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Musquodoboit River Watershed Survey and the  
Effects of Proposed Flood Control  
Project on Fish Populations

By  
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Musquodoboit River Watershed  
Survey and the Effects of  
Proposed Flood Control Project  
on Fish Populations

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Introduction:

The Department of Agriculture requested Maritime Marshland Rehabilitation Administration to study methods of controlling floods on interval land of the Musquodoboit River Valley. Flood protection was requested for 5,700 acres of land during the crop growing season. In the spring of 1964 the MMRA presented four plans covering different levels of protection for consideration by various agencies. Plan "A", the most elaborate, envisions 15 retention dams on the tributary streams to regulate discharge to the main river in time of flood, combined with dredging and blasting at selected sites on the main stem to improve flow conditions and facilitate run-off. Plans "B" to "D" involve various stages of the proposed <sup>ed</sup> given under plan "A".

To determine what effect such a proposal would have on resident and anadromous species of fish in the Musquodoboit River, a general survey of the system's spawning and rearing facilities for anadromous and resident species was carried out. Also, all obstructions to fish passage found on the system are described in the following report.

Proposed Dredging Zones

Zone one starts  $2\frac{1}{4}$  miles below Middle Musquodoboit and ends a few miles below Meagher Grant, a total distance of 21 miles. Approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  of a mile at the starting point is a stretch of good spawning gravel. The remainder of the zone is slow flowing and relatively deep (up to 8 feet) with scattered short rapid sections. The bottom is mud, silt and clay in the stills, and coarse gravel covered by growths of aquatic vegetation where velocity is greater. The banks in most places are high enough to contain 3 to 4 feet of flood. The surrounding country is low flat land (meadows, pastures). There are very few forested sections. Figures 1 and 2 typify the scenery of that section of river.

Zone two starts near the town of Upper Musquodoboit to below the town of Center Musquodoboit, a distance of approximately 8 miles. Here the river shoreline is at its lowest (see Figure 3); it meanders a great deal through marshy field, meadows and forested areas. The immediate shore is grassy, and, at time of survey, after heavy rains, the banks were on the average 1 to 2 feet high. The bottom is of mud and silt in the still area and coarse gravel mixed with aquatic plants in the flowing areas. The river averages 100 feet in width and 3 or 4 feet in depth. There are no pools as such but approximately 75% of the zone is still water. There is practically no shade.

### Proposed Blasting Areas

There are two blasting sites proposed in Plan "A". Their locations are shown on the attached map.

The first area is located at Crawford Bridge above 12 miles from the mouth of the river (Figure 10-11). Beneath the bridge is a rock ledge which impedes the flow of water at this point on the river. Removal of the ledge by blasting will widen and deepen the channel to improve flow conditions but will also lower water levels on the stretch of river above the bridge. As this is a deep stillwater section, no damage to fisheries interests will occur.

The second proposed blasting site is shown by Figures 12-13.

The river at that point is wide, shallow and strewn with large boulders. Blasting of a channel through these rapids will reduce the turbulence and ease both the water run off and fish passage without causing great damage to the bottom fauna and without drastically lowering the water levels above. No gravel bottom or rearing areas can be found in this section of the Musquodoboit River.

### Proposed Dam Sites

Dollar Lake Dam (#1) This dam is situated at the outlet of Dollar Lake. There is already a logging dam on the site (Figures 6 and 7). The actual dam or the proposed dam will control fish access between Dollar Lake and Dollar Lake Brook. Dollar Lake is considered to be good trout water and Dollar Lake Brook is the only important stream available to the trout spawners from the lake. It is doubtful that the spring gaspereau run ever reaches Dollar Lake due to a combined man-made and natural obstruction one-half mile above the mouth of the brook. The obstruction

consists of a logging dam (Figure 9) placed at the upstream end of a deep gorge which at any water level creates enough turbulence to render upstream fish migration impossible. A fishway is required to provide trout in the lake with access to and from the spawning areas on Dollar Lake Brook.

Grand Lake Dam (#2) This dam will be situated on the short stream section between Grand Lake and Pot Lake. It will control fish access to Grand Lake and its watershed. The section of stream on which the dam is to be built is short, approximately 15 feet wide and from 6 inches to 1 foot deep. The remains of a half demolished dam can be seen there. No suitable inlet streams on Grand Lake are available for spawning. Fish from the lake presumably move downstream in their search for spawning grounds. Grand Lake and its watershed is well populated by speckled trout. The lake is also a potential gaspereau spawning area. Most of the spawning grounds in the Ogilvie Brook system lies in a 2 mile section below Beaver Lake outlet. In order to reach these grounds fish (trout) from the Grand Lake area have to migrate below Lay Lake where an old saw mill dam still in good condition stands. This dam, at times of low water levels, is a total obstruction (Figures 8 and 9). The dam has been abandoned long ago and should be removed. Any new dam at Grand Lake should be provided with fish facilities.

Beaver Lake Dam (#3) Located just at the outlet of Beaver Lake on Ogilvie Brook. The lake shelters an important run of Gaspereau and a good population of speckled trout. The watershed of the lake is considerable and is inhabited by speckled trout. At present there is a logging dam on the site which although old and leaking still retards fish movement into the lake. At the time of survey hundreds of gaspereaus were observed battling their way up the right-hand corner of the dam (Figure 16). The dimensions of the actual dam are 150 feet long by approximately 4 feet high with two overhead gates and one sluiceway with a gate.

Good spawning grounds are available in the short section of stream comprised between Beaver Lake and the junction of Ogilvie Brook with the outlet of Lay Lake. This and the fact that very little spawning grounds are available above Beaver Lake stresses the need for access in and out of the Beaver Lake (Figures 14-17).

Big Shaw Lake Dam (#4) This dam site is located approximately 1 mile below the junction of Big Shaw Lake and Higgins Lake outlets. The proposed dam will be some 10-15 yards above Shaw Bridge. It will create a comparatively large artificial pond where there presently is a succession of very short rapids and long stills. The stream is wide and rather shallow. Both lakes above the proposed dam site support a good trout population and are potential spawning areas for gaspereau. All the spawning grounds for trout are found below the proposed dam site in the little river. Numerous cottages have been built around these lakes consequently the fishing pressure is high. Both lakes have been frequently stocked with speckled trout in the past 10 years. The proposed dam will destroy a good section of stream (rearing area) and its bottom fauna. Unless a fishway is provided, gaspereau will be unable to reach the spawning grounds in the lake.

Little River Lake Dam (#5) This dam is proposed for the outlet of Little River Lake on Little River. Above the lake there are approximately 12 miles of streams and two small lakes. All this watershed is cut off from the main stem of Little River by a rock obstruction called Little River Falls situated  $\frac{1}{2}$  mile below dam site #5. The remainder of Little River provides excellent rearing and spawning grounds for trout and salmon. Because of the natural obstruction below, no fishway is recommended for this proposed dam.

Lindsay Brook Dam (#6) This dam is located approximately 6 miles above the mouth of the stream. At the site and for quite a distance upstream the banks are 15 to 20 feet high. The bottom of the stream is mainly ledge rock at the site and it changes to gravel further upstream. That section of the stream has a low gradient. The proposed dam will probably back up the water quite far. The final result will be a long and narrow artificial lake. Salmon parr, shiners and daces were observed in the stream. The whole length of the stream is excellent rearing area and some sections provide spawning facilities for trout. Fish facilities should be installed at this proposed dam.

Higgins Brook Dam (#7) This dam is situated on Higgins Brook less than one mile from its mouth (Figures 19-20). At the site the true left bank has relatively little inclination and the right bank is a swamp. The width of the stream is approximately 65 feet and the depth 3 feet. The proposed dam will back water up over a large flat meadow which would accommodate a considerable body of water. The artificial lake thus created would be very shallow and flood a large area. The water supply being mainly from bog drainage is acidic and consequently poor in fish food. This area is not considered as good trout water. No fishway is required at this site.

Fraser Lakes Dam (#8) This dam is located at the outlet of Fraser Lakes (Figure 21). The stream has very low banks, 1-2 feet high and is 9 feet wide. Fraser Lakes although considered as good trout waters are relatively unimportant bodies of water. The watershed area behind the proposed dam does not warrant the needs for a fishway.

Jennings Lake Dam (#9) This dam is situated at the outlet of Jennings Lake on Fraser Brook. Just below the dam site is a series of falls and fast rapids (Figures 22-24). The highest falls give a sheer drop of 8 feet or more. These falls are considered to be impassable at most water levels. The brook above Jennings Lake has very little spawning area but features excellent rearing qualities. A fishway through the proposed dam is not recommended unless a channel was also provided through the falls.

Sherlock Brook Dam (#10) Located on Sherlock Brook two miles above its junction with the Musquodoboit River. The dam site is at the end of a long shallow valley. Above the dam there are 13 miles of stream which offers little spawning grounds but has excellent rearing qualities throughout. Trout were found in good quantities along with other small species. A few miles above the proposed dam site there is a series of falls which are believed impassable (Figure 35). Although the upper portion of Sherlock Brook is inaccessible to fish there remains enough useable stream above the proposed dam to justify the request of a fishway.

Mill Lakes Dam (#11) The proposed dam will be at the outlet of Lower Mill Lake. There is a retaining dam on the site (100 feet long x 4 feet high). Originally the dam was built for logging purposes and has been maintained until today by cottages owners on Mill Lake. The outlet of Mill Lake is  $2\frac{1}{2}$  miles long and flows into Sherlock Brook. The outlet has an impassable obstruction located about  $1\frac{1}{4}$  miles below the lake. The obstruction

is a fall or series of falls (Figures 36-37) at the site of an old saw mill. Trout were found in both the brook and the lake. However, it is believed that the trout population of Mill Lakes is maintained mainly through stocking.

Upper Mill Lake Weir Site (#12) If the water level in Mill Lakes is raised a few feet it will overflow from Upper Mill Lake to the watershed of the South Branch of the Musquodoboit River through a depression situated south east of Upper Mill Lake. To avoid a loss in reservoir potential a weir or dam will be erected across this depression (Figure 26). The bottom of this hollow is only a few feet above the actual water level in Upper Mill Lake. Since there was no water course between the two bodies of water a fishway will not be recommended.

Gleason Brood Dam (#13) This dam will be located in the upper section of Gleason Brook. The stream is seasonal and considered negligible from the point of view of fish population.

South Branch Dam Site (#14) Situated on the South Branch of the Musquodoboit River  $1\frac{1}{2}$  miles from its junction with the North branch. It will create a large artificial lake with as much as 11 miles of good trout and salmon stream above it. The bank of the valley into which the river flows at the dam site is steep and approximately 30 feet high. It is estimated that a good section of stream will be destroyed. Figure 27 illustrates the general appearance of the river above the dam. The rearing potential for trout and salmon is excellent. The need for a fishway through proposed dam #14 cannot be emphasized too much.

North Branch Dam Site (#15) Located on the North branch of the Musquodoboit 3 miles from the North-South branches junction (Figure 28). The dam site is at the apex of a sharp bend of the stream. There is an old partly demolished pier structure on the site. The river in this area flows into a long narrow valley approximately 15 feet deep. The gradient being rather steep, the headpond will not extend very far. Above the site there are  $10\frac{1}{2}$  miles of stream with particularly good rearing qualities and scattered spawning areas. A fishway is strongly recommended.

### Fish Population in the System

Most of the lakes provide good sport fishing for speckled trout. The larger lake in the lower section of the system provides for the reproduction of gaspereau. There is mention of the presence of lake trout (*Salvelinus namaycush*) in Dollar Lake and Grand Lake. Some of the lakes are stocked frequently, they are: Grand Lake, Higgins Lake and Shaw Big Lake. The gaspereau runs to Beaver Lake, Grand Lake and possibly Higgins and Shaw Big Lake. Many other lakes are closed to gaspereau by natural and man-made obstructions. These are: Dollar Lake, Little River Lake, Fraser Lakes, Jennings' Lake, Mill Lake and Sherlock Lake. No trace of gaspereau was seen in the main river above Ogilvie Brook.

In the main stem of the river salmon and trout angling is carried out mainly from Crawford's Bridge to the mouth. All the streams visited contained fish. Many were found to be excellent trout and salmon rearing waters. The better rearing facilities for both species are found in the larger tributaries and the North and South Branches. The bulk of the salmon spawning grounds were found on the main river centered around Middle Musquodoboit. Some spawning grounds for salmon are also available in the larger tributaries such as Little River, Sherlock Brook and the North and South Branches.

### Water Control Effects on Spawning and Rearing Facilities

The permanent addition of 8 to 10 inches of water in the streams controlled by dams would not add much in the way of spawning and rearing area except in the case of Lindsay Brook (lower section) and a short section of Ogilvie Brook, where it would just about double the overall potential. The flowage regulations would however help maintain a constant level of nursery area during the summer. To fulfill this purpose a considerable volume of water would have to be stored and released over a prolonged period of time, perhaps up to 60 days during a dry season. The writer in the course of a meeting with the M.M.R.A. in Amherst, was given to understand that a gradual release of the stored water through as long a period of time as possible was not in the best interest of the water control program. It also appears from the size of the storage areas that a constant flow could not be maintained for very long periods.

## Discussion and Conclusion

This survey revealed a river system well suited for trout and salmon with abundant shelter and rearing grounds and good spawning facilities. Pollution is comparatively low (farming, saw mills) and can be checked easily. The main impediments to fish life in the system are extremes in water level variations resulting in decreased size of rearing areas, man-made and natural obstructions. Much improvement could be brought to the system in general by the removal or management of obstructions such as mentioned above. A list of all obstructions is provided at the end of this report along with corresponding recommendations. It is believed that none of the proposed dams will cause serious damage or delay as long as adequate fish facilities are provided as requested.

## Recommendation

Fish facilities are requested in the following proposed water storage dams:

- (1) Dollar Lake Dam (#1)
- (2) Grand Lake Dam (#2)
- (3) Beaver Lake Dam (#3)
- (4) Shaw Big Lake Outlet Dam (#4)
- (5) Lindsay Brook Dams (#6)
- (6) Sherlock Brook Dam (#7)
- (7) North and South Branches Dams (#14 & #15)

It is recommended that: all old abandoned logging dams be removed; that the owner(s) of active logging dams be requested to assist fish passage during spring and fall by leaving dam gates open; that all owners of saw mill be warned against the disposal of sawdust by dumping it in or too near a river, stream or lake such as is the case at Gibraltar Lake (a typical example); that the five rock obstructions listed below be considered in view of eventual blasting:

- (1) The falls on Sherlock Brook (Fig. 35)
- (2) The falls on Fraser Brook (Fig. 24)
- (3) The falls on Mill Lake outlet (Figs. 36-37)
- (4) Rapids below Beaver Lake Dam (Fig. 16)
- (5) Little River Falls  $\frac{1}{2}$  mile below dam site #5.

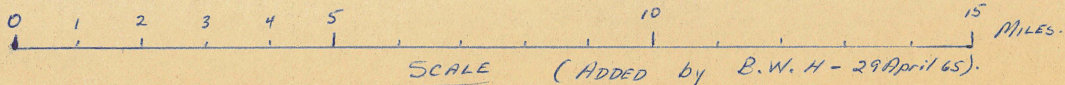
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MUSQUODOBOIT RIVER STUDY

Subwatershed No.	Site No.	Site Name	Dam Height	Dam Length	Watershed Area	Controlled Watershed Area	Reservoir Area	Reservoir Area (1/2 if not flat)	Estimated Dam Cost	Estimated Dam Cost per sq. mi. watershed controlled	Remarks
13	1	Dollar Lake	9'	300'	12.1	9.7	700	700	8,000.00	825 <sup>00</sup>	Log Sluice River Regulator
16	2	Little River Lake	20'	500'	30.8	7.7	130	130	28,500.00	3,700 <sup>00</sup>	River Regulator
12	1	Beaver Lake	15'	200'	26.5	13.2	425	425	14,000.00	1,060 <sup>00</sup>	Log Sluice River Regulator
12	2	Grand Lake	10'	400'	26.5	6.6	460	460	11,000.00	1,670 <sup>00</sup>	River Regulator
37	2	Sherlock Brook	25'	200'	20.9	8.4	325	162	27,000.00	3,220 <sup>00</sup>	
16	1	Shaw Bridge	15'	300'	30.8	7.7	275	138	16,000.00	2,080 <sup>00</sup>	
27	1	Higgins Brook	28'	500'	16.4	15.0	125	125	54,000.00	3,600 <sup>00</sup>	Ag. land, but seems necessary
36	1	Jennings Lake	14'	500'	7.3	3.7	68	68	21,000.00	5,680 <sup>00</sup>	
36	2	Fraser Lakes	8'	300'	7.3	1.5	55	55	4,500.00	3,000 <sup>00</sup>	
38	1	Gleason Brook	8'	200	4.6	2.3	300	150	5,500.00	2,390 <sup>00</sup>	
40 1	1	North Musquodoboit	45'	300'	6.0	6.0	62	31	95,000.00	15,800 <sup>00</sup>	No Visual Inspection
25	1	Lindsay Brook	36'	400'	13.3	6.7	86	43	90,000.00	13,400 <sup>00</sup>	
37	1	Mill Lake	7'	250'	20.9	8.4	417	417	6,500.00	775 <sup>00</sup>	Summer Control only
37	<del>2</del>	Mill Lake	10'	120'	20.9	8.4			12,500.00	1,490 <sup>00</sup>	Weir-overflow
39	1	South Musquodoboit	32'	150'	21.7	19.4	275	138	33,000.00	1,700 <sup>00</sup>	
Total Estimated Cost									\$ 438,500 <sup>00</sup>		



DEPARTMENT OF FISHERIES, CANADA  
 MUSQUODOBOIT RIVER  
 WATERSHED

DATE	DRAWN	SCALE
DESIGN	CHECKED	
APPROVED		

Musquodoboit River Survey  
1964

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Fig. 1: Dredging zone 1  
typical scenery.

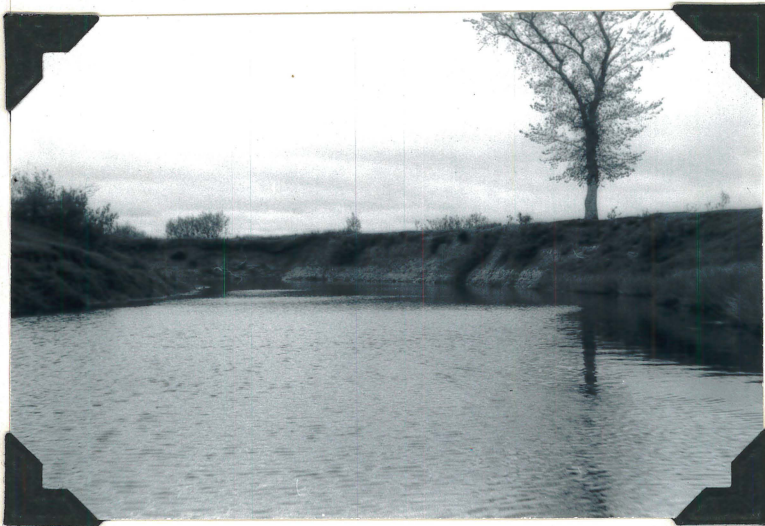


Fig. 2: Dredging zone 1  
note type of  
banks.



Fig. 3: Dredging zone 2  
a typical section  
note low grassy  
banks.

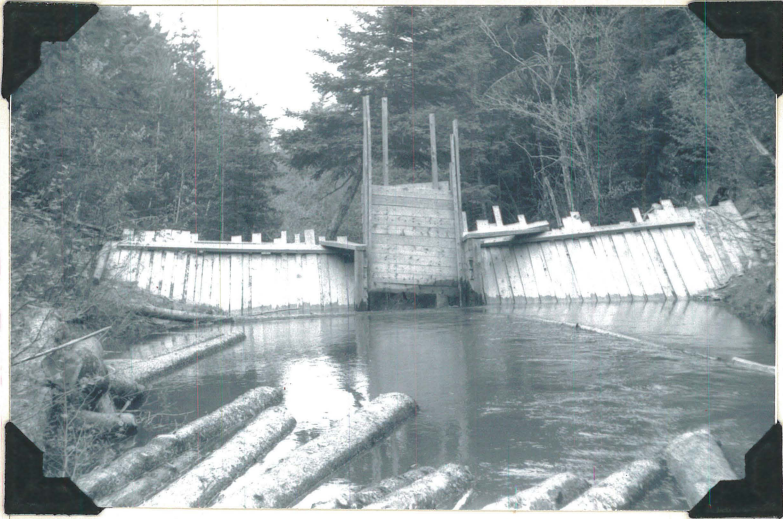


Fig. 4: Second dam on Dollar Lake Brook viewed from upstream.

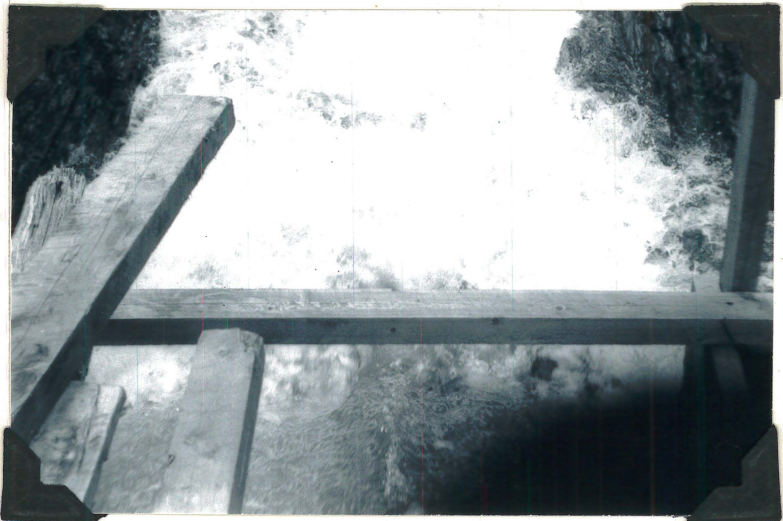


Fig. 5: Gorge below second dam on Dollar Lake Brook seen from the top of the dam.



Fig. 6: Dollar Lake dam upstream view. Dam site #1.



Fig. 7: Dollar Lake Dam viewed from downstream, gates are open.

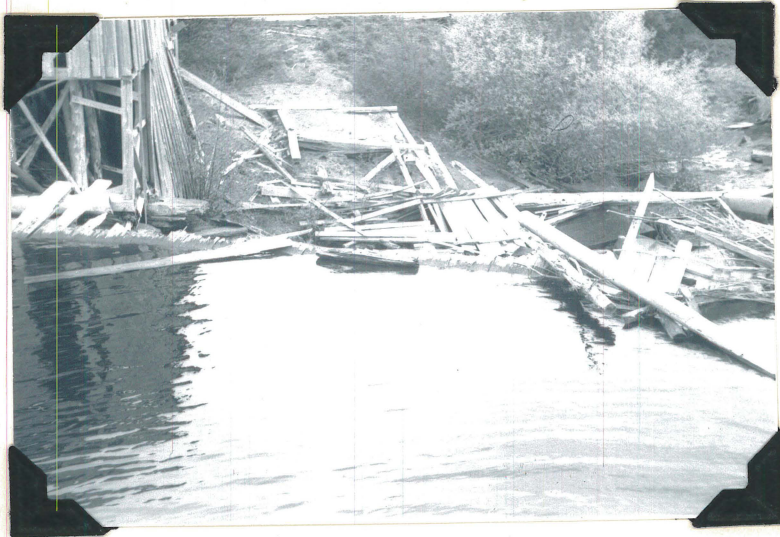


Fig. 8: Lay Lake dam seen from upstream. Old Mill left upper corner.



Fig. 9: Lay Lake dam and cascades.

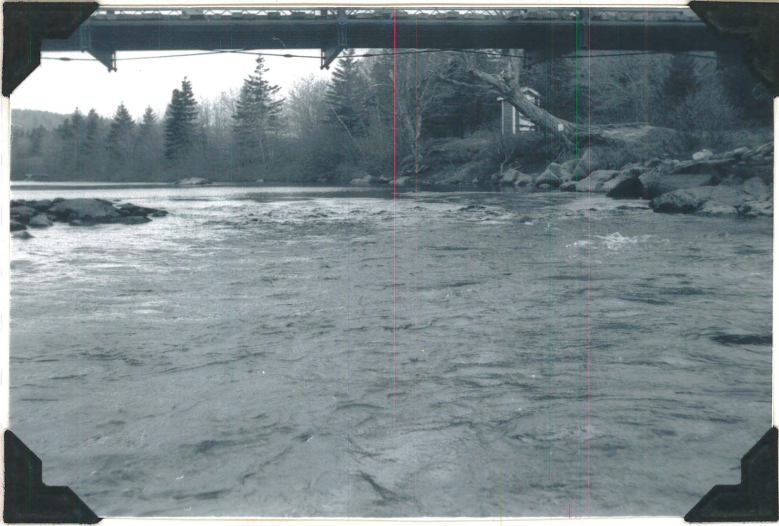


Fig. 10: Crawford's Bridge rapids. Blasting zone 1.

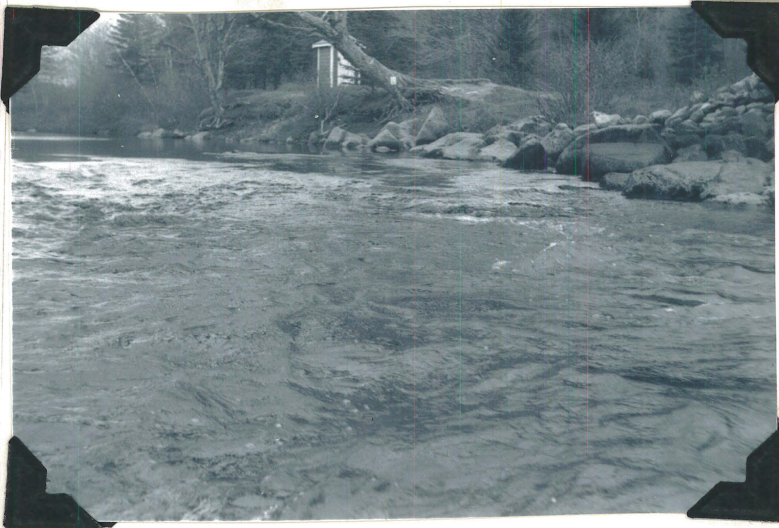


Fig. 11: Same as above closer view.



Fig. 12: Rapids below Crawford's Bridge. Blasting zone 2 looking downstream.



Fig. 13: A panoramic view of same rapid  
(Fig. 12) lower blasting area  
looking upstream.



Fig. 14: Dam on Beaver Lake outlet. Dam site #3



Fig. 15: The sluiceway gate in Beaver Lake dam.



Fig. 16: Beaver Lake dam seen from downstream.

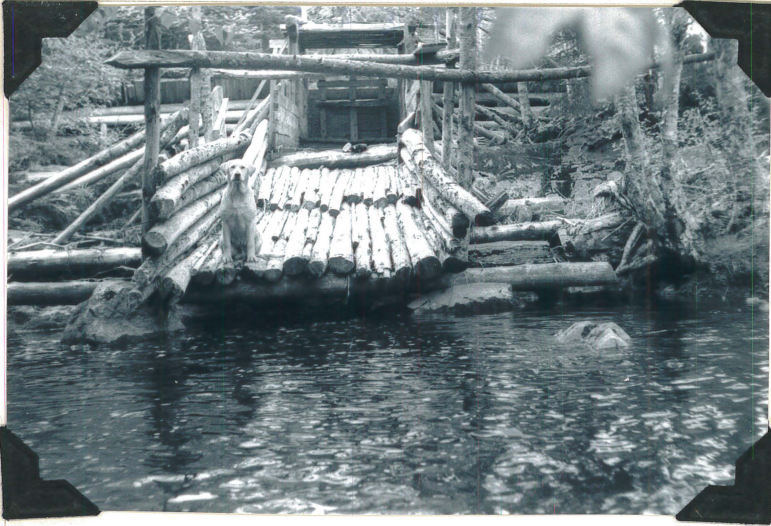


Fig. 17: The sluiceway  
seen from down-  
stream Beaver Lake  
dam.



Fig. 18: Dam site #4  
near Shaw Bridge.  
Bridge is seen in  
the background.

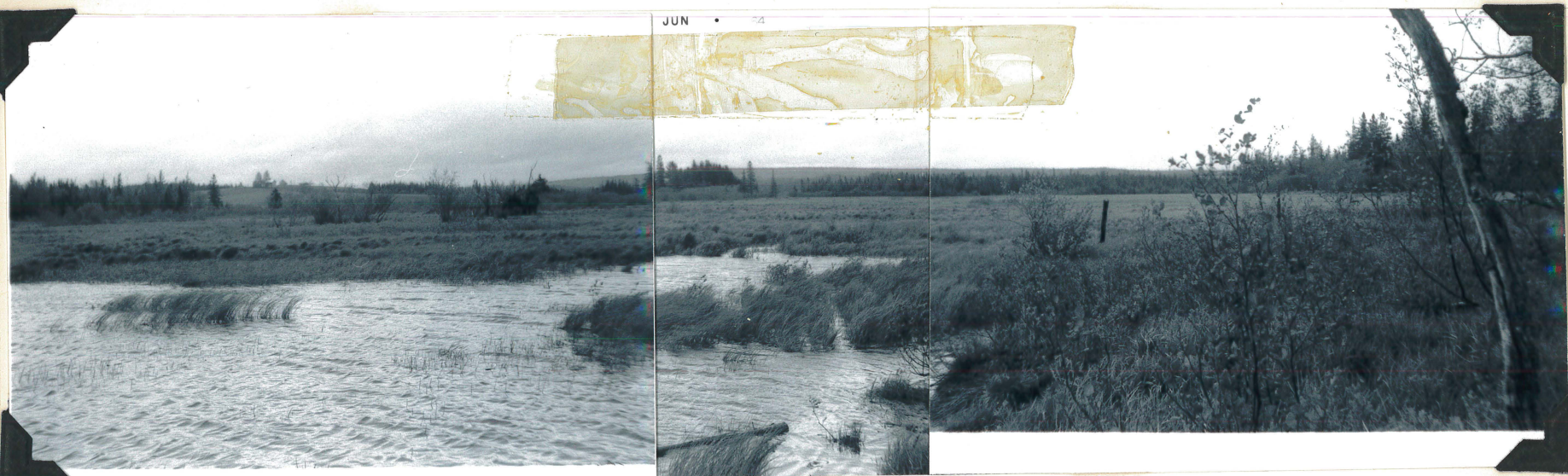


Fig. 19: Panoramic view of the swamp near dam site #7 on Higgins Brook.

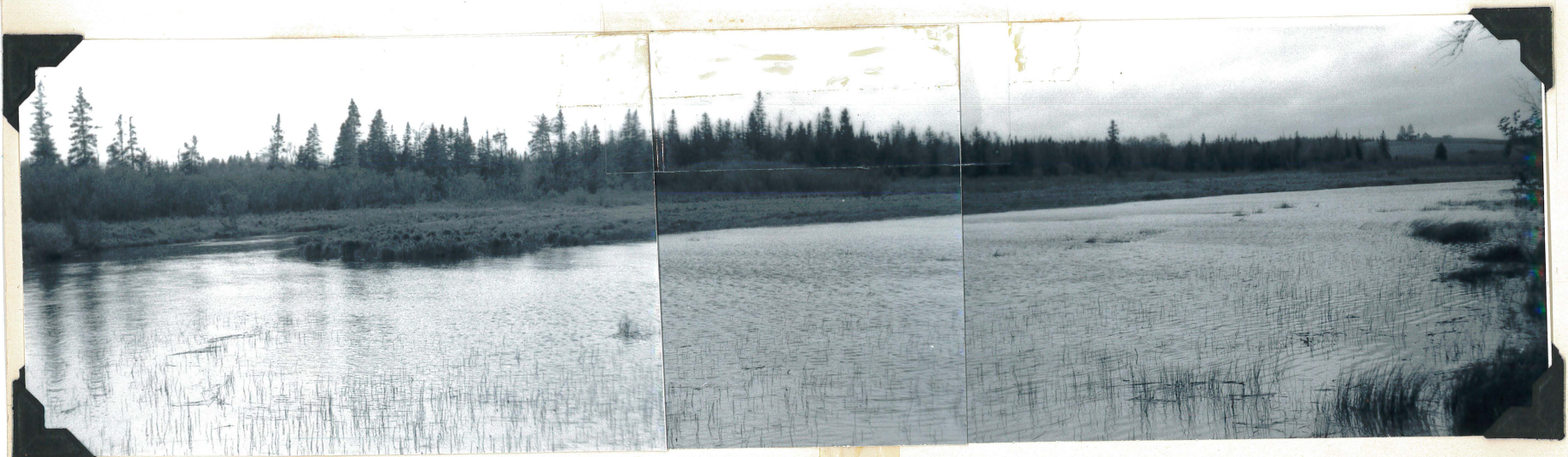


Fig. 20: Panoramic view of dam site #7 on Higgins Brook.



Fig. 21: Dam site #8 at the outlet of Fraser Lake.



Fig. 22: A series of falls on Fraser Brook below dam site #9.



Fig. 23: Falls on Fraser Brook below dam site #9.



Fig. 24: One of the roughest passages on Fraser Brook below dam #9. The falls are appr. 8' high.



Fig. 25: The dam at lower Mill Lake outlet. Dam site #11.

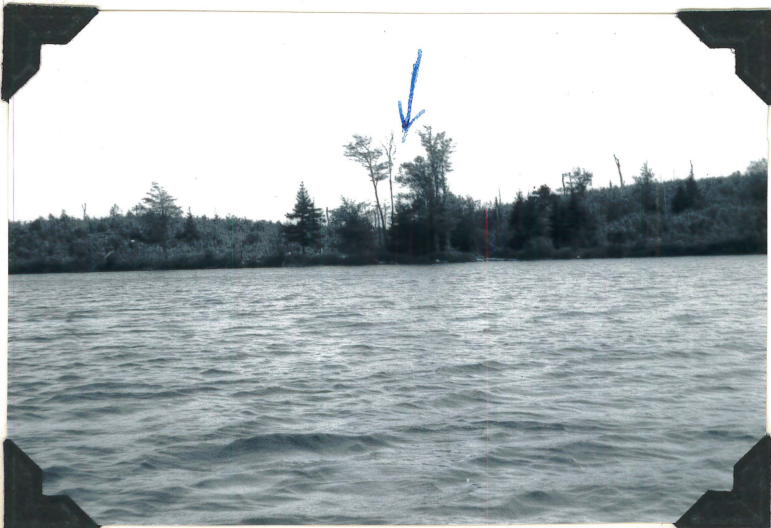


Fig. 26 : Depression of terrain as indicated by arrow. Future location for weir #12.



Fig. 27: Dam site #14  
South Branch  
Musquodoboit R.



Fig. 28: Dam site #15  
North branch  
Musquodoboit R.  
in the background  
the remains of an  
old logging dam.



Fig. 29: Old logging dam  
on Ogilvy Brook  
above Beaver  
Lake (upper water-  
shed).



Fig. 30: Old logging dam on Ogilvy Brook middle section the dam is partly demolished



Fig. 31: Logging dam on Ogilvy Brook lower section above Beaver Lake. Dam is a total obstruction



Fig. 32: Same as above seen from downstream.



Fig. 33: Retention dam  
at Carter's Mill  
on Ogilvy Brook  
near the mouth.



Fig. 34: Same as above.



Fig. 35: Falls on  
Sherlock Brook  
a few miles above  
dam site #10.  
Appr. 15 feet  
high.



Fig. 35: Illustrating the type of dam and spillway to be used on the Musquodoboit water control program.



Fig. 36: Falls on Mill Lake outlet below dam site #11. Falls drop  $\frac{1}{2}$  ft. Right bank is covered by sawdust pile and remains of old saw mill.



Fig. 37: Close up Mill Lake outlet falls.