CANADA

DEPARTMENT OF AGRICULTURE

SECOND ANNUAL REPORT

ON ACTIVITIES

UNDER THE

MARITIME MARSHLAND REHABILITATION ACT

FOR THE FISCAL YEAR ENDED

MARCH 31, 1951

PREPARED BY

MARITIME MARSHLAND REHABILITATION ADMINISTRATION

CANADA DEPARTMENT OF AGRICULTURE

AMHERST, NOVA SCOTIA

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INTRODUCTION

The Maritime Marshland Rehabilitation Administration of the Department of Agriculture has completed it's second year of operation. It was established in 1949 to carry out the Government of Canada's responsibility as provided for by the Maritime Marshland Rehabilitation Act.

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 was passed in order that the protective structures, which were gradually falling into a state of disrepair, or collapsing and permitting tide water to flood the land, might be reconstructed to preserve the soil and to assist in maintaining agricultural production.

The responsibility for the rehabilitation of these areas is shared by the provincial and federal governments. The latter is responsible for the construction of the necessary protective works required to prevent the flooding of lands by salt water. It is also responsible for the maintenance of these structures until the Minister of Agriculture turns this responsibility over to the Provinces. In addition the Government of Canada provides all the engineering services required for carrying out the rehabilitation program.

The provincial governments undertake to ensure that the marshlands are provided with adequate internal drainage and that a suitable land-use policy is developed and carried out, thus utilizing the marshlands to their full advantage. They also see that the necessary lands required for the construction of the protective works are provided. The provinces also organize the marshland owners before the rehabilitation of a particular area is undertaken.

Up to March 31, 1951, Nova Scotia had organized 55 marsh areas for rehabilitation purposes, New Brunswick, 36, and Prince Edward Island had requested assistance in respect to 1 area. These 92 areas comprise 42,065 acres of marsh which is an integral portion of an estimated 300,100 acres of farm land. In addition 7 other projects had been or were under investigation.

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 at Amherst, Nova Scotia. The facilities and staff were expanded during the year to meet the urgent need for rehabilitation. Additional technical staff, necessary for the carrying out of the works program, was obtained but only a slight increase was made in the number of personnel employed for administrative duties.

From the experiences gained during the first year's operation, standards in surveys, design of structures and construction techniques had been developed and these were put into practice with considerable success.

During the summer of 1950 the Economics Division of the Canada Department of Agriculture, carried out an economic study on some phases of marshland rehabilitation. Soil surveys were conducted on some areas in both Nova Scotia and New Brunswick.

The reports of these surveys, and the economic study, will be of considerable assistance to the Maritime Marshland Rehabilitation Advisory Committee. This Committee, appointed under Section 8 (1) of the Act, met on three occasions during the year. At these Meetings recommendations were made in respect to projects requiring rehabilitation as provided for in Section 4(a) of the Act.

Survey

To facilitate the layout of new protective structures, or the repair of existing structures, as well as to enable the proper design of drainage systems, comprehensive topographic surveys were found to be necessary. Such surveys permit proper planning and assist in the setting up of work to be carried out on a contract basis. Moreover, complete studies may be made whereby aboiteaux, costly to construct and maintain, may be eliminated with no loss in drainage efficiency.

To date the urgency of the program has not permitted surveys to be made well in advance of construction. Efforts are now being made to complete plans for projects before any major works are initiated on them.

Soil Mechanics Investigations.

Little engineering information on soil properties, from a construction viewpoint, was available in respect to the marshland soils. As practically all the protective structures require marsh soil for their construction, soil mechanics investigations were initiated during 1949, but relatively little information was obtained. During the present fiscal year, the investigations were speeded with a view to determining the conditions of the soil which was to be used in dyke fill, or which was to form the foundation for aboiteaux. The latter involves boring or

drilling in most cases. With this information at hand the hazards discovered may be guarded against or provision made to meet them. It has been found that the marsh soil varies little in structure but that, from the construction viewpoint it is very weak. The natural water content is so high that often the soil technically becomes a fluid when activated. The investigations facilitate the selection of the most suitable dyke and aboiteau location. It is expected that in future such investigations will be made in respect to all dyke and aboiteau structures.

Design

As no practical engineering designs had been developed prior to 1947, it has been found necessary, through experience, to alter dyke and aboiteau design to meet the conditions of soil and tide. The original structures and most of the existing ones were built by hand using farm tools. This method was satisfactory at the time but is not economical nor practical now. Throughout the year standards were under test and were modified where weakness appeared. By March 31, 1951, sufficient investigational work had been carried out to permit the engineering staff to modify, with some assurance, designs for dykes and aboiteaux, and also stream bank protection so far as the use of brush in the latter is concerned.

It is of particular interest to record that what is believed to be the first aboiteau with a concrete sluice, a rock and earth core fill, and no brush or brush mat foundation, was successfully constructed on Prince Edward Island in 1950.

The design of sluice gates to replace the heavy bronze type is being pressed. It is expected that some cast iron and aluminum alloy gates will be placed during the coming year. These will be less expensive and more efficient.

Studies on the use of treated fibre pipe for small sluices are being carried out with a view to eliminating the placement of some of the more costly timber sluices.

The Experimental Farms Service and the Soils and Fertilizer Division of the Nova Scotia Department of Agriculture have been co-operating in an effort to determine the most desirable species of vegetative growth to protect dykes from wash. These include grasses to protect the inside or dry slopes and also salt tolerant grasses to protect the seaside or wet slopes. Methods of preparing the salt earth fill for seeding and methods of seeding also are being investigated.

Supervision of Construction

Sufficient staff was obtained and trained to supervise dyke construction by contract or other means, aboiteau construction and repair, installation of plank facing for dyke protection, and brush matting for a limited amount of stream bank protection. It was found desirable and necessary to employ personnel acquainted with the construction of protective structures who lived in the immediate vicinity of the work. It is believed that the personnel presently employed are capable of carrying out an expanded program.

Workshop and Equipment

As previously reported, a small quantity of earth-moving equipment had been purchased. This has been suitably employed to supplement contractors' equipment on the various jobs throughout the three provinces. The size of the equipment appears to be suitable to do the work for which it was purchased.

The workshop at the Administration headquarters prefabricated all the timber sluices installed with a marked degree of success. The workshop permits the concentration of trained personnel for this work and enables strict supervision to be carried out in the matter of maintaining standards in fabrication.

ACTIVITIES OF THE MARITIME MARSHLAND REHABILITATION ADMINISTRATION.

Progress of Projects to Date.

On March 31, 1951 there were 99 projects under consideration. Of these 92 were Incorporated Marsh areas which the provinces had requested be investigated for rehabilitation. These are listed in Appendix 1. The others were projects which were established for the purpose of obtaining information as to the advisability of rehabilitation or on methods by which they were to be protected from salt water flooding.

During the year major reconstruction, was carried out on 17 projects. On 47 others protective maintenance or some minor reconstruction work was done on existing structures. The remaining incorporated areas are either projects which are already flooded by tide water following the collapse of protective structures or projects which were incorporated too late in the year for investigation or for construction work to be carried on.

Table 1 gives the number of projects incorporated by the provinces, the number under investigation, the number receiving major reconstruction, the number receiving minor reconstruction or maintenance only. Also included in the table is the marsh acreage and the estimated acreage of farm land of which the marsh forms an integral part.

Detailed reports are being prepared for each project. These reports are kept up to date and any work related to them is recorded each year. Reports on any individual projects will not be completed until the major reconstruction has been carried out on those particular projects.

During the construction season of 1950, 54 new aboiteaux were constructed. The sizes varied considerably, the sluice sizes being from single 1' x 1' inlets to a combination of 3, 3' x 4' inlets. Of the 54 aboiteaux, 50 were constructed with timber sluices having metal gates; three with asbestos bonded metal pipe, and one was made of concrete. Major repairs of a permanent nature were carried out on an additional 26 aboiteaux, of these one had an asbestos bonded metal sluice jacked

TABLE 1

MARITIME MARSHLAND REHABILITATION PROJECTS AS AT MARCH 31st, 1951.
(1949-50 Figures in Brackets).

Province	Number of Projects under consideration.	Number of Projects incorporated by the Provinces for Rehabilitation.	Number of Projects under investigation only.	Number of Projects receiving major reconstruction	Number of Projects receiving maintenance works only.	Acreage of Incorporated Projects	Total estimated farm acreage of which the marsh forms a part.
Nova Scotia	58 (21)	55 (17)	3 (4)	11 (1)	26 (6)	22,572 (7,082)	213,150 (67,282)
New Brunswick	40 (25)	36 (22)	4 (3)	7 (1)	21 (9)	19,243 (12,318)	86,950 (55,718)
Prince Edward Island	1 (1)	1 (1)	0 (0)	1 (0)	0 (0)	250 (250)	information unavailable.
T O T A L S	99	92	7	19 (1950)	47 (1950)	42,065	300,100 #

Exclusive of that in Prince Edward Island.

through sound fill to replace an existing unsound timber sluice. By the installation and repair of these structures, 33 other aboiteaux in poor condition were eliminated thus reducing replacement costs and more important, doing away with maintenance costs on these particular aboiteaux over the years to come.

There were 116,638 lineal feet of new dyke constructed and 40,822 lineal feet strengthened on the 17 projects receiving major reconstruction. On these same projects there were 8,170 lineal feet of new plank or slab facing constructed for dyke protection and 2300 lineal feet were reconditioned. Also there were four breakwaters constructed and 2200 lineal feet of stream bank protected by brush to prevent undercutting of dyke by stream action.

On the 47 marsh areas receiving maintenance only, there were 20,925 lineal feet of new dyke constructed, 44,980 lineal feet temporarily repaired and 1200 lineal feet of stream bank protected.

Projects on which major reconstruction was carried out.

The expenditures made on each project are shown in Appendix 11

Project N.B. 4 - Allison Marsh, N.B.

The dyke protecting this area of marsh was in such a condition that it was necessary to construct 9700 lineal feet of new dyke and to strengthen 4600 lineal feet of existing dyke.

Two aboiteaux with timber sluices were installed as were three with asbestos bonded metal pipe sluices. All of these sluices are equipped with metal gates to prevent leakage of silty salt water.

Two breakwaters of the rock crib variety were installed.

Project N.B. 5, Westcock Marsh, N.B.

The existing dyke protecting this marsh was in such poor condition that it was necessary to reconstruct approximately 20,000 lineal feet of dyke, utilizing existing dyke where possible. Eight hundred lineal feet of slab facing was installed to protect the new dyke where it was exposed to severe wave action. The dyke work was not completed during the construction season, final grading and finishing remaining to be carried out. The condition of the soil used in the dyke fill was such that an extra large cross-section was provided for. It will be necessary to establish vegative growth to protect this as quickly as possible.

Five aboiteaux with timber sluices were installed. Major repairs were initiated on one very large structure. This work was not completed because of the lateness of the season. The repairs initiated took the form of jacking an asbestos bonded metal pipe below the existing fill thus providing a new sluice. This was necessitated by the collapse of the existing timber sluice. On one

aboiteau fill protective facing of graded stone aggregate was placed with a view to determining it's suitability for aboiteau face protection. To date this appears to be very satisfactory and it may offer an opportunity for protection in those instances where the supply of material is readily available.

Project N. B. 13, Dorchester Marsh, N. B.

The condition of existing aboiteaux protecting this marsh was such that immediate replacement of two, and major repairs to two others, was necessary. Timber sluices were installed in the two new ones. As a means of continuing the protection of the marsh, 400 lineal feet of new dyke was constructed and minor repairs made to an additional 2100 lineal feet.

Project N. B. 14, Lower Coverdale Marsh, N. B.

The protective structures were such that it was necessary to construct a 5575 lineal feet of new dyke and to strengthen an additional 4140 lineal feet of existing dyke. Four aboiteaux were repaired, it being considered that the existing sluices were sufficiently sound to last a few more years. The liquid limit of the soil being used to make the dyke was in some locations so high that the fill material was a fluid which necessitated allowing it to dry before it was placed in its final position.

The closing down of the construction season did not permit the final grading and finishing of the new dyke. It is proposed to complete this during 1951.

Project N. B. 15, Middle Coverdale Marsh, N. B.

The condition of the existing dyke was such that it was necessary to construct 2400 lineal feet utilizing the material in the old dyke. Two new aboiteaux were constructed using timber sluices and an additional three were eliminated. The dyke work, as in the case of Lower Coverdale, was not completed.

Project N. B. 19, Beaumont Marsh, N. B.

Here again existing dyke was in such a weakened condition that 10,000 lineal feet were newly constructed. One aboiteau was replaced using a timber sluice and this resulted in the elimination of two additional ones. Soil and weather conditions held up the dyke work so that final grading and finishing was not completed. This work will also be finished during 1951.

Project N. S. 3, Falmouth Great Dyke Marsh, N. S.

The Falmouth Great Dyke Marsh appears to have what is one of the better land use programs in the Maritime Provinces. In reconditioning the existing structures there were 7300 lineal feet of new dyke constructed and 8,000 lineal feet strengthened.

Fig. 1 - Project N. B. 5 - Westcock Marsh, N. B.
A section of dyke under construction. A dragline cast the fill from the borrow pit at the right. Final grading remains to be completed.

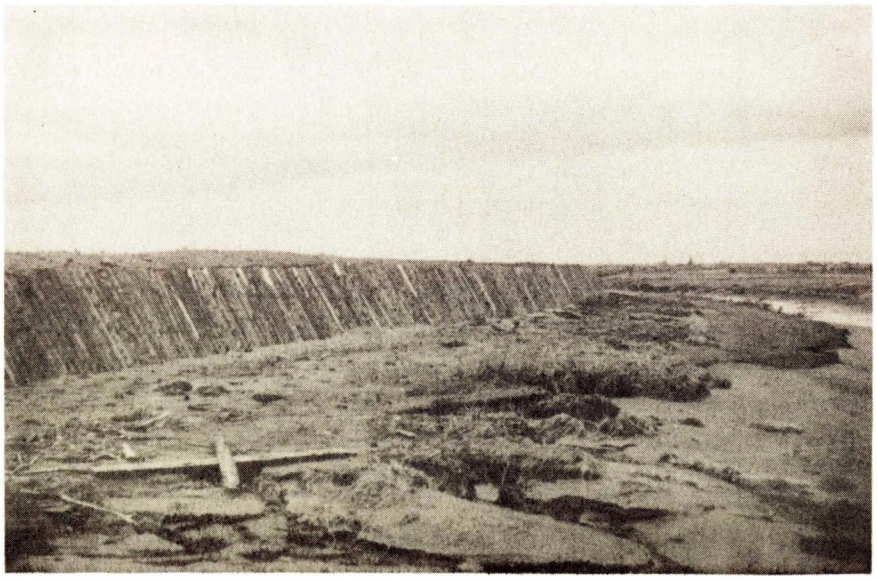

Fig. 2 - Project N. B. 5, Westcock Marsh, N. B.
A section of slab facing erected to prevent the dyke against severe wave action.

There were five new aboiteaux installed with timber sluices and these eliminated an additional five aboiteaux. Major repairs were made to five others where the sluices had considerable life remaining.

The Avon River flows by the protecting dyke and has a tendency to cause undermining of the banks. In the past the owners had provided bank protection with brush mats and these appeared to be a satisfactory means of control. However, it was necessary to install an additional 1100 lineal feet of brush matting.

N.S. 4, Queen Anne Marsh, N.S.

The dyke protecting the Queen Anne Marsh is adjacent to the wider portion of the Annapolis River and the dykes protecting it are subject to severe water action. There were 3,000 lineal feet of new dyke constructed and 6200 lineal feet strengthened. Soil conditions were such that considerable difficulty was encountered in obtaining a stabilized fill in some sections, the soil sometimes resembling a fluid. These particular sections were not brought up to grade or finished but it is expected that with the internal drainage provided, this material will become stabilized.

Six new aboiteaux with timber sluices were constructed and in one case an additional aboiteau was repaired by jacking an asbestos bonded metal pipe through the existing fill, permitting the sealing off of the old timber sluice which had collapsed. Five aboiteaux were eliminated.

Plank facing was erected along 700 of dyke to prevent serious wave action.

N.S. 5, Dugau Marsh, N.S.

It was necessary to construct 4590 lineal feet of new dyke and to strengthen 970 lineal feet. Plank facing to protect dyke was repaired and installed to protect 970 feet of existing dyke. One aboiteau was constructed and its location permitted a net decrease of one structure.

N.S. 6, Saulnierville Marsh, N.S.

The work carried out on this project consisted of the installation of a single sluice through an existing gravel bank which was otherwise protecting the marsh. The wave action in this area was such that an added precaution was taken and this consisted of a rock crib pier being erected over the outside end of the sluice.

N.S. 8, Grand Pre Marsh, N.S.

The Grand Pre Marsh is another area where the land use program appears to be satisfactory. Existing structures had been reasonably well maintained throughout the years but their condition had reached the point where it was necessary to construct 6665 lineal feet of new dyke and to strengthen 18,675 lineal feet. There were 2200 lineal feet of plank facing repaired and 5700 lineal feet newly installed. To prevent undercutting of existing dyke, 1100 lineal feet of brush matting

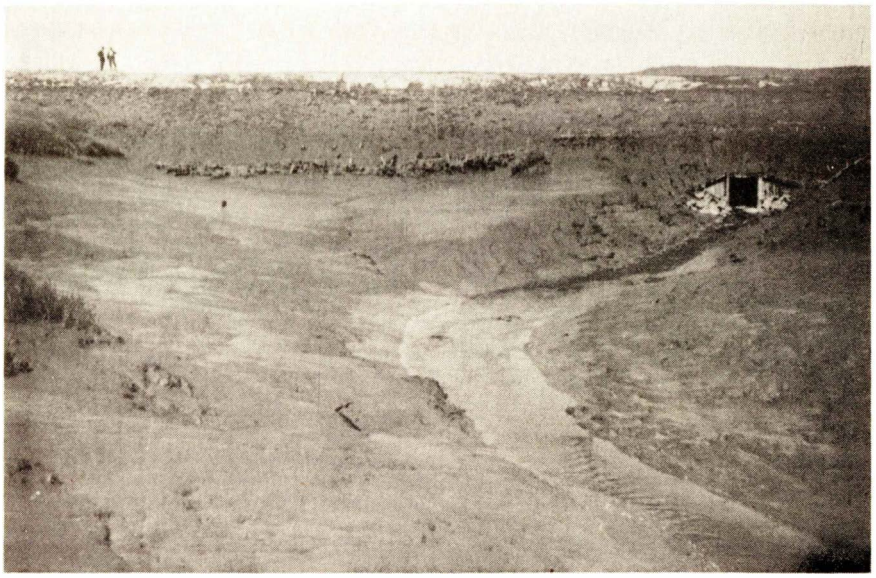

Fig. 3 - Project N. S. 4, Queen Anne Marsh, N. S. This photograph shows an aboiteau which had been erected many years ago. The fill was relatively sound but the sluice required replacement. An asbestos bonded metal pipe was jacked under the fill and an outlet channel provided. This may be viewed on the right. The old sluice, the ends which have been covered up, is under the centre portion of the fill. New fill was placed on the down stream side using brush mats to hold it in place.

Fig. 4 - Project N. S. 5, Dugau Marsh, N. S.
This view shows a section of dyke where the tide water has caused erosion near the top of the dyke and overtopping or breaking of the dyke is very likely to occur. It is a typical condition of many of the protective dykes.

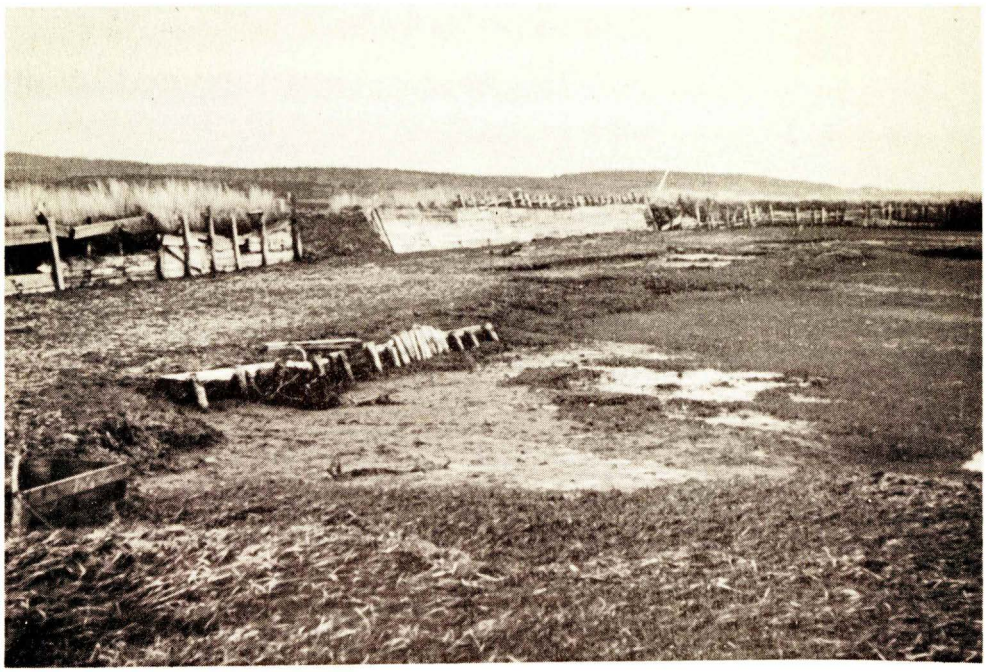

Fig. 5 - Project N.S. 5, Dugau Marsh, N.S.
This view indicates the condition of much of the existing plank or pole protective facing. This offers little protection to the dyke.

Fig. 6 - Project N.S. 5, Dugau Marsh, N.S.
In order to determine the condition of this aboiteau outlet it was necessary to dig away the face. It will be noted that the down stream end of the sluice has collapsed, necessitating replacement of the aboiteau.

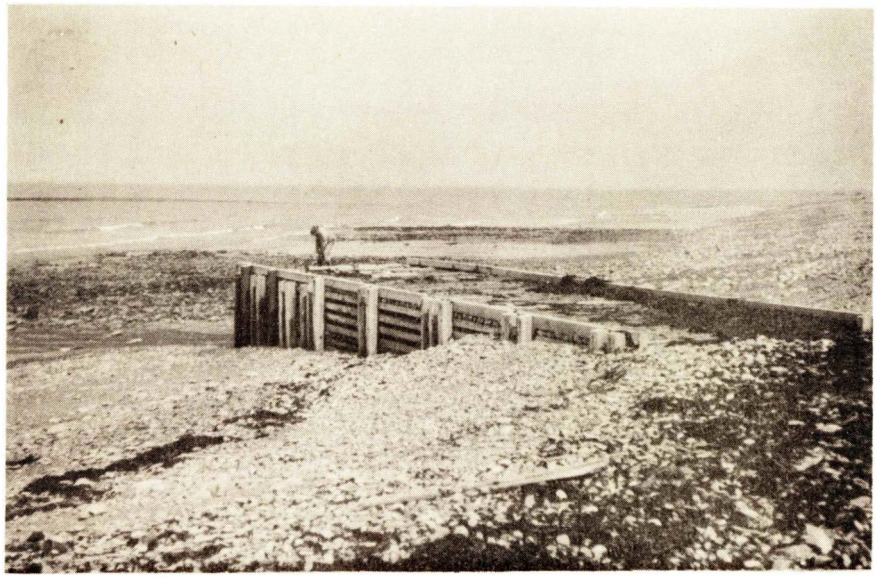

Fig. 7 - Project N. S. 6, Saulnierville Marsh, N. S.
This rock crib structure was installed to protect the down stream end of a sluice which had been placed through the rock and gravel dyke. The latter may be seen on the right. The gravel dyke is natural, having been built up by wave action. This has automatically protected the marsh from salt water flooding but provision for the outflow of fresh water was required.

Fig. 8 - Project N. S. 8, Grand Pre, N. S.
This is a view of an aboiteau on which pit run gravel has been placed to provide protection against tide water action. This aboiteau was installed to replace one which was near collapse.

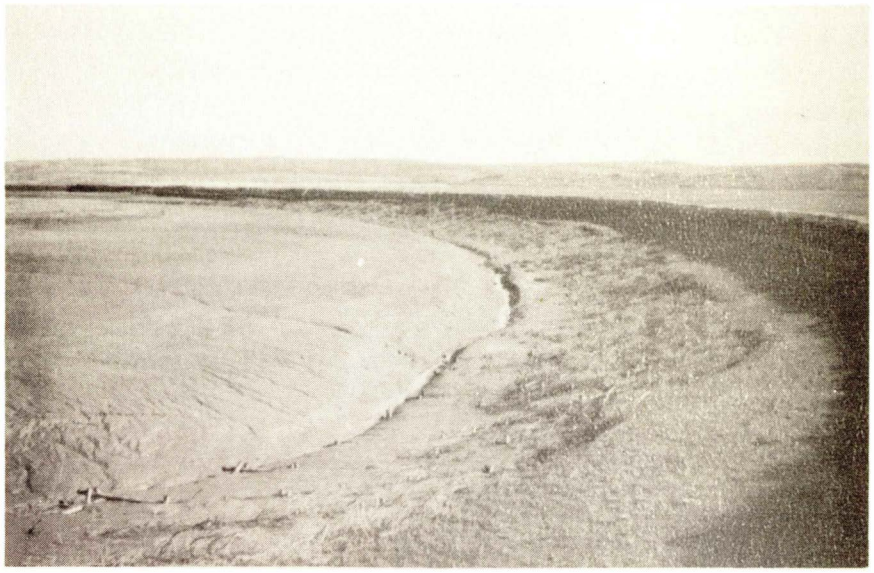

Fig. 9 - Project N.S. 8, Grand Pre Marsh, N.S. The tide water flowing up and down this gully tended to undercut the dyke. To provide protection which would not necessitate the setting back of the dyke, brush matting was placed as shown. The effect has been to move the gully channel to the left as well as to encourage silt deposits and bank build up.

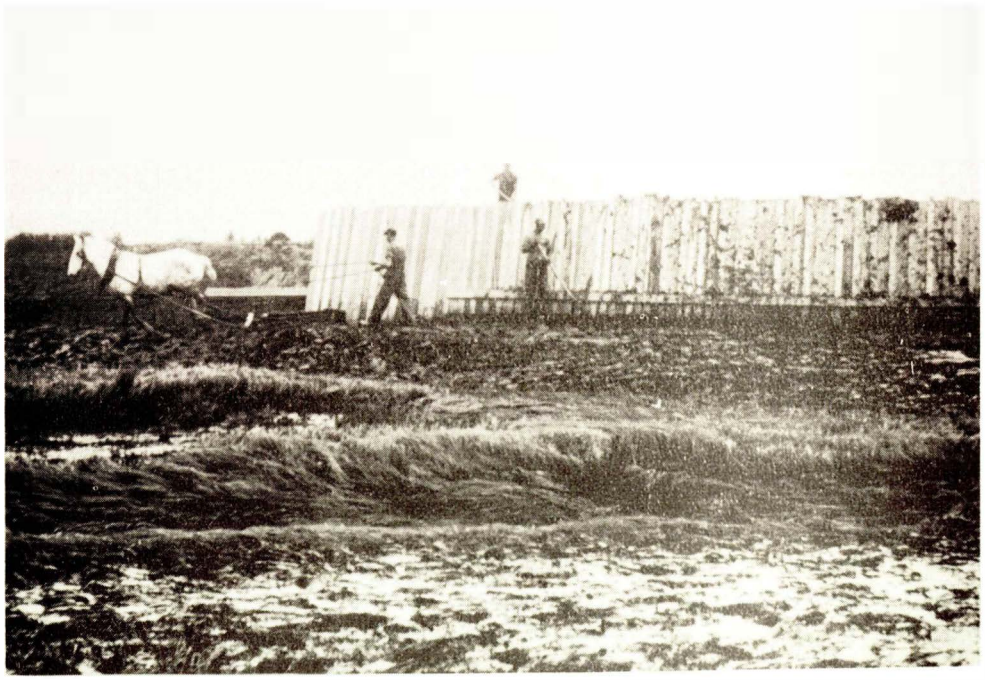

Fig. 10 - Project N.S. 8, Grand Pre Marsh, N.S. A section of vertical plank facing being installed. This is necessary in those locations where the dyke is exposed to severe wave action. Normal tides flood the marsh in the foreground almost daily, but it is the higher tides which necessitate the plank facing.

was placed. Four new aboiteaux with timber sluices were constructed and major repairs of a permanent nature were made to one other. As an experiment, pit run gravel was placed on the face of the largest new aboiteau with a view to preventing damage from the tide. To date the results appear favourable.

N.S. 11, Truro Dykeland Park Marsh, N.S.

A portion of this marsh had been subjected to salt water flooding for a number of years. One section was made secure by the construction of 18,500 lineal feet of dyke, the installation of four aboiteaux with timber sluices, and the repair of two others. The area commonly called Moose Creek Marsh, which is a part of this project, is still unprotected and the reclamation of this section should be undertaken as quickly as possible.

Some experimental work in bank protection was carried on. Pit run gravel and rock were placed on sections of stream bank to prevent undercutting of the dyke. It provided protection and piling was tied back more securely.

N.S. 42, Amherst Point Marsh, N.S.

A large portion of this marsh was subject to flooding by tide water which was causing considerable damage. It was also periodically flooding one section of highway. Through the construction of four aboiteaux with timber sluices, 8800 lineal feet of new dyke, and 1500 lineal feet of strengthened dyke, this project was made dry. One large aboiteau was erected successfully under difficult and adverse conditions.

P.E.I. 1 - Johnston River Marsh, P.E.I.

Surveys indicated that the erection of one aboiteau would protect this marsh. Borings indicated a good foundation and after considerable study it was decided to construct a rock and earth fill without the use of brush mats to strengthen the foundation or to bind the fill. The sluiceway was made of concrete, the foundation material having sufficient bearing strength, and again no brush was used. The design and method of construction varied considerably from those which have been used for aboiteaux in the past. It is believed that this structure is the first of its type to be erected and to date it appears to be very satisfactory.

Maintenance of Projects

Apart from the major works as reported above, many of the marsh projects required considerable work on the protective structures to prevent flooding by tide water. On December 15, 1950 an exceptionally high tide occurred which did considerable damage to old structures. These breaks required immediate attention and work continued until mid-January. No serious damage resulted to the marsh as a result of this tide, but many structures were weakened. Newly constructed structures stood up well.

Fig. 11 - Project N.S. 11, Truro Dykeland Park Marsh, N.S.
Coarse gravel was placed on this tidal river bank to determine it's usefullness in preventing bank erosion, which in turn necessitates the setting back of dyke in order to protect the marsh. To date this form of protection appears to have been somewhat successful but further tests are required.

Fig. 12 - Project N.S. 11, Truro Dykeland Park Marsh, N.S.
This is a view of the down stream side of a small aboiteau on which pit run gravel was placed in an effort to provide protection. To date it appears to be very satisfactory. It will be noted that silt deposits from the tide water have been made in the discharge channel. This is a problem in those locations where fresh water discharge is not continuous or of sufficient quantity. The silting occurs more rapidly in the summer months than any other season.

Fig. 13 - Project N.S. 41, Habitant Marsh, N.S. This aboiteau was completed in 1945. However, the heavy discharge of fresh water necessitated the extension of the aboiteau discharge spillway to prevent undermining of the entire structure.

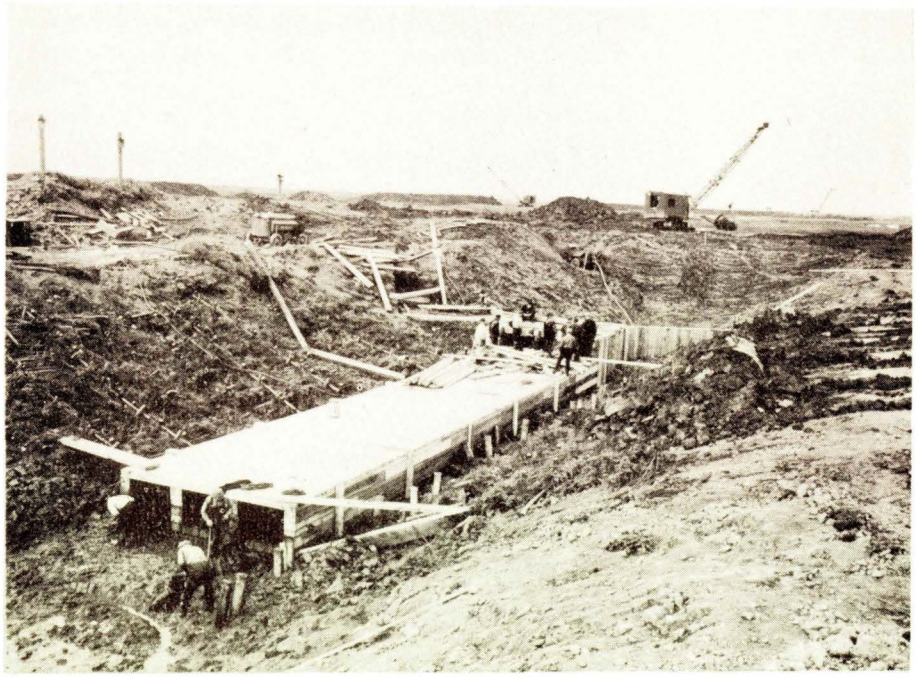

Fig. 14 - Project N.S. 42, Amherst Point Marsh, N.S. This is a view of a large aboiteau sluice being installed on a section of marsh which was not protected by dykes and aboiteaux. New dyke under construction may be seen in the background. The installation of this structure was carried out under trying conditions and it afforded the development of special installation techniques.

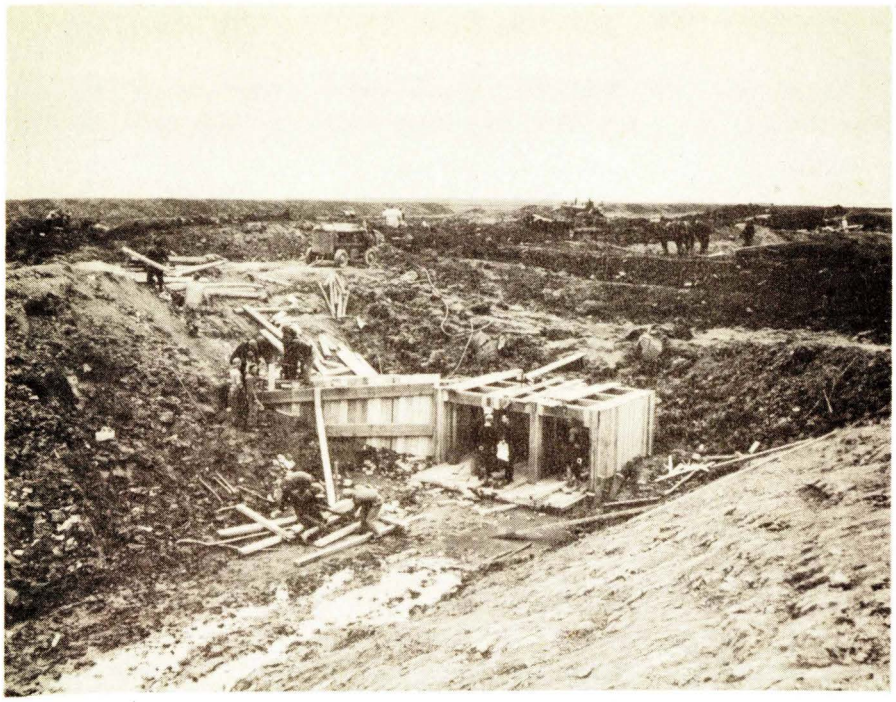

Fig. 15 - Project N. S. 42, Amherst Point Marsh, N. S. This is the same structure as shown in Figure 13. The fill is being placed over the sluice; the upstream wing walls and porch are being erected.

Fig. 16 - Project N. S. 42, Amherst Point Marsh, N. S. This is a view of the completed structure shown under erection in Figures 13 and 14.

Fig. 17 - Project No. P. E. I. 1, Johnston River, P. E. I.
The sluice shown here is the only concrete one constructed during 1950. The sub-foundation was such that this was permissible.

Fig. 18 - Project P. E. I. 1, Johnston River, P. E. I.
This fill, forming a part of the aboiteau, is made of rock and earth without the benefit of a brush mat foundation or brush in the fill itself. It is believed to be the first of its type erected. Rock rip-rap has been placed on the down stream side to prevent damage from tide water.

Throughout the year 47 projects received minor reconstruction work or minor maintenance, and this consisted of the installation of five new aboiteaux with timber sluices, major repairs to seven others and involved the construction of 20,500 lineal feet of new dyke and minor patching to another 42,900 lineal feet. One hundred lineal feet of plank facing to protect dyke was repaired and 1200 lineal feet of stream bank was protected through the use of brush mats.

This type of work will be necessary until such time as the sections most urgently requiring reconstruction have been made secure.

Projects Under Investigation.

Four projects were reported as under investigation last year. These were considered under the heading of large projects. 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 marsh-lands 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 rom this type of structure would also increase the avail-ability of marshland for excellent pasture as the watertable could be suitably lowered. Surveys have been initiated with a view to determining whether or not such structures are physically feasible and economically justifiable.

Complete reports, with all detail, will be prepared and presented separately. Progress to date with these investigations is as follows:

(a) Annapolis River Survey, N.S.

No definite conclusions or recommendations may yet be made in respect to this project. Soil and economic information is being assembled. The design of a structure is proceeding and a model of the sluiceway is to be erected and tested with a view to determining the most satisfactory and economical type of gate to permit fresh water discharge. All field work pertaining to the structure has been completed.

(b) Shepody River Survey, N.B.

The firm of consulting engineers engaged for this work have submitted a design for the necessary structures to protect slightly more than 4,000 acres and to do away with the present dykes and aboiteaux, besides bringing in land which could not otherwise be reclaimed. The plans and the design of the structure are being studied and additional information is required before recommendations can be made. Field work for the soil and economic surveys has been completed.

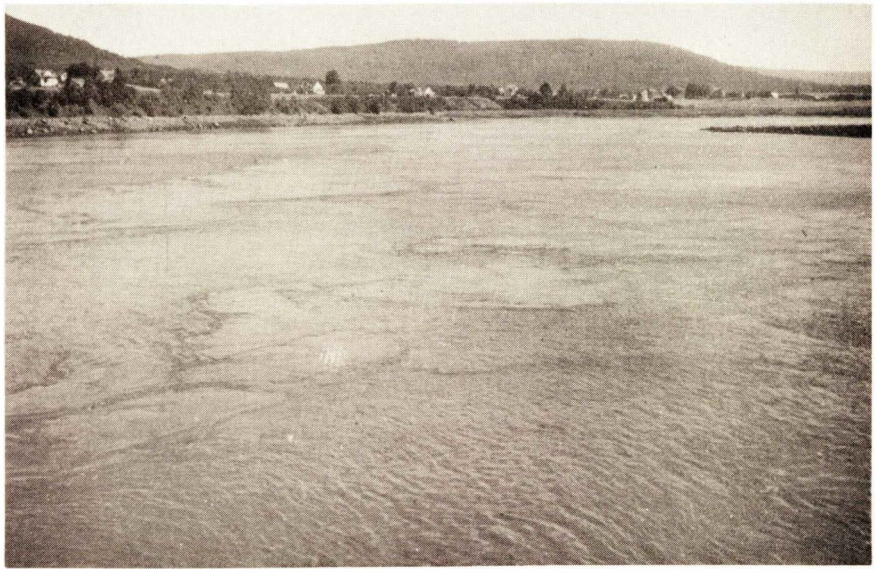

Fig. 19 - Project N. S. 17, Falmouth Village Marsh, N. S.
This is a view of one of the sites along the Annapolis River which was investigated with a view to determining whether or not it is feasible to erect a single large structure to dam the river. The tide at the time of the photograph was low. The rock bar at the right is completely submerged at half tide.

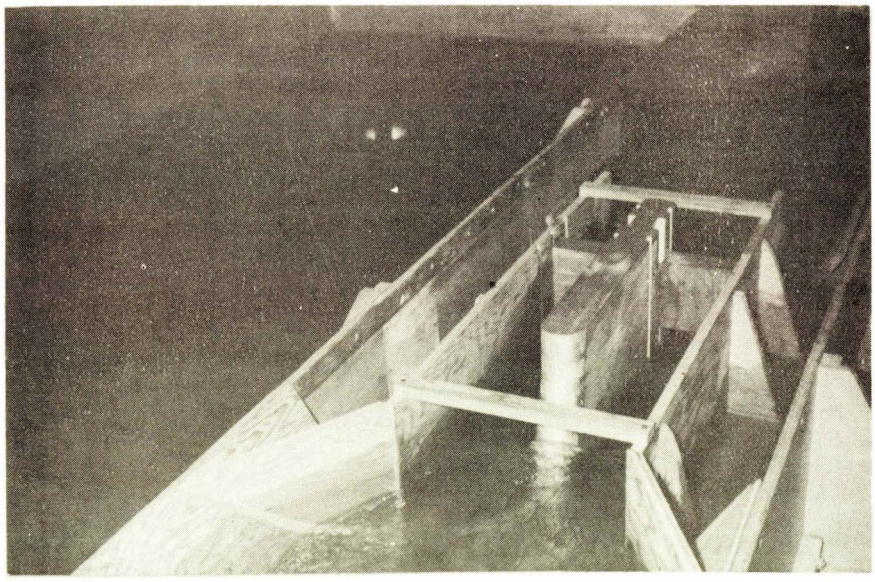

Fig. 20 - Project N. B. 10, Shepody River Survey, N. B.
This is a model which has been erected to determine the hydraulic loses of an outlet structure which was designed in support of the Shepody River investigations.

Fig. 21 - Project N. B. 22, Tantramar River Survey, N. B.
This is a view of a possible site for a large structure which would dam the Tantramar River, should such be feasible. The tide is low but during high periods is above the river banks.

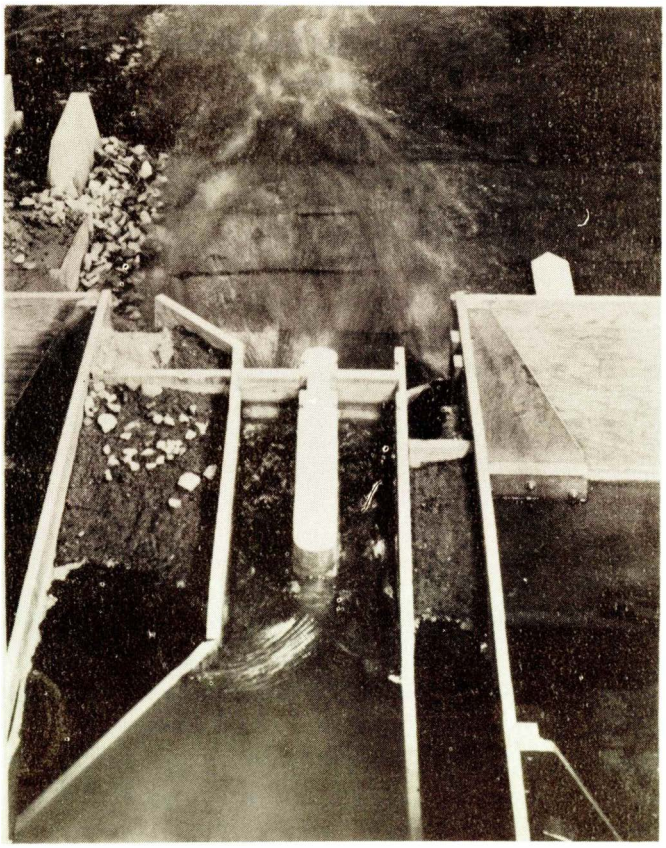

Fig. 22 - Project N. B. 22, Tantramar River Survey, N. B.
This hydraulic model is being tested to determine the scouring action of the fresh water discharged through the sluice which was designed for installation in a dam across the Tantramar River, should such a structure be found feasible.

(c) Tantramar River Survey, N. B.

As in the case of the Shepody and Annapolis rivers a thorough investigation into the feasibility of erecting a single structure is being made. The engineering field work as well as the soil and economic surveys have been carried out. This information is being assembled and the design of a structure is in progress. An hydraulic model of the proposed sluice has been prepared and will be tested.

(d) Memramcook River Survey, N. B.

It has been reported that investigations of a preliminary nature were being carried out on the Memramcook River, Westmorland County, N. B. to determine the advisability of engaging a firm of consulting engineers to locate and design a structure to dam the Memramcook River. Several sites were investigated and the preliminary surveys indicated that such a structure would be extremely expensive and entirely out of line with the benefits which could be expected.

Three other projects, of a much smaller nature than the above, were or are to be investigated.

(a) Project N. B. 39, Chance Harbour Marsh, N. B.

Engineering investigations were carried out to determine the cost of reclaiming this marsh. The Advisory Committee considered these as well as other aspects relative to the project. They have recommended that no rehabilitation work be undertaken on this area in view of its doubtful potentialities and the extremely high cost of reclamation.

(b) Project N. S. 22, Gaspereaux River Survey, N. S.

Although this project is reported as one under investigation, no studies of any consequence have been made.

(c) Project N. S. 52, Rossway, N. S.

This is a project which may warrant consideration in the future but no investigations have as yet been carried out.

Fig. 23 - Project N. S. 49, Scotch Village Marsh, N. S. The dyke which is behind the poles on the right protects the Scotch Village Marsh. The tide water which flows up and down the Kennetcook River tended to undercut the bank on which the dyke was located. The erection of a small brush breakwater directed the currents away from the bank and the large silt deposit was thus encouraged.

Fig. 24 - Project N. B. 8, Coyle Landry Marsh, N. B. This aboiteau appeared to be reasonably sound when inspected during October 1950. It was believed there were several years of life remaining in the structure. The damage was caused early in 1950 permitting a section of marsh to become flooded.

Fig. 25 - Project N.S. 48, Centre Burlington Marsh, N.S.
The bank in the foreground and that to the left comprise the inlet and outlet for tide water which floods the Marsh shown. This area is approximately 200 acres in size and a single aboiteau may be erected to protect further flooding. This area was at one time very productive.

Fig. 26 - Project N.S. 53, John Lusby Marsh, N.S.
This is a view of damage which occurs to land after the protective structures have been allowed to deteriorate and tide water is permitted to flood the area. The damage is caused by the tide water flowing off the marsh.

APPENDIX 1

PROJECTS UNDER WAY AS AT MARCH 31, 1951

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

(x) Partially out to sea.

(o) Out to sea.

Project No.	Name of Marsh Body	Location	Acreage
Nova Scotia			
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	Dugau	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 (o)	Annapolis Co.	190
N.S. 11	Truro Dykeland Park (x)	Colchester Co.	500
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	Hants Co.	141

Project No.	Name of Marsh Body	Location	Acreage
Nova Scotia (Cont'd)			
N.S. 17	Falmouth Village	Hants Co.	103
N.S. 18	Ryerson	Annapolis Co.	74
N.S. 19	Bridgetown (x)	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
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

Project No.	Name of Marsh Body	Location	Acreage
Nova Scotia (Cont'd)			
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 (o)	Cumberland Co.	1890
N. S. 54	Minudie (x)	Cumberland Co.	2310
N. S. 55	Seaman	Cumberland Co.	235
N. S. 56	Wellington	Kings Co.	2400
N. S. 57	New Minas	Kings Co.	257
N. S. 58	Granville Centre (x)	Annapolis Co.	141
		TOTAL	19539

Project No.	Name of Marsh Body	Location	Acreage
New Brunswick			
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.	
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 Horton (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.	

Project No.	Name of Marsh Body	Location	Acreage
New Brunswick (Cont'd)			
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
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	Westmorland Co.	432
N. B. 38	Rockland	Westmorland Co.	223
N. B. 39	Chance Harbour	St. John Co.	
N. B. 40	Woodpoint (x)	Westmorland Co.	65
		TOTAL	19243

Project No.	Name of Marsh Body	Location	Acreage
Prince Edward Island			
P. E. I. 1	Johnston River	TOTAL	250

Totals

Nova Scotia	19539
New Brunswick	19243
Prince Edward Island	250
Total Acreage of Incorporated Marsh Bodies.	39032

Acreage	APPENDIX 11 - Expenditures - Fiscal year:	1949-50	1950-51
	Administration	54,096.56	40,482.73
250	Surveys & Engineering	46,208.55	144,237.87
	Construction Equipment, Materials and Workshop	177,573.53	112,705.55
	Construction Projects:		
	Comeau Marsh, Nova Scotia	23,001.52	
	Falmouth Great Dyke Marsh, Nova Scotia		41,812.88
	Queen Anne Marsh, Nova Scotia		73,468.37
	Dugau Marsh, Nova Scotia		18,500.00
	Saulnierville Marsh, Nova Scotia		6,527.70
	Annapolis River Survey	8,412.16	
	Grand Pre Marsh, Nova Scotia		72,424.46
	Truro Dykeland Park Marsh, Nova Scotia		45,218.81
	Victoria Diamond Jubilee Marsh, Nova Scotia		45,694.67
	Dentiballis Marsh, Nova Scotia		53,894.35
	Habitant Marsh, Nova Scotia		3,249.49
	Amherst Point Marsh, Nova Scotia		48,000,00
	Annapolis River Survey, Nova Scotia		4,059.87
	Allison Marsh, New Brunswick		14,386.00
	Westcock Marsh, New Brunswick		67,531.76
	Shepody River Survey, New Brunswick	11,191.77	5,000.00
	Belliveau Village Marsh, New Brunswick		903.76
	Pre d'en Haut Marsh, New Brunswick		4,150.00
	Dorchester Marsh, New Brunswick		15,533.15
	Lower Coverdale Marsh, New Brunswick		20,144.60

Construction Projects: (Cont'd)	1949-50	1950-51
Middle Coverdale Marsh, New Brunswick		10,939.65
Dixon Island Marsh, New Brunswick		6,502.88
New Horton Marsh, New Brunswick		948.10
Beaumont Marsh, New Brunswick		17,814.01
Tantramar River Survey, New Brunswick	1,000.00	8,963.89
Johnston River Marsh, Prince Edward Island		19,165.00
Maintenance of Projects (including minor re-construction)		
Comeau Marsh, Nova Scotia	22.55	106.60
Windsor Forks Marsh, Nova Scotia		335.26
Queen Anne Marsh, Nova Scotia	361.61	
Grand Pre Marsh, Nova Scotia	899.50	
Woodworth Marsh, Nova Scotia	1,642.73	88.00
Upper Belleisle Marsh, Nova Scotia		150.80
Truro Dykeland Park Marsh, Nova Scotia	307.50	
Dentiballis Marsh, Nova Scotia	297.00	
Isgonish Marsh, Nova Scotia		127.00
Castle Frederick Marsh, Nova Scotia		1,539.46
Falmouth Village Marsh, Nova Scotia	291.67	1,559.12
Ryerson Marsh, Nova Scotia		69.79
Advocate Marsh, Nova Scotia		741.45
Upper Nappan Marsh, Nova Scotia		350.46
Masstown Marsh, Nova Scotia		72.80
Noel Shore Marsh, Nova Scotia		1,443.55

Maintenance of Projects (including minor re-construction) cont'd.

	1949-50	1950-51
Newport Town Marsh, Nova Scotia		1,391.64
Pre Rond Marsh, Nova Scotia		18.00
Allan River Marsh, Nova Scotia		2,014.18
Mount Anne Marsh, Nova Scotia		921.45
Windermere Marsh, Nova Scotia		196.40
Moschelle Marsh, Nova Scotia		1,047.29
Rosette Marsh, Nova Scotia		42.00
Walker Marsh, Nova Scotia		58.38
St. Croix Marsh, Nova Scotia		1,751.63
Fort Belcher Marsh, Nova Scotia		162.60
Annapolis Royal Town Marsh, Nova Scotia		332.00
Converse Marsh, Nova Scotia		351.85
Barronsfield Marsh, Nova Scotia		1,160.40
River Hebert Marsh, Nova Scotia		966.99
Selmah Marsh, Nova Scotia		50.15
Centre Burlington Marsh, Nova Scotia		16.25
Scotch Village Marsh, Nova Scotia		124.85
Morse Marsh, Nova Scotia		63.50
Upper Dyke Marsh, New Brunswick	2,468.16	4,609.14
Germantown Marsh, New Brunswick	9,639.21	1,998.20
Tantramar West Marsh, New Brunswick	3,565.62	8,081.68
Allison Marsh, New Brunswick	868.10	
Westcock Marsh, New Brunswick	910.69	

Maintenance of Projects (including minor re-construction) cont'd.

	1949-50	1950-51
Taylor Village Marsh, New Brunswick	4,987.83	5,076.92
Hopewell Hill Marsh, New Brunswick	212.45	12,768.59
Coyle Landry Marsh, New Brunswick	634.32	1,377.02
Belliveau Village Marsh, New Brunswick	1,467.05	
Pre d'en Haut Marsh, New Brunswick	6,737.02	
Dorchester Marsh, New Brunswick		.24
Fox Creek Marsh, New Brunswick		1,312.70
Gautreau Village Marsh, New Brunswick		2,931.20
Memramcook West Marsh, New Brunswick		7,279.67
Aulac Marsh, New Brunswick		3,873.87
Dock Marsh, New Brunswick		1,800.65
Dover Marsh, New Brunswick		506.00
College Bridge Marsh, New Brunswick		1,917.89
Upper Coverdale Marsh, New Brunswick		650.21
Log Lake Marsh, New Brunswick		892.02
Calkins Marsh, New Brunswick		7,552.73
West Coverdale Marsh, New Brunswick		788.78
Sackville Marsh, New Brunswick		22.04Cr. #
	$356,797.10	$982,908.87

The total cost of maintenance work on this project 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.