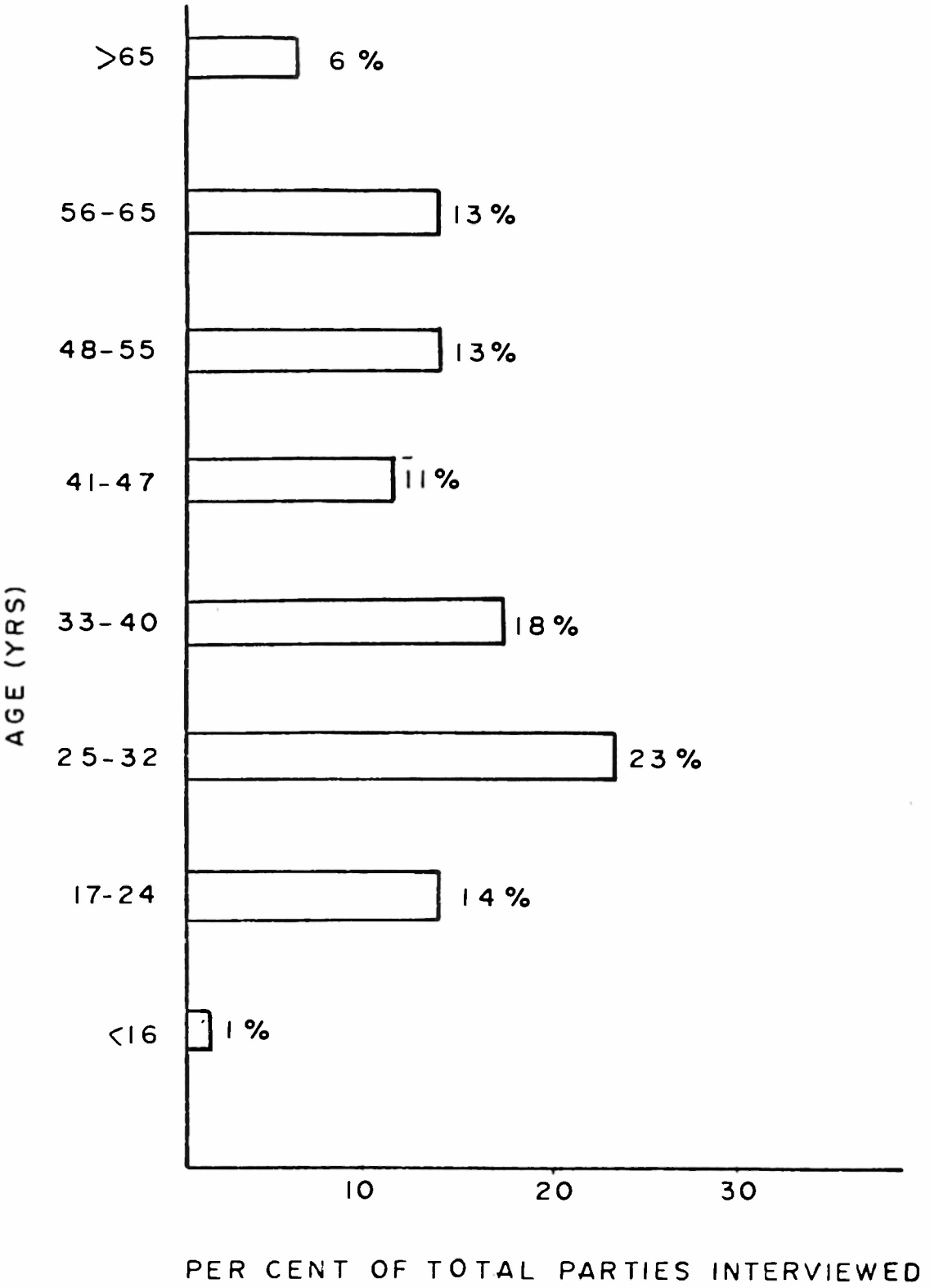
3.2.4 Age Composition of User Group: The most common age group of party spokespersons was found to be 25 - 32 years (Figure 3). The low number of spokespersons younger than 16 should not be interpreted as a scarcity of children (154 anglers not requiring licenses because of age were counted during the study). Rather, the party spokesperson was quite often the driver of the vehicle; his age would be recorded rather than that of the accompanying children.

3.2.5 Income Level: The 1975 gross family income of party spokespersons is shown in Figure 4 . A majority (53 per cent) of party spokespersons reported an income less than $10,000.

3.2.6 Seasonal Distribution of Angling: Monthly distribution of angling parties was found to be as follows:

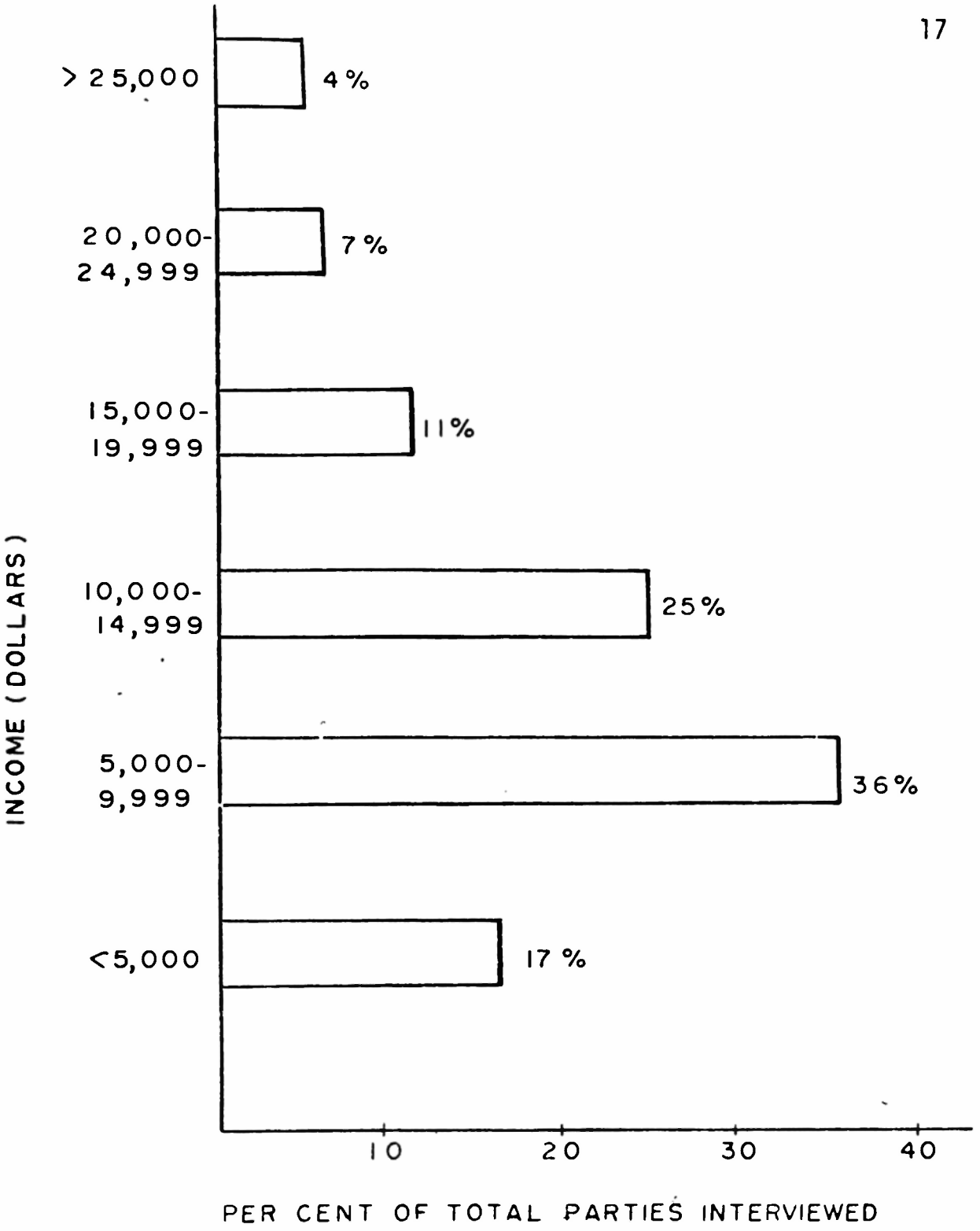
Month	No. of Parties
May	26
June	158
July	113
August	9
Total	306

Although heaviest utilization during June and July is clearly indicated, it should be noted that sampling was carried out during the entire months of June and July; interviews were conducted in May only from the 26th



AGE COMPOSITION OF PARTY SPOKESPERSONS

FIGURE 3



1975 INCOME DISTRIBUTION OF PARTY SPOKESPERSONS

FIGURE 4

through the 31st, and in August from the 1st through the 9th. Nevertheless, heaviest fishing pressure probably does occur in June and July, as statistics compiled by North Maine Woods for 1975 show (personal communication with Mr. Tom Dickens, NMW):

Month	Visitordays[1] by Anglers
May	8,517
June	15,278
July	9,019
August	5,410
September	1,557

It is important to note that brooks and streams were closed to fishing after August 15 and rivers after September 15 in 1975.

3.2.7 Party Size: Mean party size was 2.9 anglers (median = 2.4), while the number of anglers in each party was most commonly two (Table 2). Although all parties contained anglers, 37 parties (12 per cent) included at least one non-angler.

3.2.8 Trip Duration: Median trip length was 1.4 days (Table 3); however, 58 per cent of all parties fished only one day. All but 3 per cent of the total parties interviewed spent one week or less on their fishing trips.

3.2.9 Lodging Facilities: Of the 143 parties spending more than one day in the area 86 angling groups (60 per cent) utilized forest campsites maintained by North Maine Woods (Table 4). Private sporting camps were the next most commonly used lodging facility in the

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[1] Total visitordays by anglers passing through all NMW gates.

area. Only four parties stayed in hotels, motels or tourist rooms, while 18 groups used private homes, usually those of relatives or friends in the St. John Valley.

3.2.10 Annual Usage: Median annual usage for fishing was 10.3 days (Table 5); however, 34 per cent of all parties fished on the average at least once per week throughout the season (20 week season, 1 May - 15 September).

3.2.11 Previous Usage: Median previous usage for 275 party spokesperson responding, was 15.0 years (Table 6), while 67 per cent of those anglers interviewed had previously fished the St. John for 20 years or less. Only 13 of the parties (4%) were on their first fishing trip to the St. John.

3.2.12 Guides: Only two parties utilized guides during their fishing trips in the area. One guide was employed by each party and the total number of guide-days for the period amounted to three.

3.2.13 Water Body Preference: A preference for running waters is exhibited by the fact that 33 per cent of all parties preferred fishing brooks or streams, 15 per cent rivers, and 23 per cent running waters of any size (Table 7). Six per cent of the angling parties preferred ponds or lakes, while 22 per cent had no preference for fishing waters.

3.2.14 Species Preference: Anglers were asked three questions pertaining to species preference:

1) Which species do you prefer to catch in the St. John drainage?
2) Which species do you fish for most, taking all fishing into account?

3) Which species do you most desire to catch, taking all fishing into account?

We found that 86 per cent of all parties interviewed preferred to catch brook trout in the St. John (Q. 1); 96 per cent fished for brook trout most of all (Q. 2); and 92 per cent desired to catch brook trout more than any other species (Q. 3). Other species preferred by sampled angling parties (Q. 3) included landlocked Atlantic salmon, lake trout, brown trout, white perch, "bass", and bluefish.

It may be argued that the species preference expressed by an angler is inherently biased by his preference for a particular type of water body. For example, an angler who prefers to fish in brooks and streams would be expected to prefer a species such as brook trout rather than lake trout or bass, species more likely preferred by lake and pond fishermen. In order to investigate the extent of such bias influencing the overwhelming preferences for brook trout expressed by St. John anglers, species preferences were stratified according to water body preference (Table 8). An unquestionable preference for brook trout by sampled anglers can be seen regardless of water body preference.

Comparison of species and water body preferences expressed by St. John anglers with those of a statewide sample of anglers would give additional insight into the questions of where and for what species anglers fish in Northern Maine. Unfortunately statewide information is not available at this time. Such a study is being conducted by the Maine Department of Inland Fisheries and Wildlife.

3.2.15 Locations Fished: Distribution of angling pressure among various drainage subdivision of the upper St. John is shown in Table 9. The section containing the highest portion of fishing (71 per cent) was that area of the St. John River, mainstem and tributaries between the confluences with the St. John of Chementicook Stream and Allagash River. Relative utilization of other areas is shown in Table 9; however, the next most fished section, White Brook downstream to Chementicook, contained only 8 per cent of all fishing trips.

3.2.16 Fishing Method: A total of 49 per cent of all parties employed bait casting (worms), while 19 per cent relied solely on fly fishing (Table 10). Those angling parties using both fly casting and worm fishing amounted to 30 per cent. Only 2 per cent of the parties interviewed fished by trolling. The majority of angling parties interviewed (72 per cent) fished from shore without the aid of a canoe or other craft (Table 11).

3.3 Catch and Effort Reported by Angling Parties:

3.3.1 Catch by Species: Angler catches of brook trout, landlocked Atlantic salmon, lake trout, and whitefish recorded for the period 26 May through 15 August 1976 were shown in Table 12. All of the lake trout and six of the whitefish listed in Table 12 were reported by parties which fished both inside and outside (Allagash R. drainage) the project area. The remaining eight whitefish were reported by two parties: the first fished Polly Pond[1] and the main stem of the St. John; the second was a canoe party which spent 6½ days on the St. John and Chementicook Stream (starting point unknown). Fish

[1] Polly Pond (unnamed on USGS Topographic maps) drains into the St. John via Conners Brook, approximately 4 miles below Ninemile Brook.

not retained by anglers were either of legal size or sublegal, the following regulations being in effect:

Species	Minimum Length Limit	Daily Creel Limit
Brook Trout	6 in.[1]	12 fish or 7.5 lbs. in the aggregate.
Salmon	12 in.	"
Lake Trout	14 in.	"
Whitefish	No size limit	8 fish (no weight limit).

3.3.2 Angling Effort: The 306 parties interviewed in this study contained 830 anglers, who reported a total of 1754 angler-days of fishing effort (Table 13). Mean catch of brook trout per angler-day was calculated to be 5.5 for the entire sampling period. Catch per effort calculations for salmon, lake trout and whitefish were not made because of the small numbers of these species being reported by anglers (Table 12).

3.4 Total Catch and Effort Estimated from the Sample: Using the method described in Paragraph 2.4.2, estimates of total brook trout catch and angling effort were calculated from the sample for the period 26 May through 15 August 1976 (Table 14). Catch estimates for salmon, lake trout and whitefish were not calculated due to the small numbers of these species recorded during the actual sampling period (Table 12).

3.4.1 Estimated Brook Trout Catch: Mean catch of brook trout per Access Point Half Day (APHD) was estimated to be 19.9

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[1] No minimum length on brook trout taken from brooks and streams

(±2.8, p= .95). Estimated total catch for the entire 1086 available APHD's existing in the period 26 May - 15 August 1976 was 21,610 (±3,058, p= .95).

3.4.2 Estimated Angling Effort: The mean number of anglers per APHD was estimated to be 2.5 (±0.2, p= .95) with an estimated total of 2,683 (±218, p= .95) anglers exiting the project area through access gates during the period 26 May through 15 August 1976. Fishing effort was similarly estimated to be 5.7 (±1.2, p= .95) angler-days per APHD with a total of 6,199 (±1,332, p= .95).

3.5 Additional Estimates of Angling Effort in Impact Area:

3.5.1 Instantaneous Angler Counts: As part of this study the U.S. Army Corps of Engineers arranged to have aerial reconnaissance flights made over the impact area to obtain instantaneous counts of anglers. A total of 18 flights were flown between 26 May-15 August 1976 according to a pre-established stratified random sample of half-days. Morning flights began at 8 a.m. and afternoon flights at 3:30 p.m. In addition to stratification by time (weekday, weekend/holiday, morning, afternoon) the entire impact area was subdivided into six subdrainages (Table 15). During a sampling flight all visible anglers (canoeists plus shore anglers) were counted in each of these six areas.

The total number of anglers utilizing the impact area can not be estimated from the sample because of the possibility of counting an angling party more than once on successive flights (canoe parties generally take from six to nine days to travel the river to Ft. Kent and could have easily been counted more than once on successive flights). Each counted angler can be taken to represent one angler-

day of fishing effort however, because morning and evening flights were never flown on the same day. Morning and evening angler counts were combined within the weekday and weekend/holiday strata in order that the results could be expressed as "angler-days per day". When this figure is multiplied by the number of days in the season, the result is roughly comparable to the effort estimates produced by gate interviews (Section 3.4.2, Table 14).

The angler population sampled by aerial counts differs from the population sampled by exit interviews at gates, although the two overlap considerably. The aerial samples include canoe parties which did not exit through gates but do not include anglers fishing away from the main stem of the river on streams like Chementicook, Pocwock, Twomile and Fivemile which have road access points considerably above the main stem. Gate samples include the latter group plus local residents fishing in the evening only but do not include many canoe parties nor anglers fishing in the portion of the St. John main stem between the Little Black River and Fort Kent. Both surveys sampled anglers fishing from shore at the confluence of the main stem and all the tributaries and shore anglers in the Little Black and Big Black River systems. It is not possible, therefore, to determine the number of canoe parties fishing within the impact area by comparing flight data and gate interview data. Rough estimates of the proportion of canoeists within each subdrainage can be made on the basis of road access to the river in the subdrainage. Angling effort in the portion from Ninemile Brook to the Big Black River is probably largely by canoe parties because of limited road access (Table 9 lists only 2%

of the parties interviewed at gates fished this area, equivalent to about 125 angler-days during the season, while aerial counts summarized in Table 15 indicate approximately 2,000 angler-days for this portion of the drainage). Each of the other subdrainages has somewhat better road access and probably a higher proportion of anglers reaching the river and tributaries by North Maine Woods access points. Nevertheless, unusually high water conditions during the 1976 season probably allowed more canoeists to use the river throughout the summer than would be found in a normal water year. Considering the overlap in populations between the estimate of Section 3.4.2 and this Section, we feel it reasonable to estimate that angler effort expended in recreational use of the fishery resource within the project area in 1976 was not less than 6,000 and not more than 11,500 angler-days.

3.5.2 North Maine Woods Visitor Registration Data: Each visitor entering North Maine Woods is required to register at an entry checkpiont, declaring destination, purpose and duration of his proposed stay in the area. The total number of anglers registering in 1974 and 1975 at six of the seven checkpoints covered in this study were as follows (data provided by Mr. Tom Dickens, North Maine Woods):

NMW Gate	1974	1975
Allagash	1590	693
Dickey	1217	612
Estcourt	414	228
St. Pamphile	835	161
Daaquam	955	782
Musquacook	313	1184
TOTAL	5324	3660

It should be noted that the NMW data show all anglers passing through these gates, not just those fishing within the Dickey-Lincoln impact area. Except for canoe parties transiting the river, that portion of the St. John drainage reached through the Daaquam and Musquacook gates is outside the impact area. Both these gates plus the Allagash gate provide access to the Allagash watershed as well as to the St. John watershed. Direct comparison with our estimates of fishing effort (Table 13) thus would not be possible.

3.6 Expenditures Directly Related to Fishery Resource Utilization Reported by Angling Parties: Angling parties were asked to estimate expenditures for lodging, food, use permits, guides, transportation and miscellaneous items applicable to the particular trip they were finishing at the time of the exit interview. All data are tabulated on a per party trip basis. Responses to these questions were extremely variable for several reasons and thus the means and totals to be presented have large variances and very wide confidence intervals. Foremost among the reasons for variability was the large number of parties on one day trips which reported no expenditures at all. Even among parties staying more than one day within the project area there seemed to be a strong tendency not to consider food taken from home and gasoline already in the vehicle as expenses of the trip. This results in a large number of zero expenditures for food and transportation. Medians are given in the discussions of expenditure items and both means and medians are listed in the discussion of total expenditures.

3.6.1 Lodging: A total of 94 per cent of all parties interviewed spent no money on lodging (Table 16). due largely to the high

proportion of single day trips (Table 3) and to the utilization of forest campsites by most parties fishing more than one day (Table 4). Camping fees are included in the general user fee charged by North Maine Woods both to residents and nonresidents. Total expenditures on lodging by all parties interviewed amounted to approximately $1,100 for the entire sampling period.

3.6.2 Food: A total of approximately $7,195 was spent by anglers on food, with median food expenses per party per trip of $4.62. However, 44 per cent of all parties interviewed claimed no expenditures on food (Table 17).

3.6.3 User Fees Paid to North Maine Woods: Total fees paid to NMW by all parties interviewed amounted to approximately $1,973 (Table 18). The following fees were established by NMW for 1976, and were charged to all recreational visitors 15 years of age and over:

> Maine residents: $1.00/person/day for registration and camping; $5.00/person seasonal pass
>
> Nonresidents: $3.00/person/day for registration and camping; no seasonal pass available, however $15.00 maximum fee/person/visit

The large proportion of parties (48 per cent) not paying a fee to NMW for their visit reflects the fact that these anglers had purchased seasonal passes during an earlier trip.

3.6.4 Guides: A total of $112 was spent on guides by the two parties requiring such services. Average cost for guide services could not be realistically determined from only two parties; however, a fee of $20 - 25 per day for a guide is probably a reasonable estimate.

3.6.5 Travel: A total of $4113 was spent by all angling parties for transportation, with 48 per cent spending $5 or less for gasoline and any other transportation services (Table 19).

3.6.6 Miscellaneous: Miscellaneous expenses were reported by only 13 per cent of all parties interviewed (Table 20). This cost category included expenses such as fishing tackle and camping equipment purchased for the trip. Fees for nonresident temporary fishing licenses purchased for use in the St. John Valley were also included in this category.

3.6.7 Total Expenditures: As pointed out above, a large number of parties reported no expenditures at all. The result of many zero expenditures is that the mean is quite different from the median expenditure for many categories. Variation in party size also contributed to the variability of expenditures. The expenditures of a large party influence the mean more than the median. Finally, trip duration also influences party expenditures to a considerable degree, but not consistently. For example, one party of four persons spending seven days in the area reported total expenses of only $65 and another party of four spending eight days reported expenses of $109 At the other end of the spectrum was a party of seven which spent over $300 for a 2-day trip and a party of six whose 9-day trip cost well over $1,000.

Median and mean expenditures for each category of expense are summarized in Table 21. Startling differences between means and medians, resulting from the many parties reporting no expenditures, are clearly evident. An independent calculation of total expenses per

angling party, derived from the 297 interviews providing data (including zeros) for all categories, indicates a median expenditure of $20.19 and a mean expenditure of $51.49 per party per trip compared to the sum of category means of $52.52. The differences in expenditures by parties staying only one day (or less) compared to parties staying for several days is illustrated in Table 22 where parties are stratified into three groups: those not remaining overnight, those spending two to four days in the study area, and those spending five or more days. If the three summary means are combined into a mean total expenditure weighted according to the number of parties in each category, the result is a total expenditure per party of $44.65. Taking into account all the variation affecting these means, it seems reasonably safe to assume that, over the whole season, the mean expenditure of an hypothetical "average" party would be between $40 and $50.

3.7 Estimated Total Expenditures by Angling Parties in 1976: Estimation of the total amount expended by angling parties for trips to the impact area between May 26 and August 15, 1976 can be approached in a number of ways. None of the approaches produces a very precise estimate because of the wide variation in party expenditures discussed in Section 3.6. The most direct estimate, that utilizing the stratified random sample of total expenditures following the method of Section 2.4.2, yields a value of $53,889 ± $15,561 for all angling parties during the season. A second procedure utilized the estimated number of anglers for the season (2,683 ± 218, Table 14), the mean party size (2.9 ± .2 anglers, Table 2) and the mean expenditure per party ($51.49 ± $12, Table 12). This procedure provides an estimate

of $47,637 ± 20,579. A third procedure, similar to the second except that it utilized expenditure estimates stratified by trip duration (Table 22), yields a figure of $49,928 (no confidence interval was computed). It would appear, then, that the expenditures by angling parties departing from the impact area through North Maine Woods gates were in the vicinity of $50,000 in 1976. It is unfortunate that this study was not designed to collect similar expenditure information from canoe parties. Although it has been possible to include this group in the resource utilization statistics (Section 3.5.1), insufficient exit interviews were conducted to estimate the amount spent by this group. On a per party basis, it would be expected to be considerably higher than that spent by anglers covered in our survey. The $50,000 figure, then, should be considered a minimum for total angler use.

4.0 Discussion

4.1 Angler Profile: Based on information collected during exit gate interviews it is possible to assign the following list of attributes to a typical St. John angler (party spokesperson) who currently fishes within the impact area using North Maine Woods roads:

---He is typically male, between the ages of 25 and 32 and his 1975 gross income was probably less than $10,000.

---He is a Maine resident who permanently resides in Aroostook County and travels between 50 and 100 miles to his fishing area in the St. John Valley.

---He most often fishes during the months of June and July, and is commonly accompanied on his fishing trip by one or two additional anglers. Only rarely will a non-angler be included in the party.

---He will generally spend one to two days per fishing trip, but over an entire season will spend a total of about 10 days in the area.

---He is familiar with the area, having fished it for many years and does not ordinarily require services of a guide.

---He typically comes to catch brook trout and prefers fishing for trout in running waters, especially brooks and streams.

---He will usually catch five or six brook trout per day of fishing and would not ordinarily catch any salmon, lake trout or whitefish on a typical fishing day.

---He most often fishes with worms, although he may also fly fish. Ordinarily a canoe or other craft would not be used and his fishing would be done from shore.

---If he does spend the night in the area he will typically stay at a North Maine Woods campsite, or he occasionally may use a private sporting camp.

---He may consider that his trip cost him nothing because he brought food from home and used the gasoline already in his car, but the mean expenditure for parties staying for less than five days was $15.00 per party per day; most of it for food, gasoline and user fees.

4.2 Dollar Value of the Sport Fishery

4.2.1 Cost per Angler-day of Recreation: Several alternative estimates of total expenditures by anglers using the fishery resource within the impact area were offered in Paragraph 3.7. The amount of money spent by anglers seeking recreational fishing was estimated using each method to be roughly $50,000 for the period 26 May through 15 August 1976. It was pointed out that this estimate of the monetary value of the resource was probably minimal due in part

to the lack of expenditure information from canoe parties. Other factors, such as high water conditions and altered user and license fees (see Paragraph 1.0) probably served to decrease fishing effort during the 1976 season and thus led to a lower monetary estimate than might have been obtained during a more normal year.

Another method of evaluating the dollar value the fishery resource involves computation of the cost per angler-day, the amount of money an individual spends for a day's recreational fishing. Based on total expenditures of $15,294 (Table 12) and total fishing of 1754 angler-days (Table 13) reported by interviewed parties, the cost per angler-day amounts to $9.72. This cost per unit effort assessment of the fishery is probably a more meaningful indication of of its dolar value than the estimates of total expenditures. Factors such as adverse water conditions that would affect total effort over an entire season should not influence cost per unit effort, although there would be a concomitant decrease in total expenditures during a poor water year. However, several other factors that adversely influenced estimates of total expenditures (see Paragraphs 3.6 and 3.7) would also affect the cost per angler-day. First, the large proportion of anglers reporting zero expenditures (primarily one-day parties) did actually spend money for gas and food brought along for the day. Secondly, the lack of expenditure information from canoe parties probably reduced the cost per unit effort estimate, due to the kinds of expenses incurred during an extended canoe trip (e.g. guides, flight service) that were not reported by the group of anglers for which the value of $9.72 was calculated. The value of

$9.72 per day's recreational fishing should thus be regarded as a minimum estimate.

4.2.2 Comparison with National Standards: The following criteria were established by the Water Resources Council (Federal Register, V. 38, No. 174, Part 3, 10 September 73) for classifying water based recreational resources:

Type of Outdoor Recreation Day	Range of Unit Day Values
General	$0.75 - 2.25
Involves primarily those activities attractive to the majority of outdoor recreationists and generally requires the development and maintenance of convenient access and adequate facilities.	
Specialized	$3.00 - 9.00
Involves primarily those activities for which opportunities, in general, are limited, intensity of use is low, and often may involve a large personal expense by the user.	

The value of $9.72 per angler-day of recreation would certainly place the fishery resource currently existing in the impact area within the specialized category.

Additional standards are also available in the most recent national survey of fishing and hunting published by the Bureau of Sport Fisheries and Wildlife (1972) for 1970. According to this census of anglers across the country, the average freshwater fisherman spent $6.30 per day's fishing. Although this value would undoubtedly be higher in 1976 due to inflation, the 1970 national average expenditure also included expenses such as fishing licenses

and all fishing equipment purchased that year by the angler. Including such items in the cost per angler-day for the St. John fishery would raise the value beyond $9.72 and undoubtedly well above the national average.

4.3 Precision of Estimates: Any survey designed to sample multiple attributes of a population sacrifices precision in estimates of some attributes to gain information on other attributes. Precision is defined, for purposes of these comparisons, as 100 times the standard error of the mean divided by the mean obtained from the stratified sample (see Section 2.4.2). Precision is a function of sample size, thus precision can be increased by increasing sample size. In this survey, sample size could have been increased without increased labor costs by concentrating sampling effort at those gates where the most traffic was expected, i.e. Dickey, Little Black and Estcourt. This scheme, however, would have sacrificed information on geographic distribution of the catch within the impact area. Canoe parties could have been more fully sampled by stationing interviewers at every potential landing spot or by requesting canoe parties to stop for an interview at some definite place (i.e. Walker Brook Campground) according to some randomized scheme. This would probably have increased the precision of the expenditures estimate at the cost of sampling at one or two of the NMW gates.

Total number of anglers exiting the study area through NMW gates was the most precisely estimated of any of the population parameters (Table 23) and total catch of brook trout was the second most precise figure, however the latter figure is subject to vagaries of

memory for parties fishing several days. Estimation of total angler-days was almost equally precise by either method (Table 23). Descriptive material on the sample actually interviewed is contained in Appendix B. This decription can be used in evaluating possible alternatives for increasing the precision of estimates of certain attributes while losing precision on others.

4.4 Present Utilization of the Fishery Resource: Current fishing opportunities in the area seem to be attractive, as evidenced by the high proportion of anglers returning year after year. Impoundment of a substantial portion of the drainage would of necessity alter the existing brook trout fishery in various running waters within the impact area. Actual catch of trout is undoubtedly a major attractant to anglers under present conditions, as evidenced by the large proportion of brook trout retained by fishermen. Another attraction presently existing in the area might be those aesthetic experiences enjoyed while fishing. In any case the relatively large amount of money spent for a day's fishing illustrates the value the St. John angler places on the existing fishery resource.

5.0 Summary

A stratified random sample of 306 angling parties completing fishing trips within that portion of the St. John River drainage controlled by North Maine Woods checkpoints was used to characterize utilization of the fishery resource within the impact area of the proposed Dickey-Lincoln School Hydroelectric Project. Angler interviews conducted at North Maine Woods gates were supplemented by aerial observations of angler effort. Data obtained from the

sample were then used to infer utilization for the time period extending from 26 May to 15 August 1976.

Maine residents made up 87% of the sample and 85% of the Maine residents were from Aroostook County. They drove an average of 70 miles to their fishing areas and more than half fished only one day per trip. Median annual usage was 10.3 days however and 34% of the party spokespersons fished an average of once a week. Fishing pressure was heaviest in June and early July. Median previous usage of this particular resource was 15 years and only 4% of the parties were fishing the St. John drainage for the first time. Brook trout was the principal species sought by anglers and more than 70% preferred to fish in running waters as opposed to ponds and lakes or no preference. Worms were used exclusively as bait by half the parties, 20% used fly fishing exclusively and most of the rest combined these two methods.

Based on the sample, we estimated that approximately 2700 anglers exerted a pressure of approximately 6,200 angler-days on the resource and creeled approximately 21,600 brook trout during the season. Estimates of angler effort derived from aerial counts agreed fairly closely with estimates from gate counts, but include different groups of anglers. For this reason, we feel that an upper limit of 11,500 angler-days for the sampling period is reasonable. Angling effort by anglers passing through North Maine Woods gates was concentrated on that section of the St. John and its tributaries between Chementicook Stream and the Allagash River, including the Little Black River drainage. Aerial observations, however, indicated that fishing effort between Ninemile and the mouth of the Big Black

River was nearly equal to that between Chementicook Stream and the Allagash River.

Estimates of angler expenditures directly related to fishery resource utilization were considerably more variable than estimates of catch and effort. A large number of parties reported no expenditures at all. Median expenditure per party was $20, mean expenditure was $50 and the mean expenditure per angler day of effort was $9.70 Extending the latter two figures to the whole population yields an estimated expenditure of $50,000 by anglers utilizing the impact area during the sampling period. This estimate does not accurately reflect expenditures by canoe parties, however.

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Table 1. SUMMARY OF SAMPLING PLAN, 26 MAY - 15 AUGUST 1976

Stratum	Available APHD's	Sampling Proportion (Percent)	
		Proposed	Achieved
Early Season			
Major Access			
Weekend/holiday			
Morning	57	37.5	30
Evening	57	75	60
Weekday			
Morning	120	20	18
Evening	120	37.5	32
Lesser Access			
Weekend/holiday			
Morning	41	25	27
Evening	41	37.5	41
Weekday			
Morning	91	10	13
Evening	91	20	27
Late Season			
Major Access			
Weekend/holiday			
Morning	34	25	15
Evening	34	50	38
Weekday			
Morning	100	12	9
Evening	100	20	16
Lesser Access			
Weekend/holiday			
Morning	25	10	4
Evening	25	20	16
Weekday			
Morning	75	12	11
Evening	75	12	12
Total	1086		

Table 2. SIZE OF ANGLING PARTIES[1]

Number of Party Members	Sampling Season		
	Early	Late	Total
1	13(35)	6(3)	13(38)
2	40(103)	39(18)	40(121)
3	23(60)	17(8)	22(68)
4	11(29)	22(10)	13(39)
5	5(14)	6(3)	6(17)
6	4(10)	6(3)	4(13)
>6	4(9)	2(1)	3(10)
Mean	2.9	3.1	2.9
N	260	46	306

[1] Per cent of total with actual number of parties in parentheses.

Table 3. TRIP DURATION[1]

Duration in Days	Sampling Season		
	Early	Late	Total
1	59(153)	49(22)	58(175)
2-4	32(82)	47(21)	34(103)
5-7	6(16)	2(1)	6(17)
> 7	3(8)	2(1)	3(9)
Median	1.3	1.5	1.4
N	259	45	304

[1] Per cent of total with actual number of parties in parentheses.

Table 4. LODGING USED BY ANGLING PARTIES[1]

Type of Lodging	Sampling Season		
	Early	Late	Total
No Lodging[2] (Day trip)	54(140)	47(21)	53(161)
Forest Campsite	27(71)	33(15)	28(86)
Sporting Camp	10(26)	9(4)	10(30)
Hotel, Motel or Tourist Room	1(2)	2(2)	1(4)
Private Campground	2(5)	0(0)	2(5)
Private Home	6(15)	7(3)	6(18)
N	259	45	304

[1] Per cent of total with actual number of parties in parentheses.

[2] The number of parties reporting no lodging is less than the number reporting a trip duration of one day (Table 3). This inconsistency apparently arose from parties that remained overnight with friends or relatives in the Allagash-Fort Kent area but fished on only one calender day.

Table 5. ANNUAL USAGE BY ANGLING PARTIES[1]

Sampling Season	Annual Usage (Days per Season)				
	1-10	11-20	>20	Median	N
Early	52(131)	14(36)	34(85)	10.3	252
Late	52(21)	15(6)	34(14)	10.2	41
Total	52(152)	14(42)	34(99)	10.3	293

[1] Per cent of total with actual numbers of parties in parentheses

Table 6. PREVIOUS USAGE BY ANGLING PARTIES[1]

Years of Previous Usage	Sampling Season		
	Early	Late	Total
0-10	40(94)	50(21)	42(115)
11-20	24(56)	28(12)	25(68)
21-30	18(42)	7(3)	16(45)
31-40	10(23)	5(2)	9(25)
>40	8(18)	10(4)	8(22)
Median	15.2	10.5	15.0
N	233	42	275

[1] Per cent of total with actual number of parties in parentheses.

Table 7. WATER BODY PREFERENCE OF ANGLING PARTIES[1]

Water Body	Sampling Season		
	Early	Late	Total
Brooks and Streams	32(81)	41(18)	33(99)
Rivers	18(45)	2(1)	15(46)
Ponds and Lakes	6(16)	4(2)	6(18)
Any Running Water	20(51)	43(19)	23(70)
No Preference	24(62)	9(4)	22(66)
N	255	44	299

[1] Per cent of total with actual number of parties in parentheses.

Table 8. COMPARISON OF ANGLER PREFERENCES FOR BROOK TROUT BASED ON WATER BODY PREFERENCES[1]

Species Preference Criteria	Water Body Preferences				
	Brooks and Streams	Rivers	Lakes and Ponds	Any Running Waters	No Preference
Species Sought in St. John Drainage					
Brook Trout	95	43	14	68	64
Other[2]	4	3	4	2	2
Species Fished for Most (total fishing in all drainages)					
Brook Trout	98	46	15	70	59
Other[2]	1	0	3	0	7
Species Desired Most (all fishing experiences)					
Brook Trout	96	42	13	66	58
Other[2]	3	4	5	4	8
Total No. of Parties per Water Body Preference Category	99	46	18	70	66

[1] Reported as the number of parties of a total of 299 responding to both questions preferring brook trout or other species compared to their water body preferences (Table).

[2] Other species preferred by anglers included landlocked Atlantic salmon, lake trout, brown trout, white perch, "bass", and bluefish.

Table 9. LOCATIONS FISHED BY ANGLING PARTIES INTERVIEWED AT ACCESS GATES[1]

Location[2]	Sampling Season		
	Early	Late	Total
St. John R. and Tributaries			
Allagash R. to Chementicook Str. (including Little Black R.)	74(179)	56(24)	71(203)
Chementicook Str. to White Brk. (excluding Big Black R.)	7(17)	16(7)	8(24)
White Brk. to Ninemile Brk.	2(6)	0(0)	2(6)
All Areas Upstream from Ninemile Brk.	2(6)	0(0)	2(6)
Big Black R. and Tributaries	6(15)	14(6)	7(21)
More than One of the Above Subdrainages	8(20)	14(6)	9(26)
N	243	43	286

[1]Per cent of total with actual number of parties in parentheses.

[2]See Figure for locations of listed waters.

Table 10. FISHING METHOD USED BY SAMPLED ANGLING PARTIES[1]

Method	Sampling Season		
	Early	Late	Total
Fly Fishing	21(52)	11(5)	19(57)
Bait Casting (worms)	48(121)	53(24)	49(145)
Fly Fishing and Bait Casting	29(74)	36(16)	30(90)
Trolling	2(5)	0(0)	2(5)
N	252	45	297

[1] Per cent of total with actual number of parties in parentheses.

Table 11. SHORE AND CRAFT UTILIZATION BY SAMPLED ANGLING PARTIES[1]

Shore or Craft	Sampling Season		
	Early	Late	Total
Shore (no craft)	74(190)	62(28)	72(218)
Canoe or other Craft	11(28)	22(10)	13(38)
Combination Shore and Craft	15(38)	16(7)	15(45)
N	256	45	301

[1] Per cent of total with actual number of parties in parentheses.

Table 12. CATCH BY SPECIES REPORTED BY ANGLING PARTIES

Species	Sampling Season		
	Early	Late	Total
Brook Trout			
No. Caught	5407	1218	6625
No. Retained	4718	1055	5773
Landlocked Atlantic Salmon			
No. Caught	6	1	7
No. Retained	4	1	5
Lake Trout[1]			
No. Caught	1	3	4
No. Retained	1	3	4
Whitefish[1]			
No. Caught	14	0	14
No. Retained	1	0	1

[1] See text for explanation.

Table 13 CATCH OF BROOK TROUT PER RECORDED ANGLING EFFORT

Catch and Effort Reported by Anglers	Sampling Season		
	Early	Late	Total
Total Catch of Brook Trout	5407	1218	6625
Total Anglers	693	137	830
Total Angling Effort in Angler days	1493	261	1754
Mean Catch per Effort (brook trout per angler-day)	5.6	5.3	5.5

Table 14. TOTAL BROOK TROUT CATCH AND ANGLING EFFORT ESTIMATED FROM THE SAMPLE[1]

Population Parameter	Estimated Value	
	Mean per APHD	Total
Brook Trout Catch	19.9 ± 2.8	21,610 ± 3,058
Anglers Exiting Impact Area through Access Gates	2.5 ± 0.2	2,683 ± 218
Angler-days of Fishing Effort	5.7 ± 1.2	6,199 ± 1,332

[1] Estimates are for the population of 1086 available Access Point Half-Days existing in the period 26 May through 15 August 1976. Each estimate is given with its 95 per cent confidence interval.

Table 15. DISTRIBUTION OF FISHING EFFORT WITHIN IMPACT AREA[1]

Area	Mean Effort[2] per Day	Total Effort for[2] the Sampling Period
St. John Main Stem:		
Ninemile Brook to Big Black River	23.6 ± 4.3	1940 ± 352.6
Big Black River to Chementicook Stream	7.0 ± 1.7	574 ± 139.4
Chementicook Stream to Little Black R.	14.6 ± 5.1	1202 ± 418.2
Little Black River to Fort Kent	10.9 ± 3.4	893 ± 278.8
Big Black River	6.2 ± 0.9	506 ± 73.8
Little Black River	4.8 ± 0.6	394 ± 49.2
Total Impact Area	67.2 ± 13.3	5509 ± 1091.

[1] Estimated from stratified sample of instantaneous angler counts for the period 26 May - 15 August 1976.

[2] Fishing effort expressed as angler-days; estimates given with 95 per cent confidence intervals.

Table 16. LODGING EXPENDITURES BY ANGLING PARTIES[1]

Dollars	Sampling Season		
	Early	Late	Total
0	94(241)	95(42)	94(283)
2-25	2(5)	0(0)	2(5)
26-99	3(7)	2(1)	3(8)
>100	2(4)	2(1)	2(5)
Median per Party per Trip	$0.06	$2.02	$0.06
Total for All Parties Interviewed	$780	$330	$1110
N	257	44	301

Table 17. FOOD EXPENDITURES BY ANGLING PARTIES[1]

Dollars	Sampling Season		
	Early	Late	Total
0	43(111)	48(21)	44(132)
1-10	21(53)	11(5)	19(58)
11-25	17(43)	30(13)	19(56)
26-100	12(31)	10(4)	13(35)
>100	7(18)	2(1)	6(19)
Median per Party per Trip	$4.62	$3.00	$4.62
Total for All Parties Interviewed	$6489	$706	$7195
0	256	44	300

[1]Per cent of total with actual number of parties in parentheses.

Table 18. USER FEES PAID TO NORTH MAINE WOODS BY ANGLING PARTIES[1]

Dollars	Sampling Season		
	Early	Late	Total
0	46(119)	54(24)	48(143)
1-10	36(94)	34(15)	36(109)
11-25	12(31)	7(3)	11(34)
26-99	5(13)	4(2)	5(15)
Median per Party per Trip	$2.79	$0.42	$2.38
Total for All Parties Interviewed	$1767	$206	$1973
N	257	44	301

Table 19. TRAVEL EXPENDITURES BY ANGLING PARTIES[1]

Dollars	Sampling Season		
	Early	Late	Total
0-5	48(122)	51(22)	48(144)
6-15	26(67)	32(14)	27(81)
16-30	14(37)	9(4)	14(41)
>30	11(29)	7(3)	11(32)
Median per Party per Trip	$6.18	$5.44	$6.12
Total for All Parties Interviewed	$3601	$512	$4113
N	255	43	298

[1] Per cent of total with actual number of parties in parentheses.

Table 20. MISCELLANEOUS EXPENDITURES BY ANGLING PARTIES[1]

Dollars	Sampling Season		
	Early	Late	Total
0	88(226)	84(37)	87(263)
1-25	7(19)	14(6)	8(25)
> 25	5(13)	2(1)	5(14)
Median per Party per Trip	$0.07	$0.19	$0.07
Total for All Parties Interviewed	$1099	$149	$1248
N	258	44	302

[1] Per cent of total with actual number of parties in parentheses.

Table 21. SUMMARY OF EXPENDITURES BY ANGLING PARTIES

Cost Category	Number of Parties Responding	Total Spent By Responding Parties	Median Spent per Party per Trip	Mean Spent per Party per Trip
Lodging[1]	301	$110	$0.06	$ 3.69
Food[1]	300	7195	4.62	23.98
Guide Service	302	112	0.02	0.37
User Fees[1]	301	1973	2.38	6.55
Travel[1]	298	4113	6.12	13.80
Miscellaneous[1]	302	1248	0.07	4.13
Sum of Means	—	—	—	$52.52
Total Spent[2] per Trip	297	$15,294	$20.19	$51.49

[1] From Tables 16 - 20 .

[2] Calculated separately for the 297 parties for which complete data are available. Not additive.

Table 22. MEAN PARTY EXPENDITURES CLASSIFIED ACCORDING TO TRIP DURATION.

Expenditure Category	Trip Duration		
	1 Day (N= 175)	2-4 Days (N= 100)	5 Days or More (N= 25)
Lodging	$ 0.00	$ 2.90	$ 17.56
Food	4.81	22.79	108.80
User Fees	3.13	8.38	20.58
Guide Service	0.11	0.00	3.68
Transportation	8.11	16.00	28.74
Miscellaneous	1.32	4.65	16.39
Sum of Means	$17.48	$54.72	$195.75

Table 23. PRECISION OF ESTIMATES FOR CATCH, EFFORT, AND TOTAL EXPENDITURES[1]

Variable	Estimated Value	Per cent Error[2]
Total Catch of Brook Trout	21,610	7.2
Total Anglers Exiting Through Access Gates	2,683	4.1
Total Angler-days Determined By Exit Interviews at Gates	6,199	11.0
Total Angler-days Determined by Aerial Reconnaissance	5,509	10.1
Total Expenditures	$53,889	14.8

[1] For the period 26 May - 15 August 1976.

[2] Per cent error = $\frac{s(\bar{y}_{st})}{\bar{y}_{st}} \times 100$

APPENDIX A.

MAINE COOPERATIVE FISHERY RESEARCH UNIT

FISHERY RESOURCES UTILIZATION STUDY-1976

DICKEY-LINCOLN SCHOOL IMPACT AREA

Date_____ Party No._____ Site_____ Time_____

Number People in Party_____ Number Resident Licenses_____

Number Anglers not requiring licenses because of age_____ How many angler days?_____ AM or PM survey Total anglers in party_____

Fished: Lakes, Streams, Both.

List up to six lakes, ponds, brooks and streams fished by party, in decreasing order of effort:

a._____ d._____

b._____ e._____

c._____ f._____

What fish do you most prefer to catch in the St. John River country? Brook trout, LL Salmon, Combination (which?)_____Other_____.

Do you prefer fishing: Brooks, Streams, Rivers, Ponds, Lakes, any running water, Ponds and Lakes, no particular preference?

Taking all your fishing for the year together, which species do you fish for most?_____. Which species do you most like to catch?_____. How many days did the party spend in the St. John Valley this trip?_____ How many days each year (average) does the spokesperson fish the St. John?_____

How many years have you fished the St. John_____. What fishing methods were used by party (circle all applicable)? Fly casting, Trolling, Bait casting (worms).

Appendix A. (cont.)

What were the predominate types of bait used by party?_____.

Fished from: Shore & Wading, Canoe, Rowboat, Outboard, Rubber boat or raft, Other (describe)_____.

How many of the people who fished caught one or more fish?_____.

FISHING SUCCESS--How many of each species?

	Legal Kept	Legal Released	Sublegal
Brook trout	_____	_____	_____
LL Salmon (Ouananiche)	_____	_____	_____
Lake Trout (Togue)	_____	_____	_____
Whitefish	_____	_____	
Pickerel	_____	_____	
Perch	_____	_____	
Other:_____	_____	_____	_____

ECONOMIC DATA

Permanent residence of party spokesperson: State or Province_____

County_____ Town_____

How many miles from residence to the St. John _____.

If trip originated from a temporary or seasonal residence closer to the St. John than permanent residence, give origin of trip and distance to the St. John: State or Province_____Town_____Distance_____.

What is spokesperson's age____.

What is spokesperson's family income level before deductions (show card) _____.

Appendix A. (cont.)

Estimate of amount of money (dollars) that party spent on this trip to the St. John:

Lodging	_____	Food	_____
Camping & User Fees	_____	Guide Service	_____
Gas & Auto Service	_____	Miscellaneous	_____

Did the party utilize services of professional guide? ____. If yes, how many guides?_____ and how many days?_____.

For lodging, did the party utilize: Forest Campsites, Privately owned campground, Sporting camp, Motel, Tourist Rooms, Other (describe):____

_____.

If camping, did the party use: Tent, Tent trailer, Camper trailer, Pick-up camper, Motor home, Other (describe):_____

_____.

CARD CONTAINING INCOME BRACKETS SHOWN TO PARTY SPOKESPERSON:

What was your 1975 family income before deductions for taxes, Social Security, etc.?

1) under $ 5,000	5) $20,000 - $24,999
2) $ 5,000 - $ 9,999	6) $25,000 - $29,999
3) $10,000 - $14,999	7) $30,000 - $49,999
4) $15,000 - $19,999	8) $50,000 or more

APPENDIX B.

DESCRIPTION OF THE SAMPLE

Table ' summarizes the projected and achieved sampling proportions for the various strata. The purpose of this Appendix is to record the number of parties actually interviewed according to the various time and place divisions used in constructing the strata. Such information may be of value in constructing similar surveys in the future and in evaluating the effectiveness of this survey.

CENSUS SITE			
Gate	Number Parties Interviewed[1]	Frequency (Per cent)	Cumulative Frequency (Per cent)
Dickey	191	62.4	62.4
Allagash	35	11.4	73.8
Estcourt	30	9.8	83.6
Little Black[2]	21	6.9	90.5
St. Pamphile	20	6.5	97.0
Canoe landings	6	2.0	99.0
Daaquam	2	0.7	99.7
Musquacook	1	0.3	100.0

[1] Number of parties that had actually fished in the St. John study area.

[2] The gate on the Little Black River road was never installed; vehicles were not required to stop and all interviews were voluntary.

Appendix B. (cont.)

If distribution of angling effort within the project area had not been one of the important types of information sought, the survey could have been confined to the Dickey, Estcourt and Allagash gates and sampled 84% as many parties at a considerable saving in labor and travel cost. Alternatively, the same expenditure for labor and travel concentrated on these three gates would have produced a larger sample of parties.

SEASONAL DISTRIBUTION

Month	Number of Parties	Frequency (Per cent)	CUMULATIVE Frequency (Per cent)
May	26	8.5	8.5
June	158	51.8	60.3
July	112	36.7	97.0
August	9	3.0	100.0

Sampling began on May 26 and included the Memorial Day weekend. Sampling was scheduled to end August 15 but actually ended August 9 because of washouts associated with hurricane Belle. Three scheduled weekdays and two scheduled weekend days (15 samples) were lost.

DAY OF WEEK

Day	Number of Parties	Frequency (Per cent)	Number Days in Season	Parties Per Day
Sunday	88	28.8	12	7.3
Monday (non-holiday)	20	6.5	9	2.2
Tuesday	23	7.5	11	2.1

Appendix B. (cont.)

Wednesday	31	10.1	12	2.6
Thursday	13	4.2	12	1.1
Friday	23	7.5	12	1.9
Saturday	91	29.7	12	7.6
Holidays (Mondays)	17	5.5	2	8.5

Difference between number of parties interviewed on weekdays and weekend days reflects increased sampling effort on weekend days to some extent.

TIME OF DAY

Closest Hour	Number of Parties Interviewed	Frequency (Per cent)	Cumulative Frequency (Per cent)
700	1	0.3	0.3
800	1	0.3	0.7
900	11	3.6	4.3
1000	8	2.6	6.9
1100	22	7.2	14.2
1200	11	3.6	17.8
1300	23	7.6	25.4
1400	16	5.3	30.7
1500	23	7.6	38.3
1600	38	12.5	50.8
1700	42	13.9	64.7
1800	36	11.9	76.6
1900	21	6.9	83.5
2000	37	12.2	95.7
2100	13	4.3	100.0

This table clearly illustrates a preponderance of afternoon and evening trip completions. Less than 20 per cent of the parties

Appendix B. (cont.)

completed fishing in the morning. If sampling had been discontinued at 1700, 35 per cent of the parties interviewed would have been missed. On the other hand, only 7 per cent of the parties would have been missed if the sampling day had begun at 1100 instead of 0700.

ANGLERS SAMPLED PER STRATUM

Stratum	Number Times Sampled	Number Anglers Checked	Mean Anglers per sample
Early Season			
Major Access			
Weekend/holiday			
Morning	17	110	6.5
Evening	34	221	6.5
Weekday			
Morning	22	68	3.1
Evening	39	181	4.6
Lesser Access			
Weekend/holiday			
Morning	11	10	0.9
Evening	17	64	3.8
Weekday			
Morning	12	13	1.1
Evening	25	26	1.0
Late Season			
Major Access			
Weekend			
Morning	5	8	1.6
Evening	13	86	6.6
Weekday			
Morning	9	14	1.6
Evening	16	24	1.5
Lesser Access			
Weekend			
Morning	1	0	0.0
Evening	4	3	0.8
Weekday			
Morning	8	2	0.2
Evening	9	0	0.0

Stratification by season was clearly effective. In only one case--weekend evenings at major access points--did the number of anglers per sample in the late season approach the number in the early season.

Appendix B. (cont.)

Stratification into major and lesser access was also effective; it would have been more effective if Allagash gate had been included in the major access category. As noted above, the Little Black access point should probably have been handled differently considering the fact that it was not operated during the sampling season. Stratification into weekdays versus weekend days and holidays was more effective at major access points than at lesser access points and more effective in the early season than the late season. Stratification into morning and evening half days was effective in only two cases--on weekend evenings at lesser access points in the early season and at the same time at major access points in the late season. Recall, however that mornings extended from 0700 until 1400 and evenings from 1400 until 2100 while 50 per cent of the anglers exited between noon and 1800.