THE RECREATIONAL RESOURCES OF THE SQUAW RAPIDS RESERVOIR PROVINCE OF SASKATCHEWAN, CANADA

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Carl H. Burton

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ABSTRACT

THE RECREATIONAL RESOURCES OF THE SQUAW RAPIDS RESERVOIR PROVINCE OF SASKATCHEWAN, CANADA

by Carl H. Burton[1]

In order to provide for the logical development and use of a public recreational area, considerable knowledge is required as to the need, the type and extent, the location and the timing of such development. This is especially true of a new, and as yet to be used, area. Such is the case of a new reservoir.

Recreation has been recognized for some time as an important collateral use of water-control projects developed primarily for power generation, irrigation, flood control or navigation, and if plans for possible recreational use of these water bodies can be drawn up at an early stage, much later grief can be avoided. It is for this reason that this study was carried out.

The reservoir described is located on the main stem of the Saskatchewan River in the east-central portion of the Province of Saskatchewan.

Formed behind a power-development dam which is scheduled for completion in 1963, the reservoir will bring to that portion of the Province a large (73,000 acres) new body of water. This thesis attempts an inventory of the

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[1]Regional Forester, Saskatchewan Department of Natural Resources.

recreational resources of that reservoir - the adaptable shoreline sites, wildlife, fisheries, historical aspects, and vegetative pattern. Factors limiting any of these features are discussed. These natural resources, set in the prevailing cultural environment are then appraised in the framework of criteria which determines the location or establishment of Provincial Parks in Saskatchewan. Based on the resultant evaluation, suggestions are made as to the general paths of development which recreational use of the reservoir might follow.

Field investigations of the shoreline and surrounding area were carried out during the summer of 1960. Discussions were held with the project engineers regarding the operational aspects of the reservoir, upon which, to a great extent, use of the reservoir for recreation depends. While detailed development plans are not included, sites appearing favourable to recreational development are indicated and their adaptability to particular types of recreational use.

The conclusion is drawn that as an "intermediate" recreation area, based on population demands, the reservoir would be a marginal undertaking as a Provincial Park. However, if uniqueness be the principal criteria in Park selection, the setting aside of a portion of the reservoir as a Provincial Park would be warranted. The recommendation is made that preservation of existing recreational values be a part of any development policy of the provincial

government regardless of the initial administrative disposition, in the event that future unforeseeable events should alter the anticipated recreation demand.

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By

Carl H. Burton

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PREFACE

Since the early summer of 1953, when employed by the Saskatchewan Department of Natural Resources in their Forest Inventory Division, the author has had a particular fascination for the Saskatchewan River. For at that time he travelled its turbid waters from below Nipawin ninety miles to Cumberland House. Riding the turbulent waters of the Squaw and Tobin Rapids, little thought was held then that a decade later the water above these rapids would be submerged beneath ninety feet of placid reservoir waters.

It was with a considerable degree of pleasure, therefore, that the author accepted the assignment of inventorying and assessing the recreational resources of that reservoir.

Appreciation is extended to the Saskatchewan Department of Natural Resources for granting educational leave in which to follow further academic pursuits; to Dr. C. R. Humphrys, thesis committee Chairman for his counsel; to Assistant Professors L. F. Twardzik and M. H. Steinmueller for their constructive criticisms and imparted knowledge and to Instructor L. M. Reid for his assistance at many stages of the work.

Last, but certainly not least, the author is indebted to his wife, for the hours of laborious "rough draft" typing,

and for her continual moral support and encouragement, without which this study would never have been completed.

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CHAPTER I

INTRODUCTION

In the spring of 1960, construction was started on a two hundred thousand kilowatt power development on the lower Saskatchewan River in the east-central portion of the Province of Saskatchewan.

Scheduled for completion by the end of 1964, the development will have associated with it a 73,000 acre storage reservoir backed up behind the power dam for a distance of 46 miles.

It was the purpose of this study to evaluate the recreational resources of that reservoir and to discuss the part it might play in the recreation activities of the people, not only of the region but of the entire province.

Methods of Investigation

The field investigations associated with the study were carried out by the writer during a five week period in June and August of 1960. During that time, the shoreline of the reservoir and its surrounding area were examined in detail with the aid of aerial photographs and contour maps. An aerial flight over the entire reservoir basin gave a final bird's-eye view of the physical setting.

Personal discussions were held with engineers at the

dam site regarding actual dam and reservoir operation. The writer was also in attendance at two of the meetings of the Squaw Rapids Power Project Liaison Committee held in the area during that summer period. It was at such meetings that problems, within the realm of any of the government agencies affected by the project, were discussed.

Municipal clerks within an approximate fifty mile radius of the impoundment were subsequently contacted by letter for information as to the general attitude of the local people towards the possible impact of the reservoir upon their recreation habits.

CHAPTER II

DESCRIPTION OF THE PROJECT

Location and Accessibility

The Squaw Rapids Development is the first hydro-electric project to be undertaken by the Saskatchewan Power Corporation.[1] It will also be the first project constructed on the river in the Province for the primary purpose of power development.[2]

The site is located on the main stem of the Saskatchewan River approximately 42 miles north-east of the town of Nipawin. The site was selected as the most attractive after a study of potential sites on the river by a consulting engineering firm from Vancouver.

Plans for building the dam were announced by the Corporation in the fall of 1959, and contracts were subsequently let for site clearing and the major earthworks.

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[1] The Saskatchewan Power Corporation is a corporate body consisting of members appointed by the Lieutenant-Governor in Council. Established under the terms of the Crown Corporations Act of 1947, and operating now under the terms of the Power Corporation Act of 1950, its function is the generation, transmission, distribution, sale and supply of hydro and steam electric energy, as well as natural or manufactured gas.

[2] A multi-purpose, irrigation-power dam is currently under construction on the South Saskatchewan River, eighteen miles above Outlook, Saskatchewan. This is approximately 300 river miles above the Squaw Rapids dam.

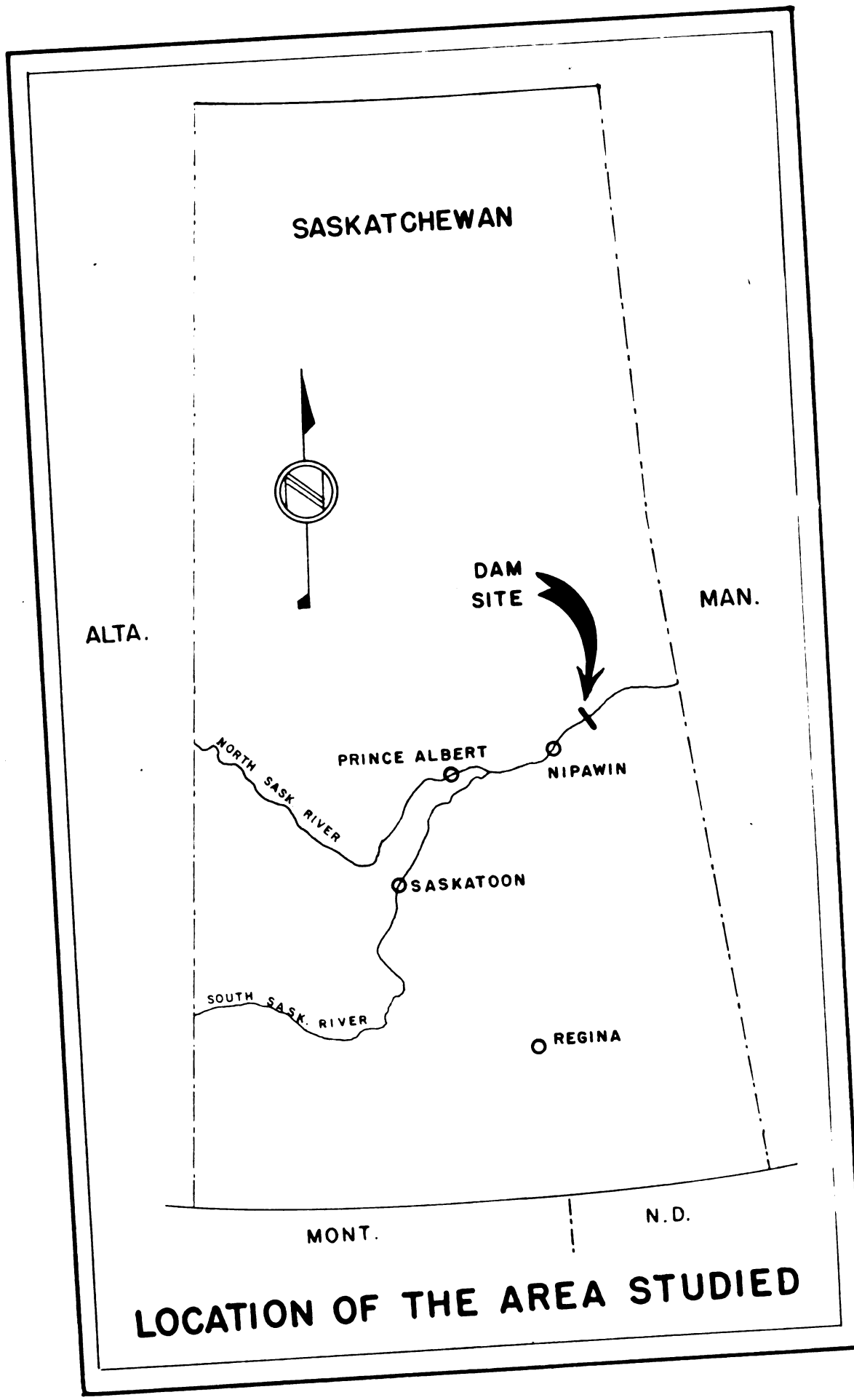
SASKATCHEWAN
DAM
SITE
MAN.
ALTA.
NORTH SASK RIVER
PRINCE ALBERT
NIPAWIN
SASKATOON
SOUTH SASK. RIVER
REGINA
MONT.
N.D.
LOCATION OF THE AREA STUDIED

Figure 1.

Construction of the dam was started early in the spring of 1960, and is scheduled for completion by spring of 1963. Acquisition of privately owned and leased land in the flowage area was started in April of 1960 and by January of 1961 three-quarters of such land needed for the reservoir had been acquired. The land ownership pattern is discussed fully in Chapter IV.

Three gravel surfaced provincial highways presently serve the general reservoir area. These are Highway 55 from the west, and 35 and 23 from the south. The only highway presently serving the reservoir basin directly is 35, which skirts the northern margin, and will in fact be inundated at its northern extremity. The south side of the reservoir is served by a number of municipal earth roads only, with the exception of the gravel surfaced "project access" road; constructed from Carrot River in the spring of 1960 to service the power project. This road, of provincial highway calibre, will eventually form an extension of Highway 23, with a connecting spur from Nipawin to the west.

The towns of Carrot River and Nipawin, both vying as "Gateway to the Squaw Rapids", are served by trunk lines of the Canadian National and the Canadian Pacific Railways respectively. Carrot River is the "end of steel".

Because of the attraction which it will afford, both during construction and after completion, it is felt that a description of the power project is merited.

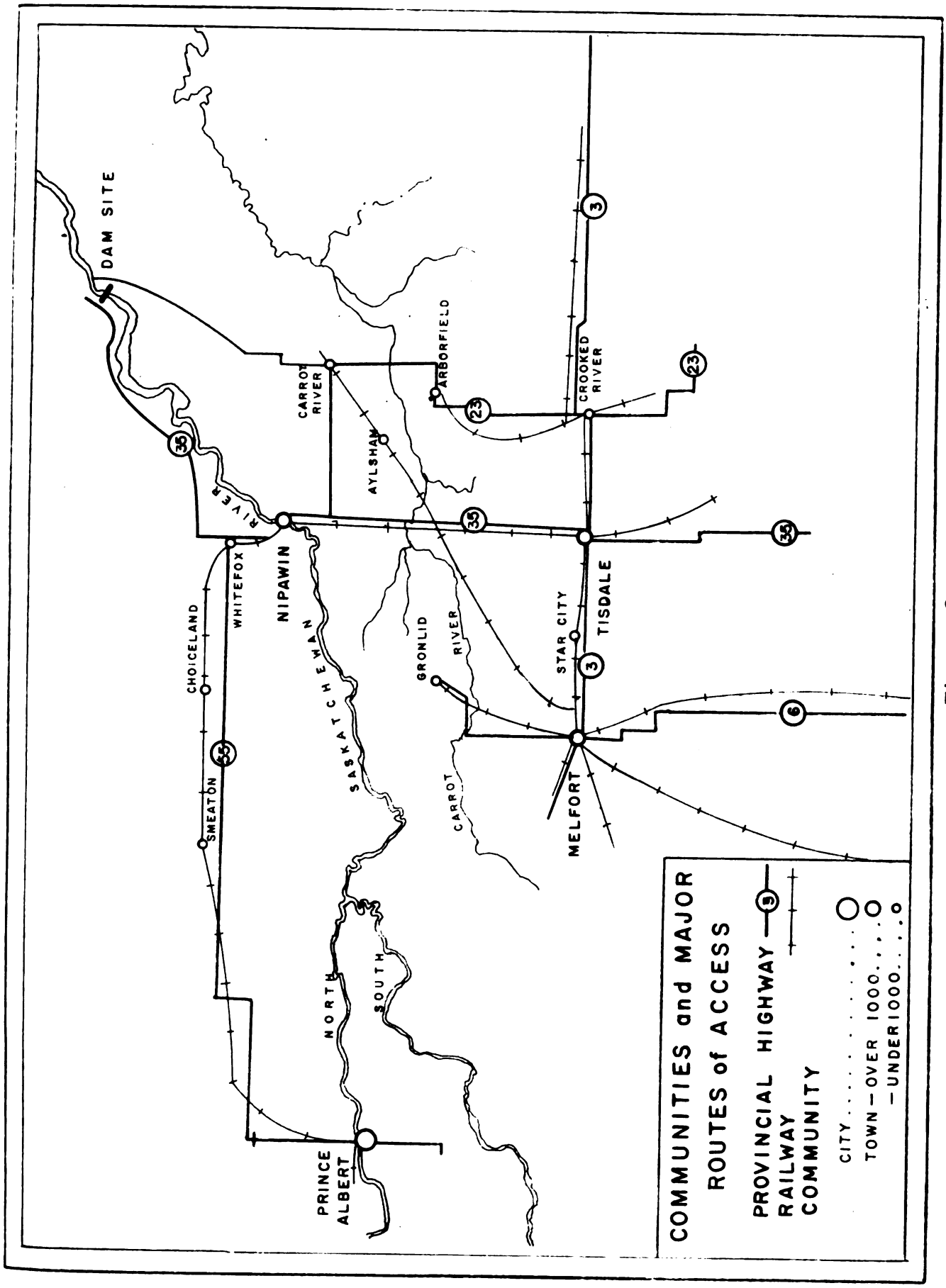
COMMUNITIES and MAJOR ROUTES of ACCESS
PROVINCIAL HIGHWAY
RAILWAY
COMMUNITY
CITY
TOWN—OVER 1000
—UNDER 1000
DAM SITE
RIVER
CARROT RIVER
ARBORFIELD
CROOKED RIVER
AYLSHAM
NIPAWIN
WHITEFOX
CHOICELAND
SMEATON
SASKATCHEWAN
NORTH
SOUTH
PRINCE ALBERT
GRONLID
RIVER
CARROT
STAR CITY
TISDALE
MELFORT
35
3
23
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Figure 2.

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Project Statistics

The dam is of the earth fill type, 110 feet in height and 2,000 feet in length. Dikes leading north and south from the dam will protect the dam approaches to the highest flood levels anticipated, as well as diverting these flood waters, on the north side, to the emergency outlet provided by the Torch River.

Associated with the dam is a power canal which will carry water approximately 3 miles around the present Squaw and Tobin Rapids to the powerhouse thus making the fall in the river available for the generation of power. The powerhouse, situated at the river's edge, will house six 33,500 kilowatt generators, providing an approximate annual output of one billion kilowatt hours. The orientation of these features is indicated in Figure 4.

The construction of the dam will create a reservoir which will be used for regulating the flows. At the normal operating elevation of 1,029 feet above sea-level, the reservoir will extend upstream from the dam for 46 miles and will be about 10 miles across at its widest place. Approximately 1.78 million acre-feet will be stored in the reservoir with the surface at 1,029 feet above sea level. Usable storage will be 505,000 acre feet resulting from a drawdown of 8 feet below the normal operating level.

The intention is for the Squaw Rapids Reservoir to be filled during the spring months each year, and the water so stored to be released in the winter months to supplement the

natural river flow.

Life expectancy of the hydro-electric machinery is fifty years. The dam, however, can be considered as having a one hundred year life - contingent upon many conditions unknown at this time.[3] Chief of these, siltation of the basin, will be relieved to some extent by the South Saskatchewan River Dam. Long term plans call for subsequent power installations on the main stem which in turn will relieve silting conditions in the Squaw Rapids reservoir.

Physiography of the Reservoir

The Squaw Rapids Development is situated in the broad lowland of the Saskatchewan Valley in the Western Lake Section of the great Central Lowland Province of North America.[4] This valley, which is about 40 miles wide descends in a broad and subdued plain from a general elevation of over 1,100 feet in the Carrot River and Nipawin Districts to an elevation of 852 feet in the flood plain at The Pas in Manitoba, where the Saskatchewan River and its combined tributaries, the Torch and the Carrot Rivers, have cut a gap through higher moraines to reach Cedar Lake and eventually

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[3] Letter from P. Warren McAra, Resident and Design Engineer, Saskatchewan Power Corporation, Regina, Saskatchewan, February 7, 1961.

[4] A. K. Lobeck, Physiographic Diagram of North America, (The Geographical Press - C. S. Hammond & Co., Maplewood, New Jersey, 1950), p. 6.

Lake Winnipeg, 255 miles downstream from the dam.[5]

The lowland plain was formed during retreat of the glacial ice as an arm of glacial Lake Agassiz, the main body of which was downstream of the Sipanok Channel in Saskatchewan and Manitoba. This former lake floor has been modified in recent times by the activity of the Saskatchewan and Carrot Rivers in cutting through the lacustrine plain, depositing sediments in the lower areas and building delta and levee deposits in the flood plain. As a result of its origin, the relief of the Saskatchewan Lowland is generally flat, with the only major alterations being the channels of the Saskatchewan, Whitefox and Torch Rivers. It is this relief which sets the character of the reservoir and its adaptation to recreation, as discussed in the following sections.

Lacustrine clay was deposited on the floor of the glacial lake, with sand and silt laid down in the shoreline areas. The extensive sand deposits on both sides of the river approximately one-third of the length of the reservoir upstream from the dam probably represent the beach line of the receding glacial lake below the main beaches which mark the upper limits of the former lake basin at its southern and western margins on the slopes of the Pasquia and Wapawekka Hills.

It is these sand ridges which now support the pine

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[5] J. S. Clayton and J. G. Ellis, Report on the Soils of the Lower Saskatchewan Valley, Saskatchewan Soil Survey, 1952, p. 7.

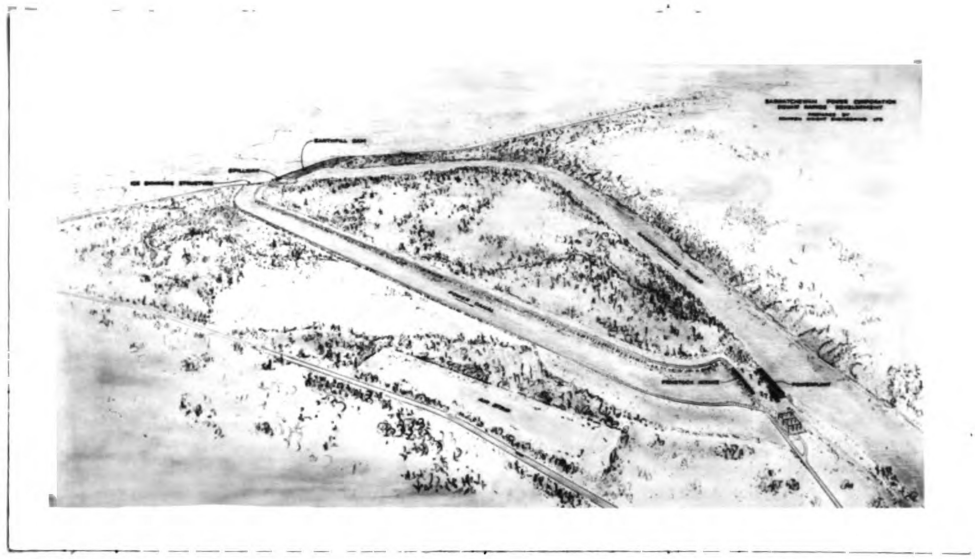

Figure 4. Diagramatic sketch of the project.

Figure 5. Aerial view of the project area looking north. The lack of relief typifies the Lower Saskatchewan Valley.

Figure 6. Aerial view of Squaw Rapids dam construction looking upstream towards coffer dam. The observation pavilion and picnic grounds are encircled in the background.

Figure 7. Aerial view of power station site showing plant site, airstrip and cleared portion of power canal.

Figure 8. Buttress dam and spillway structure under construction looking south-east.

Figure 9. Buttress and spillway structures of the dam looking west.

forests that give to the reservoir area its primary aesthetic value, as well as providing, where slopes at shoreline are favourable, the best potential for beach development.

Hydrography of the Reservoir

There are a number of features in the hydrographic pattern of the reservoir which are of major significance in the determination of any recreational potential. These cover such factors as the plan of operation of the dam and the resultant water level fluctuations, reservoir surface area and depth, shoreline length and character, probable water quality, and reservoir sedimentation. Each of these was studied in greater or lesser detail, dependent upon its relative importance in a recreation assessment, and the information available in its appraisal.

Plan of Operation of the Dam

The value of a reservoir for recreation and wildlife depends almost entirely upon the plan of operation of the dam and the resulting effect upon water levels in the reservoir. For this reason, power-plant reservoirs are usually better adapted to recreational use and wildlife than irrigation or flood control reservoirs, because a more constant water level is required for operation of the generators at maximum efficiency. Fluctuations of water level will govern to a large extent the volume and variety of recreation uses possible on a reservoir. In addition, it will also control the selection of beach and park areas and the design

and location of such recreation facilities as boat docks, boat launching ramps and summer homes.

It has been assumed as a basis for this study, that in accordance with engineering plans, water levels will remain fairly stable throughout the primary recreation months of June, July and August.

The full supply level or normal power pool elevation is 1,029 feet above sea level. The maximum elevation of the reservoir anticipated, the hypothetical flood level, is 1,041 feet above sea level. This can be expected to occur, on the basis of the limited records available (44 years) only once in approximately 10,000 years. The minimum elevation is 1,021 feet above sea level - allowing for an 8 foot drawdown from the normal surface elevation. According to the engineering plans, the probable beach area will be between the 1,029 and the 1,033 foot contours.

The Saskatchewan River watershed embraces two geographical areas having widely divergent meteorological conditions and drainage characteristics. These are the Great Plains and the Rocky Mountains. Marjorie Campbell phrased it well when she wrote in her treatise on the river, "The Saskatchewan, they say, drains the Rocky Mountains into the Atlantic Ocean."[6] As a result of this disparity, the Saskatchewan River in the reservoir area experiences two

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[6] Marjorie Wilkins Campbell, The Saskatchewan. Rivers of America Series (New York: Rinehart & Co., Inc., 1950), p. 17.

peaks of high water. The first of these - a spring crest of short duration in April and May - is due to run-off of snow-melt on the prairies. A second more prolonged flood with higher discharges develops to peaks in June and July as a result of snowmelt in the mountains.

The reservoir will fill in April or May with the waters of the spring "break-up" and receive a further crest in July. The level would be above normal in these periods. The drawdown of the reservoir would continue for the remainder of the year until a minimum level is reached just before the anticipated spring crest.

It appears therefore, that during the recreation season of June, July and August, drawdown below the normal elevation of 1,029 feet will not be a problem. Above-normal levels, presumably, as mentioned previously, to a level of four feet in excess of normal may interfere with certain recreational uses. This relatively minor fluctuation should not create undue hardship to summer recreationists, if prior allowance is made in the layout of areas and facilities.

The relatively favourable summer water level condition, of course, will not alleviate the detrimental affects upon fish and waterfowl habitat of the eight foot drawdown experienced during the winter months.

Surface Area and Depth

Due to the nature of the topography of the Saskatchewan Valley Lowland, the reservoir will show two distinct and separate configurations. For the upper two-thirds of its

length it will be confined essentially to the present valley of the river, to the extent that in its upper reaches it will mean only a slight raising of the river in its present channel to a point often reached, even now, in flood stage. This portion of the reservoir, the upper two-thirds, will have a maximum width of only two and a half miles and will average slightly over one mile wide.

Over the lower one-third of its length the reservoir will be of an entirely different nature, for here its waters will lap once more over the lacustrine deposits laid down in this same depression some ten thousand years ago by ancient Lake Agassiz. With gradients as low as four feet in a mile along its margin, this large area, ten miles wide at full supply level, will be affected most by reservoir drawdowns. As a result of the low gradient, the probable beach area between the 1,029 foot and the 1,033 foot contour will extend for distances of as much as one mile. That is, a four foot raising of the water level above the normal pool elevation of 1,029 would move the shoreline a mile laterally. Winter drawdowns would exhibit an even more impressive contrast. Drawdown from the anticipated summer high of 1,033 feet to the minimum low expected of 1,021 feet, would mean a lateral movement in the shoreline of this area of as much as four miles. Needless to say, such portions of the reservoir shoreline do not lend themselves favourably to development for most forms of water recreation.

Ironically, a considerable network of drainage ditches

constructed over the past twenty years to reclaim much of the land in this portion of the reservoir basin will be inundated. These ditches may be valuable as connecting waterways for residual pools of water remaining after the level of the reservoir is lowered.

The finer textured silty soils of this lagoon-like area stand also in marked contrast to the courser sands of the reservoir shoreline farther upstream. These differences were of primary importance in the assessing of relative recreation values for portions of this reservoir.

The pre-existing topography has had a further effect on the reservoir in establishing the character of the shoreline. For the most part the reservoir will have a very regular shoreline, broken only by the sinuous character of the present river channel. No islands will be created by flooding the proposed reservoir. The present alluvial islands laid down by river deposition are of a temporary nature and will be inundated under forty to eighty feet of water.

This regularity of the shoreline can be best indicated by a comparison of the shore development of this reservoir with that of other reservoirs and natural lakes, both in the area and elsewhere.

The "shore development factor" of this reservoir, which is the ratio of the actual length of the shoreline to

the minimum that would contain the surface area is 2.8.[7] This is indicative of a regular shoreline and compares closely to the shore development factor of 2.4 of Namew and Cumberland Lakes, two lakes of the Saskatchewan Valley approximately sixty miles downstream to the north and east.[8] Lakes of the southernmost part of Saskatchewan, often considered to be the "flat" region of the province, usually display a shore development factor between three or four. That of the large South Saskatchewan River reservoir, for instance, will be 3.4. Many of the deeply indented shorelines of the Precambrian Shield lakes to the north, with their myriad islands, have factors of around fourteen. On the extreme side are some of the intensely used reservoirs in the United States, such as Lake Texoma behind the Denison Dam with a shore development factor of twenty-nine and Lake of the Ozarks in Missouri with a factor of forty.

The nature of the shoreline is of more than passing interest for it is tied in closely with the relative value of the reservoir for recreation. Aside from aesthetic considerations, the lack of any significant bays, inlets or islands can be a detrimental factor influencing boating use, in that no protection is offered from any of the prevailing

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[7] This factor represents the ratio of the reservoir shoreline length to the circumference of a circle which would contain the reservoir area.

[8] E. B. Reed, Limnology and Fisheries of Cumberland and Namew Lakes of Saskatchewan, A Report to the Saskatchewan Fisheries Laboratory, Dept. of Natural Resources, Saskatoon, 1959. (Unpublished), p. 6.

winds. This also increases shoreline erosion. An irregular shoreline also offers considerably more scope for the development of a park and more frontage is available for other riparian uses. From the standpoint of water sports, a deeply indented shoreline can be an advantage in that there is a quicker warming of the inlet waters to a degree suitable for use.

Unlike its counterpart on the South Saskatchewan River the Squaw Rapids Reservoir will be a relatively shallow body of water. Being confined essentially to the valley of the river, which has established a gradient of 1.3 feet per mile from Nipawin to the dam site, there will be a gradual decrease in depth as one proceeds upstream from the dam.

The deepest point will be directly above the dam; approximately ninety feet of water at full supply level. The central portions of the reservoir, the area where the greatest amount of shoreline recreation use can be anticipated, will have an average depth of seventy feet.

The large lagoon-like basin to the south and west of the dam will not be very deep. Soundings in its deepest portion will be only thirty feet, and over much of it will be from four to ten feet.

CHAPTER III

RECREATIONAL RESOURCES

Recreational Aspects of the Dam

The Squaw Rapids Dam, although it is rated second to the South Saskatchewan River Dam in size, will be the first of the two completed. It will be the only dam on the river in the Province created solely for the development of power.[1] Because of the interest thus created, the dam and its associated canal and power house can be expected to attract numerous sightseeing visitors. The massive concrete spillway, the outlet works to the spillway and canal and the powerhouse itself with its large generators in operation will be of most interest to visitors.

Although present attendance figures are unavailable, an indication of the fascination which the dam construction holds is evident in the fact that nearly 6,000 people visited the site during the first half of the summer of 1960 - the first year of construction. This figure would no doubt have been much higher if an active publicity program had been

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[1] The only existing major hydro-electric power development in the Province of Saskatchewan is that of the Churchill River Power Company at Island Falls on the Churchill River 140 miles to the north. This plant supplies electric power for the smelters at Flin Flon, Manitoba.

launched. Public information releases were held to a minimum in order to promote safety and to prevent interference with construction. The reason for this policy was the lack of convenient access and suitable points from which to view the construction.[2]

In order to accommodate those intrepid visitors who did arrive, a small information building and lookout point were constructed by the Saskatchewan Power Corporation just above the dam on the south side of the river. Associated with this point is a day use picnic area developed by the Department of Natural Resources for the convenience of visiting sightseers, approximately a quarter of a mile up-stream. Both these developments were located in such a manner that the public by-passes the principal construction areas in arriving at them, thus minimizing interference with construction traffic. (See Figure 6.)

Both picnic area and information centre are located so that they are only slightly above the reservoir surface at the probable upper beach level of 1,033 feet above sea level - a two foot rise in the water above this level would inundate the area. For this reason an alternate location will have to be found for them, which will act as the focal point for visitors to the dam site. Such sites are not easily found in the immediate area.

The landscape in the general vicinity of the dam

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[2] Minutes of the Squaw Rapids Power Project Liaison Committee Meeting, January 25, 1960.

consists of a poorly drained swamp and quite definitely lacks aesthetic appeal. The major vegetative cover is black spruce (Picea mariana) and tamarack (Larix laricina) with scattered patches of white spruce (Picea glauca). Directly above the river in the better drained sites, aspen (Populus tremuloides) and white birch (Betula papyrifera) provide a more pleasing environment - it is through such stands that the old "Pas Trail" winds and where the present picnic grounds are located.

Alternate possible locations for the picnic site are close to the entrance gate, which unfortunately is approximately three miles from the dam site, or in the vicinity of the powerhouse, the latter having other than access, distinct advantages over the former location. An observation building at either of these alternate locations would be useless for viewing the dam and spillway but it could be located somewhere inside the triangular area between the canal and the dam. This would depend upon the final policy decision of the Saskatchewan Power Corporation regarding public access in the vicinity of the project.

Although rather small, the present information building would suffice until the demands to be met are better known.

Guided trips through the powerhouse, model exhibits and other means of explaining the purpose of the project and how it works should be part of the public information service provided at the site in future. A 16 mm. colour film of the

operation, made during the course of construction by the Department of Industry and Information should be a valuable contribution to such a public service. Such public information services have become standard procedure at most modern power developments reaching their zenith at such places as Niagara's Sir Adam Beck #2 Generating Station and the Robert Saunders Generating Station on the St. Lawrence River.

Because of the attraction which the development will have for recreationists in the future, the need for consideration of preserving any recreational values adjacent to the project site was recognized at an early date, and a recommendation to this effect was made to the Saskatchewan Power Corporation by the Department of Natural Resources.[3]

Access to the dam will be from the south only, over the newly constructed project access road, since the now-existing trail on the north side of the river will be inundated even at normal pool elevation. On the north side, the approaching road - Provincial Highway 35 from Whitefox - will terminate at the water's edge six miles from the dam. This feature has also precluded the possibility of a road crossing the dam.

The lack of an access road around the reservoir is unfortunate. Existing access roads will closely parallel the reservoir shoreline and an encircling road, a portion of it crossing the dam, would be a decided advantage to recreationists as will be shown in a later chapter.

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[3]Liaison Committee Meeting, August 19, 1960.

In its report on the recreation resources of the then uncompleted Denison Dam on the Texas-Oklahoma border, the National Park Service mentions in particular the recreational asset of a drive across the top of that dam and the commanding view it would afford of the broad reservoir above and the narrow river below.[4]

As good fishing is usually associated with the water just below such dams, "tail-water" fishing can be expected to be popular in this vicinity - both below the dam and at the tailrace of the powerhouse, if a suitable pool exists at these points. Because of the canal associated with this project, blocking ready access to the south side of the river below the dam, and the inaccessibility of the north shore at the dam, shoreline fishing may be restricted to the water just below the powerhouse. This again will depend upon the stand which the Power Corporation takes with regard to public access in the immediate vicinity of the dam, the canal and the powerhouse. There has been no formal agreement made between the Saskatchewan Power Corporation and the Department of Natural Resources in this regard to date.

Boat access to the river downstream of the dam and the powerhouse will be difficult, for here the river lies fifty to sixty feet below steep cut banks. A road constructed into the river bank would have to be an all-weather type

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[4] U. S. Dept. of the Interior, National Park Service, Recreational Resources of the Denison Dam and Reservoir Project, (Washington: U.S. Government Printing Office, 1943), p. 9.

with sufficient room for car and boat-trailer parking and manoeuvering at the river's edge. Demands for such access would have to be considerable to justify the investment, although savings could be made by providing it while construction equipment is in the area.

There appears to be no general policy on the use for fishing of tailwater areas below major dams in the United States. The Sport Fishing Institute in an article on the subject decried this deficiency, and the great loss of excellent fishing which resulted from restrictions on the use of tailwater areas for fishing.[5] Restrictive zones ranging from half a mile below the large Garrison Reservoir Dam on the Missouri River to fifty yards from the base of the Army Corps of Engineer's Fort Gibson Dam in Oklahoma exist. Fishermen on Tennessee Valley Authority waters on the other hand, are able to fish right up to the downstream faces of the dams if they want to.

In summary, the Sport Fishing Institute suggests that " . . . by educating the fishermen to the general pattern of operations of the dams, including the various hazards that do exist or can develop, and enforcing fundamental rules for safety such as the operation of boats, safety equipment requirements, etc., fishing in a tailwater close to dams appears to be about as safe as anywhere."[6]

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[5] "Availability of Tailwater Fishing," S.F.I. Bulletin, No. 115, Sport Fishing Institute, June, 1961, pp. 1-2.

[6] Ibid., p. 2.

Sport Fishing Potential

Fishing ranks high among the summer activities favoured by Saskatchewan recreationists. For this reason, the fisheries potential of the reservoir must be taken into account in any discussion of its possible value for recreation.

Because of a lack of fundamental data and the great number of variables involved however, any assessment of the sports fishing potential must be of a conjectural nature. Atton, in a brief report on the sport fisheries potential of the South Saskatchewan River reservoir described only features of the reservoir which would tend to be beneficial in contrast with a number of features which would be detrimental.[7] He was non-committal as to whether the fishing would be good, bad or indifferent.

Due to the great number of natural lakes in the Province now supporting not only angling but commercial fishing, and the relative newness of reservoir fishing, research has been limited almost completely to the former. However, on the basis of conditions expected to prevail on the South Saskatchewan reservoir and their effect on the fishing potential there, some comparisons can be made with respect to the Squaw Rapids reservoir.

Thermal stratification resulting from the great depth

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[7] F. M. Atton, Sport Fishery Potential of the South Saskatchewan Reservoir, Report to the Recreation Committee, South Saskatchewan Project, May, 1960. (Unpublished), pp. 1-5.

of the South Saskatchewan reservoir should provide suitable cold water environment for whitefish, pickerel, pike and goldeye populations. The average annual flow of the South Saskatchewan River approximates the volume of this reservoir, so that flushing time (the time to replace the water volume if the reservoir were drained) is only 1.2 year. This, it was felt, would seriously reduce plankton production. The annual drawdown regimen of forty feet and the resultant freezing of the exposed bottom could mean considerable destruction of bottom organisms. In comparison, the Squaw Rapids reservoir will have fluctuations amounting to twelve feet from highest to lowest water levels, with a maximum drawdown of eight feet below normal occurring during the winter months.

This operational procedure will place it in a relatively better position than its southern counterpart, although there are too many unknowns to make a categorical statement that fishing will be good. With regard to water levels, Bennet cites Eschmeyer as stating that several permanent-level pools on the Tennessee Valley Authority impoundments had provided poorer fishing than had other reservoirs that are subjected to wide fluctuations in water levels. He suggested that " . . . the winter drawdown apparently limits the abundance of rough fish (by limiting their food) without serious injury to the game fish

populations."[8] This concept was substantiated by Bennet in his studies of drawdown effects upon the fish of Ridge Lake, an impoundment used as an outdoor laboratory in Illinois.[9]

That fluctuating water levels could have beneficial as well as detrimental effects upon fish populations was found by Wood in his study of a number of Tennessee Valley Authority impoundments.[10]

With a storage capacity of 1.8 million acre feet and an average annual river flow of 13.7 million acre feet, flushing time for the Squaw Rapids reservoir would be in the order of only forty-seven days. That is, the reservoir waters could be replaced almost eight times yearly. This would seriously reduce plankton production.

At the South Saskatchewan reservoir, approximately thirty-eight per cent of the bottom would be exposed at low water.[11] The Squaw Rapids reservoir with its more limited drawdown and lesser shoreline development would have a maximum of approximately fifteen per cent of the bottom

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[8] G. W. Bennet, "The Effects of a Late Summer Drawdown on the Fish Populations of Ridge Lake, Coles County, Illinois. Trans. of 19th North American Wildlife Conference, March, 1954, p. 259.

[9] Ibid., pp. 259-270.

[10] Roy Wood, "The Significance of Managed Water Levels in Developing the Fisheries of Large Impoundments," Journal of Tennessee Academy of Science, Vol. 26, No. 3, July, 1951, pp. 214-235. For some of the detrimental effects see U.S. Dept. of the Interior, National Park Service, A Survey of the Recreational Resources of the Colorado River, p. 105.

[11] Atton, p. 3.

exposed at the lowest proposed level. There would consequently be less damage done to bottom organisms.

The condition of the upstream waters during the winter months may be the key to the relative success or failure of a reasonable sports fishery in the Squaw Rapids reservoir. Reed found in 1957 that sulphate, chloride, alkalinity and hydrogen ion content increase markedly during the period in which the Saskatchewan River is ice covered.[12] This condition occurring at the same time that dissolved oxygen content is drastically reduced, does not produce an environment favourable to a fish population. Reed suggests that many fish, unable to winter in the river, either die or migrate.[13]

The Squaw Rapids reservoir is in a much less favourable position as regards pollution than its counterpart to the south. The North Saskatchewan River suffers extensively from pollution before reaching Saskatchewan.

In his biological study of the Saskatchewan River, Reed found that, "The Saskatchewan between the forks and Cumberland Lake shows the effect of the polluted condition of the North Branch during winter. The volume of the river

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[12] E. B. Reed, A Biological Survey of the Principal Rivers of the Saskatchewan River System in the Province of Saskatchewan 1957 and 1958, A Report to the Saskatchewan Fisheries Laboratory, Dept. of Natural Resources, Saskatoon, 1959. (Unpublished), p. 14.

[13] Ibid., p. 124.

in relation to volume of wastes prevents serious pollution during summer."[14]

The marginal winter conditions prevailing for fish in the main stem of the river could be drastically upset by further pollution in the South Branch. And the greatest threat here is from the City of Saskatoon. Reed found, although admittedly from too limited a sample to make a general statement, a decrease in oxygen content which coincided with a period of rapid population growth in that City.[15] According to Reed, "If severe conditions are allowed to develop in the South Branch below Saskatoon, this area of recruitment will be lost and the entire angling resources of the North, the South below Saskatoon and the Saskatchewan from the forks to the Manitoba border lost."[16]

Oxygen content of the South Branch could also be influenced by conditions in the South Saskatchewan reservoir. In his study, Reed felt that some improvement could come about in the river below the dam through the increased winter flow which would be an aid to dilution of waste effluents.[17] This in turn would depend upon the oxygen content of the waters reaching Saskatoon. There is a strong possibility of winter stagnation in the upper reservoir. If drawdown is taken from the deep waters near the bottom of the dam, it

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[14] Ibid., p. 4.

[15] Ibid., p. 123.

[16] Ibid., p. 125.

[17] Ibid., p. 126.

is possible that water low or even lacking in oxygen would constitute the flow below the dam in winter. Very little re-oxygenation under the ice can be expected between the dam and Saskatoon. Water low in oxygen would only worsen conditions of pollution below Saskatoon. According to Reed, "Oxygen exhaustion in the South Branch between Saskatoon and the forks comparable to that in the North above the forks would make conditions untenable in winter for fish at least as far as Cumberland House."[18] Such waters reaching the Squaw Rapids impoundment, which will already have a great volume of decay products, will not create the best of conditions for fish populations.

Should drawdown of the South Saskatchewan Reservoir be from its upper levels on the other hand, and an improvement occur in Saskatoon's pollution situation, the relatively small volume winter flows would have little effect upon the large volume of the Squaw Rapids reservoir, occupied as it will be by the diluted summer and fall flows.

At the present time goldeye (Amphiodon alosoides) and northern pike (Esox lucius) are the chief angling species of the river, with lesser numbers of walleye or pickerel (Stizostedion vitreum). A considerable number of rough fish, notably long nose sucker (Catostomus catostomus) and northern suckers (Catostomus commersoni) are also taken by anglers.[19]

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[18] Ibid., p. 125.

[19] Ibid., p. 129.

In a memo to the Director of Fisheries, Biologist R. P. Johnson, wrote:

> "The larger fish expected to be in the reservoir [Squaw Rapids] are goldeye, sauger, walleye, pike, perch, burbot, common suckers, northern sucker, quillback sucker, red-horse suckers and sturgeon. The first five species will probably be of importance to the sport fishery. The possibilities of introducing lake trout for sport fishing and whitefish for commercial fishing are poor, as both these need colder water for survival. The depths of the reservoir will not induce thermal stratification and protect the cold deeper layers of water from becoming too warm for these species. Other trouts such as rainbows do not survive well in the presence of predators such as pike, pickerel and perch."[20]

As already mentioned, goldeye constitutes the principal species fished at present. Reed presents considerable evidence that would indicate that migration of goldeye prevails.[21] On the limited information available, there appears to be a spring spawning run into the upper reaches of both forks, and a downstream movement each autumn below Cumberland Lake even as far as The Pas.

According to the construction schedule for the dam, complete closure of the river should be achieved early enough in 1962 that the spring flood will be carried over the spillway floor. This would prevent the upstream movement of extensive numbers of the goldeye and could have a great effect upon this species.

One phenomenon characteristic of new impoundments may

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[20] R. P. Johnson, Memo to Director of Fisheries, Saskatchewan Department of Natural Resources, November, 1959.

[21] Reed, A Biological Survey . . . , pp. 84-87.

well be repeated in the Squaw Rapids. This is an initial high game-fish productivity followed by a gradual decline over a period of six or seven years. Bennet found such a cycle of transition in his Illinois Studies.[22] Tarzwell, in his creel census studies on four Tennessee Valley Authority reservoirs found that the second year of impoundment is most productive for game fish, but during the third and fourth years game fish tend to decrease and coarse fish tend to increase.[23] Closer to home, Lyons, in referring to the Tweedsmuir Park reservoir in west-central British Columbia, reported that in the years immediately following impoundment "fish populations soared."[24]

One area in which improvement can be expected is the tailwater fisheries.[25] The waters appearing below the dam and the powerhouse will be taken from the upper level of the reservoir. As a result water temperatures and oxygen content should be more favourable than if taken from the depths behind the dam. The reservoir will also act as a settling

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[22] Bennet, p. 260.

[23] C. L. Tarzwell, "A Second Season of Creel Census on Four Tennessee Valley Authority Reservoirs," Trans. of 6th North American Wildlife Conference, 1941, p. 213.

[24] C. P. Lyons, B. C. Dept. of Rec. & Cons., Parks Branch, letter, June 30, 1961.

[25] A good discussion of this aspect of reservoir fishing is given by D. W. Pfitzer in "Investigations of Waters Below Storage Reservoirs in Tennessee." Trans. of 19th North American Wildlife Conference, (Washington: Wildlife Management Institute, March, 1954), pp. 271-280.

basin for much of the silt and detritus which was formerly moved downstream by the natural river flow. Clearer waters should therefore prevail for considerable distance downstream.

It is with respect to winter conditions that the greatest improvement will probably accrue. With power development operating at even two-thirds capacity, downstream flows will approximate 17,000 cubic feet per second contrasted to present winter monthly averages of as low as 3,600 cubic feet per second in February.

As mentioned previously, the many variables involved make forecasting future fish populations in the reservoir, with any degree of accuracy unlikely. It does appear safe to say, however, that the sport fishing on the reservoir will probably not be above average in the long run, and with the great number of already existing natural lakes to the north supporting excellent fishing, the reservoir fishing would have to be above average to compete with these natural lakes.

Much will depend, of course, on the fisheries management which is initiated on the reservoir. Tarzwell, following his studies of fish populations in Wheeler reservoir on the Tennessee River emphasized that ". . . every effort of management in newly impounded waters should be directed towards preventing the increase of the coarse species at the cost of the game species," and further, "These management practices should be undertaken in new reservoirs immediately after, or even before, their impoundment as they will be

much less effective if the cycle of displacement of game fish by coarse fish is allowed to get underway before they are put into operation."[26]

Wildlife

Because of the importance of big game and waterfowl hunting in the fall recreation activities of many Saskatchewan residents and the dependence of a number of local trappers on the fur animals of the area, consideration should be made of the possible effects of the reservoir upon existing wildlife populations. Unfortunately, little research has been directed towards this aspect. Any discussion of the possible effects must therefore be, for the most part, presumptive in nature.

The forest, farm land, and swamp adjacent to the river are presently the habitat of moose, deer, bear, elk and smaller mammals including beaver, mink, squirrel, weasel, muskrat, rabbit and occasionally fisher, marten, lynx and coyote.

It is anticipated that migration of the larger animals downstream and into the forested region of the Torch River and northwards will occur. It was found in the

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[26] C. L. Tarzwell, "Fish Populations in the Backwaters of Wheeler Reservoir and Suggestions for their Management," Trans. of American Fisheries Society, Vol. 71, p. 213.

For a thought provoking discussion of reservoir fisheries management from a layman's standpoint see Harold Titus', "Our Manmade Lakes: A Haven for Trash," Field and Stream, LXV, No. 3, July, 1960, pp. 27, 83-85.

Tweedsmuir Park reservoir of British Columbia, that many moose were drowned in attempting to swim the reservoir and becoming tangled in the shoreline debris.[27] Because of the general confinement of that species to the north side of this reservoir, it is doubtful that this will be a serious factor here. Settlement on the south shore of the reservoir will act as a barrier to migration in that direction.

The habitat for beaver and muskrat, it is felt, will improve, particularly in the large bay-like area in the downstream extremity of the reservoir. In a letter to the Regional Field Supervisor of the Saskatchewan Department of Natural Resources, Game Management Officer Toews reported:

> I firmly believe that this portion of the flooded area will become one of the finest muskrat marshes in this part of the province, provided that suitable muskrat feed is seeded on some of the farm lands presently under cultivation. This is very heavy black land, and will be very shallowly flooded. The shoreline slope is so gradual that it cannot be seen without instruments, typical of some of the best muskrat and duck marshes.[28]

Effects of the extreme winter drawdowns and subsequent freezing of the flood and habitat will probably have a great influence on populations in this portion of the reservoir however, and the change in riparian vegetation in the central portion of the reservoir, from the extensive poplar-and willow-covered alluvial flats to spruce

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[27] Lyons, letter, June, 1961.

[28] Reported by J. Johnson, Regional Field Supervisor in Department memorandum dated June 6, 1960.

and jackpine covered slopes at higher elevations, will probably cause considerable migration of the beaver and muskrat now inhabiting this section.

Located within the general pattern of both the Central and Mississippi Flyways, there is a possibility that the reservoir, especially in its lower reaches, will attract considerable numbers of migrating waterfowl. Few waterfowl use the river at present, although Cumberland Lake, sixty miles downstream, is a favourite resting place. Many Canada Geese are hunted in that area during the fall migration period. Much will depend upon the effects of water level fluctuations on the aquatic plants along the reservoir margins.

Reporting on the possible effects of water fluctuations upon waterfowl in reservoirs of the Colorado River basin, the National Park Service of the United States Department of the Interior wrote;

> There will be no large aquatic plants along the margins of reservoirs having water level fluctuations of more than ten feet during the growing season. Since these plants comprise the principal food supply and habitat of waterfowl, the absence of these plants seriously curtails the wildlife and recreational values of reservoirs.[29]

While drawdowns in the Squaw Rapids reservoir will be most pronounced in other than the growing season, the sub-zero temperatures prevailing might have as equally adverse an effect. The raising of the reservoir level during the May

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[29] U. S. Department of the Interior, National Park Service, "A Survey of . . . , p. 106.

and early June flood peaks would also be a decidedly negative factor in waterfowl nesting.

Some fears were expressed by farmers in the vicinity, that duck populations attracted to the reservoir in the fall might constitute a considerable depradation hazard. Fears of a similar situation were expressed with regard to the South Saskatchewan River reservoir as reported in a news story of March, 1960, in which "D. T. McFarlane (Liberal - Qu'Appelle - Wolseley) feared that if the commission [South Saskatchewan River Development Commission] set up bird and wildlife sanctuaries, a situation might be created where grain farmers in the reservoir area would suffer crop damage from the protected birds."[30]

In summary then, it can be said that inundation of the reservoir basin will result in migration of the larger game animals up-and downstream and overland to the north. Beaver and muskrat habitat should be improved for the most part. Presence of extensive waterfowl populations will depend primarily upon the effects of water level fluctuations upon shoreline food and habitat.

Forest Cover

Situated at the north-east extremity of settlement in the Province, at the edge of the Mixedwood Section or "commercial forest" belt of the Boreal Forest Region, the reservoir will offer two major contrasting vegetative

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[30] Regina Leader Post, March 16, 1960.

features.[31] It is this contrast which gives to the reservoir much of its attraction.

Land along the entire south side and the upper one-third of the north side has been cleared for agricultural use. Here are raised the crops of oats and barley, the rape seed and the alfalfa which form the major economic base of the entire community. Land along the lower two-thirds of the north shore, however, has a cover of white spruce, black spruce, aspen and jackpine (Pinus banksiana) - principal components of the Mixedwood Forest belt. Here, within the borders of the Northern Provincial Forest, is a touch of the wilderness which stretches unbroken northward to the Precambrian Shield and beyond. Small patches of the same forest cover appear on the opposite side of the reservoir contiguous to the shore. The all-aged nature of the forest gives added attractiveness.

In addition to the species mentioned, tamarack, balsam fir, (Abies balsamea) white birch and balsam poplar (Populus balsamifera) are common in the more moist sites. Manitoba maple (Acer negunda var. interius), green ash (Fraxinus pennyslvanica) and white elm (Ulmus americana) also appear occasionally along the Torch River and on the islands of the Saskatchewan River as intrusives from the Manitoba Lowlands Section a short distance to the east.

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[31] J. S. Rowe, Forest Regions of Canada, Canada Dept. of Northern Affairs and National Resources - Forestry Branch Bulletin 123, (Ottawa: Queen's Printer, 1959), p. 22.

With such cover the reservoir area will enjoy the autumn splendour characteristic of the forest belt which caps the Aspen Grove Section from Manitoba to the Alberta border.

Extensive cutting has been carried out in the reservoir area over the years - for lumber, ties, pulpwood, poles, fence posts and rails and fuelwood. Considerable thought should be given to setting aside buffer strips adjacent to the water and along all roads and trails in the reservoir area on which cutting would be restricted in order to maintain an aesthetically pleasing environment. With regeneration of cutover lands slow and sporadic over most of the upland areas here, logged-over areas present an eyesore for many years afterwards. Judicious thinning of some of the overstocked pine and spruce stands, in areas favourable to recreation use would also enhance the immediate scenery.

Recreation-wise, the forest vegetation serves more than just as a pleasant backdrop. Soils suitable for recreation development and use were found to be closely related to the tree species present. The ubiquitous jack-pine for instance, serves notice of a well drained, sandy site adapted to public recreation facilities, trails, septic tanks and drainage fields, and, close to the water's edge, of a favourable footing to anglers and bathers. The heavier lacustrine clay and silt soils, or poorly drained sandy sites, indicated by a cover of spruce and poplar on the other hand,

do not lend themselves so readily to development. This condition was noticeable to a degree such that a workable formula suggests itself - the potential of an area for recreation use in this reservoir vicinity, varies directly with the proportion of pine present in the forest cover.

Like many rules, this one has an exception. This is with regard to one major recreation use - hunting. Upland game bird and big game hunting are popular here, as everywhere in Saskatchewan, and the spruce and poplar lowlands are the favourite haunts of the quarry.

Historical Aspects

The lower Saskatchewan Valley has been of great significance in the development of Western Canada from the days of the first fur traders and explorers to the present. From the time of Henry Kelsey, the first white man to visit the Saskatchewan River in 1691, until the late 19th century this river, traversing a thousand miles of forest, prairie and mountain, was the main route for the traders from Hudson Bay and Montreal.

Because of the historic interest in the river, some fears were felt that inundation of such a large area of the river valley would destroy an unknown number of important historic sites. In order to determine the extent and importance of any such sites, an investigation of the reservoir area was carried out in the summer of 1960.

Under the auspices of the Saskatchewan Museum of

Natural History and the Saskatchewan Power Corporation, an archaeological survey was undertaken "for the purpose of discovering and ultimately recommending for salvage, the sites, both British and French trading posts and Indian encampments, that will be flooded once the dam is completed."[32]

Through public education, and care in its presentation, the historic aspects of an area are becoming increasingly of interest to recreation seekers. Such historical associations can either form the basic reason for the existence of a park - the raison d'etre, or they may merely be an additional attraction. There exist in the Province of Saskatchewan now, few parks other than those of a local nature which fall under the first classification. However, Cypress Hills Provincial Park, with its nearby historic Fort Walsh, is a good example of an area in which historical associations augment the other natural and scenic features prevailing.

With regard to the reservoir area under study, there is unfortunately little of historical significance upon which any historic program could be based. Lying between the principal distribution and collection points of the fur trade, and "off the beaten track" of the major land trails subsequently established, the immediate area of the reser-

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[32] Saskatchewan Museum of Natural History, Preliminary Archaeological Investigations in the Squaw Rapids Reservoir, Final Report for the period June 8 - August 20, 1960. (Unpublished), p. 1.

voir was never intensively occupied until lumbering and agricultural development reached the vicinity in the early part of the century. Surface collections made throughout the reservoir area by the archaeological reconnaissance tended to confirm this fact.

Cumberland House, site of the earliest inland trading post of the Hudson Bay Company, built by Samuel Hearne in 1774, is situated approximately 60 miles downstream. Forty-five miles above Nipawin, on the other hand, was the Company's Fort a la Corne, the site originally of a French fort built in 1753.[33]

Investigation of the reservoir area in 1960 revealed forty-two sites which were in or peripheral to the area to be inundated.[34] Test excavations were recommended for ten of the areas of former habitation, in order to provide more information about the early inhabitants. The majority of these are situated above the area to be flooded, which is of significance from the standpoint of any potential for development in a historic sites program.

Of more recent interest and closely associated with an activity which was of primary importance to the entire Lower Saskatchewan Valley are the remaining evidences of earlier colourful logging days. The old "Pas Trail", an

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[33] Campbell, p. 24.

[34] Saskatchewan Museum of Natural History, Preliminary Archaeological Investigations . . ., p. 9.

early logging road which will form the greater part of any access road for recreational use of the south side of the reservoir, and whose route skirts the shoreline beyond the project and on down-river to The Pas, Manitoba, is a feature with considerable local interest. The mouldering remnants of one of the early logging "depot camps" attendant with this early road will be inundated in the Jackfish Cabin area.

From the foregoing it would appear that there are insufficient features of historical significance upon which to base any comprehensive historic sites program. Should the day arrive when an intensive recreation program might be warranted on the reservoir, however, there is sufficient base upon which a modest but worthwhile historical interpretive program could be established. As well as the points already covered, the early portage between the Saskatchewan and the Torch Rivers and the part it played in the water travel of the early inhabitants would lend itself to such an interpretive program. One of the more valuable sites discovered in the archaeological reconnaissance is adjacent to this portage, and since it will not be inundated it could conceivably form the focal point of the portage developed as a self guiding trail.

Sites for Recreational Development

In their study of the recreational resources of the then uncompleted Denison Dam and Reservoir Project, the

National Parks Service of the United States Department of the Interior suggested some of the factors upon which the selection of sites for possible recreational development might be based. The list includes:

"1. Accessibility from centers of population over existing and proposed highways and other means of transportation.

2. Adaptability of the site to the various types of development requirements.

3. Scenic qualities of the site and the relationship to large expanses of water.

4. Orientation with relation to prevailing wind.

5. Relationship of the sites to each other with respect to desirable and practical intercommunication.

6. Soil conditions and existing vegetative growth

7. Depth of water adjacent to sites.

8. Minimum of objectionable features."[35]

After investigation of the area to be inundated and the adjacent shoreline area, keeping in mind the aforementioned considerations, a number of shoreline sites appear to be adapted to future development. These can be given an order of priority based on their relative adherence to the various appraisal factors.

Basic to consideration of the factors listed in the appraisal of the shoreline area of the reservoir under

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[35] U.S. Department of the Interior, N.P.S. Recreational Resources of . . ., p. 10.

study was the location of the probable beach line - the marginal strip between the 1,029 foot and the 1,033 foot contour. As well, in the consideration of areas suitable for installations of a permanent type, the position of the 1,041 foot contour was noted. With the possibility of water levels reaching this latter elevation, however remote, any summer homes, group camp buildings, sewerage facilities, water supply wells and similar permanent improvements should be located above hypothetical flood level. Picnic areas and campsites with their attendant facilities could be located below this level but above the 1,033 foot contour. This would keep them in close relation to the normal pool elevation of 1,029, yet above the anticipated upper beach line. Boat launching ramps, boat docks, boat houses and similar facilities of a floating or movable nature could be located at the normal pool elevation of 1,029 feet.

On the basis of these criteria, the reservoir shoreline can be reduced to a section approximately sixteen miles long on the north side and eight miles long on the south. Within these bounds in turn, localized areas can be drawn - one on the south side and three on the north. In addition to these major development areas, there are a number of sites suitable for such minor development as boat launching and docking facilities and scenic overlooks. Each of these will be discussed separately.

Major Development Sites

a) South Shore:

Considerable disadvantage in accessibility ensues from the long, linear nature of the reservoir and the lack of an encircling access road. As mentioned previously, the dam itself will be a magnet attracting considerable numbers of recreationists to the south side of the reservoir. Due to its configuration, any use of the reservoir by such visitors outside the vicinity of the dam will entail considerable road travel. To reach the only major development area suggested on this side of the reservoir will necessitate a drive of close to thirty miles from the dam - one half of it over second class municipal dirt roads. Should the visitors to the dam be inclined to observe the flooded shoreline conditions elsewhere on the reservoir or to make use of any aesthetically attractive portion of the shoreline it is the south side which they would traverse.

Area "A"

On the basis of this accessibility, Area "A" on the south shore of the reservoir would appear to warrant first priority as a major development area. (Figure 10) In addition to its accessibility this area includes a number of allied advantages. Good boat access could be provided by means of the now existing trail to the river, and the level, sandy, pine covered terrain above is readily adaptable to camping and picnic ground layout. Slopes above probable

beach line are such that close relationship between any such upland developments and the water at various stages of fluctuation would be maintained.

This area has a shoreline length of about two miles which, together with a width averaging half a mile, would provide 640 acres of land suitable for development. Development here could include a picnic area, a campground, and an area reserved for summer cottage sites should the need arise. As will be illustrated in Chapter IV, the ownership of a summer home does not constitute a primary desire of recreation users in this part of Saskatchewan. With day use and weekend facilities taxed to the limit in Greenwater Provincial Park, for instance, 25% of the cottage sites available there are unoccupied.

There are several unfavourable features attendant with this area which must be recognized. With prevailing winds from the south and west during the summer months, the regular shoreline will offer little protection to small water craft, so that boat mooring will be a problem. Because of physical conditions of the shoreline here, and problems resulting from littoral drift, especially of organic debris, construction of breakwaters or jetties would not be economically sound.[36] The same would apply to pre-impoundment

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[36]The closest available large aggregate material is that found in the rapids area of the river below the dam. It is this material which is being utilized in the riprap of the dam.

excavation of a small cove or basin. A suggested alternative, which would place permanent mooring facilities some distance away from the balance of intensive development in this area, would be to excavate a mooring basin to the north where the shore of the reservoir makes a sharp turn to the east. The gentler slopes here are much more adaptable to such an installation. A boat launching ramp, however, would be needed in the immediate area of major development and temporary beaching of boats at a specified portion of the adjacent shoreline could be allowed. Any subsequent boat servicing concession would be at the suggested mooring basin to the north.

Although natural beach conditions would be somewhat wanting here because of the silty nature of the immediate littoral shelf, the abundant sand of the backslopes would make the construction of a sizeable beach relatively simple. The backslopes are rather steep over the entire shoreline here varying from seven percent to twenty-four per cent. The littoral shelf, on the other hand, has an average slope of three per cent and after improvement with the sand of the backslopes it would make a satisfactory underwater beach. Depth of the reservoir offshore, over the present river channel, would be about sixty-five feet.

Although such water oriented development as beach and boat access would be restricted to the southerly end of this area because of shoreline topography, the level toplands suitable for picnic grounds, campground or summer home sites, extend northward for a distance of almost two miles. Road construction here, as for most of the toplands above the

reservoir, would be relatively simple, although any roads constructed in the sand would be somewhat difficult to maintain under heavy traffic conditions.

At the northern extremity of this area, a high promontory overlooks the reservoir which would be an excellent point for a scenic lookout, for at this point the reservoir makes a right-angled turn, thus providing expansive views of the reservoir to the north-east as well as to the south.

Major development Area "A" would fill the needs of two separate groups of recreation seekers. (Figures 3 and 10). On the one hand for those persons visiting the damsite and wishing to otherwise make use of the reservoir this would be the closest developed area, necessitating a drive of approximately thirty miles. Sixteen of these miles would be the return route over the first class project access road. The remaining fourteen miles would be over secondary municipal dirt roads. If extensive usage of this route materializes, considerable improvement would be required of these roads to bring them up to standard. Gravelling would be a basic improvement necessary from the outset to provide at least an all-weather road.

The second group of users would be repeat users of the reservoir - day use, weekend use and longer - drawn from a shorter radius, to whom the dam no longer holds an attraction. This group would travel the route from either Nipawin or Carrot River - distances of thirty and twenty-five miles respectively. Of these, the route from Carrot River would

have the advantage of the project access road for half the distance. Improvement of the remaining portion already discussed with regard to access from the dam would therefore have further justification.

The extensive slippage and slumping of the shoreline, especially at the northern margin of this area would limit expansion close to the shoreline in that direction. Portions of the shoreline are even now in the process of slipping, and whether this action would continue under reservoir rather than river conditions is unknown. However, the glacial till, sand and gravel of this area are highly susceptible to undercutting and slumping. The dangers inherent in this condition are well illustrated in a story told to the author. A quarter-mile section of the south bank fell away unannounced two years ago, to the consternation of a local farmer who nearly drove his tractor over the vanished roadway which up to that time had paralleled the river.

With winds prevailing from the west and south-west during much of the open water season the presence of large amounts of floating debris on the reservoir in its early years could be another limiting factor to use of this side of the reservoir.

b) North Shore:

The north shore of the reservoir has one major advantage over the south shore, and that is its relative accessibility. Provincial Highway 35, a gravel surfaced

highway, parallels closely this side of the reservoir - its upper extremity will, in fact, be inundated by the rising waters of the reservoir, even at normal pool elevation.

Offsetting this advantage are its relative isolation from the feature attraction of the reservoir - the dam - and the smaller population of recreation users upon which to draw within the reservoir's range of influence.

Investigation of the shoreline on this side of the river revealed three areas with potential for recreational development. Each has attributes which favour a particular recreation use.

Area "B"

This area, located about three miles north of Area "A" is a narrow strip comprised of approximately 195 acres closely adjacent to and paralleling the highway. (Figure 10) Shoreline length is about 1.5 miles. As with its counterpart across the reservoir, this area consists of level pine covered terrain above steep slopes dropping to the 1,040 foot contour. However, the presence here below the backslopes, of long narrow sand benches with favourable slopes at the probable beach line provide a better potential for natural beaches. This area could be developed for picnic and campground use.

This location will overlook to the east, the largest single expanse of water on the reservoir, culminating at the dam twelve miles away. Offshore depths here would be in the

order of seventy-five feet. Half a mile to the north of this area, the present portage to the river will probably constitute the preferred boat launching site on this side of the reservoir. Presently the site of the boathouse for the Provincial Department of Natural Resources, the steep portage road used as access to the river since the days the Indians made the two mile portage from the Torch River, will offer a natural boat launching site where it meets the reservoir waters. The short road from the main highway could be improved at a modest cost, and ample level space for car and boat-trailer parking exists on the level toplands above the reservoir. The steep shoreline precludes, however, construction of any extensive mooring and storage facilities at the water's edge.

Area "C"

Should the shoreline of the reservoir prove aesthetically unattractive, it is doubtful that the need for cottage sites on this side of the reservoir will exist. However, to satisfy the demands that might come, consideration should be given to reserving an area for this use. Suitable sites are at a premium on this side of the reservoir where a favourable relation with the water can be maintained above the 1,041 foot contour.

Area "C" approximately one mile upstream from the major development area suggested on the opposite side of the river, should be reserved for this use. (Figure 10) The

Figure 11. Level, sandy, pine covered terrain suitable for development will overlook the reservoir.

Figure 12. Bank slippage precludes recreation development along parts of the reservoir shoreline.

relative isolation usually desired by this class of recreationists would be well provided here, since the only land access to the area would be over two miles of winding forest road. The mixed forest of white spruce, poplar and jackpine would provide an excellent setting. The beach, though limited in length to about 1,000 yards, would be adequate for such a subdivision if care in providing proper access is provided in planning the physical layout of the individual sites.

Limiting factors here are the large spruce swamp adjacent to the north, and steep eroding banks to the south of the entrance road to the area. As a result, development would be confined to an area of approximately 200 acres.

Area "D"

This area, constituting almost 500 acres just within the upstream boundary of the Provincial Forest, is the remaining area which appears to have potential for major development. (Figure 10) Because of certain natural characteristics unique to this area, it provides a development opportunity for a recreational land use not yet discussed, namely institutional, group or organization camp sites as they are variously called.

In a paper adapted from his Organized Camping in New York State, A. T. Wilcox lists the main factors which should be considered in choosing a site for organized camping as follows:

"Accessibility
Size
Privacy
Adjoining Lands
Temperature - Humidity
Elevation
Slope
Fire Hazards
Rainfall
Underground Water
Springs
Streams
Lakes
Lake Site
Soil
Level Space
Open Area
Prevailing Winds
Ventilation
Vistas
Cover
Bottom of Swim Area
Building Material
Plants
Animals
Geology
Topography
History"[37]

Area "D" appears to meet the requirements suggested by Dr. Wilcox. Large level openings suitable for playfields abound, stands of jackpine are scattered about, and excellent drainage conditions prevail. A number of free flowing springs in the area of the uplands above the 1,041 foot contour would indicate that no difficulty should be experienced in providing well water. Slopes above the probable beach line are such that installations could be located within reasonable distance of the water. The easy access, the abundant trails through forest and open meadow, and the isolation are other advantages to this area favouring its reservation for institutional camp sites. Such camps do not require extensive beach area so that the small but excellent beach existing should suffice.

Minor Development Sites

Apart from the four major development areas discussed, there are a number of locations with advantages for a certain

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[37] A. T. Wilcox, Organized Camp Development, (Unpublished manuscript, 1941), p. 8.

specific use. These include scenic lookouts or viewpoints and boat launching sites. Provided with only basic facilities, the purpose of these would be to supplement the major development areas. Minimum picnic facilities could be provided at these locations if subsequent use should warrant, although the added administrative burden of a number of scattered use areas should be recognized.

There are six such sites available on the reservoir, made up of two boat launching sites and a scenic view on the north side, and two scenic lookouts and a boat launching site on the south side. The latter is in addition to the site included in major development area "A". The lookout suggested well upstream on the south side is located on a wooded section of school land which has considerable aesthetic value in itself. Location of these sites is indicated in Figure 10.

The upstream lookout site suggested for the north side of the reservoir is presently the site of a small public picnic and camping ground equipped with picnic shelter, tables, fireplaces and pit toilets. In view of the popular appeal that this site now enjoys, it is suggested that these facilities remain as they are. Observation of the visitation pressures experienced here could serve as a useful guide in determining the need for development of facilities in major development area "B".

CHAPTER IV

FACTORS INFLUENCING RECREATIONAL DEVELOPMENT

Clearing of the Reservoir Basin

Thus far the "reservoir" has been treated more or less as merely a man-made lake - an open body of water with the possibilities and drawbacks of many natural bodies of water. Reference was made to three limiting factors to shoreline development-fluctuating water levels; instability of parts of the shoreline; and floating debris. To these three can be added an additional factor which may "make or break" use of the reservoir for recreation - the inundated forest-covered basin.

There are a number of aspects of recreation use which hinge upon this contingency. These include access to the water, angling upon the surface and development customarily associated with shorelands such as boat docks and boat launching ramps, bathing beaches, picnic sites, campgrounds and summer homes. The degree to which use is made of the reservoir for any or all of these will depend upon which of the three possible approaches is followed by the Provincial Government: (1) No clearing of the forest-cover other than what has been removed in the course of salvage logging operations, (2) Partial clearing at selected portions of the

Figure 13. Salvage logging of spruce in the basin of the Squaw Rapids reservoir. The residual stand is aspen.

Figure 14. Truck being loaded with tree length logs by front end loader during salvage operations at Squaw Rapids.

shoreline. Such clearing would presumably be carried out at those sites offering the most potential as indicated in Chapter III, (3) Complete clearing of the forest-cover of the basin, or at least those portions of it above an elevation at which the tops of trees would be submerged to a specific depth at the low water surface elevation expected during the recreation season.

At the time of writing, it is not known which alternative course will be taken. Consequently any consideration for particular shoreline development or use must be made with respect to the three possible conditions which might prevail.

An insight into the type of conditions which may exist can be gathered by observing those which prevailed at a reservoir created under quite similar circumstances.

In 1953, several lakes in Tweedsmuir Provincial Park in west-central British Columbia were inundated under as much as 100 feet of water behind the Kenney Dam constructed on the Nechako River by the Aluminum Company of Canada. According to an official of the British Columbia Department of Recreation and Conservation, opinion on the non-clearing of the reservoir shoreline ranged from the extreme views of "a non-usable body of water because of drowned shorelines and floating debris," to "a much better recreational area with clean shorelines brought about by the shearing action of ice."[1]

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[1] C. P. Lyons, letter, June 30, 1961.

Because of cost considerations, only selected portions of the shoreline of this reservoir were cleared, with four aspects determing the location of such clearing - shoreline strips in front of residential and resort areas; to eliminate what would be unsightly islands of dead trees posing a navigational hazard and a trap for floating debris; to provide access from the water to picnic and campground areas on the shore; and to provide entry and exit places for migrating moose and caribou.[2]

The conditions prevailing following inundation are well summarized by Park Officer Lyons,

> As the reservoir was rising and for a year after it reached crest height, the water was turbid and hardly fit for drinking. Great quantities of floating debris accumulated especially from the flooding of old burns with their dry snags and windfalls. There were numerous land slides where the undermining of sand and gravel caused hillsides to sluff into the reservoir. The former lake and river system on which river boats were used was now so exposed that travel became hazardous unless much larger boats were employed. Sudden winds and the inability to make a quick landing on a flooded shoreline posed a problem. Many moose were drowned in attempting to swim the reservoir and becoming tangled up in the debris along the shorelines. The scenic aspect reached a low point as needles turned brown on drowned trees.[3]

Because of the similar physical environment, many of

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[2] Savings were made in the actual clearing by piling the bucked-up trees and wrapping them with heavy wire. These held together as units, eventually became water-logged, and sank to the bottom. Deciduous trees such as alder, aspen and cottonwood, quickly sank and limbing or bucking of these was not required. With the greater proportion of forest-cover remaining in the Squaw Rapids reservoir basin composed of aspen, balsam poplar and birch, this latter feature would simplify clearing to some extent.

[3] C. P. Lyons, letter.

the conditions found to exist on the Tweedsmuir Park reservoir can be expected to be repeated on the Squaw Rapids reservoir.

Time brought considerable improvement, however, to the point where it could be reported that:

> In two year's time there was a remarkable improvement. Due to prevailing westerly winds the floating material was carried into a convenient side-arm of the reservoir or had lodged rather securely among standing trees. The feared hazard to navigation was mostly eliminated. It should be mentioned though, that for several summers it was necessary to make "sweeps" of the reservoir, open entrances to clearings, and generally keep floating material on its eastward move. In places the powerful barge was able to "pocket" much of this in bays.[4]

In addition to these improvements it was found, in agreement with the customary trend as discussed in Chapter IV that fish population soared. Beaches began to form where soil and wave conditions were suitable, and the scenic aspect improved as dead needles fell from the trees and many toppled over.

It is significant to note, however, that, "The predictions by Alcan [Aluminum Company of Canada] for a great surge in tourist use never materialized, In fact, it is considerably less than prior to flooding perhaps for obvious reasons."[5]

Some of the shoreline conditions prevailing on that reservoir, and which may be repeated on the Squaw Rapids

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[4] Ibid.

[5] Ibid.

Figure 15. Aerial view over Ootsa Lake (British Columbia) as waters rise.

Figure 16. View of a portion of the flooded shoreline of Ootsa Lake.

Figure 17. Small area cleared in lodge pole pine for campsite.

Figure 18. Shore cleared in front of area planned for summer residences.

Figure 19. Ice action has tilted trees but they are regaining their upright position.

Figure 20. Erosion of unstable sand and gravel banks.

reservoir are indicated in the accompanying illustrations.

The Squaw Rapids reservoir has certain advantages over the analogous area. A river rather than a lake chain occupies the original basin, and very limited recreational use was made of that river. In effect, any reasonable amount of recreation use available on the reservoir will be an improvement. And in the scenic environment of the British Columbia reservoir, alternate recreational areas are innumerable; in this part of Saskatchewan use will be made of an area even under somewhat adverse conditions due to the lack of available alternatives.

The effects of winter ice upon the shoreline vegetation and soils of this reservoir too may differ. For in addition to the ice formed upon the surface of the reservoir proper, each spring's "break-up" on the river will bring with it into the reservoir a considerable amount of upstream ice.

Need for Recreational Development

In order to estimate the relative need for recreational developments at the reservoir, it is necessary to consider what recreational areas already exist in the area, or are proposed; and the population which would make use of such developments. Each of these will now be discussed separately.

Existing Recreation Areas and Use

The location of the Squaw Rapids Reservoir with respect to already established recreation areas is illustrated in Figure 21. The closest developed recreational

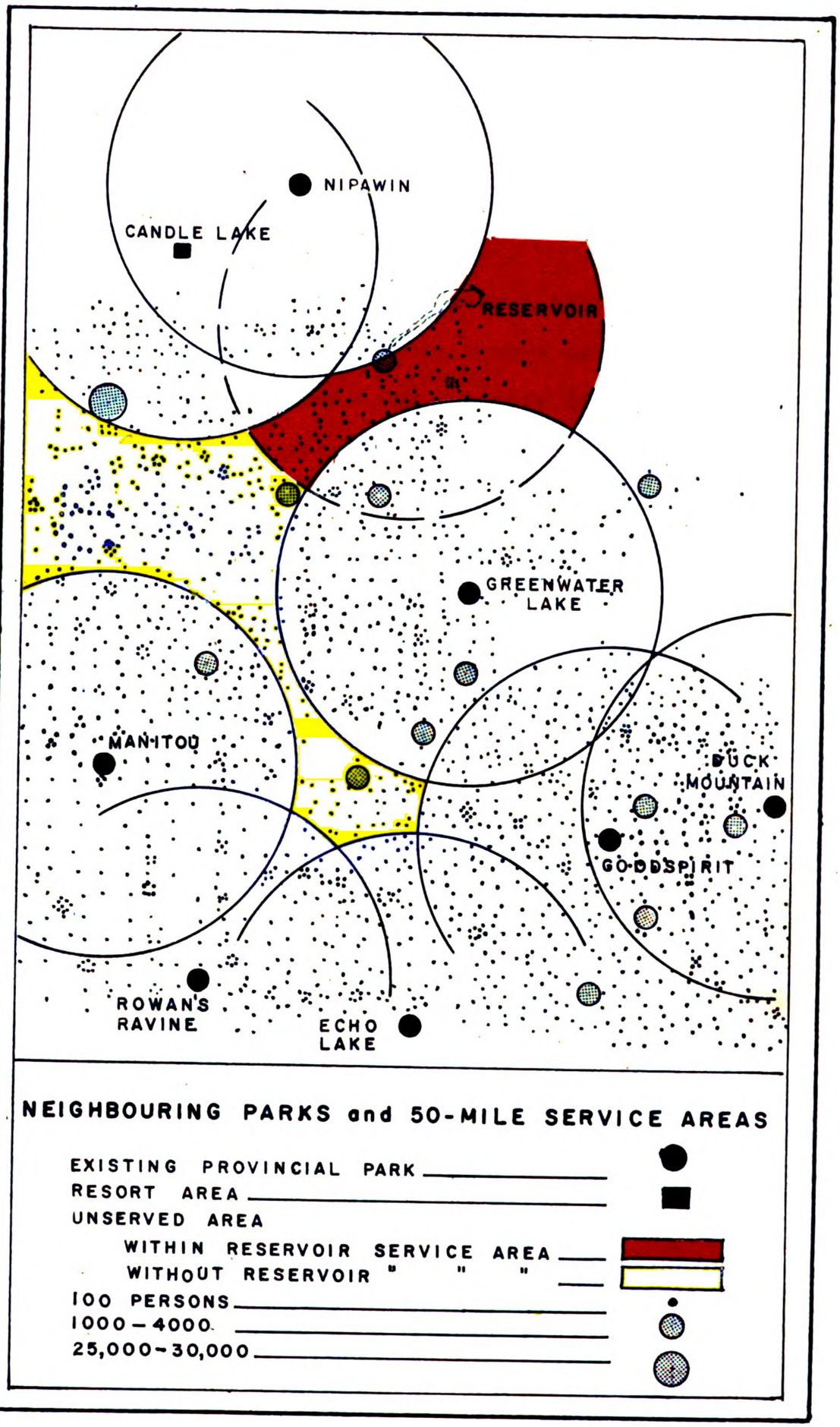
NIPAWIN
CANDLE LAKE
RESERVOIR
GREENWATER LAKE
MANITOU
DUCK MOUNTAIN
GODDSPIRIT
ROWAN'S RAVINE
ECHO LAKE
NEIGHBOURING PARKS and 50-MILE SERVICE AREAS
EXISTING PROVINCIAL PARK
RESORT AREA
UNSERVED AREA
WITHIN RESERVOIR SERVICE AREA
WITHOUT RESERVOIR " " "
100 PERSONS
1000 – 4000
25,000 – 30,000

Figure 21.

areas of any extent are Nipawin Provincial Park and Candle Lake resort area, eighty-five and ninety-five miles respectively, to the northwest, and Greenwater Provincial Park 100 miles to the south.

Day-use facilities at Greenwater Lake Park are taxed to the limit on weekends during the summer and the beach area there has almost reached its ultimate limit of use.[6] Although information on actual annual visitation numbers at this park is very limited, a count kept during the period of July 1st - August 25th of 1960 indicated just under 15,000 visitors.[7] While Candle Lake too is heavily utilized during the summer months, the same is not true of the wilderness type Nipawin Provincial Park. Traffic counts kept during the summer of 1959 indicated a visitation of 43,000 to the Candle Lake resort area. For the month of August of that year a road check revealed 14,000 travellers over the Hansen Lake road.[8] This partially completed road has opened up extensive areas of great recreation potential both within the park and north of it and more intensive use of this area can be expected.

Any usage of the reservoir can be expected to come then, other than from within a limited radius to the west,

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[6] A. G. Stark, Regional Superintendent, Dept. of Nat. Res., Saskatchewan, letter, April 10, 1961.

[7] R. L. Carter, Parks and Conservation Branch, Sask., February 6, 1961, letter.

[8] Interview with Dept. of Nat. Res. officials, Prince Albert, Saskatchewan.

predominantly from the south. It is interesting to note that in his report on recreation in the north-west part of Saskatchewan, Baker suggests, in an aside, that in order to open recreation resources for the people of Southern Saskatchewan in the north-east area of the Province, "a completely new road network must be contracted to the north of Nipawin or Hudson Bay into the Amisk Lake Region."[9] The creation of the Squaw Rapids reservoir obviates, to some degree, this need since it brings a reservoir of considerable recreational potential 100 miles closer to the people of southern Saskatchewan.

Some attempts have been made by the local people of a few of the communities in the reservoir area to develop small day-use areas in their immediate vicinity. The service clubs of the town of Carrot River have maintained, for several years, a site on the Carrot River - Prudham Park - approximately ten miles south of the town. Situated on private land, the site has had limited use because of the extremely unreliable water levels in the river, and the limited development has deteriorated badly through lack of maintenance.

The Village of White fox, has also maintained a picnic site on the Torch River some eight miles to the north but it too has seen better days.

Of more recent vintage, and showing some promise, is

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[9] W. M. Baker, "A Recreation Report on the North-West of Saskatchewan," Saskatchewan Dept. of Nat. Res., Regina, December, 1956, (Unpublished), p. 9.

the overnight campground which has been developed on town property on the outskirts of Nipawin by a local service club. This small six acre site experienced considerable use during its first year of existence (1960) which reflects the need for more such outdoor accommodation in this part of the Province.

Heretofore, little use has been made of the Saskatchewan River in this area for recreation with the exception of a limited amount of angling, and fall big game hunting along portions of the shoreline. Due to its treacherous nature - shifting sand bars and shoals, rapid currents and deceptive eddies - the river does not lend itself to swimming and boating. This is evidenced by the fact that a service club in the Town of Nipawin, located on the high banks overlooking the river, is currently attempting to raise sufficient funds for an outdoor swimming pool.

The Department of Natural Resources has maintained picnic and campground sites at several spots above the river such as the one indicated in Figure 24, but no good beaches exist and access to the river is in most cases difficult, due to the steep, eroding banks. With inundation, water levels will be raised from these silt and clay alluvial deposits to the coarser sand slopes of the higher elevations, providing a natural base more conducive to recreation use.

Recreation in Saskatchewan is for the most part, regional in nature. At Greenwater Provincial Park, for instance, the bulk of the day-use visitors originate from

Figure 22. Steep, eroding clay banks now make access to the river difficult in many places.

Figure 23. Pine-covered sand slopes such as this will meet the water's edge after flooding. This will form part of the shoreline of Area D.

Figure 24. Recreation development on the river has been restricted to picnic areas and small campgrounds.

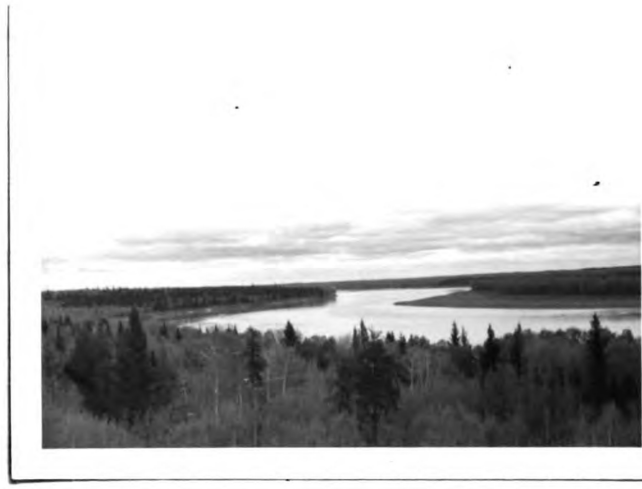

Figure 25. The lower reaches of the reservoir as viewed from campground pictured above. The land in the background will be inundated.

within a thirty mile radius; the weekend crowds from within a fifty mile radius; and the extended-visit campers from within a sixty mile radius.[10]

This rather localized demand for recreation activity is indicated in the demand for summer cottage sites at Greenwater Park. Analysis of the points of origin of cottage owners at that Park shows that sixty-eight per cent of them reside within a radius of thirty miles. Eighty-six per cent of the owners reside within a sixty mile radius.

These figures compare closely with the findings of Baker regarding summer cottage ownership in the Makwa Lakes area on the west side of the Province. He found there that sixty-one per cent of the cottage owners live within a thirty-five mile radius, and that forty-five per cent reside within a fifteen mile radius. Consequently, Baker concludes " . . . the permanent residence of cottage owners clearly indicates the regional aspect of the recreation resources of this chain of lakes."[11]

An even closer relationship with Greenwater Provincial Park conditions exists in the southern region where eighty-eight per cent of the cottagers travel sixty miles or less from their abode.[12]

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[10] Stark, letter.

[11] Baker, "A Recreation Report on the . . .," p. 141.

[12] Baker, "A Report on Outdoor Recreation in Southern Saskatchewan, Part I.

Population Within the Range of Influence

The attraction which a new dam and reservoir will have for the people of a region is a difficult thing to appraise. The road to reservoir visitation estimates is strewn with the shattered statistics of recreation planners. Each has special circumstances which may not be repeated elsewhere, so that direct comparisons with the attraction afforded by other reservoirs may be dangerous.

With this thought in mind it is with some trepidation that an attempt is made here to estimate the possible range of influence of the Squaw Rapids reservoir.

One hundred road miles to the south of the reservoir is the already well established Greenwater Provincial Park. Serving a region sharing, in many respects, the characteristics of that surrounding the reservoir such as population density, rural-urban ratio, and economic base, this park should provide valid analogies through inspection of some aspects of its range of influence.

As an "intermediate" recreation area, this park could be expected to have a somewhat greater range of influence than the reservoir. Alternative areas are few and far between - 110 miles south is Goodspirit Provincial Park; 150 miles by road to the south-east is Duck Mountain Provincial Park; and 180 miles to the north is the closest "wilderness" type park, Nipawin Provincial Park.

Analysis of the points of origin of visitors to Greenwater Park reveals, as mentioned previously, that the

greatest proportion of day-use visitors comes from within a thirty mile radius. Weekend campers come primarily from within a fifty mile radius and camping and family groups staying for longer periods from within a sixty mile radius. Considering the customary water based attractions of the reservoir to exert an equal effect upon its region then the range of influence of the reservoir could be expected to lie within a fifty to sixty mile radius.

Situated as it is, in a region blessed by Providence with a greater number and variety of recreation outlets, the natural attractions of the reservoir - its forest and water setting - cannot be expected to reach out to as great a distance as the well-established park to the south. Two major features delimit the range of influence - unsettled, uninhabited area to its north and east; and competitive recreation areas to the north-west and to the south.

The fact that it is located at the extremity of settlement automatically restricts the area from which potential recreation users can be drawn. A circle circumscribing the reservoir includes settlement only within an arc of 120 degrees.

To the west, that area served by Highway 55, the competitive influence of Candle Lake and Nipawin Provincial Park, is soon felt. In answer to the possible effects which the reservoir might have on the recreation habits of the people of that area, the Reeve of the Rural Municipality of Torch River wrote, "The Hansen Lake road has opened up

a great many possibilities quite close to us without causing much flurry."[13] Thus the Village of Choiceland, approximately twenty-five miles west of the reservoir probably represents the margin within which day-users can be expected from the west. Highway 3 would probably form the southern boundary of attraction, beyond which the effects of Greenwater Provincial Park will be felt.

It is in the south-west that the greatest untapped recreation market lies. The communities of the Carrot River Valley centered about the Town of Melfort are sadly deficient in natural recreation areas. Only slightly farther by road (ten miles) than Greenwater Park, the reservoir could well divert traffic formerly headed to that Park particularly if use there continues to increase. Park facilities there are heavily taxed on weekends in the summer and the beach area, not easy to enlarge, has reached its ultimate use.

Much more difficult to appraise than the attraction of the reservoir for the traditional water based recreation activities is the attraction which the power development itself may afford. One would assume its attraction to range out far beyond the usual limits of a recreation area. Although cast in the shadow of the gigantic South Saskatchewan River development, it is still a significant project, and unique in a number of respects. Besides the fact that it

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[13] R. A. Thomas, Reeve, Rural Municipality 448, February 4, 1961. The reeve is the chief executive officer of the elected municipal council.

is 300 miles from the larger dam, its attraction will lie in the fact that it is (1) the first completed dam on the Saskatchewan River in the Province (2) the only dam constructed solely for power production (3) set in a forest environment as opposed to the treeless, prairie aspect of the South Saskatchewan Dam. The associated canal too is a feature lacking in the larger dam.

Origin studies conducted on several Sundays at the observation pavilion of the South Saskatchewan dam indicated that all visitation at those times came from within a one hundred mile radius. Project construction often holds greater fascination than the finished product, so that the final range of influence may not extend to that distance. On the basis of this and the fact that the South Saskatchewan Dam lies just off the main north-south arterial highway of the Province, it is doubtful that the Squaw Rapids dam will attract visitors from that distance. Thus, it appears that the probable effective range of influence of the dam will parallel that for the normal reservoir users - within approximately a sixty mile radius. An exception to this may be afforded by visitation from the City of Prince Albert, the closest city of any appreciable size (25,000 population) situated 125 miles to the west on the direct route of Provincial Highway 55.

Contrasts are often made between the greater relative need or desire for recreation of urban versus rural residents. While this may be true of the large cities, the

towns and villages of Saskatchewan are composed, for the most part, of farmers living there for the conveniences provided, or of people directly involved in servicing the needs of the rural inhabitants. In the semi-arid conditions of the prairie and park-belt of Saskatchewan, there is as much need felt for recreation, especially water-oriented recreation, by the rural populace as by the urban people. To anyone who has spent a hot, dust-filled July day upon the seat of a tractor in the monotonous routine of summer-fallowing with the heat waves forming an illusory water-body on the horizon, this would be an understatement. For these reasons, comparisons of rural-urban relationships are valueless in assessing the need for "user-oriented" recreation areas here. However, observation does suggest that a preferential difference does exist in types of recreation activities favoured. Day-use activities such as fishing and picnicking appear to be of most appeal to the rural segment, cottage owners and extended vacationists more frequently originate from town folk.

If such is the case, rural-urban ratios should be taken into account in the planning of any recreation areas on the reservoir.

The total population now residing within municipal subdivision boundaries coinciding with the sixty mile radius of influence is 36,000. This includes six incorporated towns, six incorporated villages and nine rural

municipalities.[14]

TABLE 1

POPULATION WITHIN A SIXTY-MILE RADIUS OF RESERVOIR, 1960.

	Number	Population	Percentage
Cities	---	---	---
Towns	6	11,590	31.7
Villages	6	1,931	5.3
Rural Municipalities	9	23,084	63.0
Total		36,605	100.0

Source: Municipal Directory of Saskatchewan, 1960.

Assuming that population trends for the past four decades will continue, the population within this region will lie between a low of 42,000 and a high of 44,000 by the year 1970. By 1980 this will have grown to between 48,000 and 51,000.[15] Accompanying the rise, if past trends continue will be an increasing proportion of urban inhabitants. The

[14] Under the authority of the British North America Act, the 1909 Legislature of Saskatchewan established a system of rural municipal government, made up of rural municipalities. Their privileges-powers are prescribed in some detail in the Rural Municipality Act. The typical rural municipality in Saskatchewan exercises its authority over an area of nine townships, although in recent years amalgamations of several municipalities with each other have resulted in areas larger than this. This is especially true along the forest fringe.

[15] Figures obtained by the apportionment method using projections for the Prairie Provinces prepared for the Royal Commission on Canada's Economic Prospects by W. C. Hood and A. Scott. For their projections, presumption was made that recent population growth trends for the three provinces of Manitoba, Saskatchewan and Alberta will largely continue. See the Commission's Report, Output; Labour and Capital in the Canadian Economy, (Ottawa, Queen's Printer), p. 180.

increase in the urban proportion of the total population of the region over the past decade has kept a close pace with population increase. That is, percentage-wise, urban population has remained fairly stable over the past decade (1951- 29 per cent of total; 1956 - 32 per cent; 1960 - 32 per cent).

In absolute numbers, the rural segment will probably stabilize within this period due to extension of rural services and gradual completion of farm consolidation. By 1980 approximately thirty-eight per cent of the population will be urban. The greater proportion of these will reside in the three major towns of Melfort, Tisdale and Nipawin. These towns now contain seventy-one per cent of the non-rural residents of the region and there is a trend for the growth of such service towns to occur at the expense of villages. It is evident therefore, that population increase within the sixty mile radius will not be exactly dynamic, although in addition, further numbers will be added as the range of influence widens, with road improvement, beyond this radius. One feature drastically disrupting any population projections made for the region would be the exploitation of the recently discovered Choiceland iron ore deposits.

Increased specialization together with further mechanization may bring to the farmer the benefits of greater leisure time, analogous to a degree with that granted his urban counterpart in the shorter work week. If so, greater demands for appropriate recreation outlets can be expected from this segment of the population.

In summary, it appears on the surface that on the basis of population numbers, demands for recreation on the reservoir will be relatively light, and predominantly rural and small town oriented at least for the next twenty years.

The fast growing towns of Melfort, Nipawin and Tisdale with thirty-two per cent of the regional population, (the only towns within the region with greater than 1,000 inhabitants) will probably provide a disproportionate volume of any future reservoir users. Residents of Melfort and Tisdale, the largest towns of the Carrot River Valley, an area naturally deficient in areas with water-oriented recreation potential, will choose between the reservoir, if developed, and Greenwater Provincial Park, lying as these do almost equidistant from the two towns.

Land Ownership Pattern

All previous discussion has considered the reservoir area in its entirety. Intensive development as a public recreation area can be limited to that land which is in public ownership. Fortunately, the areas of recreational potential are located on public land.

The present land ownership of the immediate reservoir area is indicated in Figure 26. Analysis of this ownership pattern reveals that twenty-eight per cent of the reservoir shoreline will be in Provincial Forest - administered by the Provincial Department of Natural Resources, sixteen per cent will be provincial land administered jointly by the Departments of Natural Resources and Agriculture, twenty-five per

cent will compose shoreline acquired by the Saskatchewan Power Corporation in their land acquisition program and thirty-one per cent will be in private ownership.[16]

Of the entire reservoir shoreline then, approximately sixty-nine per cent will be in public ownership. The picture for public access and development is even more favourable when the portions of the reservoir suitable for recreation use are considered. Private land ownership of the reservoir shoreline is concentrated along the upper one-third of its length. It is in the lower two-thirds, or more specifically in the middle portion of the reservoir, that vegetation, slopes, soil and access are best combined for recreation use as was illustrated in Chapter III. This portion is owned and controlled by public agencies.

The Criteria for Provincial Park Location

There are two generally accepted approaches to the selection of areas for public parks at the Provincial Government level which, in varying degrees of refinement or modification, are in use today. In the first, sometimes called the

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[16] On the land acquired by the Saskatchewan Power Corporation, all farmers were given the option of obtaining a lease free of rent to December 31, 1961. In addition that land between the 1,033 and 1,041' contour line, referred to as the "Buffer Zone" because it may never be flooded, is being leased back to the vendors of the property for a period between January 1, 1962 and December 31, 1964. After that period it will be determined as to what authority will administer the leasing of this land. It may be turned back to the Department of Agriculture for them to administer along with their other lands in the area. In any event this land can be considered, for all intents and purposes, as public land.

scientific or aesthetic approach, areas are chosen which contain outstanding or representative types of scenic or scientific features peculiar to that Province. These are the areas referred to by Clawson as "resource-based" recreation areas.[17] The value of such areas does not depend upon accessible population centres: the natural qualities are all-important. Cypress Hills Provincial Park in the southwest corner of the Province with its unique geological and botanical significance represents such an area. So does Lac La Ronge Provincial Park, far to the north, typifying as it does, the rugged forest and water environment of the Precambrian Shield.

In the second, variously called the sociological, recreational or political approach, areas are chosen primarily to serve population concentrations efficiently. Location, access, and adaptability to recreation use are paramount. These Clawson refers to as "intermediate areas" where "scenic beauty and other natural advantages are desirable, but not all-important; the aim is to get the best facilities that are available without sacrifice of accessibility."[18]

As early as 1931, Laurie Cox, Landscape Architect with the Central New York State Parks Commission, recognized these as guidelines in State Park selection, and added a third. This is a compromise between the first two in that " . . .

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[17] Marion Clawson, "The Crisis in Outdoor Recreation," American Forests, Vol. 65, No. 3, March, 1959, p. 40.

[18] Ibid., p. 40.

we would secure strategic location of areas of high recreational value, and at the same time, either in connection with them or separately, acquire also specimens of the outstanding scenic and historic types of the state in question."[19]

Although apparently lacking a formal written policy with regard to the selection of areas for Provincial parks, the Province of Saskatchewan tends to follow this last approach. As guidelines in the selection of suitable areas, the Provincial Parks and Conservation Branch considers the following criteria: "(1) The uniqueness or representativeness of the area to be made a park . . . . (2) The proximity of the proposed park area to centres or heavy densities of population."[20]

Included in the first are considerations of the scenic attractiveness of the area not found elsewhere and to be preserved at all costs, or characteristics typifying a wide area of terrain which should be preserved no matter what changes in land use occur in the surrounding districts. In the second, thought is given to the adequacy of present outdoor play areas, the distance which people must drive to reach a park area and the pressures applied to existing developed areas.

The situation is rendered especially difficult in

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[19] L. D. Cox, "Some Basic Principles of State Park Selection and Design," Landscape Architecture, Vol. 22, No. 1, October, 1931, p. 9.

[20] R. L. Carter, January 30, 1961, letter.

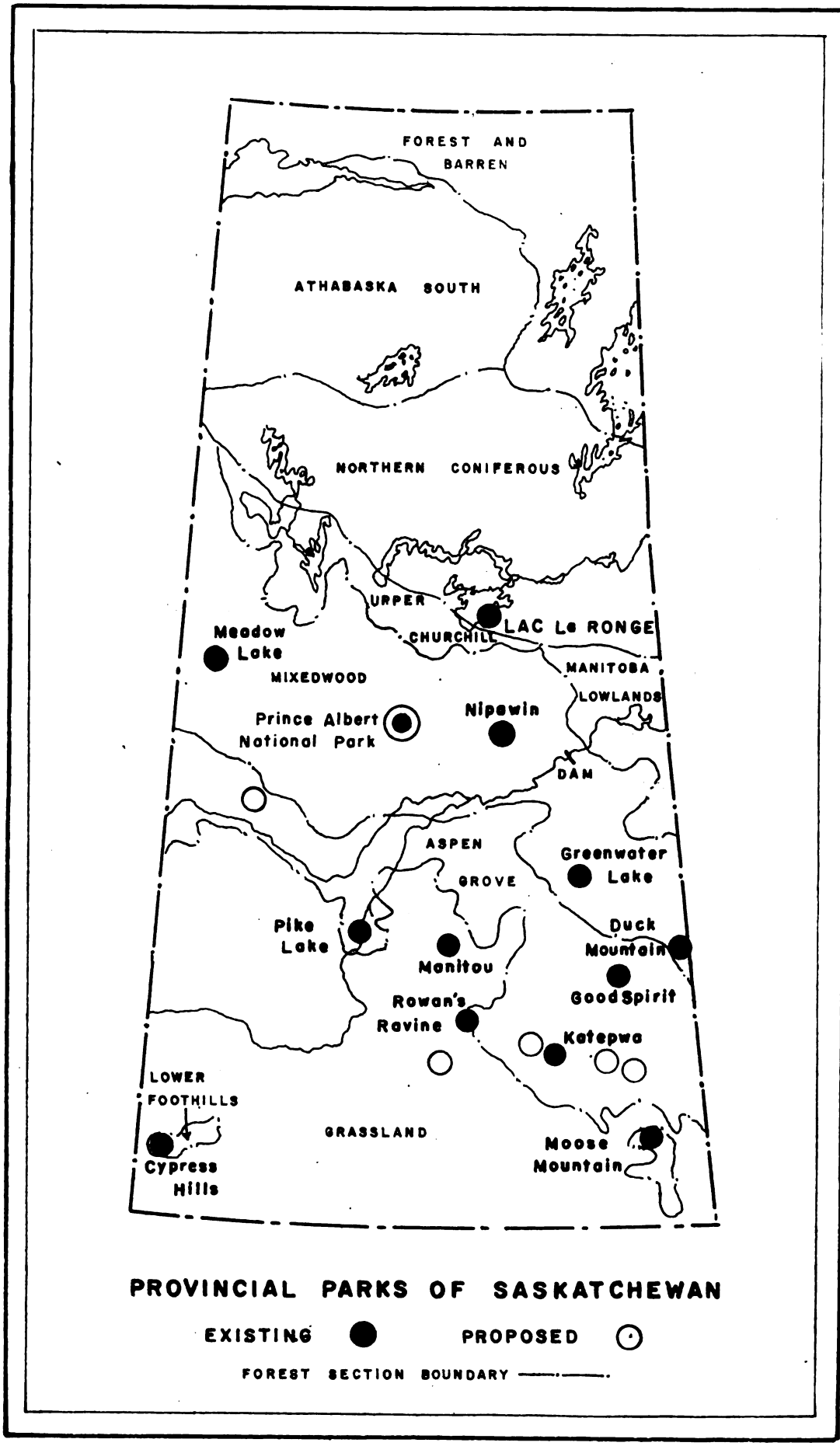
FOREST AND
BARREN
ATHABASKA SOUTH
NORTHERN CONIFEROUS
URPER
CHURCHILL
LAC Le RONGE
Meadow
Lake
MIXEDWOOD
MANITOBA
LOWLANDS
Prince Albert
National Park
Nipawin
DAM
ASPEN
GROVE
Greenwater
Lake
Pike
Lake
Manitou
Duck
Mountain
Good Spirit
Rowan's
Ravine
Katepwa
LOWER
FOOTHILLS
GRASSLAND
Moose
Mountain
Cypress
Hills
PROVINCIAL PARKS OF SASKATCHEWAN
EXISTING
PROPOSED
FOREST SECTION BOUNDARY

Figure 27.

Saskatchewan by the population distribution. To the south, in the semi-arid and relatively treeless lower two-fifths of the Province are nine of the ten cities and eighty per cent of the towns of over 1,000 inhabitants. In the northern three-fifths of the Province on the other hand, within easy access of its lakes and rivers and varying forest types readily adaptable to recreational development live the balance of the population. Strict adherence to the "scientific theory" in this instance would soon exhaust the potentialities for park development in the south, with the result that a large proportion of the population would be a considerable distance from the nearest Provincial Park. As a result, considerable compromise has been made, to the point where accessibility and geographical location play a major role in the selection of an area for Provincial Park development.

In recommending the establishment of a Provincial Park on Buffalo Pound Reservoir in south-central Saskatchewan, for instance, Baker in his recommendations to the Provincial Government wrote; "The central location of this proposed park with respect to major concentrations of population in the Southern Region and vital arteries of traffic movement across the province are an outstanding feature of this scheme."[21] Again in justifying his recommendation for the establishment of a Provincial Park on Jackfish and Murray Lakes in the

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[21] W. M. Baker, A Report on Outdoor Recreation in Southern Saskatchewan, Part II, Dept. of Natural Resources, Regina, 1958, (Unpublished), p. 88.

west-central section of the Province he wrote; "The justification for this development was framed mainly in terms of the recreation requirements of the people of North Battleford and the surrounding region."[22] In summarizing the findings of his investigation on Last Mountain Lake, Baker wrote, "Investigation proved that the most outstanding park area closest to Regina was located at Rowan's Ravine on the east shore of Last Mountain Lake . . . . While this area was recognized as marginal for development at the provincial level because of the locational factor [sixty road miles from Regina - underlining added] and the lack of forest cover, it did possess a great potential if properly handled."[23] A new park was subsequently established at Rowan's Ravine in 1958.

The City of Saskatoon has long suffered a locational disadvantage with respect to Provincial Parks, for the simple reason that no areas of sufficient physical or cultural attraction exist in the area for such park development. Baker found in his study of the Saskatoon park problem, that Pike Lake, an oxbow of the Saskatchewan River had definite locational advantages but lacked adequate physical resources. He therefore felt that " . . . the physical resources of this site will not justify the establishment of a Provincial Park."[24]

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[22] Ibid., p. 150.

[23] Ibid., p. 156.

[24] Ibid., p. 139.

Nevertheless, Pike Lake Provincial Park is now included in the official park advertising bulletins of the Provincial Department of Natural Resources. It would appear therefore, that the pressures of population demand and geographical location carry considerable weight in the selection of Provincial Parks in this Province.

In fulfilling the need for a park system which would include features "characteristic" of the Province of Saskatchewan, a number of vegetative and physiographic zones would be represented. Because of the close inter-relationship between the two, in some instances one area suffices to typify both.

Ideally then, representation would include the Grasslands of the south-west corner of the Province, the Aspen Grove belt which borders it, the broad swath of the Mixedwood Section further north and the Upper Churchill Section in west-central Saskatchewan. The Northern Coniferous Section would be represented, and also the Athabasca Lowlands between Cree Lake and Lake Athabasca. One could carry it ideally, if not logically, to include an area typifying the transitional forest - barren section.[25]

Physiographically we would have park areas typifying the three Prairie steppes, the Cretacious Escarpment on the east side and the Missouri Coteau on the west. The Precambrian Shield too would be represented.

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[25]Cf. J. S. Rowe, Forest Regions of Canada, pp. 7-32.

Perusal of the present distribution of Provincial Parks shows the Grassland Section represented with two existing parks and a number in the course of consideration; Aspen Grove - two existing parks and a number in the offing; Mixedwood Section - four existing parks; Northern Coniferous - one park; Upper Churchill - several areas reserved for future development.[26] Thus it can be seen that all but two of the major vegetative zones of the Province are, or will be, represented in the Provincial Park System. Consideration should be given to the reserving of suitable or outstanding examples of those remaining to ensure that the best will be represented when the need arises. For if recreation demand forecasts become reality, it is not inconceivable that Saskatchewan will provide a share of the increased market.[27]

Because of the generally subdued relief of most of the province, representativeness rather than uniqueness would be for the most part, the justification for park selection on the basis of physiography. There are exceptions to this of course. Cypress Hills Provincial Park represents a unique physiographic feature as well as vegeta-

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[26] For a discussion on those parks recommended for establishment and development see, by Baker, A Report on Outdoor Recreation in Southern Saskatchewan, 1958; "A Recreation Report on the North-West Park of Saskatchewan", 1956; and A Report on Recreation Conditions on Jackfish and Murray Lakes, 1956. (Unpublished).

[27] See for example "The Crisis in Outdoor Recreation" by Marion Clawson, and by the same author, The Dynamics of Park Demand, Regional Plan Association, Inc. Bulletin No. 94, (New York: 1960) esp. pp. 35-36.

tive community. The Qu'Appelle Valley chain of parks is another. Parks exemplifying a wider area of terrain are Duck Mountain Park of the Cretaceous Escarpment and Meadow Lake Provincial Park and the Jackfish Lake resort area at the edge of the Missouri Coteau. Oddly enough, very few Provincial Parks have been established in the Province in which the major topographic feature is a river - lakes seem to be a sine qua non.

A recent exception to this rule is the Meadow Lake Provincial Park straddling the Waterhen River, and the small streams of Nipawin Provincial Park, which even here are incidental to the lakes. The construction of a reservoir on the Saskatchewan River may bring intensive use for the first time to its waters, for on neither the North or South Branches nor on the main stem has there ever been any amount of recreational development.

In consideration of this policy framework the reservoir under study may now be evaluated as to its ability to meet the required standards for Provincial Park status. This can be done from the standpoint of its representativeness, its geographical location with respect to population centres; and lastly its singularity.

The Reservoir Evaluated

Situated as it is in the Mixedwood Section of the Province, the reservoir does not offer any scenic attraction not already represented in developed parks. As mentioned,

four parks - Duck Mountain, Greenwater Lake, Nipawin and Meadow Lake Provincial Park are all situated within this vegetative zone. The level, almost monotonous landscape, with its cover of white spruce and poplar, jackpine and birch offer no outstanding scenic environment. Theoretically, the reservoir area does typify the small portion of the first prairie steppe which projects into the Province from Manitoba - a physiographic uniqueness. However, the ideals of a park planner notwithstanding, this would register on a very limited number of recreation users - the contrast with the adjacent area is not sufficiently pronounced.

Analysis of the population figures in the region as summarized in Chapter IV indicate that relatively speaking, recreational demand will be small - 36,000 people live within a sixty mile radius as compared to 53,000 for Greenwater Lake Park and 157,000 for Rowan's Ravine Park in the south.[28]

Geographical spacing is a mechanical method sometimes used in determining locations for State and Provincial Parks. With greater and greater demands being put upon governments at these levels to provide park and recreation areas, this method is becoming policy of more than one park agency - provide a system of parks such that no resident is more than a specified distance from any state or provincial park. The Tennessee State Parks administration for instance, recommends as policy guiding development that "As a general goal there

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[28] Baker, A Recreation Report . . ., p. 156.

should be a state park within approximately fifty miles of every citizen."[29] The State of Pennsylvania, carrying it further, recommends a state park within twenty-five miles of each inhabitant.[30]

Until all areas are served within at least a fifty mile radius, it would not be logical in Saskatchewan to confine it to such narrow limits. However, assuming acceptance of such a policy in the future - a provincial park within fifty miles of every resident - the reservoir developed as such a park would serve only a limited area not already served, as illustrated in Figure 21. Considering the already developed and popular public resort area at Candle Lake restricts the area even more.

The situation is aggravated by the position of the reservoir at the extremity of settlement. Bound on north and east by forest and swamp, the reservoir will include an inhabited area only within one-third of the circle circumscribed about the fifty mile radius. On the basis of geographical location and population demand, a much stronger case could be given for the location of a park to satisfy the large unserved area to the south-west - the last remaining area of any size in the "Park Belt" unserved by either

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[29] Tennessee State Planning Commission in co-operation with Dept. of Conservation, Division of State Parks, State Parks - a proposed program for Tennessee, Publication No. 243, November, 1952, p. 2.

[30] M. K. Goddard in his Keynote Address before the 15th Annual Great Lakes Park Training Institute at Pokagon State Park in Indiana, February, 1961 discussed the premises on which this policy is based.

provincial park or resort area.[31]

From the point of view of provincial park status on the basis of geographical location therefore, it appears that the reservoir is, literally, in an unfortunate position with respect to existing parks.

As a last remaining measure we may now consider the reservoir in the light of any possible unique features. Two such features suggest themselves, one naturally unique the other culturally; (1) Large areas of inundated forest; (2) The concomitant power development.

The first of these, the inundated forest-covered basin, is dependent of course upon the degree of clearing carried out. At the time of writing, this is not known. Should complete clearing take place, the reservoir will be unique only with regard to the second feature. As the only existing power development on the Saskatchewan River, indeed, with the exception of the road-wise inaccessible hydro electric development on the Churchill River the only major hydro electric development in the Province, it acquires considerable historical significance.

In summary then, the reservoir does not appear to warrant immediate inclusion in the Provincial Park system on the basis of population demands, geographical location with respect to existing Provincial Parks, representativeness, or, as illustrated in Chapter III, archaeological signif-

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[31] The forest-grassland transition of western Canada is often referred to as the "Park Belt".

icance. On the basis of singularity however, it does merit consideration.

CHAPTER V

RECOMMENDATIONS

Before suggesting any recommendations as to possible recreational development of the reservoir, it may be worthwhile to examine some of the alternatives available.

(1) Development as a Provincial Park:- Assuming the basin remains uncleared, minimum facilities for access to and use of the reservoir could be provided and the area treated as a scenic (drowned forests) and cultural (power development) rarity. Development would focus on visitation to the power project and shoreline observation points. The northern part of Tweedsmuir Provincial Park in west-central British Columbia provides that Province with this phenomenon.[1]

(2) Development as a Provincial Park:- Assuming the basin cleared or partially cleared of its forest cover, the reservoir could be developed as a recreation area with the customary water oriented improvements at one or more of the sites suggested in Chapter IV. The culturally unique feature of the dam and power plant would be the focus of attraction.

(3) Development as a Provincial "Resort Area":- Regardless

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[1] British Columbia Department of Recreation and Conservation Tweedsmuir Park - British Columbia. Mimeographed publication of the Parks Branch, Victoria, Sept., 1960, p. 2.

of the extent of clearing carried out, the reservoir could be developed along the lines of such "pseudo-provincial parks" as Candle Lake, Emma Lake and Loon Lake.[2] Preservation of those values present together with provision of minimum facilities at strategic locations would insure that future needs could be adequately met. There would be development as the need arises, but it would be limited and according to plans of the Department of Natural Resources.

(4) Development as a Regional Park:- In this instance, there would be no involvement of the Provincial Government as far as physical development is concerned. Development would be carried out by one or more of the adjacent municipalities as a park or parks to serve local residents.

Regardless of whether the reservoir basin is cleared or not, if the policy of the Provincial Government is to preserve areas of unique attraction, and if the policy of the Saskatchewan Power Corporation is favourable to public access to the project area, then serious consideration should be given to the establishment on the reservoir of a Provincial Park.

Of those remaining, alternative number three would appear to be the most logical. With a large proportion of the reservoir shoreline (sixty-nine per cent) already in public ownership, there is not the pressure for immediate

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[2] These provide public recreation areas administered by the regional staff of the Department of Natural Resources and lack official provincial park status. They have usually associated with them considerable intensively developed private lands.

action so often the case nowadays with areas possessing recreation possibilities, where land acquisition is of paramount importance.

Under this course of action, development would be restricted to only authorized areas and to specific standards. A definite development policy would have to be followed. The reasons for such a stand were well summarized in the Denison Dam study which states, "Under a lax administrative policy of allowing individuals to construct private and commercial recreational developments of every conceivable type on the area, many of the values which have been created by construction of the dam and reservoir would decrease greatly, and some might become worthless."[3]

Should future demands warrant, through a realization of the difficult-to-assess drawing power of the power development, then recognition as a provincial park at that time could be considered in the light of these new conditions.

In reference to regional park development, experience has shown that municipalities in Saskatchewan are, for the most part, neither willing nor able to initiate and carry out park development.[4] Examination of the existing municipal

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[3] U. S. Dept. of the Interior, N.P.S. Recreational Resources of the . . . , p. 47.

[4] For a discussion of regional park development problems in Saskatchewan, Cf. Baker, A Report on Outdoor Recreation in Southern Saskatchewan, Part II, Chapter I, "The Administrative Organization of Public Park Development in Saskatchewan", pp. 1-50, and by the same author, "Recreation Report on the North-West Part of Saskatchewan", Chapter III, "The Administrative Hierarchy of Parks", pp. 49-55.

parks as discussed in Chapter V would indicate that the region of the reservoir is no exception.

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