THE RECREATION POTENTIAL OF THE STEWIAKE RIVER

by

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THE RECREATION POTENTIAL OF THE STEWIAKE RIVER

ABSTRACT: Rivers are becoming increasingly popular recreation resources as land and water use competition intensifies. The first river basin board in Nova Scotia was formed to manage the Shubenacadie-Stewiake Rivers under multiple use objectives. The board required an estimation of the recreation resources of the Stewiake River and after a review of pertinent literature the RIVERS method was chosen as the most appropriate technique for measuring recreation potential. The RIVERS method identified the recreation activities which were best suited to the river as a whole,(fishing, hunting, nature study) the activities best suited to each segment or land-water unit, the continuity of the activities potential throughout the river, and the overall recreation potential of each segment. Particular limitations of the RIVERS method were noted and include quantitative significance, weighting procedures, use in a pristine environment, and use where planning and management objectives already exists such as in state, provincial or federal natural rivers programs. There is an additional and immediate need for the preparation of a recreation management plan for the Stewiake River.

INTRODUCTION

Background Information

Rivers are of great recreation value because of their linear configuration which disperses use, the relatively high carrying capacity of the water-land interface, their capability of supporting a variety of water dependent and water related activities, and their distribution amongst population areas as a result of early settlement patterns. The value of rivers for recreation is increasing due to competition for use of land, an increase in urbanization and trends to control water quality. Traditionally river recreation was confined to the sporting activities of fishing and hunting, however, non-consumptive recreation activities such as boating, canoeing, camping and nature study are becoming increasingly more popular. A river which is located near urban centers, is deep yet not dangerously swift and has a relatively high water quality will be a valuable recreation resources. The Stewiake River in Nova Scotia meets these requirements. However, these requirements are also important to other land use activities such as agriculture, transportation, urban settlement, mining and to some extent forestry. The competition between these land uses over the water resource will affect the recreation value of the

river. Recreation use is one of the cleanest and least consumptive of all water uses but is always negatively affected by the more intense land-water use activities. Management of water resources under multiple use objectives although popular in other parts of North America is just now being considered in Nova Scotia. The recent formation of the Shubenacadie-Stewiake River Basin Board as a joint Federal-Provincial project is the first step in the systematic allocation of the rivers resources under multiple use objectives. The initial task of the board was the authorization of a series of technical reports in an attempt to collect the base data required to clearly define management objectives.

The river basin board is intent on giving serious consideration to the esthetic and recreation values of the Stewiake River. The Stewiake is one of the few rivers in the province that maintains a sufficient flow of water during the low flow season to permit a wide range of recreation activities. The geographic location of the Stewiake River makes it accessible for day tripping to approximately forty percent of the provincial population. Large numbers of wetlands with various degrees of productivity are found in association with the river. These wetlands have traditionally been attractive to hunters. The nature of land use within the river basin has created various successional stages of forest and field cover making the area

very productive for wildlife and attractive to hunters. The Stewiake has long been one of the best biological producers of sport fish in the province, among other reasons, due to underlying sedimentary rock resulting in soils rich in calcium carbonate[2]. The Stewiake River is a free flowing river and has never experienced the trials and tribulations associated with dams and channelization efforts. Another contributing factor to the recreation value of the river is the condition of the floodplain. The floodplain is in a relatively natural state, the only intense land use activity being agricultural production of grass crops for pasture and several small gravel extraction operations. Furthermore habitation has, on the whole, developed away from the floodplain leaving the quality of the river water suitable for most recreation activities and the river banks well vegetated and esthetically pleasing.

The agency responsible for crown lands and development of outdoor recreation resources in the province is the Nova Scotia Department of Lands and Forest. The Department's interest in the Stewiake River stems from the responsibilities of its various subdivisions including Fish and Wildlife, Parks and Recreation, Forestry Operations, and Land Aquisition. It is through this agency that the recreation resources of the Stewiake River can be developed. In particular, the agency has various legislative tools on hand to protect and enhance the recreation values of the river including the Forest

Protection Act, e.g. Green Belt Clause, the new Trails Act with its authority to designate waterways as provincial canoe trails, and the Lands & Forest Act to acquire lands, develop parks, and protect and enhance fish and wildlife population.

The Nova Scotia Department of Lands and Forest was faced with two major problems in attempting to plan and manage the Stewiake River as a recreation resource. The first problem is one of public ownership of lands with river frontage. The crown owns only 8 of 160 Km of river frontage and the meager holdings are located in the head waters of the river. The second problem is the lack of basic inventory data from which to make planning and management decisions pertaining to the development of river recreation resources.

In order to act on these problems and to provide the Shubenacadie-Stewiake River Basin Board with an adequate estimation of the Stewiake's recreation value, the Parks Division decided to undertake a study of the recreation potential of the river. There was a definite need to utilize a systematic methodology which would identify natural constraints as well as the physical attractions and capabilities of the river to engender and sustain popular recreation activities. Other criteria required of the methodology was that it should have the ability to differentiate potentials between various segments of the river and at the same time differentiate potentials between entire rivers. The comparison between

entire rivers would be of future interest and could aid in the development of a provincial classification system for rivers.

Study Objectives

The purpose of this study is to asses the recreation potential of the Stewiake River. The methods utilized in this study, if proven adequate, will be applied to other provincial rivers. This study was undertaken by the Nova Scotia Department of Lands and Forest in conjunction with the Geography Department of Oregon State University.

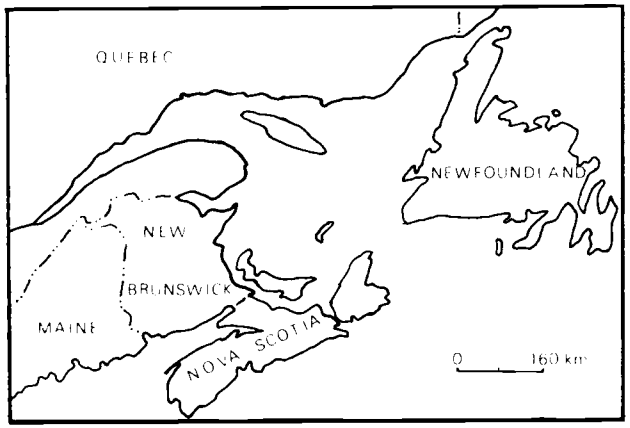
STUDY AREA

Location

The Stewiake River is located in the very heart of Nova Scotia forty Km from Truro, the hub of the province. The following map illustrates the relationships between the Stewiake River, the distribution of major population centers and the distance time factor involved. (Fig. 1) It is quite evident from this illustration that the Stewiake maintains a geographic position which engenders its recreation capabilities.

STEWIAKE RIVER LOCATION

IN RELATIONSHIP TO POPULATION AND DISTANCE-TIME FACTOR



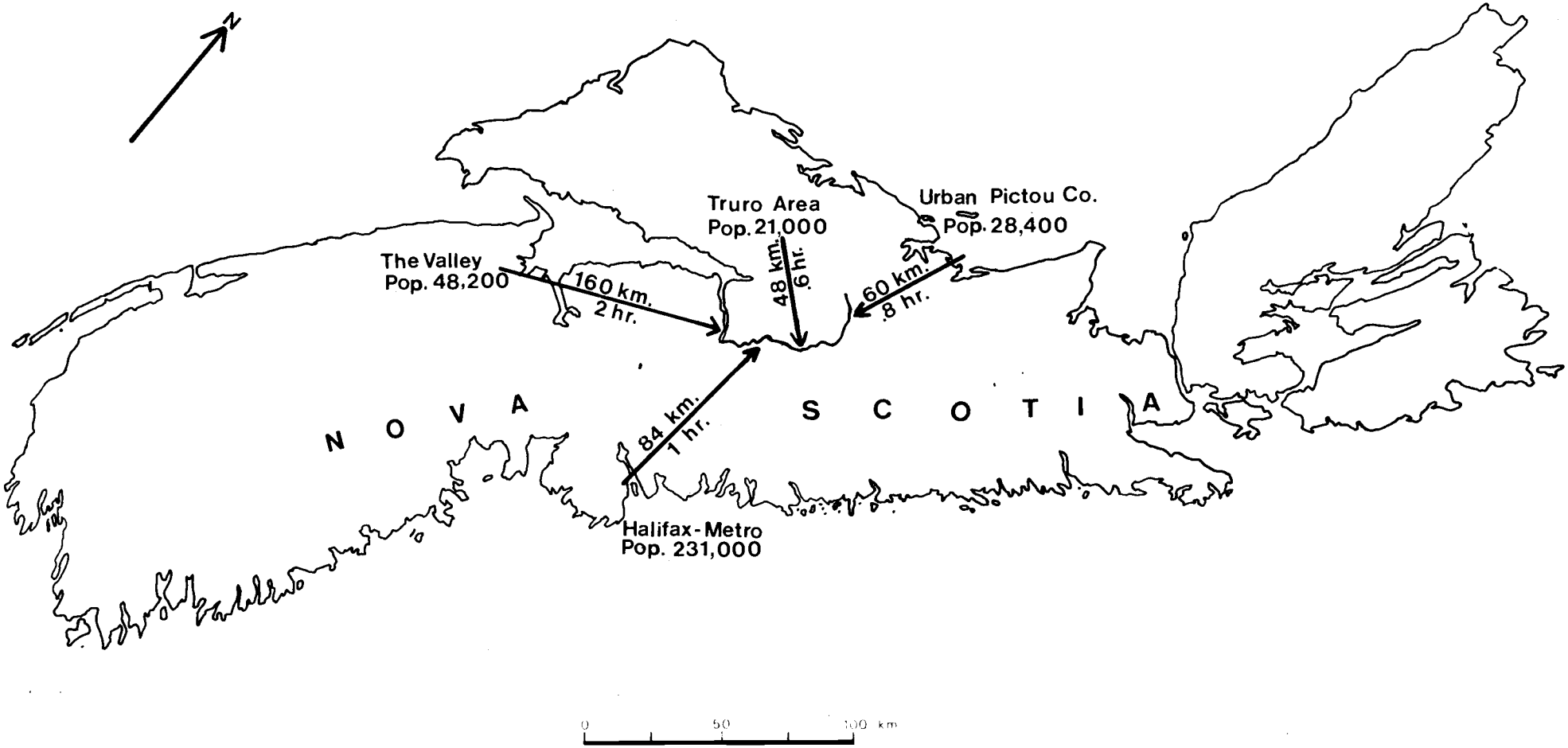


FIGURE 1

Physical Parameters

The Stewiake River begins as a series of small spring-fed streams in the Pictou highlands. Gathering water from other spring-fed tributaries it weaves its way westward for eighty-four Km before mixing with the muddy tidal waters of the Shubenacadie River. This confluence of half silt and half water struggles downstream against tidal bores, rips and eddies until finally pouring itself into Cobequid Bay, an extended arm of the Bay of Fundy. The river drains an area of approximately 976 Km^2 and maintains a flow of between 28.4 and 56.80 cubic meters per second depending on the seasonal fluctuations. A relatively steep river bed slope of 2.6 m/Km results in high velocities, particularly in spring and fall flood.

Geologically, the Stewiake River is underlain by sedimentary rocks of the Carboniferous era. These rocks are of the Windsor group and are comprised of limestone, shales, and sandstones. The river runs along the base of the Gay River Ridge which rises abruptly to a height of 235 meters. This ridge is a section of the Atlantic Upland, Precambrian in origin and consisiting of Quartzite and Slate[3]. The Wisconsin glacier is responsible for many of the present land features such as shallow pan lakes, bogs, erratic boulders and the overlaying glacial till.

Post glacial cutting and deposition by streams together with the overlaying glacial till have helped produce the various soils evident along the Stewiake River. The headwaters are dominated by sandy loam soils over gravelly loam and are stony throughout. These uplands are hilly, well drained and suitable for forestry and localized farming. Further downstream alluvial deposition has produced silty clay soils which exhibit variable drainage. These soils occupy over eighty percent of the river valley and are suitable for crop production in all but poorly drained wetlands and flood prone lowlands. The remaining land of the river valley is dominated by clay loam soils, often mottled, derived from clay till. These lands are imperfectly drained and suited as pasture and woodlot[4].

Before European settlement the Stewiake River valley possessed a unique forest zone that is known today as the Red spruce-Hemlock-pine Zone. This species association represented the only truly distinctive forest in the Maritime Provinces. However, the entire river basin has been either cut over, burned or cleared over time and as such only a few remnants of the old growth forest remain. Today the forest cover is dominated by coniferous trees such as white spruce, black spruce, balsam fir, red spruce and larch, and deciduous species, chiefly beech, sugar maple and yellow birch[5]. O'Brian has reported the occurrence of several rare wetland plant

species in the Stewiake River valley including Beteela michaurie (dwarf birch), Equisetum variegateuim (Variegated Scouring Rush) and Pegonia ophioglorsoides (Rose Pegonia).[6]

Land Use

Land use along the Stewiake River basically consists of agriculture and foresty. Cleared land occupies ninety five kilometers or fifty eight percent of the total river frontage while forests and wetlands occupy the remaining 42%. The cleared agriculture land is distributed amongst ninety five individual farms with river frontage. The entire valley contains 178 census farms with a total acreage of 58,357 acres of which 37,005 acres is woodlot. Cropland represents only 6% of the present land use while hayland occupies 20% and pasture 18%.[7]

The only town in the valley is Stewiake with a population of about four hundred. There are also several small villages with immediate populations under one hundred and include Upper Stewiake, Middle Stewiake and East Stewiake. Roads, the majority of which are gravel, run on both the north and south sides of the valley but are located far above the floodplain and in only a few situations are found adjacent to the river. Eleven bridges make the river quite accessible for certain recreation activities.

ASSESSING RIVER RECREATION POTENTIAL

In order to predict the recreation potential of the Stewiake River a methodology was needed which would assess the suitability of most popular recreation activities and then be able to indicate the best combination of activities for both the river segments and the entire river. As the Stewiake River is not a pristine river, its water quality and quantity are affected more by man's land use activities than by natural processes. A river research methodology must be able to account for the influence of land use on the biology, physiology, water quality and quantity of the river.

Literature Review

A literature review of popular inventory methodologies was undertaken and revealed that there has been little orderly research and development of systematic techniques in this area of concern. Although each technique developed to date attempted to be all-encompassing in design, in reality each had a specific purpose and philosophical stand which was clearly embodied in its methodology. For example, the Craigheads developed one of the earliest methods but it was only

effective in evaluating wild western rivers for the activities of boating, fishing and hunting.[8] Also, Luna B. Leopold attempted to quantitatively evaluate and compare the esthetic quality of rivers in order to justify the designation of unique sections that deserve preservation. He considered esthetic evaluation as an indicator of recreation potential.[9] Jurrard, applying the Leopold technique to Canada's northern rivers, found the system to be inadequate as the relative uniqueness ratio was an unrealistic parameter for protective priorities.[10] Hamill, utilizing statistical tests on Leopold's technique, concluded that Leopold employed an unnecessarily complex calculation procedure and uniqueness values that were unrealistic.[11] Other methods include those developed by McConnell and Stoll, Olson, Dearinger, Morisawa, and the U.S.F.S.[12] In each case these methods were rejected for not possessing the type of analysis needed to meet the criteria for evaluating the recreation resources of the Stewiake River.

The Canadian Federal Government has produced a series of maps titled "Canadian Land Inventory - Land Capability for Recreation" in which land units are classified into one of seven capability classes ranging from high to low.[13] The major weakness of this system is the basic assumption that there is no need to classify water bodies because their recreation value accrues to the adjoining shoreland.

This assumption is totally inaccurate as both water based and water related activities depend on the parameters of the water body itself such as water quality, water quantity, biology and physiology.

The Ontario Ministry of Natural Resources recently designed a method for assessing river corridors as potential waterway parks. This method is mainly designed for more remote pristine enviornments and is basically concerned with the activity of canoeing.[14] This system uses only seventeen variables which do not account for the effects of land use on the waterway and therefore are not suited for use on the Stewiake River.

RIVERS Method

Chubb has recently designed and tested in a pilot study of a recreation potential assessment method he terms RIVERS (River Inventory and Variable Evaluation for Recreation Suitability).[15] This study evaluates the potential of sixteen popular recreation activities by identifying and scoring the relative significance of certain variables for each of the activities on a five point scale. The accompanying table is a list of river recreation activities included in the evaluation. (Table 1) The river is first divided into 1.6 Km long segments within a primary zone, or 100 metre corridor, and a secondary zone or .4 Km corridor on both

TABLE 1

LIST OF 16 RIVER RECREATION ACTIVITIES INCLUDED IN EVALUATION

Activity	Description
1. Wild area canoeing	Canoeing where the main goal is to enjoy paddling a canoe in a pristine and/or challenging environment with minimum contact with other users.
2. General or social canoeing	Canoeing where pristine settings and/or challenging water conditions are not considered essential; participants often enjoy interaction with others.
3. Small craft boating	Boating using oars or motor under 10 h.p. Goal is to enjoy the boating experience itself.
4. Power boating	Boating using a 10 h.p. or larger motor. Experience often involves exhilaration of speeding over water.
5. Waterskiing	Using a powerful boat to tow a person on waterskis or watersled.
6. Swimming	Enjoyable water contact from strenuous swimming or diving to playing in water or just "cooling off". Includes on-shore activities.
7. Bank fishing	Attempting to catch fish for recreational purposes from the river bank or while walking or wading in the channel.
8. Boat fishing	Attempting to catch fish for recreational purposes from a boat.
9. Nature study	River oriented observation, collection, photography, or scientific study of flora, fauna, soils, rocks, or minerals.
10. Hunting	River oriented recreational shooting of animals or birds with rifles, shotguns, or bows and arrows.
11. Canoe camping	Camping overnight when travelling by canoe. Shelter, if used, may be natural, agency provided, or portable.
12. Trail camping	Camping overnight when travelling on foot, trail vehicle, or horseback, along river corridor trails. Shelter as canoe camping.
13. Vehicle camping	Camping overnight in a trailer, truck camper, tent or other shelter carried by vehicle while using the river corridor for recreation.
14. Picnicking	Eating a meal outdoors when main goal is to enjoy river environment.
15. Trail travel	Travel in river corridor on foot, trail vehicle, or horse-back when the main goal is enjoyment of the river environment.
16. Pleasure driving	Enjoyment of the river environment while travelling in a vehicle on roads in the river corridor.

Source: Chubb M. and Bauman E. opp.cit., footnote 14, pp. 26.

sides of the river. Inventory information on sixty seven variables is then collected for each segment by utilizing aerial photography, topographical and soil maps, agency reports and finally a field survey of the river and its corridor. (Table 2) After the data has been collected it must undergo a transformation and weighing process to distinguish the relative importance of the raw variable score for each activity as Chubb explains: "... a score of five for a river segment with torrential flow may be appropriate for the esthetic appreciation associated with pleasure driving but is quite inappropriate for swimming... the process of changing the scoring to fit the relationship between variable and an activity was termed transformation."[16]

After data transformation the scores are multiplied by assigned weights. The weighting procedure is based on the following rationale. "For example, remoteness (variable number 66) is very important for wild area canoeing, quite important for much nature study and hiking, not particularly important for general canoeing and of no importance or possibly detrimental for most power boating. We, therefore, developed a weighting system by which each score (transformed where appropriate) was multiplied by a weight of 1,2,3,4, or 5 in order to reflect its relative importance for each activity."[17]

Finally totals and percentages for each activity and each segment are calculated. The resulting variance in the

TABLE 2

INVENTORY VARIABLES

A. BASIC PHYSICAL FACTORS

1. Width of River
2. Site Development Potential
3. Apparent Stream Velocity
4. Floatability
5. Flow Fluctuation
6. Months of Water Flow
7. Stream Bed Material
8. Dominent River Pattern
9. Water Surface Profile
10. Bank Erosion

B. SPECIAL PHYSICAL FEATURES

11. Acreage of Ponds
12. Sandy beaches
13. Oxbow Lakes and Bayous
14. Islands-suitable for Dry land Activities

    a) Under ½ acre
    b) ½ - 2 acres
    c) 2 - 5 acres
    d) 5 - 10 acres
    e) + 10 acres

15. Navigational Obstructions
16. Immediate Bank Height

C. WATER QUALITY

17. Turbidity
18. Temperature
19. Main Produced Solids on Bottom
20. Main Produced Floating Liquids
21. Man-Produced Floating Solids
22. Bacteriological Quality
23. Pesticides
24. Chemical Pollutants
25. Odor

- cont'd -

D. SOILS

26. Corridor Soils: Primary
27. Corridor Soils: Secondary

E. BIOLOGICAL FACTORS

28. Algae
29. Water Plants Submergent
30. Water Plants Floating or Emergent
31. Fauna: Samll Game
32. Fauna: Large Game
33. Fauna: Non-Game
34. Fauna: Water Fowl
35. Fauna: Other Birds
36. Fauna: Fish (warm)
37. Fauna: Fish (cold)
38. Right Bank-Land Flora Type (Primary)
39. Right Bank-Land Flora Density (Primary)
40. Right Bank-Land Flora Diversity (Primary)
41. Right Bank-Land Flora Type (Secondary)
42. Right Bank-Land Flora Density (Secondary)
43. Right Bank-Land Flora Diversity (Secondary)
44. Left Bank-Land Flora Type (Primary)
45. Left Bank-Land Flora Density (Primary)
46. Left Bank-Land Flora Diversity (Primary)
47. Left Bank-Land Flora Type (Secondary)
48. Left Bank-Land Flora Density (Secondary)
49. Left Bank-Land Flora Diversity (Secondary)
50. Wild Flowers

F. LAND USE

51. Right Bank-Adjacent Land Use (Primary)
52. Right Bank-Adjacent Land Use (Secondary)
53. Left Bank-Adjacent Land Use (Primary)
54. Left Bank-Adjacent Land Use (Secondary)
55. Historic Sites or Features
56. Public Land Ownership

G. AESTHETICS

57. Artificial Controls
58. Detrimental Values of Buildings
59. Trash & Litter
60. Utilities Grossings
61. Other Departmental Values
62. Scenic Variety
63. View Confinement
64. Apparent Beauty
65. Unique Features
66. Remoteness
67. Accessibility

Source: Chubb, opp.cit, footnote 17, pg. 29.

calculated data is indicative of the range and breadth of the recreation potentials of the river.

The RIVERS method was chosen for use in this study of the Stewiake River because of its apparent ability to adhere to the aforementioned criteria for this study. It was hoped that the application of the RIVERS method would not only provide the required data from which to classify river segments but would also provide a test procedure for its overall effectiveness with particular types of Nova Scotian rivers.

METHODOLOGY

The initial task in the application of the RIVERS methodology to the Stewiake River was the identification of the upper and lower limits of the river to be included in the study. The upper limit of the Stewiake River was located at the first bridge crossing the river on route 289, grid reference: (U.T.M.) 087180, Hopewell N.S. Above this point the water flow is insufficient for most water dependent activities and the bank slopes are too steep to permit the occurrence of water related activities with the exception of hiking, trail camping and nature study. The confluence of the Stewiake with the Shubenacadie River was selected as the lower limit, grid reference (U.T.M.) 700985, Shubenacadie N.S..

There was an initial hesitation to include the section between the village of Upper Stewiake and the Shubenacadie River due to the influence of the Fundy tides. After some debate it was felt that many water related activities would be feasible on the adjacent shorelands as would certain water dependent activities such as fishing and boating at high tide. It was also felt that application of the RIVERS method would reveal the range of restrictions and attractions of this tidal influence zone.

The next stage of the study was the collection of air photos, topographic maps and agency reports on the eighty kilometers of the study river. Colored aerial photographs scale, 1:10,000, 1974 were chosen as they were believed to be the most capable remote sensing aid available from which to extract the required data. Canadian Dept. of Energy, Mines and Resources Topographic sheets scale 1:50,000, 50 ft. contour, 1972 were also obtained for this study. Other resource materials collected include the country soil bulletin and a series of fifteen reports published by the Shubenacadie-Stewiake River Basin Board on the basin's natural resources and social-economic condition.

The RIVERS method calls for the division of the river into mile long segments. Initial tests were administered using the one mile long segment and results proved it to be inadequate. A mile long segment through forests might be

interupted by farms, roads, or a village causing a dilemma in the scoring of variables for that segment. This is due to the fact that forty seven out of sixty seven variables have the potential to be affected by land use, as well as the fact that some of the variables are direct measurements of land use. Another problem with the one mile segments was in the repetition of variable scores between adjacent segments exhibiting similar land use and river character. This repetition of similar scores would produce little or no variation between segments. Needless to say, the use of mile long segments would have resulted in an unnecessary amount of busy work and insignificant results.

It was decided to admend the RIVERS method by delineating segments on the basis of identifying either distinct changes in land use, e.g. forest/agriculture/village/forest, or river character e.g. meandering/straight channel. This method attempts to detect natural land-water unit segments which when scored would indicate significant degrees of variance necessary to rank and classfy the recreation potential of each river segment. This method generated a total of twenty-two unique segments or on the average one every 3.6 Km with the shortest being 1 Km and the longest 5.3 Km. (Figure 2)

Inventory forms (Appendix A) were prepared for each RIVER segment and data derived from air photo interpretation and agency reports was entered on the form. Air photo analysis

STEWIAKE RIVER SEGMENT LOCATIONS

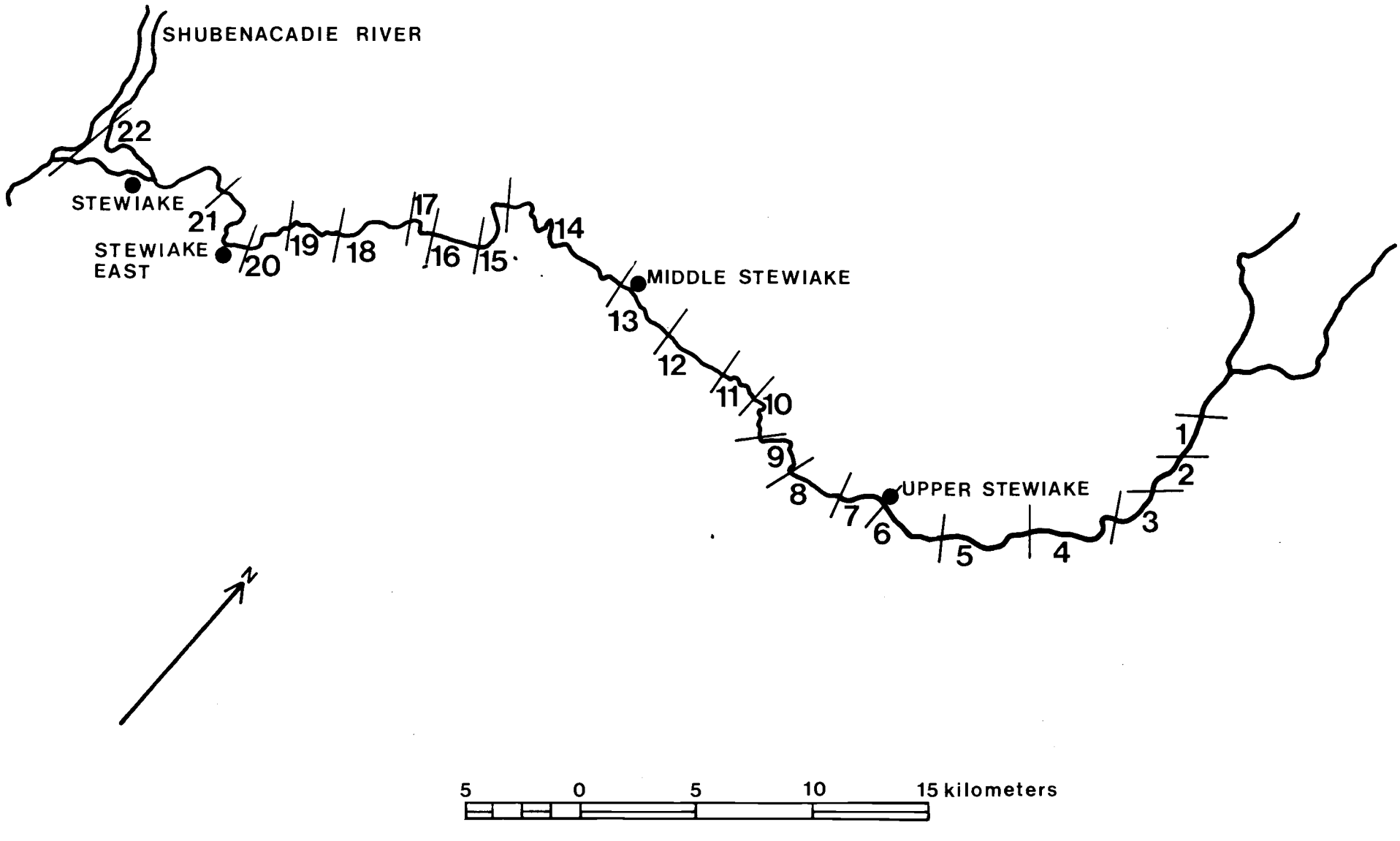


FIGURE 2

was the primary source for twenty of the variables while agency reports provided the information on seventeen variables and the field reconnaissance supplied the details on the remaining thirty variables. Often sources provided complimentary information which added a confirmation factor to the acquisition of data and scoring of variables.

The field reconnaissance involved three activity stages; floating the river, hiking the corridor and driving the roads. The type of watercraft utilized to float the river was a sixteen foot canoe paddled solo by the author. A slow pace was deliberately maintained with frequent stops to insure a detailed reconnaissance and therefore no conflict arose over the ability to observe and record information and maneuver the craft. The eighty Km river was traversed in five working days averaging sixteen Km per day. This included paddling downstream, then hiking back upstream through the river corrider to field check the suitability of the land for water related activities. Finally the accessibility factor of each segment for dispersed activities was scored by observations made while driving a four-wheel-drive jeep on all roads within two segments above and below the segment being scored. Accessibility is difficult to quantify and may be one of the major weaknesses of the RIVERS method as Chubb explains.

We found it was much more difficult to develop a satisfactory scoring system for this factor than had been anticipated. The major problem was that the accessibility of one river segment for most of the activities depends on the accessibility of other segments.[18]

The data was processed without the aid of computers and proved very time consuming. Scores were calculated for each of the sixteen activities within each of the twenty two segments by utilizing a prepared "Segment Activity Score Sheet (Appendix A)". A total of 352 of these score sheets were manually produced for the Stewaike River. The exact procedure employed is best described directly by Chubb.

1) The appropriate variables for the activity under consideration were determined from the table of weights and transformation indices and entered in the first column; at the same time, the transformation table number was transferred to column 3 and the weight entered in column 5;

2) the raw scores for each of the appropriate variables were then transferred to the second column from the segment's inventory form;

3) the appropriate transformation table was consulted, the raw scores treated accordingly, and the resulting transformed score was entered in column 4;

4) the transformed score was multiplied by the weight already in column 5 and the product entered in column 6;

5) totals for each of the 6 groups of variables were then calculated;

6) these totals were summed to give a total score for the segment; and

7) the total segment score was expressed as a percentage of the total possible score. This final step of expressing the total segment score as a percentage of the activities total possible score was devised to make comparison of the

suitability of a segment for different activities possible. This was necessary because each activity had a different total possible score since various numbers of factors were included in the scoring of each of the 16 activities.[19]

RESULTS AND DISCUSSION

The RIVERS method produced a considerable amount of data on each segment and therefore a wealth of information on the river as a whole was generated. As a result of the quantity of information collected only mean scores and summary percentages are included in this report. Inventory packets were developed for each segment and included the field inventory sheets, segment activities score sheet, aerial photos, topographic reference maps and a summary score sheet. These inventory packets are on permanent file at the Nova Scotia Department of Lands and Forest, Parks Division head-quarters, Debert, Nova Scotia.

The data was analyzed with the intent of producing scores reflective of the range of recreation potentials of the Stewiake River both from an activity viewpoint and from a segment or land-water unit perspective.

Table three is an accumulation of mean scores representing the potential of sixteen activities on the Stewiake River. At an initial glance the values all seem low when compared to the potential top score of one hundred. However in order

TABLE 3

MEAN PERCENTAGE SCORES FOR 16 ACTIVITIES ON THE STEWIAKE RIVER

	Activity	Mean Score	Rank Order
1.	Wild Canoeing	48.4[a]	10
2.	General canoeing	54.3	9
3.	Small craft boating	46.0	12
4.	Power boating	24.6	15
5.	Swimming	38.4	14
6.	Water Skiing	0[b]	16
7.	Nature study	70.1	2
8.	Hiking	66.2	4
9.	Picnicking	65.8	6
10.	Canoe camping	47.7	11
11.	Trail camping	65.0	7
12.	Vehicle camping	66.0	5
13.	Bank fishing	66.3	3
14.	Boat fishing	44.5	13
15.	Pleasure driving	60.8	8
16.	Hunting	73.7	1
Average mean activitiy score for the Stewiake River		49.3	

a. Possible score ranges from to 100

b. A score of 0 indicates an activity is rated impossible of improbable.

Source: Author Field Survey

for a river to consistently score one hundreds it has to be in a pristine enviornment, be deep yet not too swift, have excellent site development potential for water related activities, offer a variety of esthetic experiences and have an accessibility factor which engenders each particular activity. This type of river is really quite rare as other competing land and water uses have successfully sought out similar requirements.

The low scores are then reflective of the fact that the Stewiake River exhibits a sequential land use pattern comprised of forestry, agriculture, gravel extraction, wet land, and habitation. As the character of the river segments change so do the activity variables and their subsequent scores. The mean of their scores is a representative figure for the entire eighty Km of river. The mean score is particularly useful in comparing the entire river with the potentials of other rivers while attempting to choose between and/or classify the rivers.

The recreation activities with the most potential for the entire river include hunting, nature study, and bank fishing. The factors combining to produce the high ranking of these activities include diversity of vegetation, accessibility, water quality, a relatively unoccupied floodplain, and the high productive capabilities of the river for fish and wildlife. Camping, picnicking and hiking also scored very high

for the entire river. This is due to the good site development potential within the river corridor and to the various physical and esthetic attractions of the river. Of course, these scores again must be kept in perspective. The high ranking of, say, vehicle camping with a score of 66 out of 100 indicates that certain restrictions on the activities capabilities do exist. The ranking column in Table 3 is to be used for comparison of the relative potentials of activities on the the Stewiake River. All of the water related activities have low mean scores due to the insufficient water flow in the first six segments of the river.

Table four gives the activity score by each segment and is much more indicative of the range and breadth of the river's recreation potential than is Table three. These scores reveal the weaknesses and strengths of the river by segment. One way to utilize this table is to look for continuity between segments. For instance, imagine a general canoe trip down the river; the first six segments are impossible to canoe, the next three have moderate canoeing potential, segment ten has a slightly higher potential, at eleven the experience weakens and then at twelve it reaches a peak, it then begins to diminish until sixteen is reached and the canoeing is excellent for three segments, finally the experience tapers off in the tidal influence zone. The "continuity between

TABLE 4

RIVER RECREATION POTENTIAL ASSESSMENT SCORES FOR STEWIAKE RIVER

Activity	Segment																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	21
Wild canoeing	0	0	0	0	0	0	69	67	69	75	61	81	63	69	70	80	76	74	65	53	42	51
General canoeing	0	0	0	0	0	0	70	66	70	75	66	88	68	72	74	81	80	77	69	63	51	56
Sm. craft boating	0	0	0	0	0	0	70	63	68	73	62	78	61	66	70	78	77	75	65	0	50	57
Power boating	0	0	0	0	0	0	0	0	0	0	55	72	0	0	60	65	65	66	63	0	48	46
Swimming	0	0	0	0	0	0	62	55	53	60	46	73	55	59	57	69	71	72	61	52	0	0
Water skiing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
Nature study	83	77	80	75	74	62	72	72	74	77	69	68	66	74	73	84	80	77	68	56	49	60
Hiking	85	77	81	61	69	63	60	65	64	68	60	78	62	68	73	65	76	74	63	53	41	57
Picnicking	84	77	74	69	68	61	67	58	57	58	55	71	63	66	68	70	71	74	66	55	51	58
Canoe camping	0	0	0	0	0	0	67	62	63	67	61	77	65	70	70	78	75	72	66	51	51	56
Trail camping	79	76	66	61	66	65	66	60	60	64	57	75	62	62	69	74	73	73	63	54	49	58
Vehicle camping	73	71	77	69	70	65	69	61	60	63	58	76	64	70	67	73	76	75	67	57	50	61
Bank fishing	76	74	75	68	68	58	66	65	61	70	61	76	64	68	67	76	75	74	66	59	54	58
Boat fishing	0	0	0	0	0	0	67	59	60	68	57	66	58	64	65	69	72	71	62	55	51	53
Pleasure driving	83	73	71	66	60	58	66	62	61	65	57	73	60	64	69	73	62	75	60	50	43	50
Hunting	82	78	83	74	72	67	74	74	77	79	68	83	65	76	74	84	84	77	74	62	51	64

Source: Author Field Survey

segments" analyses can be a valuable aid in the planning and site selection of launching sites, rest areas and canoe camping facilities as it readily unveils the constraints and attractions of the river as a whole.

The most important and significant results from this study are the identification of the recreation potential of each segment. This information can significantly aid in the decision to purchase or to protect certain lands for recreation and esthetic purposes as part of the river basin board's multiple use objectives. Table five is a list of mean segment scores and their relative rank order for the Stewiake River. The segment with the highest recreation potential is segment twelve followed closely by segments sixteen, seventeen and eighteen. The factors which produced the high potentials in these land unit types include, forest cover, sufficient water quantity and quality for most activities, relative remoteness, accessibility, high esthetic values, excellent fishing and hunting opportunities and good site development potential. Segment scores were classified into classes ranging from high recreation potential to low recreation potential and are depicted cartographically in Figure 3. This illustration depicts only the general pattern based on the mean scores of all sixteen activities. In order to clarify this further, each activity score for each segment

TABLE 5

MEAN SEGMENT SCORES AND THEIR RANK ORDER FOR THE STEWIAKE RIVER

Section Rivers Scores

Segment	Score	Rank Order
1	40.3[a]	17
2	37.6	18
3	33.4	21
4	34.0	20
5	34.2	19
6	32.0	22
7	59.0	9
8	52.0	13
9	56.0	10
10	60.1	7
11	55.8	11
12	70.9	1
13	54.7	12
14	59.2	8
15	64.1	5
16	70.0	2
17	69.5	3
18	69.1	4
19	61.1	6
20	45.6	15
21	40.6	16
22	49.0	14
Average mean segment score for the Stewiake River	52.2	

a. Possible score ranges from to 100.

Source: Author Field Survey

STEWIAKE RIVER RECREATION POTENTIAL

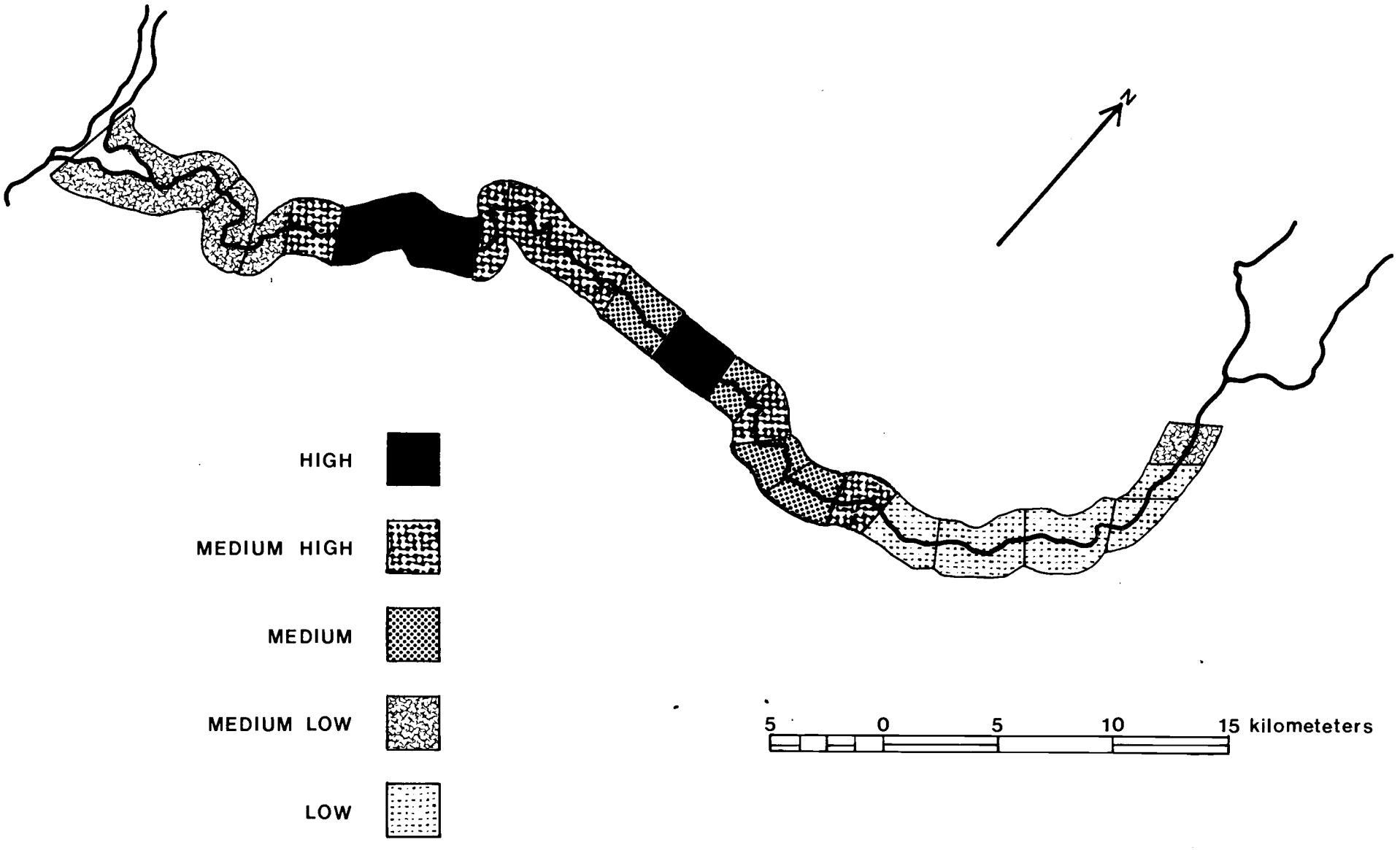


FIGURE 3

was ranked from highest potential to lowest potential. Table 6 provides specific information on each particular recreation activity. For instance, although segment one is classified in Figure 4 as having a low overall recreation potential, it has the highest potential for the activities of hiking and trail camping. Likewise segment two also has a low overall potential yet it is ranked in Table 6 as number three out of twenty-two for the activity of pleasure driving. The rank ordering of each activity by segment is an important concept in the planning and management of the river as a whole entity.

In summary, the results of the RIVERS method as applied to the Stewiake River, have capably indicated the activities best suited for the river as a whole, the activities best suited to each segment, the continuity of the activities potential throughout the river, and the overall recreation potential of each river segment.

LIMITATIONS OF RIVERS METHODOLOGY

The RIVERS method produces numerical scores which are quantitative indicators of recreation potential. These score should not be viewed as empirical statistics but as data representing the generalization of a complex web of inter-dependecies. The significance of one score related to another

TABLE 6

RANK ORDER OF RECREATION ACTIVITIES POTENTIALS BY RIVER SEGMENT

Rank Order

Activity	Highest Potential																Lowest Potential					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	River Segments (Figure 2)																					
Wild canoeing	12	16	17	10	18	15	14	9	7	8	19	13	11	20	22	21	0	0	0	0	0	0
Gneral canoeing	12	16	17	18	10	15	14	9	7	19	13	8	11	20	22	21	0	0	0	0	0	0
Sm. Craft Boating	12	16	17	18	10	15	7	9	14	19	8	13	11	20	22	21	0	0	0	0	0	0
Power boating	12	18	16	17	8	19	11	15	20	21	20	0	0	0	0	0	0	0	0	0	0	0
Swimming	12	18	17	16	7	19	10	14	15	8	13	9	20	11	0	0	0	0	0	0	0	0
Water skiing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nature study	16	1	17	3	2	10	18	4	14	9	5	15	7	8	11	12	19	13	6	22	20	21
Hiking	1	3	12	2	17	18	15	5	14	10	16	8	9	6	19	13	4	11	7	22	20	21
Picnicking	1	2	3	18	12	17	16	15	4	5	7	19	14	13	6	10	8	9	22	11	20	21
Canoe camping	16	12	17	18	15	14	11	10	7	19	13	9	8	22	20	21	0	0	0	0	0	0
Trail camping	1	2	12	16	17	18	13	10	19	11	3	7	14	13	9	8	4	5	6	22	20	21
Vehicle camping	17	12	18	3	16	2	1	14	5	4	7	19	11	15	6	13	10	9	8	22	20	21
Bank fishing	16	8	20	21	12	1	17	3	18	2	10	14	11	15	13	9	5	4	7	19	6	22
Boat fishing	17	18	16	10	7	12	15	14	19	9	8	13	11	20	22	21	0	0	0	0	0	0
Pleasure driving	1	18	2	12	16	3	15	7	4	10	14	8	17	19	5	6	13	9	11	20	22	21
Hunting	17	16	12	3	1	10	18	2	9	14	15	4	8	7	19	5	11	6	13	22	20	21

Source: Author Field Survey

becomes more important as the variation between the scores increases. In the case of the Stewiake River, the scores proved reflective of the land unit segment they represented and fell into natural groups or classes. However, there was some ambivalence in the classifying of scores as the numerical variation between scores decreased. Therefore, the lines between classes must not be viewed as absolute values but as general delineations. (Figure 3)

It is the author's opinion that the most important part of this study was the collection of the base data in a systematic fashion on the entire river. Having the inventory data on permanent file will provide an accessible source of information to help solve a wide variety of management problems both now and in the future.

Although one of the principles in the initial design of the RIVERS method was simplicity, there still remains a need to include more variables. One half of the activities are land based yet not enough emphasis is put on site development potential for these activities. The inventory form should break down variable no. 2, site development potential, into separate relative variables in order to reveal the strengths and weaknesses of the river corridor for each activity. Also there is a need to examine the weighting procedure by identifying the factors which an activity is most dependent on such

as remoteness for wild canoeing, bacterial count for swimming and soils for camping. The present system does not express the degrees of activity dependencies as occurs in reality.

One of the major weaknesses with the RIVERS method is its attempt to be all emcompassing by trying to be appropriate for all types of rivers.[20] Its methods are particularly useful for the collection of inventory material and classifying segments while studying rivers corridors which have sequential land use patterns influencing the recreation potentials. However, the RIVERS system is much too cumbersome for studying a pristine wilderness river. Nowadays pristine or wild rivers are not assessed for their potential for all forms of popular recreation activities but for a few particular and dispersed activities. Also the planning and management issues of wild river are not usually based on the physical conditions of the land-water interface but on user group conflicts. The RIVERS method does not appear to be applicable for studying rivers which already have had planning and management goals clearly stated. This includes rivers being studied for possible inclusion in State, Provincial or Federal natural rivers programme which have been defined by both legislation and administrative policy. This classification of these types of rivers is done simply on the basis of remoteness, accessibility, development, prior use, floatability and relative wildness.

CONCLUSION AND RECOMMENDATION

The Stewiake River is naturally endowed with recreation potential due to its geographic location, its abundance of fishing and hunting opportunities, the quality and quantity of the water which is suitable for most recreation activities, the site development potential occurring within the corridor and the spatial distribution of roads, farms and villages within the river valley.

The RIVERS method has successfully identified the particular limitations and capabilities of the river as a whole and as segments or land-water units for a wide variety of river recreation activities. The next logical step and major recommendation from this paper is the preparation of a management plan based, in part, on information accumulated by this study. The recreation management plan would identify alternatives for action within the multiple-use objectives of the Shebenacadie-Stewiake River Basin Board. The management plan should discuss land aquisition priorities, activity and facility development priorities, green belt designation, canoe trail designation, fish and wildlife protection and enhancement, watershed management and the maintenance and enhancement of water quality, all within a framework of carrying capacity and avoidance of user conflicts.

FOOTNOTES

[1]O'Brien, M. and Hudgins Etta, Wetlands and Wildlife Management in the Shubenacadie - Stewiake River Basin. Technical Report No. 15. (Shubenacadie-Stewiake River Basin Board. Halifax, Nova Scotia, 1978) pp. 21-25.

[2]Morantz, D. A Review of Existing Information on the Fisheries of the Shubenacadie - Stewiake River Basin. Technical Report No. 7. (Shubenacadie - Stewiake River Basin Board, Halifax, Nova Scotia, 1978) pp. 33.

[3]Wicklund R.E. and Smith A.R. Soil Survey of Colchester County, Nova Scotia. Report No. 3. Nova Scotia Soil Survey. Truro. N.S. 1948. pp. 9-12.

[4]Wicklund R.E. and Smith G.R. opp. cit., footnote 3, p.51.

[5]Wicklund R.E. and smith G.R. opp.cit., footnote 3, p14-15.

[6]O'Brien M. and Hudgins Etta, opp. cit., footnote 1, p. 26-28.

[7]Byers D. and Wandt F., Land use patterns and Trends in the Subenacadie River Basin 1964-1974, Technical Report No. 10 (Shubenacadie - Stewiake River Basin Board, Halifox, 1978)

[8]Craighead, Frank C. and Craighead, John J. River Systems: Recreational Classification, Inventory and Evaluation. Naturalist 13(2): pp. 2-19.

[9]Leopold, Luna B. and O'Brien Moura. On the Quantitative Inventory of the Riverscape. Water Resources Research 4(4) pp. 709-717.

[10]Jurrand P. The Leopold Technique and Canada's Northern Rivers: Problems in the Field Inventory. National Parks Service. Ottawa 1975.

[11]Hamill, Louis, Statistical Tests of Leopold's System for Quantifying Aesthetic Factors Among Rivers. Water Resources Research 10(3) pp. 395-401.

[12]Dearinger, John A. Aesthetic and Recreational Potential of Small Naturallistic Streams Near Urban Areas. Lexington, Kentucky: University of Kentucky Water Resources Institute, 1968. MacConnell, W.P. and Stall P.G. Evaluating Recreation

Resources of the Connecticut River. Photogrammetric Engineering 35(7) 1969. pp. 686-692.

Morisawa, Marie. Evaluation of Natural Rivers, Final Report. Binghampton, New York: State University of New York, 1971.

Olson, Charles E., et. al. Inventory of Recreation Sites. Photogrammetric Engineering 35(6) 1969. pp. 561-568.

U.S. Department of Agriculture, Forest Service, Northern Region. Recreation Opportunity, Inventory and Evaluation. Missoula, Montana: U.S.F.S. 1974.

[13]Canada Land Inventory; Land Capabilities for Recreation. Queens Printer Ottawa, 1971.

[14]Chubb, M. and Bauman E. The RIVERS method. Department of Geography, Michigan State University, 1976.

[15]Chubb M. and Bauman E. opp. cit., footnote 14.

[16]Chubb M. and Bauman E. opp. cit., footnote 14, p.46.

[17]Chubb M. and Bauman E. opp. cit., footnote 14, p.48.

[18]Chubb M. and Bauman E. opp. cit., footnote 14, p.43.

[19]Chubb M. and Bauman E. opp. cit., footnote 14, p.48-49.

[20]Chubb M. and Bauman E. opp. cit., footnote 14, p.65.

APPENDIX "A"

Source: Chubb M. and Bauman E. opp.cit., footnote 14.

APPENDIX 1

Form # 1

RIVER RECREATION POTENTIAL ASSESSMENT PROJECT: FIELD INVENTORY

River Name: STEWIAKE River Number: _____ Segment Number: 13

State: NOVA SCOTIA County: COLCHESTER Township: _____

Location of Initial Point: _____

Field Work Date(s): _____ Surveyors: _____

Photographs: Roll Number: 7-052 Frame Number(s): 152-160 Recording Tape Number: _____

(NOTE: In factors 26, 38-49, and 51-54, "Primary" refers to land adjacent to the river which constitutes an inventory zone extending from the banks to 300 feet inland. "Secondary" refers to the inventory zone extending from 300 feet to one-quarter mile inland.)

A. BASIC PHYSICAL FACTORS

(NOTE: River should be at least fifteen feet wide.)

1.	WIDTH OF RIVER	5. Very Broad (over 200')	4. Broad (120-200')	(3.) (80-120')	2. (40-80')	1. Narrow (15-40')
2.	SITE DEVELOPMENT POTENTIAL (considering width of river valley flat)	(5.) Suitable for developed sites	4.	3.	2.	1. Unsuitable for developed sites
3.	APPARENT STREAM VELOCITY	5. Very Swift (torrential)	4. Swift	(3.) Moderate	2. Sluggish	1. Stagnant or minimal flow
4.	FLOATABILITY (rate each activity below according to this scale)	5. Always	4. Long Pools (normal flow)	3. During High Water	2. With Difficulty	1. Never

a) Canoeing 5 c) Powerboating 1

b) S. Craft Boat. 4 d) Waterskiing 1

5.	FLOW FLUCTUATION	5. Infrequent & negligible	(4.) Seldom occuring & of little impact	3. More frequent & moderate, or infrequent & Serious	2.	1. Frequent & Serious
6.	MONTHS OF WATER FLOW	(5.) 11-12 mths.	4. 8-10 mths.	3. 5-7 mths.	2. 3-4 mths.	1. less than 3 mths.
7.	STREAM BED MATERIAL (suitability of material for activities rated below according to this scale)*	5. Excellent	4. Very Good	3. Good	2. Poor	1. Very Poor

a) Wild. Canoeing 4 g) Nature Study 5 m) Driving for Pleasure 5

b) General Canoeing ____ h) Hiking ____ n) Bank Fishing ____

c) Small Craft Boat. 4 i) Picnicking ____ o) Boat Fishing ____

d) Powerboating ____ j) Canoe Camping ____ p) Hunting 4

e) Swimming ____ k) Trail Camping ____

f) Waterskiing ____ l) Vehicle Camping 2

*SPACE FOR NOTES:

Rocks & Boulders _____ Sand _____

Cobbles _____ Clay or Silt _____

Gravel _____ Muck _____

8. DOMINANT RIVER PATTERN — 5. Pond(s) & Stream; 4. Braided; 3. Meanders; (2.) Gentle Curves; 1. Channel

9. WATER SURFACE PATTERN AND PROFILE (suitability for each activity rated below according to this scale)* — 5. Excellent; 4. Very Good; 3. Good; 2. Poor; 1. Very Poor

a) Wild. Canoeing	3	g) Nature Study	4	m) Driving for Pleasure	?
b) General Canoeing	3	h) Hiking	4	n) Bank Fishing	5
c) Small Craft Boat.	1	i) Picnicking	3	o) Boat Fishing	2
d) Powerboating	1	j) Canoe Camping	9	p) Hunting	3
e) Swimming	3	k) Trail Camping	3		
f) Waterskiing	+	l) Vehicle Camping	3		

*SPACE FOR NOTES:

Smooth _____ Rapids _____

Ripples ✓ Chutes _____

Pools ✓ Waterfalls _____

10. BANK EROSION (beyond normal river action which may negatively affect recreational activities) — 5. Infrequent & negligible; (4.) Seldom occuring & of little impact; 3. More frequent & moderate, or infrequent & serious; 2. ; 1. Frequent & Serious

B. SPECIAL PHYSICAL FEATURES

11. ACREAGE OF PONDS (natural, or man-made impoundments; pond must be equal to or greater than twice the width of the river)	5. over 250	4. 200-250	3. 150-200	2. 100-150	(1.) less than 100	
12. SANDY BEACHES (capable of supporting small groups of swimmers)	5. 5 & over	4. 4	3. 3	(2.) 2	1. 1	
13. OXBOW LAKES AND BAYOUS	5. 5 & over	4. 4	3. 3	2. 2	(1.) 1	
14. ISLANDS (suitable for camping, picnicking, or other dry-land recreational use)						
a) ISLANDS UNDER ½ ACRE	5. 5 & over	4. 4	3. 3	2. 2	1. 1	
b) ISLANDS ½ - 2 ACRES	5. 5 & over	4. 4	3. 3	2. 2	1. 1	
c) ISLANDS 2 - 5 ACRES	5. 5 & over	4. 4	3. 3	(2.) 2	1. 1	
d) ISLANDS 5 - 10 ACRES	5. 5 & over	4. 4	3. 3	2. 2	1. 1	
e) ISLANDS OVER 10 ACRES	5. 5 & over	4. 4	3. 3	2. 2	1. 1	

(NOTE: If the segment has received a value of "1" under Variable 4, do not rate Variable 15 for that activity.)

15.	NAVIGATIONAL OBSTRUCTIONS	5. None	4. Minimal	3. Infrequent obstructions not requiring portages	2. Infrequent obstructions requiring portages	1. Frequent portages

a) Canoeing 4 c) Powerboating —

b) S. Craft Boat. 3 d) Waterskiing —

16.	IMMEDIATE BANK HEIGHT	5. Easy exiting throughout segment	4.	3.	2.	1. Absence of reasonable exiting locations

a) Canoeing 3 c) Powerboating 1

b) S. Craft Boat. 3

C. WATER QUALITY

17.	TURBIDITY	5. Clear	4. Cloudy	(3.) Turbid	2. Very Turbid	1. Muddy
18.	TEMPERATURE (average July daytime)	5. < 60°	4. 60 - 68°	3. 68 - 78°	2. 78 - 85°	1. > 85°
19.	MAN-PRODUCED SOLIDS ON BOTTOM (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious

a) Water-Contact (Total) 3 c) Aesthetics 3

b) Watercraft Contact 2

20.	MAN-PRODUCED FLOATING LIQUIDS (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious

a) Water-Contact (Total) 4 c) Aesthetics 4

b) Watercraft Contact 4

21.	MAN-PRODUCED FLOATING SOLIDS (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious

a) Water-Contact (Total) 4 c) Aesthetics 4

b) Watercraft Contact 4

22.	BACTERIOLOGICAL QUALITY (fecal coliforms)	5. Excellent Quality	4.	3.	(2.) Minimally acceptable	1. Unacceptable

23.	PESTICIDES (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious
	a) Water-Contact (Total) ___		c) Aesthetics 4			
	b) Watercraft Contact ___					
24.	CHEMICAL POLLUTANTS (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious
	a) Water-Contact (Total) 4		c) Aesthetics 4			
	b) Watercraft Contact 4					
25.	ODOR (rate impact on the recreational activity groups below)	5. None of significance	4. Seldom & of little impact	3. More frequent & moderate, or infrequent & serious	2.	1. Frequent & Serious
	a) Water-Contact (Total) 3					
	b) Watercraft Contact 3					
	c) Aesthetics 5					

D. SOILS

(NOTE: In Variables 26 and 27, consider the general limitations for camping, picnicking, and other dry land recreational uses.)

26.	CORRIDOR SOILS: PRIMARY	5. Negligible restrictions	4. Infrequent & minor restrictions	3. More frequent & moderate, or infrequent & serious restrictions	2.	1. Frequent & Serious restriction
27.	CORRIDOR SOILS: SECONDARY	5. Negligible restrictions	4. Infrequent & minor restrictions	3. More frequent & moderate, or infrequent & serious restrictions	2.	1. Frequent & serious restriction

E. BIOLOGICAL FACTORS

(NOTE: For Variables 28, 29, and 30, the underlying assumption is that ratings will reflect amounts of algae and waterplants which affect recreational activities.)

28.	ALGAE	5. Absent	4.	3. Moderate	2.	1. Infested
29.	WATER PLANTS: SUBMERGENT	5. Absent	4.	3. Moderate	2.	1. Infested
30.	WATER PLANTS: FLOATING AND/OR EMERGENT	5. Absent	4.	3. Moderate	2.	1. Infested
31.	FAUNA: SMALL GAME	5. Abundant	4.	3.	2.	1. Absent
32.	FAUNA: LARGE GAME	5. Abundant	4.	3.	2.	1. Absent

33.	FAUNA: NON- GAME	5. Abundant	4.	3.	2.	1. Absent
34.	FAUNA: WATERFOWL	5. Abundant	4.	3.	2.	1. Absent
35.	FAUNA: OTHER BIRDS	5. Abundant	4.	3.	2.	1. Absent
36.	FAUNA: FISH (Warm)	5. Abundant	4.	3.	2.	1. Absent
37.	FAUNA: FISH (Cold)	5. Abundant	4.	3.	2.	1. Absent

(NOTE: Variables 38 through 43 represent the RIGHT BANK.
Variables 44 through 49 represent the LEFT BANK.)

38.	LAND FLORA: TYPE (PRIMARY)	5. Wooded	4. Trees & Brush	3. Open Grass & Trees	2. Bog, Marsh, Swamp, Brushy	1. Lawns, or Barren
39.	LAND FLORA: DENSITY (PRIMARY)	5. Dense	4.	3. Moderate	2.	1. Thin
40.	LAND FLORA: DIVERSITY (PRIMARY)	5. Great	4.	3. Moderate	2.	1. Small
41.	LAND FLORA: TYPE (SECONDARY)	5. Wooded	4. Trees & Brush	3. Open Grass & Trees	2. Bog, Marsh, Swamp, Brushy	1. Lawns, or Barren
42.	LAND FLORA: DENSITY (SECONDARY)	5. Dense	4.	3. Moderate	2.	1. Thin
43.	LAND FLORA: DIVERSITY (SECONDARY)	5. Great	4.	3. Moderate	2.	1. Small
44.	LEFT BANK LAND FLORA: TYPE (PRIMARY)	5. Wooded	4. Trees & Brush	3. Open Grass & Trees	2. Bog, Marsh, Swamp, Brushy	1. Lawns, or Barren
45.	LEFT BANK LAND FLORA: DENSITY (PRIMARY)	5. Dense	4.	3. Moderate	2.	1. Thin
46.	LEFT BANK LAND FLORA: DIVERSITY (PRIMARY)	5. Great	4.	3. Moderate	2.	1. Small
47.	LEFT BANK LAND FLORA: TYPE (SECONDARY)	5. Wooded	4. Trees & Brush	3. Open Grass & Trees	2. Bog, Marsh, Swamp, Brushy	1. Lawns, or Barren
48.	LEFT BANK LAND FLORA: DENSITY (SECONDARY)	5. Dense	4.	3. Moderate	2.	1. Thin
49.	LEFT BANK LAND FLORA: DIVERSITY (SECONDARY)	5. Great	4.	3. Moderate	2.	1. Small
50.	WILDFLOWERS	5. Abundant	4.	3. Moderate	2.	1. Absent

F. LAND USE

(NOTE: Variables 51 and 52 represent the RIGHT BANK.
Variables 53 and 54 represent the LEFT BANK.)

51.	ADJACENT LAND USE: PRIMARY	5. Natural Area	4. Mixed natural area and agriculture, or vacant	3. Primarily agriculture	2. Extractive Resources	1. Urban/ Suburban (Human structures)
52.	ADJACENT LAND USE: SECONDARY	5. Natural Area	4. Mixed natural area and agriculture, or vacant	3. Primarily agriculture	2. Extractive Resources	1. Urban/ Suburban (Human structures)
53.	LEFT BANK ADJACENT LAND USE (PRIMARY)	5. Natural Area	4. Mixed natural area and agriculture, or vacant	3. Primarily Agriculture	2. Extractive Resources	1. Urban/ Suburban (Human structures)
54.	LEFT BANK ADJACENT LAND USE (SECONDARY)	5. Natural Area	4. Mixed natural area and agriculture, or vacant	3. Primarily agriculture	2. Extractive Resources	1. Urban/ Suburban (Human structur)
55.	HISTORIC SITES OR FEATURES	5. Many	4.	3. Few	2.	1. None
56.	PUBLIC LAND OWNERSHIP	5. 90-100%	4. 75-90%	3. 50-75%	2. 25-50%	1. 0-25%

G. AESTHETICS

57.	ARTIFICAL CONTROLS (impact on recreation activities rated below according to this scale)*	5. None	4. Minimal	3.	2.	1. Substantial

a)	Wild. Canoeing	5	g)	Nature Study	5	m)	Driving for Pleasure 5
b)	General Canoeing	5	h)	Hiking	5	n)	Bank Fishing 5
c)	Small Craft Boat.	5	i)	Picnicking	5	o)	Boat Fishing 1
d)	Powerboating	1	j)	Canoe Camping	5	p)	Hunting 5
e)	Swimming	1	k)	Trail Camping	5		
f)	Waterskiing	1	l)	Vehicle Camping	5		

*SPACE FOR NOTES:

Rip-Rap _____ Walls _____

Channelization _____ Dams _____

Groins _____ Other _____

58. DETRIMENTAL VALUES OF BUILDINGS (impact on recreation activities rated according to this scale)* 5. None 4. Minimal 3. 2. 1. Substantial

a)	Wild. Canoeing	1	g)	Nature Study	5	m)	Driving for Pleasure	5
b)	General Canoeing	5	h)	Hiking	1	n)	Bank Fishing	5
c)	Small Craft Boat.	5	i)	Picnicking	5	o)	Boat Fishing	4
d)	Powerboating	5	j)	Canoe Camping	1	p)	Hunting	2
e)	Swimming	5	k)	Trail Camping	1			
f)	Waterskiing		l)	Vehicle Camping	2			

*SPACE FOR NOTES:

	# of	Impact on River Environment
Residential	3	
Trailers		
Farmsteads	9	
Schools(Instit.)	1	
Commercial	1	GRAVEL EXTRACTION
Industrial		

59. TRASH & LITTER (river bank & float) 5. Infrequent & negligible 4. Seldom occuring & of little impact (3.) More frequent & moderate, or infrequent & serious 2. 1. Frequent & Serious

60. UTILITIES' CROSSINGS (e.g. electric transmission, telephone) 5. None (4.) Seldom occuring 3. Infrequent 2. Moderately occuring 1. Frequent

61. OTHER DETRIMENTAL VALUES* (not covered in above) 5. None 4. Seldom & of little impact (3.) More frequent & moderate, or infrequent & serious (2.) 1. Frequent & Serious

*Indicate type(s) of detrimental values rated above:
LARGE GRAVEL EXTRACTION OPERATION

62. SCENIC VARIETY 5. Diverse Views 4. (3.) Limited Views 2. 1. Monotonous

63. VIEW CONFINEMENT 5. Open, no confinement 4. 3. Occasional Confinement (2.) 1. Closed by hills, cliffs, or trees

64. APPARENT BEAUTY 5. Outstanding 4. 3. Pleasant (2.) 1. Monotone, Dull

65. UNIQUE FEATURES (scenes, structures, geologic formations, etc.) 5. One of a Kind 4. Unique to North America 3. Unique to state 2. Unique to this river (1.) None

66. REMOTENESS (% of total length of main channel greater than one-quarter mile from a road or human habitation) 5. 80-100% 4. 60-80% 3. 40-60% 2. 20-40% (1.) 0-20%

H. ACCESSIBILITY

67. ACCESSIBILITY (rate, considering the information below and from Form #2, according to this scale) 5. Accessibility is appropriate 4. 3. Accessibility is difficult or inadequate 2. 1. Accessibility is excessive

a)	Wild. Canoeing	4 *	g)	Nature Study	3	m)	Driving for Pleasure	5
b)	General Canoeing	4 *	h)	Hiking	2 *			
c)	Small Craft Boat.	3 *	i)	Picnicking	2	n)	Bank Fishing	5
d)	Powerboating	2 *	j)	Canoe Camping	4 *	o)	Boat Fishing	3 *
e)	Swimming	2	k)	Trail Camping	2 *	p)	Hunting	4
f)	Waterskiing	3 *	l)	Vehicle Camping	2			

(NOTE: * denotes that accessibility rating for recreational activity has been derived from Form #2 which considers the segment within a larger five segment unit. Unmarked activities' accessibilities are rated for the present segment alone.)

	# of Bridges	Presence of Parellel Roads 0-300'	Presence of Parellel Roads 300'-1/4 mi.	# of Access Points
Trails				
4WD				
2WD	1		1	1
CTY				1
MTR			1	
RR				

(4WD- roads passable only with four-wheel drive equipped vehicles.
2WD- roads passable with standard automobile; usually good dirt, gravel.
CTY- very good gravel surface and paved surface roads; generally well used; county type roads.
MTR- major tourist road; freeways, divided four lanes, state highways, U.S. routes.)

FAUNA OBSERVED OR SIGNS OF:

	# Observed	Signs
WATERFOWL		
BIRDS OF PREY		
KINGFISHER		
PERCHING BIRDS		
OTTER		
OTHER MAMMALS (specify)		
FISH (type)		

FLORA OBSERVED (Most Abundant Species)

TREES _____

_____

SHRUBS _____

_____

HERBS _____

_____

ADDITIONAL COMMENTS:

APPENDIX 5

RIVER RECREATION POTENTIAL ASSESSMENT PROJECT: SEGMENT-ACTIVITY SCORE WORKSHEET

Form #

ACTIVITY: WILD CANOEING

River Name: Stewiacke River Number: 1 Segment Number:

SIGNIFICANT VARIABLES	RAW VARIABLE VALUES	TRANSFORMATION TABLE NUMBER	TRANSFORMED VALUE	WEIGHT	SEGMENT-VARIABLE SCORE	VARIABLE GROUP SUBTOTALS
Basic Physical						
	3	13	5	2	10	
	5	13	5	5	25	
	4			3	12	
	4			3	12	
	4			2	8	
	3	13	5	3	15	
	3			3	9	
	4			1	4	
						81
Special Physical						
	1			1	1	
	0			1	0	
	0			1	0	
	2			1	2	
	0			1	0	
	0			1	0	
	4			2	8	
	3			2	6	
						17
Water Quality						
	3			3	9	
	3			2	6	
	4			4	16	
	4			4	16	
	3			1	3	
	4			4	16	
	4			4	16	
	3			5	15	
						94
Soils						
Biological						
	2			1	2	
	3			2	6	

SIGNIFICANT VARIABLES	RAW VARIABLE VALUES	TRANSFORMATION TABLE NUMBER	TRANSFORMED VALUE	WEIGHT	SEGMENT-VARIABLE SCORE	VARIABLE GROUP SUBTOTALS
30	3			2	6	
31	4			1	4	
32	3			1	3	
33	3			1	3	
34	2			1	2	
35	4			1	4	
36	2			1	2	
37	4			1	4	
38	1	6	1	3	3	
39	2	13	5	1	5	
40	3			2	6	
41	3	4	5	3	15	
42	2	13	5	1	5	
43	3			2	6	
44	1	6	1	3	3	
45	3	13	5	1	5	
46	3			2	6	
47	5	4	5	3	15	
48	4	13	5	1	5	
49	3			3	9	
50	3			2	6	
						120
Land Use						
51	3	3	3	5	15	
52	4	3	4	5	20	
53	3	3	3	5	15	
54	5	3	5	5	25	
55	1			1	1	
56	1			1	1	
						77
Aesthetics						
57	5			4	20	
58	1			3	3	
59	2	2	3	3	9	
60	4	2	4	3	12	
61	3			3	9	
62	3			3	9	
63	2			3	6	
64	1			1	1	
65	1			1	1	
						70
Accessibility						
66	4			5	20	
						20

TOTAL SEGMENT POINTS (A): 462

TOTAL POSSIBLE POINTS (B): 765

SEGMENT-ACTIVITY SCORE (A / B): .60