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THIRD ANNUAL REPORT  
ON ACTIVITIES  
UNDER THE  
MARITIME MARSHLAND REHABILITATION ACT  
FOR THE FISCAL YEAR ENDED  
MARCH 31, 1952

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## ACTIVITIES UNDER THE MARITIME MARSHLAND REHABILITATION ACT.

### INTRODUCTION

The Maritime Marshland Rehabilitation Administration of the Department of Agriculture has completed its third year of operation. It was established in 1949 to carry out the provisions of the Maritime Marshland Rehabilitation Act of 1948.

The marshlands of the Maritime Provinces lie along tributaries to the Bay of Fundy except for a few which are on tributaries to Northumberland Strait. These soils have contributed greatly to the agricultural production and economy of the area since the first reclamation took place in the vicinity of Annapolis Royal, Nova Scotia, some 320 years ago. The marshland soils are very fertile and when properly protected and cultivated yield excellent crops of hay.

The Maritime Marshland Rehabilitation Act authorized the construction and reconstruction of the dykes, aboiteaux and breakwaters in the marshlands of Nova Scotia, New Brunswick and Prince Edward Island. The Federal Government undertakes the construction of the protective works required to prevent the flooding of lands by salt water, and also provides all the engineering services required to carry out the rehabilitation program.

The Provincial Governments and marsh owners undertake the construction and maintenance of adequate drainage canals and laterals, and provide the land and right-of-ways required for the construction of the protective works. The provinces also organize the marshland owners before the rehabilitation of a particular area is undertaken to ensure that a suitable land-use policy is developed and carried out.

In carrying out the program of works the installations constructed since 1949 now number 120 aboiteaux, 40.8 miles of new dykes, 14,200 lineal feet of dyke protected with new plank facing, 900 lineal feet of plank facing repaired, and 6905 lineal feet of stream bank protection with brush matting and rock cribbing. Considerable temporary repairs have also been made to existing structures pending construction of permanent installations.

Up to March 31, 1952, Nova Scotia had organized 62 marsh areas for rehabilitation purposes, New Brunswick 44, and Prince Edward Island had requested assistance for one area. Nova Scotia has requested that action be temporarily deferred on 4 areas and New Brunswick has requested the same treatment for one. The 107 areas comprise 47,382 acres of marshland which is an integral portion of an estimated 335,200 acres of farm land. Apart from the above projects, investigations are being carried out on five others at the present time. Appendix 1 lists all projects by Provinces.

Appendix 11 lists the expenditures made during the year for administration, surveys and engineering, construction of equipment, materials and workshop, and for construction and maintenance of projects.

ORGANIZATION OF THE MARITIME MARSHLAND  
REHABILITATION ADMINISTRATION

The headquarters of the Maritime Marshland Rehabilitation Administration is located at Amherst, Nova Scotia. Administrative and Engineering Branches operate from this central location.

The Engineering Branch is responsible for engineering investigations, designs and developments, that are required for the construction of works to protect the marshlands against flooding by salt water. It is also directly responsible for the construction of these works. To facilitate construction in the field, two construction district offices have been established. One of these is located at Moncton, New Brunswick, and the other is at Windsor, Nova Scotia.

The Engineering Branch consists of six main divisions as follows:

- (1) The Survey Division carried out complete topographic surveys of the areas to be considered for rehabilitation purposes. Such surveys enable the proper planning of works prior to the commencement of construction.
- (2) The Drainage Division investigates the drainage requirements for any marsh area, designs the necessary fresh water drainage system and determines the size and number of aboiteau sluices required.
- (3) The Soil Mechanics Division determines foundation and other soil conditions prior to construction. The soils encountered and used in dyke and aboiteau construction are generally found to have no strength from the standpoint of soil mechanics theories. Studies of the structures in existence, as well as the structures being built, with subsequent behaviour checks, have been made to determine design factors. The results of these investigations permit the advising of the Construction Division what structures require special remedial measures for any given set of conditions encountered.
- (4) The Construction Division carried out the construction program. For the most part works have been executed on the basis of standard designs which have been developed through the efforts of the entire Engineering Branch.
- (5) The Seeding Division, in co-operation with the Experimental Farm Service and the Nova Scotia Department of Agriculture, is engaged in determining suitable grass mixtures to seed on dykes for general protection. However, more important is the protection against washing of the sea-side of the dyke by wave action, and efforts are being concentrated in respect to this development. The division prepares the finished dykes and aboiteaux for seeding which may consist of applying ground



**Fig. 1 - A field of recently mown timothy and clover on a marshland field in the vicinity of Truro, N. S. It is estimated that the yield will be in excess of three tons per acre.**



**Fig. 2 - A new constructed up-river dyke near Brooklyn, N. S. Bulldozers and a grader were used. The new dyke, at some locations is behind the old dyke.**

gypsum, or lime, or both. The dykes are then seeded and the resulting vegetation is treated in a normal manner.

- (6) The Workshop Division carried on the required maintenance of the Administration's vehicles, earth-moving equipment, and other allied construction equipment. All timber aboiteau sluices are prefabricated in the workshop to rigid specifications with better results and a saving over the older method of building these structures on the aboiteau site.

The workshop has been able to produce such experimental and new-departure items as steel sluice gates, soil mechanics testing devices and hydraulic apparatus.

The work of the above divisions is co-ordinated by the Chief Engineer, supported by the required design and drafting personnel.

Soil Surveys by the Experimental Farm Service and its co-operating agencies were continued throughout Nova Scotia and New Brunswick during the past year. The results of these surveys are of considerable assistance in evaluating the marshland areas.

The Maritime Marshland Rehabilitation Advisory Committee, established under Section 8 (1) of the Act, met on four occasions to consider rehabilitation problems and make recommendations to the Minister of Agriculture.

#### ACTIVITIES OF THE MARITIME MARSHLAND REHABILITATION ADMINISTRATION.

##### General

There are three basic factors which tend to make the erection of the dykes, aboiteaux, and breakwaters unique:

- (1) The great tidal range of the Bay of Fundy.
- (2) The generally weak structure of the soils and foundations. (From the structural standpoint the former have no measurable strength).
- (3) The low working limits from the standpoint of economics.

The problems of dyke and aboiteau construction, and reconstruction, are being approached by the Engineering Branch as a result of technical investigations and practical experience. Before introducing radical departures in construction methods, an attempt has been made to analyse the older structures as they had been built. Consequently, while there now remain many problems to be solved, there is a reasonable degree of certainty as to the basic requirements and nature's limitations on new approaches.



Fig. 3 - The inside slope of a dyke constructed in 1950 with grass sown early in 1951. This photograph was taken in August of 1951.

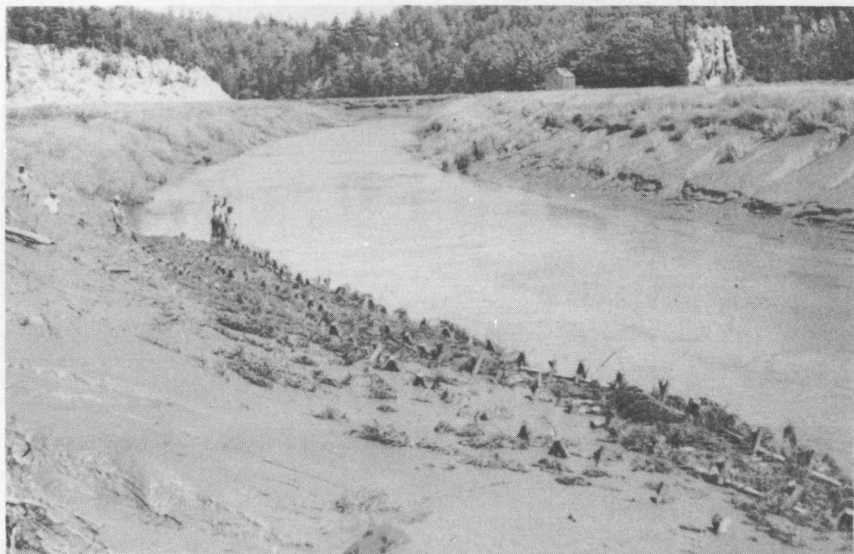


Fig. 4 - Brush matting being installed as a means of preventing under-cutting of stream banks. These mats are placed at specific points only. Note the silt deposit on those which were first placed. It is important that they extend down to the bottom of the river.

The following are items of a general nature relating to protective structures being erected:-

- (a) Dykes - It has been found necessary to construct dykes of a larger cross-section than was originally anticipated. For the most part dykes are constructed with a slope of three to one on the sea side and two to one on the marshland side. As the dykes can be made only with the material at hand, occasions have arisen when the earth used has had a water content of 80 per cent. As a result larger fills of earth are required and it is sometimes necessary to rebuild certain sections after the fill has become partially dried. Due to certain sections of dyke foundation being extremely weak, it is necessary to brush these locations prior to dyke erection. Provision is made through shallow ditches, or by grading, for the proper drainage of fresh water away from any dyke base. The outside borrow pits are made to drain which in turn encourages silt to be deposited from the silt laden tide water.
- (b) Dyke Protection - In those locations where dyke is exposed to severe wave action it is necessary to provide a form of plank facing. The timber used is pre-treated with a solution containing sodium fluoride and dinitrophenol.

Where no special protection is required, an effort is being made to establish salt-tolerant grasses on the sea-side of the dyke. Suitable grass mixtures are not readily available. It has been found possible to harvest and reseed native Maritima Puccinellia, a semi-salt tolerant grass, with favourable results. Tall wheat grass also appears to withstand salt water flooding to some degree.

As the soil placed in the dykes very often contains large quantities of salt, ground gypsum is applied on the top and the inside slope of the dyke to speed up leaching. Lime is later applied if required. This portion of the dyke is then seeded to grass, a mixture containing timothy, red top, common and Dutch white clover, crested wheat grass, brome grass, western rye grass and meadow fescue. This is an experimental mixture and certain species may be eliminated.



- (c) Aboiteaux - The pre-fabrication of timber sluices, based on a standard design, continues to be satisfactory. Although brass alloy gates are installed in most structures, cast iron and aluminum alloy substitutes have been installed on an experimental basis with a view to finding a more efficient and less costly gate. A steel gate with a chain suspension to help diminish head losses has been designed. These are pre-fabricated and are treated with a preservative as a protection against corrosion. It is not expected that these gates will have as great a life time as those made from brass alloy but they are relatively inexpensive. In certain installations cylindrical pressed fibre pipes, with steel gates, have been used in place of the more conventional timber sluices.
- (d) Bank Protection - In those locations where the cutting action of the tide removes the river bank, it is necessary to install a form of breakwater in order that undercutting of the dyke may be prevented. To date, a brush mat appears to be the most satisfactory protective structure. However in some locations, where the action has been particularly severe, rock crib work has been installed.
- (e) Drainage - The design and lay-out of fresh water drainage systems for all marsh areas is carried out as a service to the two Provinces. Standard specifications have been developed and are employed.

In previous reports reference has been made to the repair of aboiteaux which only require the replacement of sluices. In the construction season of 1950 two structures were repaired by plugging the old sluice and installing, by means of tunnelling, asbestos bonded metal pipe. The latter replaces the former timber sluice as a drainage outlet.

Although these two repaired installations appear to be satisfactory, it is not expected that this protection should become general due to the comparatively high cost.

During the past construction season, what is believed to be the largest timber aboiteau sluice yet used in the Maritimes was installed in Albert County, New Brunswick. This sluice contains three compartments, each measuring 4' x 5' in open cross-section, and is 90' in length. The entire sluice was pre-fabricated at the headquarters workshop. Steel gates with chain suspensions, and treated with a rust preventive, were installed. As the soil foundation was found to be gravelly, short steel cut-offs were driven to prevent underground seepage.



Fig. 5 - An aboiteau located in Yarmouth County which was built many years ago. The lower half of this structure was made with quarried rock and a steel gate was hung over the sluice exit which cannot be seen in this photograph.

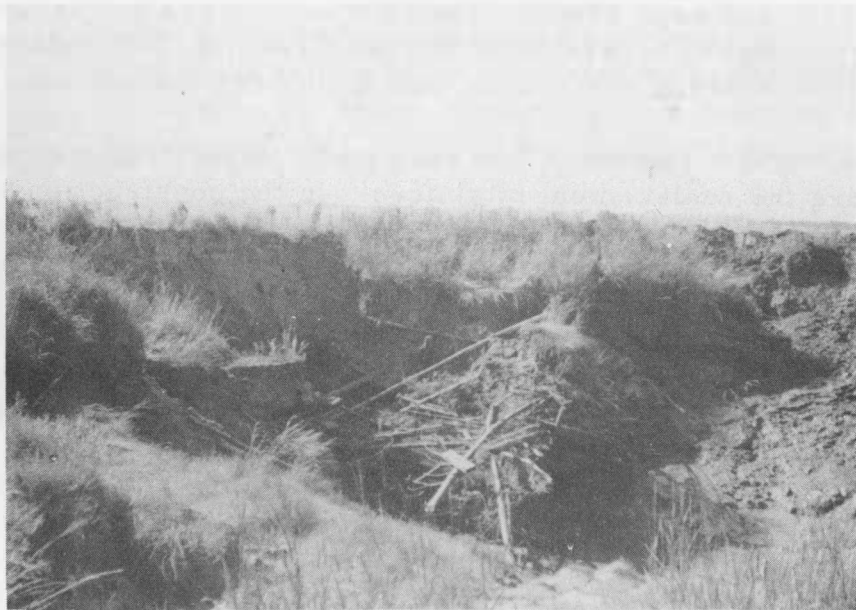


Fig. 6 - The sea-side of an aboiteau in the vicinity of Amherst, N. S. This structure was in a complete state of collapse and a new aboiteau was erected immediately behind it.

In co-operation with the New Brunswick Department of Highways and Public Works, an aboiteau was constructed in Westmorland County to serve as a bridge as well as a drainage outlet.

Near Truro, Colchester County, Nova Scotia, a reinforced concrete sluice, having three compartments, was installed. This is the second sluice of this type to be erected, the first being in Prince Edward Island. The foundation in this instance, being of a gravelly nature, was tapped with well points to control the water-table elevation during construction. This sluice is also equipped with treated steel gates because of the size of the discharge outlets. #

#### Progress of Projects to Date

On March 31, 1952, there were 114 projects which had been or were to be considered for rehabilitation purposes. Of these, 107 were incorporated marsh areas for which the Provinces had requested assistance. These are listed in Appendix 1. The other projects were established for the purpose of obtaining information as to the advisability of rehabilitation, or on methods by which they might be protected from salt water flooding. The investigations on two of these projects were previously brought to a conclusion and were reported on in previous years' reports.

Of the 107 projects, or incorporated marsh areas, 15 were brought forward by the Provinces during the past year, 7 being in Nova Scotia and 8 in New Brunswick. Table 1 gives the numbers of projects by provinces and indicates that there have been 47,382 areas of marsh incorporated for rehabilitation purposes. It is estimated that this marsh acreage is an integral part of 335,200 acres of farm land.

The latter part of the construction season was extremely wet. This hindered construction to the extent that some planned works could not be completed. Climatic conditions during the month of January were extreme and heavy flash floods occurred causing some areas to be flooded. However, no damage of particular consequence resulted to protective structures.

The program of works carried out during the past year was planned to provide protection to areas where the structures were in the most need of immediate re-construction, or where through the lack of protective works considerable marshland was being badly eroded by tidal action. There were 1400 acres of marshland newly protected from flooding and these protective works, in addition to safe-guarding existing structures, ensured that tide water would not break through and cause increased damage to valuable lands through continuous gullying by tidal action.

During the past year major reconstruction was carried out on 13 new areas in New Brunswick and 13 new areas in Nova Scotia. This brings the total number of areas to receive major works for protection against flooding by tide waters, to 38 in the three provinces. There still remains some additional work to be done on most of these areas. Maintenance work to maintain newly erected structures and

Table 1.

MARITIME MARSHLAND REHABILITATION PROJECTS AS AT MARCH 31, 1952.(1950 - 51 Figures in Brackets)

| Province                | No. of Projects<br>under<br>consideration | No. of Projects<br>incorporated by<br>the Province for<br>Rehabilitation | No. of<br>Projects under<br>investigation<br>only | Acreage of<br>Incorporated<br>Projects | Total estimated<br>farm acreage of<br>which the marsh<br>forms a part |
|-------------------------|---|--|---|--|---|
| Nova Scotia             | 65<br>(58)                                | 62<br>(55)   | 3   | 23,869<br>(22,572)                     | 225,400<br>(213,150)  |
| New Brunswick           | 48<br>(40)                                | 44<br>(36)   | 4   | <del>23,263</del><br>(19,243)          | 109,800<br>(86,950)   |
| Prince Edward<br>Island | 1<br>(1)                                  | 1<br>(1)   | -<br>-  | 250<br>(250)                           | information<br>unavailable  |
| Total                   | 114                                       | 107  | 7   | 47,382                                 | 335,200 #   |

\* Investigations were completed on two of these prior to April 1, 1951. # Exclusive of that in Prince Edward Island.



Fig. 7 - The sea-side of a large aboiteau in Albert County, N. B. Note how the tide water has removed the earth fill from between the brush layers. In the immediate foreground is temporary brush work as a means of repairing the weakest spot in the fill while a new structure was being erected.

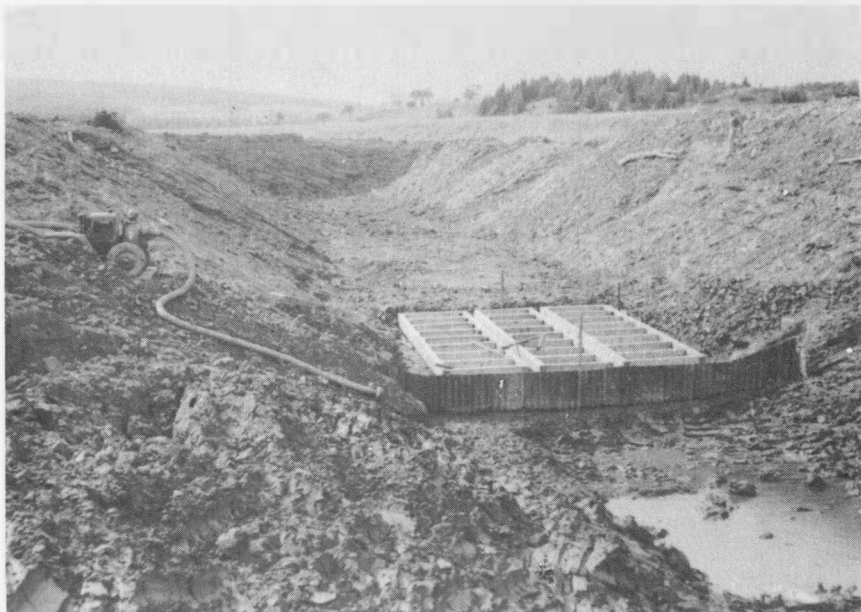


Fig. 8 - This photograph shows the excavation made adjacent to a creek bed for a new aboiteau sluice. Steel piling has been used to cut off seepage below the sluice bed. This seepage would otherwise take place through a seam of gravel at this location.

Table 2.

## SUMMARY OF THE NUMBER OF PROJECTS WORKED ON 1951 - 52.

| Province             | No. of Projects under consideration | No. of Projects on which works of a major nature were carried out 1951-52 | No. of Projects on which maintenance works only were carried out 1951-52 | No. of Projects on which the Province has requested action be temporarily deferred 1951-52 | No. of special Projects which have been or are being investigated. | No. of Projects on which no works have been initiated |
|----------------------|-------------------------------------|---|--|--|--|---|
| Nova Scotia          | 65                                  | 19  | 32   | 4  | 3  | 7   |
| New Brunswick        | 48                                  | 18  | 15   | 1  | 4 **   | 10  |
| Prince Edward Island | 1                                   | 0   | 1  | 0  | 0  | 0   |
| Totals               | 114                                 | 37 *  | 48   | 5  | 7  | 17  |

\* - of these 37 projects major works were initiated for the first time on 26, thirteen in each of Nova Scotia and New Brunswick.

\*\* - Investigations were completed on two of these prior to April 1951.

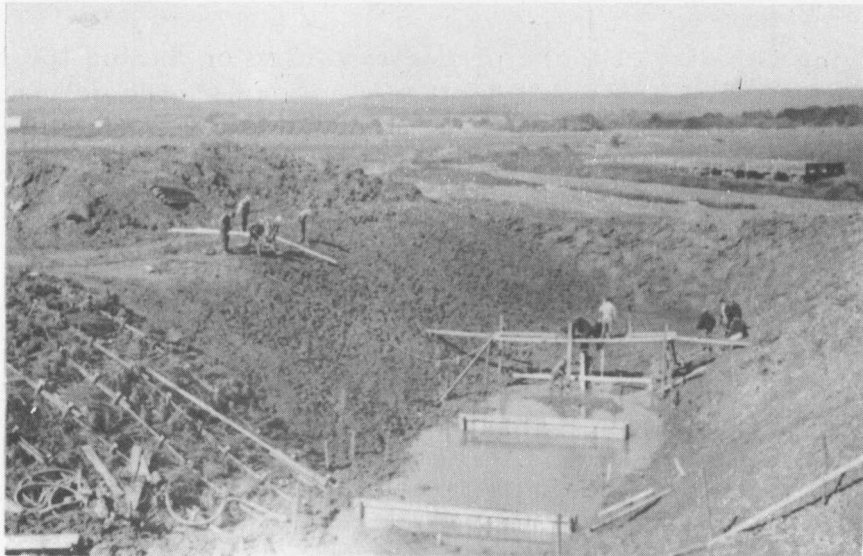


Fig. 9 - The excavation for a new aboiteau sluice near Falmouth, N. S. The new sluice may be viewed in the right background across the stream bed. This will be floated into place.

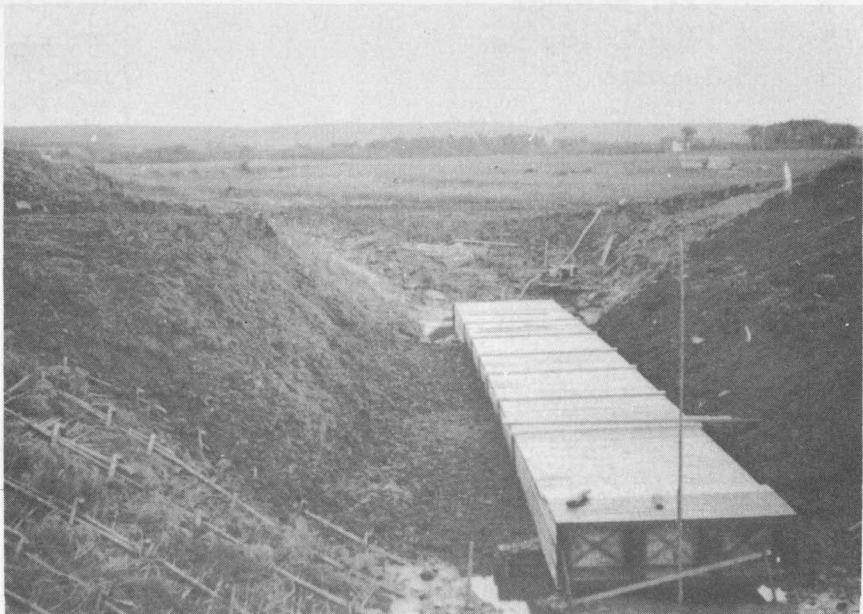


Fig. 10 - This is the sluice referred to in Fig. 9 after it has been placed. The gates may be viewed in the near end.

to hold old protective works was carried out on an additional 47 projects. Table 11 summarizes the foregoing by Provinces.

The following is a list of those projects worked on during the past year. The total expenditures to date on all projects is given in Appendix 11.

(a) Projects Receiving Works of a Major Degree - 1951-2

Nova Scotia

|             |       |    |                     |                   |
|-------------|-------|----|---------------------|-------------------|
| Project No. | N. S. | 3  | Falmouth Great Dyke | Hants County      |
| "           | N. S. | 4  | Queen Anne          | Annapolis County  |
| "           | N. S. | 5  | Dugau               | Annapolis County  |
| "           | N. S. | 8  | Grand Pre           | Kings County      |
| "           | N. S. | 9  | Woodworth           | Annapolis County  |
| "           | N. S. | 10 | Upper Belleisle     | Annapolis County  |
| "           | N. S. | 11 | Truro Dykeland Park | Colchester County |
| "           | N. S. | 13 | Dentiballis         | Annapolis County  |
| "           | N. S. | 14 | Elderkin            | Hants County      |
| "           | N. S. | 16 | Castle Frederick    | Hants County      |
| "           | N. S. | 17 | Falmouth Village    | Hants County      |
| "           | N. S. | 21 | Upper Nappan        | Cumberland County |
| "           | N. S. | 23 | Masstown            | Colchester County |
| "           | N. S. | 27 | Newport Town        | Hants County      |
| "           | N. S. | 31 | Fox Bow             | Annapolis County  |
| "           | N. S. | 38 | St. Croix           | Hants County      |
| "           | N. S. | 40 | Fort Belcher        | Colchester County |
| "           | N. S. | 53 | John Lusby          | Cumberland County |
| "           | N. S. | 55 | Seaman              | Cumberland County |

New Brunswick

|             |       |    |                   |                    |
|-------------|-------|----|-------------------|--------------------|
| Project No. | N. B. | 5  | Westcock          | Westmorland County |
| "           | N. B. | 6  | Taylor Village    | Westmorland County |
| "           | N. B. | 7  | Hopewell Hill     | Albert County      |
| "           | N. B. | 11 | Belliveau Village | Westmorland County |
| "           | N. B. | 13 | Dorchester        | Westmorland County |
| "           | N. B. | 14 | Lower Coverdale   | Albert County      |
| "           | N. B. | 15 | Middle Coverdale  | Albert County      |
| "           | N. B. | 19 | Beaumont          | Westmorland County |
| "           | N. B. | 21 | Memramcook West   | Westmorland County |
| "           | N. B. | 24 | Aulac             | Westmorland County |
| "           | N. B. | 28 | Upper Coverdale   | Albert County      |
| "           | N. B. | 30 | Calkins           | Albert County      |
| "           | N. B. | 33 | West Coverdale    | Albert County      |
| "           | N. B. | 37 | Sackville         | Westmorland County |
| "           | N. B. | 41 | Turtle Creek      | Albert County      |
| "           | N. B. | 42 | Jones             | Westmorland County |
| "           | N. B. | 45 | Chartersville     | Westmorland County |
| "           | N. B. | 46 | Wilson            | Westmorland County |





XX job

Fig. 11 - This structure is a combined aboiteau and highway crossing near Belliveau Village, N. B. The sluice was worn to a considerable degree and the entire facing on the sea-side of the structure has broken away. New Brunswick aboiteaux are being constructed with a slope of 3-1, and in the case of the larger structures a gravel facing is being placed.



Fig. 12 - This photograph shows the placing of fill and brush in the structure which is to replace that shown in Fig. 11. The downstream porch, wingwalls and sluice end may be seen.

(b) Projects Receiving Maintenance Works Only - 1951-52

Nova Scotia

|             |       |                             |                   |
|-------------|-------|-----------------------------|-------------------|
| Project No. | N. S. | 1 Comeau                    | Annapolis County  |
| "           | N. S. | 2 Windsor Forks             | Hants County      |
| "           | N. S. | 12 Victoria Diamond Jubilee | Colchester County |
| "           | N. S. | 15 Isgonish                 | Colchester County |
| "           | N. S. | 18 Ryerson                  | Annapolis County  |
| "           | N. S. | 20 Advocate                 | Cumberland County |
| "           | N. S. | 24 Noel Shore               | Hants County      |
| "           | N. S. | 29 Pre Rond                 | Annapolis County  |
| "           | N. S. | 30 Allan River              | Annapolis County  |
| "           | N. S. | 32 Mount Anne               | Annapolis County  |
| "           | N. S. | 33 Windermere               | Annapolis County  |
| "           | N. S. | 34 Moschelle                | Annapolis County  |
| "           | N. S. | 35 Ricketson                | Annapolis County  |
| "           | N. S. | 36 Rosette                  | Annapolis County  |
| "           | N. S. | 37 Walker                   | Annapolis County  |
| "           | N. S. | 39 Round                    | Colchester County |
| "           | N. S. | 41 Habitant                 | Kings County      |
| "           | N. S. | 42 Amherst Point            | Cumberland County |
| "           | N. S. | 43 Annapolis Royal Town     | Annapolis County  |
| "           | N. S. | 44 Converse                 | Cumberland County |
| "           | N. S. | 45 Barronsfield             | Cumberland County |
| "           | N. S. | 46 River Hebert             | Cumberland County |
| "           | N. S. | 47 Selmah                   | Hants County      |
| "           | N. S. | 49 Scotch Village           | Hants County      |
| "           | N. S. | 50 Herbert River            | Hants County      |
| "           | N. S. | 51 Morse                    | Annapolis County  |
| "           | N. S. | 56 Wellington               | Kings County      |
| "           | N. S. | 57 New Minas                | Kings County      |
| "           | N. S. | 58 Granville Centre         | Annapolis County  |
| "           | N. S. | 61 Kennetcook               | Hants County      |
| "           | N. S. | 65 Bishop Beckwith          | Kings County      |

New Brunswick

|             |       |                     |                    |
|-------------|-------|---------------------|--------------------|
| Project No. | N. B. | 1 Upper Dyke        | Albert County      |
| "           | N. B. | 2 Germantown        | Albert County      |
| "           | N. B. | 3 Tantramar West    | Westmorland County |
| "           | N. B. | 4 Allison           | Westmorland County |
| "           | N. B. | 8 Coyle Landry      | Westmorland County |
| "           | N. B. | 12 Pre d'en Haut    | Westmorland County |
| "           | N. B. | 16 Dixon Island     | Westmorland County |
| "           | N. B. | 18 Fox Creek        | Westmorland County |
| "           | N. B. | 20 Gautreau Village | Westmorland County |
| "           | N. B. | 26 Dover            | Westmorland County |

New Brunswick (Continued)

|             |       |                   |                    |
|-------------|-------|-------------------|--------------------|
| Project No. | N. B. | 27 College Bridge | Westmorland County |
| "           | N. B. | 29 Log Lake       | Westmorland County |
| "           | N. B. | 40 Woodpoint      | Westmorland County |
| "           | N. B. | 44 Coles Island   | Westmorland County |
| "           | N. B. | 47 Hillsboro      | Albert County      |

Prince Edward Island

|             |          |                  |               |
|-------------|----------|------------------|---------------|
| Project No. | F. E. I. | 1 Johnston River | Queens County |
|-------------|----------|------------------|---------------|

In carrying out the above program of works the following installations were made:

- (a) Dykes - There were 77,550 lineal feet of new dyke constructed and 67,600 lineal feet repaired and strengthened. To date there have been approximately 40.8 miles of new dyke erected.
- (b) Dyke Protection (Plank Facing) - 6,000 lineal feet of dyke were protected by newly installed plank facing bringing the total amount to date up to 14,200 feet. In addition 900 lineal feet of facing was repaired.
- (c) Stream Bank Protection - 4,400 lineal feet of brush matting was installed at critical points along stream banks bringing the total to date up to 6,600 feet. Also 305 feet of stream bank was protected by rock cribbing.
- (d) Aboiteaux - Sixty-four aboiteaux were completed. This brings the total number of new aboiteaux installed since 1949 up to 120. The installations of four others was initiated.

Investigations have continued to determine whether or not certain large structures may be physically feasible and economically justifiable. For a number of years it had been the opinion of some that the construction of a single large structure across each of several tidal rivers would stop the flow of tide water, thus protecting the marshland above the structures. This would do away with many miles of dykes and many aboiteaux, and more important, would eliminate the continual undercutting of dykes due to changing stream beds. In all cases, the benefits of this type of reclamation would extend beyond the marshland areas. Other interests such as railroads, highways, and towns would receive considerable protection. The reclamation resulting from this type of structure would protect additional land and increase the availability of marshlands for excellent pasture as the watertable could be maintained at a more suitable level.

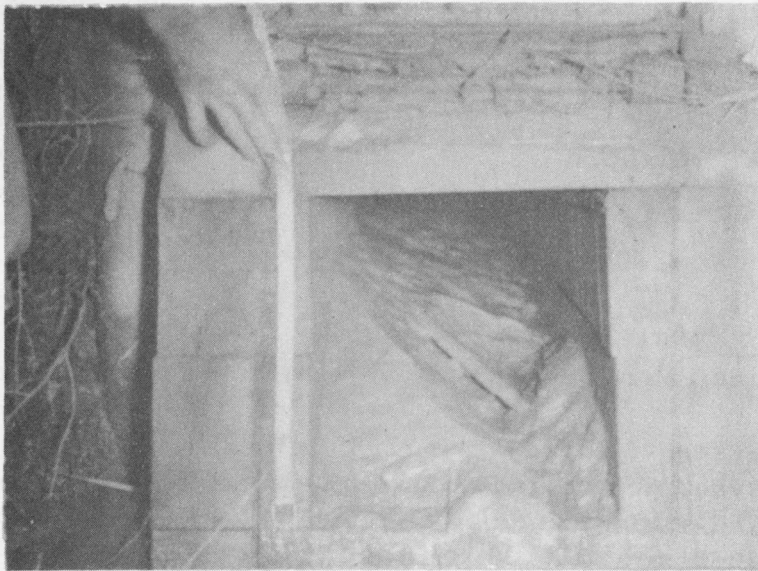


Fig. 13 - If the gates in sluices are not tight, considerable silt is deposited in the sluice and in the fresh water drainage ditch leading to it. This is particularly so on up-river marsh aboiteaux.



Fig. 14 - This photograph shows the gate on the sluice indicated in Fig. 13. The angle iron on the gate was placed in an attempt to prevent leakage of salt water and silt. However, this was not satisfactory. This aboiteau sluice was built many years ago.

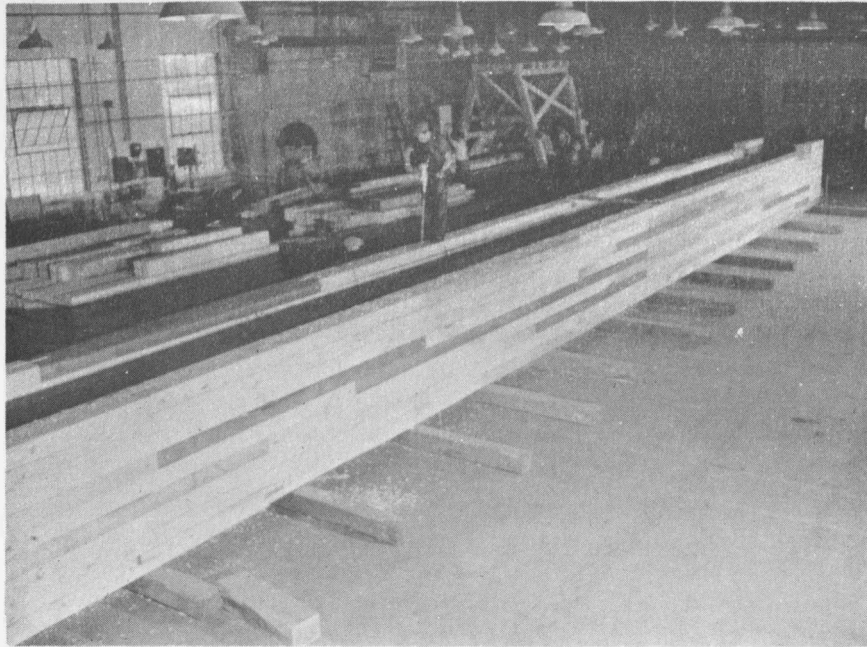


Fig. 15 - This photograph is an interior view of a timber sluice being fabricated in the Amherst headquarters workshop.



Fig. 16 - A view of the soil mechanics laboratory where pre-investigation of fill and foundation conditions is carried out from samples obtained in the field.

Investigations had been previously brought to a conclusion in respect to two projects and were reported on in the previous year's report. These were:

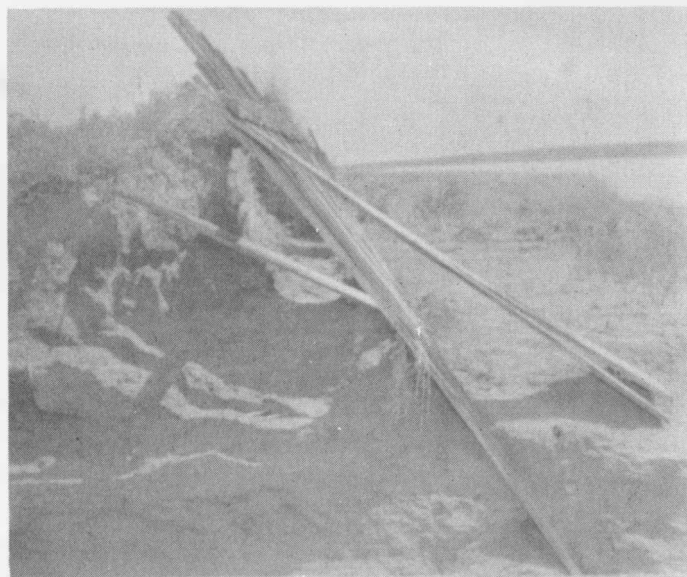
- (1) Memramcook River Survey, Westmorland County, New Brunswick.
- (2) Chance Harbour Marsh, St. John County, New Brunswick.

The other projects under investigation are as follows:

- (1) Annapolis River Survey, Annapolis County, Nova Scotia - As the engineering report of investigations and designs has not been completed no conclusions or recommendations may yet be made. The soil and economics information is now available. It is expected that the final reports will be assembled during the coming year.
- (2) Shepody River Survey, Albert County, New Brunswick - Although all field surveys have been completed and the resulting information assembled, additional engineering studies are required before recommendations for construction can be made.
- (3) Tantramar River Survey, Westmorland County, New Brunswick - Field investigations have been completed with the exception of the internal drainage system. As is the case with the Shepody River Survey additional engineering studies into construction problems are being made.
- (4) Gaspereaux River Survey, Kings County, Nova Scotia - Preliminary investigations have been carried out relative to erecting a combined highway crossing and aboiteau across this river. At the request of Nova Scotia Department of Highways and Public Works some discussion has resulted but no action is recommended at the present time.
- (5) Rossway Marsh, Digby County, Nova Scotia - No investigations of consequence have been made to date.



**Fig. 17** - A view of old rock crib work being repaired in the vicinity of Annapolis Royal, N.S. At extremely vulnerable points this type of protection is required to prevent under-cutting of the dyke.



**Fig. 18** - This is a view of an old dyke protected with plank facing. In this case the dyke or plank facing gave way, probably through lack of maintenance.

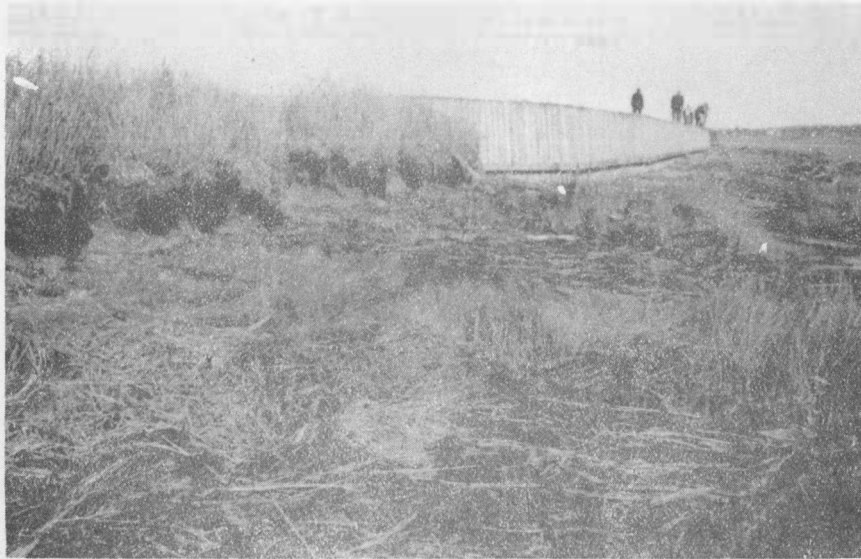


Fig. 19 - New plank facing being installed to protect dyke against wave action, the condition of the old dyke may be viewed at the left.



Fig. 20 - This is a photograph of marsh out to tide near Amherst, N. S. In the immediate foreground is what was once a small field drainage ditch and this continued well into the background. The tide flowing on and off the marsh has eroded this ditch at the rate of about 1000' per year.



APPENDIX 1

PROJECTS UNDER WAY AS AT MARCH 31, 1952.

Note: Acreages are shown for Marsh Bodies incorporated by the Provincial Governments.

(x) Partially out to sea.

(o) Out to sea.

(\*) Projects on which the Provincial Departments of Agriculture have requested that action be deferred.

| Project No.        | Name of Marsh Body      | Location       | Acreage |
|--------------------|-------------------------|----------------|---------|
| <u>Nova Scotia</u> |                         |                |         |
| N. S. 1            | Comeau                  | Annapolis Co.  | 279     |
| N. S. 2            | Windsor Forks           | Hants Co.      | 420     |
| N. S. 3            | Falmouth Great Dyke     | Hants Co.      | 940     |
| N. S. 4            | Queen Anne              | Annapolis Co.  | 376     |
| N. S. 5            | Duagu                   | Annapolis Co.  | 146     |
| N. S. 6            | Saulnierville           | Digby Co.      | 95      |
| N. S. 7            | Annapolis River Survey  | Annapolis Co.  |         |
| N. S. 8            | Grand Pre               | Kings Co.      | 2315    |
| N. S. 9            | Woodworth (x)           | Annapolis Co.  | 160     |
| N. S. 10           | Upper Belleisle         | Annapolis Co.  | 190     |
| N. S. 11           | Truro Dykeland Park (x) | Colchester Co. | 500     |

| Project No.                    | Name of Marsh Body       | Location       | Acreage |
|--------------------------------|--------------------------|----------------|---------|
| <u>Nova Scotia (Continued)</u> |                          |                |         |
| N. S. 12                       | Victoria Diamond Jubilee | Colchester Co. | 320     |
| N. S. 13                       | Dentiballis              | Annapolis Co.  | 283     |
| N. S. 14                       | Elderkin (x)             | Hants Co.      | 55      |
| N. S. 15                       | Isgonish                 | Colchester Co. | 375     |
| N. S. 16                       | Castle Frederick (x)     | Hants Co.      | 141     |
| N. S. 17                       | Falmouth Village (x)     | Hants Co.      | 103     |
| N. S. 18                       | Ryerson                  | Annapolis Co.  | 74      |
| N. S. 19                       | * Bridgetown (o)         | Annapolis Co.  | 60      |
| N. S. 20                       | Advocate                 | Cumberland Co. | 423     |
| N. S. 21                       | Upper Nappan             | Cumberland Co. | 405     |
| N. S. 22                       | Gaspereau River Survey   | Kings Co.      |         |
| N. S. 23                       | Masstown (x)             | Colchester Co. | 500     |
| N. S. 24                       | Noel Shore (x)           | Hants Co.      | 358     |
| N. S. 25                       | * South Maitland         | Hants Co.      | 34      |
| N. S. 26                       | Stirling Brook (o)       | Hants Co.      | 47      |
| N. S. 27                       | Newport Town             | Hants Co.      | 227     |
| N. S. 28                       | Scott's Bay (o)          | Hants Co.      | 62      |
| N. S. 29                       | Pre Rond                 | Annapolis Co.  | 134     |
| N. S. 30                       | Allan River (x)          | Annapolis Co.  | 283     |
| N. S. 31                       | Fox Bow                  | Annapolis Co.  | 137     |
| N. S. 32                       | Mount Anne               | Annapolis Co.  | 130     |
| N. S. 33                       | Windermere               | Annapolis Co.  | 117     |

| Project No.                    | Name of Marsh Body    | Location       | Acreage |
|--------------------------------|-----------------------|----------------|---------|
| <u>Nova Scotia (Continued)</u> |                       |                |         |
| N. S. 34                       | Moschelle             | Annapolis Co.  | 59      |
| N. S. 35                       | Ricketson             | Annapolis Co.  | 47      |
| N. S. 36                       | Rosette               | Annapolis Co.  | 33      |
| N. S. 37                       | Walker                | Annapolis Co.  | 58      |
| N. S. 38                       | St. Croix             | Hants Co.      | 220     |
| N. S. 39                       | Round                 | Colchester Co. | 75      |
| N. S. 40                       | Fort Belcher          | Colchester Co. | 140     |
| N. S. 41                       | Habitant              | Kings Co.      | 550     |
| N. S. 42                       | Amherst Point         | Cumberland Co. | 2130    |
| N. S. 43                       | Annapolis Royal Town  | Annapolis Co.  | 100     |
| N. S. 44                       | Converse              | Cumberland Co. | 636     |
| N. S. 45                       | Barronsfield          | Cumberland Co. | 212     |
| N. S. 46                       | River Hebert          | Cumberland Co. | 890     |
| N. S. 47                       | Selmah                | Hants Co.      | 120     |
| N. S. 48                       | Centre Burlington (o) | Hants Co.      | 210     |
| N. S. 49                       | Scotch Village        | Hants Co.      | 50      |
| N. S. 50                       | Herbert River         | Hants Co.      | 72      |
| N. S. 51                       | Morse                 | Annapolis Co.  | 48      |
| N. S. 52                       | Rossway (o)           | Digby Co.      |         |
| N. S. 53                       | John Lusby (x)        | Cumberland Co. | 1890    |
| N. S. 54                       | Minudie (x)           | Cumberland Co. | 2310    |
| N. S. 55                       | Seaman                | Cumberland Co. | 235     |

| Project No.                    | Name of Marsh Body   | Location        | Acreage      |
|--------------------------------|----------------------|-----------------|--------------|
| <u>Nova Scotia (Continued)</u> |                      |                 |              |
| N. S. 56                       | Wellington           | Kings Co.       | 2400         |
| N. S. 57                       | New Minas            | Kings Co.       | 257          |
| N. S. 58                       | Granville Centre (x) | Annapolis Co.   | 141          |
| N. S. 59                       | Brown Salt Pond      | Yarmouth Co.    | 104          |
| N. S. 60                       | Morse Bishop         | Annapolis Co.   | 73           |
| N. S. 61                       | Kennetcook           | Hants Co.       | 155          |
| N. S. 62                       | McKay                | Cumberland Co.  | 143          |
| N. S. 63                       | * Maccan             | Cumberland Co.  | 200          |
| N. S. 64                       | * Glenholme (x)      | Colchester Co.  | 162          |
| N. S. 65                       | Bishop Beckwith      | Kings Co.       | <u>460</u>   |
|                                |                      | TOTAL           | <u>23869</u> |
| <u>New Brunswick</u>           |                      |                 |              |
| N. B. 1                        | Upper Dyke           | Albert Co.      | 271          |
| N. B. 2                        | Germantown           | Albert Co.      | 698          |
| N. B. 3                        | Tantramar West       | Westmorland Co. | 2133         |
| N. B. 4                        | Allison              | Westmorland Co. | 133          |
| N. B. 5                        | Westcock             | Westmorland Co. | 674          |
| N. B. 6                        | Taylor Village       | Westmorland Co. | 374          |
| N. B. 7                        | Hopewell Hill        | Albert Co.      | 1371         |
| N. B. 8                        | Coyle Landry (x)     | Westmorland Co. | 206          |
| N. B. 9                        | Harvey (o)           | Albert Co.      | 643          |
| N. B. 10                       | Shepody River Survey | Albert Co.      |              |

| Project No.                      | Name of Marsh Body      | Location        | Acreage |
|----------------------------------|-------------------------|-----------------|---------|
| <u>New Brunswick</u> (Continued) |                         |                 |         |
| N. B. 11                         | Belliveau Village       | Westmorland Co. | 152     |
| N. B. 12                         | Pre d'en Haut           | Westmorland Co. | 83      |
| N. B. 13                         | Dorchester              | Westmorland Co. | 1411    |
| N. B. 14                         | Lower Coverdale         | Albert Co.      | 141     |
| N. B. 15                         | Middle Coverdale        | Albert Co.      | 51      |
| N. B. 16                         | Dixon Island            | Westmorland Co. | 304     |
| N. B. 17                         | New H rton (o)          | Albert Co.      | 554     |
| N. B. 18                         | Fox Creek               | Westmorland Co. | 84      |
| N. B. 19                         | Beaumont                | Westmorland Co. | 158     |
| N. B. 20                         | Gautreau Village (x)    | Westmorland Co. | 174     |
| N. B. 21                         | Memramcook West         | Westmorland Co. | 820     |
| N. B. 22                         | Tantramar River Survey  | Westmorland Co. |         |
| N. B. 23                         | Memramcook River Survey | Westmorland Co. |         |
| N. B. 24                         | Aulac                   | Westmorland Co. | 1853    |
| N. B. 25                         | Dock                    | Westmorland Co. | 25      |
| N. B. 26                         | Dover (x)               | Westmorland Co. | 34      |
| N. B. 27                         | College Bridge (x)      | Westmorland Co. | 800     |
| N. B. 28                         | Upper Coverdale         | Albert Co.      | 45      |
| N. B. 29                         | Log Lake                | Westmorland Co. | 3734    |
| N. B. 30                         | Calkins                 | Albert Co.      | 350     |
| N. B. 31                         | Baie Verte (o)          | Westmorland Co. | 440     |
| N. B. 32                         | * Salem (o)             | Albert Co.      | 65      |

| Project No.                      | Name of Marsh Body | Location        | Acreege       |
|----------------------------------|--------------------|-----------------|---------------|
| <u>New Brunswick</u> (Continued) |                    |                 |               |
| N. B. 33                         | West Coverdale     | Albert Co.      | 161           |
| N. B. 34                         | Coverdale          | Albert Co.      | 89            |
| N. B. 35                         | Waterside          | Albert Co.      | 425           |
| N. B. 36                         | Boundary Creek     | Westmorland Co. | 67            |
| N. B. 37                         | Sackville (x)      | Westmorland Co. | 432           |
| N. B. 38                         | Rockland (o)       | Westmorland Co. | 223           |
| N. B. 39                         | Chance Harbour (o) | St. John Co.    |               |
| N. B. 40                         | Woodpoint (x)      | Westmorland Co. | 65            |
| N. B. 41                         | Turtle Creek       | Albert Co.      | 259           |
| N. B. 42                         | Jones              | Westmorland Co. | 113           |
| N. B. 43                         | Creek's            | Albert Co.      | 110           |
| N. B. 44                         | Coles Island       | Westmorland Co. | 2119          |
| N. B. 45                         | Chartersville      | Westmorland Co. | 305           |
| N. B. 46                         | Wilson             | Westmorland Co. | 182           |
| N. B. 47                         | Hillsboro          | Albert Co.      | 871           |
| N. B. 48                         | McAlmon (o)        | Albert Co.      | <u>61</u>     |
|                                  |                    | TOTAL           | <u>2 3263</u> |

Prince Edward Island

|            |                |       |            |
|------------|----------------|-------|------------|
| P. E. I. 1 | Johnston River | TOTAL | <u>250</u> |
|------------|----------------|-------|------------|

Totals

|                           |            |
|---------------------------|------------|
| Nova Scotia.....          | 23869      |
| New Brunswick.....        | 23263      |
| Prince Edward Island..... | <u>250</u> |

Total A reage of Incorporated Marsh Bodies 47382

| <u>APPENDIX 11 - Expenditures - Fiscal years:</u> | <u>1949-51</u> | <u>1951-52</u> |
|---|----------------|----------------|
| Administration                                    | 94,579.29      | 56,795.94      |
| Surveys & Engineering                             | 190,446.42     | 181,493.50     |
| Construction Equipment, Materials & Workshop      | 290,278.08     | 169,740.03     |
| Construction Projects:                            |                |                |
| Amherst Point Marsh, Nova Scotia                  | 48,000.00      | 3,424.02       |
| Annapolis River Survey                            | 12,472.03      | 1,567.61       |
| Castle Frederick Marsh, Nova Scotia               |                | 20,650.10      |
| Comeau Marsh, Nova Scotia                         | 23,001.52      |                |
| Converse Marsh, Nova Scotia                       |                | 2,213.92       |
| Dentiballis Marsh, Nova Scotia                    | 53,894.35      | 13,468.83      |
| Dugau Marsh, Nova Scotia                          | 18,500.00      | 2,274.18       |
| Elderkin Marsh, Nova Scotia                       |                | 17,926.98      |
| Falmouth Great Dyke Marsh, Nova Scotia            | 41,812.88      | 36,315.07      |
| Falmouth Village, Marsh, Nova Scotia              |                | 2,387.84       |
| Fort Belcher Marsh, Nova Scotia                   |                | 11,139.96      |
| Grand Pre Marsh, Nova Scotia                      | 72,424.46      |                |
| Habitant Marsh, Nova Scotia                       | 3,249.49       |                |
| Isgonish Marsh, Nova Scotia                       |                | 1,302.03       |
| John Lusby Marsh, Nova Scotia                     |                | 26,774.19      |
| Masstown Marsh, Nova Scotia                       |                | 19,705.58      |
| Newport Town Marsh, Nova Scotia                   |                | 25,730.36      |
| Queen Anne Marsh, Nova Scotia                     | 73,468.37      | 14,990.91      |
| Saulnierville Marsh, Nova Scotia                  | 6,527.70       | 46.48          |
| St. Croix Marsh, Nova Scotia                      |                | 53,005.44      |

| Construction Projects: (Continued)          | 1949-51   | 1951-52   |
|---|-----------|-----------|
| Truro Dykeland Park Marsh, Nova Scotia      | 45,218.81 | 21,162.18 |
| Upper Belleisle Marsh, Nova Scotia          |           | 25,390.30 |
| Upper Nappan Marsh, Nova Scotia             |           | 17,744.44 |
| Victoria Diamond Jubilee Marsh, Nova Scotia | 45,694.67 | 2,861.05  |
| Woodworth Marsh, Nova Scotia                |           | 14,500.00 |
| Allison Marsh, New Brunswick                | 14,386.00 | 2,275.87  |
| Aulac Marsh, New Brunswick                  |           | 30,756.53 |
| Beaumont Marsh, New Brunswick               | 17,814.01 | 8,506.50  |
| Belliveau Village Marsh, New Brunswick      | 903.76    | 15,790.19 |
| Calkins Marsh, New Brunswick                |           | 45,282.58 |
| Chartersville Marsh, New Brunswick          |           | 1,962.07  |
| Coyle Landry Marsh, New Brunswick           |           | 3,407.70  |
| Dixon Island Marsh, New Brunswick           | 6,502.88  |           |
| Dorchester Marsh, New Brunswick             | 15,533.15 | 14,917.63 |
| Hopewell Hill Marsh, New Brunswick          |           | 20,983.26 |
| Lower Coverdale Marsh, New Brunswick        | 20,144.60 | 8,683.76  |
| Memramcook West Marsh, New Brunswick        |           | 32,777.43 |
| Middle Coverdale Marsh, New Brunswick       | 10,939.65 | 1,817.90  |
| New Horton Marsh, New Brunswick             | 948.10    |           |
| Pre d'en Haut Marsh, New Brunswick          | 4,150.00  |           |
| Sackville Marsh, New Brunswick              |           | 11,224.91 |
| Shepody River Survey                        | 16,191.77 | 5,285.61  |
| Tantramar River Survey                      | 9,963.89  | 13,237.59 |
| Taylor Village Marsh, New Brunswick         |           | 61,208.78 |



Construction Projects: (Continued)

|   | 1949-51   | 1951-52   |
|---|-----------|-----------|
| Turtle Creek Marsh, New Brunswick                         |           | 2,017.09  |
| Upper Coverdale Marsh, New Brunswick                      |           | 8,417.95  |
| Westcock Marsh, New Brunswick                             | 67,531.76 | 35,294.55 |
| West Coverdale Marsh, New Brunswick                       |           | 3,485.61  |
| Wilson Marsh, New Brunswick                               |           | 1,697.67  |
| Johnston River Marsh, Prince Edward Island                | 19,165.00 | 160.66    |
| Maintenance of Projects (including minor re-construction) |           |           |
| Advocate Marsh, Nova Scotia                               | 741.45    | 536.17    |
| Allan River Marsh, Nova Scotia                            | 2,014.18  | 983.61    |
| Annapolis River Town Marsh, Nova Scotia                   | 332.00    | 34.92     |
| Barronsfield Marsh, Nova Scotia                           | 1,160.40  | 1,164.86  |
| Bishop Beckwith Marsh, Nova Scotia                        |           | 2,196.59  |
| Castle Frederick Marsh, Nova Scotia                       | 1,539.46  |           |
| Centre Burlington Marsh, Nova Scotia                      | 16.25     | 493.07    |
| Comeau Marsh, Nova Scotia                                 | 129.15    | 1,078.82  |
| Converse Marsh, Nova Scotia                               | 351.85    |           |
| Dentiballis Marsh, Nova Scotia                            | 297.00    |           |
| Falmouth Village Marsh, Nova Scotia                       | 1,850.79  |           |
| Fort Belcher Marsh, Nova Scotia                           | 162.60    |           |
| Fox Bow Marsh, Nova Scotia                                |           | 9,420.93  |
| Grand Pre Marsh, Nova Scotia                              | 899.50    |           |
| Granville Centre Marsh, Nova Scotia                       |           | 1,862.95  |
| Habitant Marsh, Nova Scotia                               |           | 875.81    |

Maintenance of Projects (including minor re-construction) (Continued)

|  | 1949-51  | 1951-52   |
|--|----------|-----------|
| Hebert River Marsh, Nova Scotia        |          | 175.90    |
| Isgonish Marsh, Nova Scotia            | 127.00   | 210.70    |
| Kennetcook Marsh, Nova Scotia          |          | 395.15    |
| Masstown Marsh, Nova Scotia            | 72.80    |           |
| Morse Marsh, Nova Scotia               | 63.50    | 652.81    |
| Moschelle Marsh, Nova Scotia           | 1,047.29 | 1,221.88  |
| Mount Anne Marsh, Nova Scotia          | 921.45   | 927.90    |
| New Minas Marsh, Nova Scotia           |          | 6,667.78  |
| Newport Town Marsh, Nova Scotia        | 1,391.64 |           |
| Noel Shore Marsh, Nova Scotia          | 1,443.55 | 1,355.24  |
| Pre Rond Marsh, Nova Scotia            | 18.00    | 397.43    |
| Queen Anne Marsh, Nova Scotia          | 361.61   |           |
| Ricketson Marsh, Nova Scotia           |          | 88.00     |
| River Hebert Marsh, Nova Scotia        | 966.99   |           |
| Rosette Marsh, Nova Scotia             | 42.00    | 20.09     |
| Round Marsh, Nova Scotia               |          | 3,407.50  |
| Ryerson Marsh, Nova Scotia             | 69.79    | 4,507.52  |
| Scotch Village Marsh, Nova Scotia      | 124.85   | 1,018.30  |
| Seaman Marsh, Nova Scotia              |          | 19,918.83 |
| Selmah Marsh, Nova Scotia              | 50.15    |           |
| St. Croix Marsh, Nova Scotia           | 1,751.63 |           |
| Truro Dykeland Park Marsh, Nova Scotia | 307.50   |           |
| Upper Belleisle Marsh, Nova Scotia     | 150.80   |           |

Maintenance of Projects (including minor re-construction) Continued)

|  | 1949-51   | 1951-52  |
|--|-----------|----------|
| Upper Nappan Marsh, Nova Scotia        | 350.46    |          |
| Walker Marsh, Nova Scotia              | 58.38     | 254.70   |
| Wellington Marsh, Nova Scotia          |           | 5,325.03 |
| Windermere Marsh, Nova Scotia          | 196.40    | 1,481.26 |
| Windsor Forks Marsh, Nova Scotia       | 335.26    | 4,525.02 |
| Woodworth Marsh, Nova Scotia           | 1,730.73  |          |
| Allison Marsh, New Brunswick           | 868.10    |          |
| Aulac Marsh, New Brunswick             | 3,873.87  |          |
| Baie Verte Marsh, New Brunswick        |           | 923.03   |
| Belliveau Village Marsh, New Brunswick | 1,467.05  |          |
| Boundary Creek Marsh, New Brunswick    |           | 109.14   |
| Calkins Marsh, New Brunswick           | 7,552.73  |          |
| Coles Island Marsh, New Brunswick      |           | 1,515.88 |
| College Bridge Marsh, New Brunswick    | 1,917.89  | 650.39   |
| Coverdale Marsh, New Brunswick         |           | 19.31    |
| Coyle Landry Marsh, New Brunswick      | 2,011.34  |          |
| Dixon Island Marsh, New Brunswick      |           | 459.89   |
| Dock Marsh, New Brunswick              | 1,800.65  |          |
| Dorchester Marsh, New Brunswick        | .24       |          |
| Dover Marsh, New Brunswick             | 506.00    | 78.40    |
| Fox Creek Marsh, New Brunswick         | 1,312.70  | 479.13   |
| Gautreau Village Marsh, New Brunswick  | 2,931.20  | 617.65   |
| Germantown Marsh, New Brunswick        | 11,637.41 | 56.00    |

Maintenance of Projects (including minor re-construction) (Continued)

|                                      | 1949-51               | 1951-52               |
|--------------------------------------|-----------------------|-----------------------|
| Hillsboro Marsh, New Brunswick       |                       | 959.52                |
| Hopewell Hill Marsh, New Brunswick   | 12,981.04             |                       |
| Jones Marsh, New Brunswick           |                       | 4,619.52              |
| Log Lake Marsh, New Brunswick        | 892.02                | 5,143.28              |
| Memramcook West Marsh, New Brunswick | 7,279.67              |                       |
| New Horton Marsh, New Brunswick      |                       | 60.85                 |
| Pre d'en Haut Marsh, New Brunswick   | 6,737.02              | 457.31                |
| Salem Marsh, New Brunswick           |                       | 434.76                |
| Sackville Marsh, New Brunswick       | 22.04 Cr. #           |                       |
| Tantramar West Marsh, New Brunswick  | 11,647.30             | 7,941.10              |
| Taylor Village Marsh, New Brunswick  | 10,064.75             |                       |
| Upper Coverdale Marsh, New Brunswick | 650.21                |                       |
| Upper Dyke Marsh, New Brunswick      | 7,077.30              | 3,367.68              |
| Westcock Marsh, New Brunswick        | 910.69                |                       |
| West Coverdale Marsh, New Brunswick  | 788.78                |                       |
| Woodpoint Marsh, New Brunswick       |                       | 464.93                |
|                                      | <u>\$1,339,705.97</u> | <u>\$1,195,987.59</u> |

# The total cost of maintenance work on this project during 1950-51 was \$378.26. Expenditures to the amount of \$148.42 were charged directly to the project. The balance of the expenditures, \$229.84 were not charged directly to the project, but to Construction Equipment, Materials and Workshop, in error. By agreement, the Town of Sackville bore \$170.46 of the total cost of works, and this sum was credited directly to the project. Thus the credit of \$22.04.