

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INITIAL REPORT

JOB NO. 69

ACCLIMATISATION DISTRICT: Otago

TITLE: Great Moss Swamp Hydro-electric Investigation

OBJECTIVES: To investigate the fisheries aspects of Great Moss Swamp and all streams likely to be affected by the proposed power scheme with regard to the possible need to install fish passes.

INTRODUCTION

Field work was carried out between 3 August and 5 August 1965 by Technical Field Service and other Management Branch Officers of the Marine Department. Due to adverse weather and difficult access only limited data were gathered. Figure 1 is a general map of the area showing sampling areas.

METHODS

One stream was electric-fished with an earth-return system and bottom fauna samples taken, collected, and identified. The other streams were surveyed visually and photographed.

C.J. Hardy, Electro-Fishing Technician, supervised the electric fishing and assisted with all other aspects of the investigation.

FINDINGS

GREAT MOSS SWAMP: The swamp occupies a large shallow basin about 2,700 feet above sea level between the Lammermore Range, and the Rock and Pillon ranges.

During the open season a certain amount of duck

shooting takes place on the swamp.

LOGANBURN STREAM: (Figure 2) This stream is the only outlet to Great Moss Swamp, and flows in a northerly direction through a steep sided gorge, to join the Taieri River approximately four miles above Pairau.

As difficult access made electric-fishing impractical a short section of the stream was examined visually.

Stream width varied from 20 to 60 feet, and the average depth was about $2\frac{1}{2}$ feet including small pools up to six feet deep. The flow, probably running slightly above normal, was approximately 100 cusecs.

The banks were 80% stable, two or three feet high, tussock and snowgrass covered and with large outcrops of the schist that is common to the area. The stream was contained in a steep gorge 300 to 600 feet deep, the sides of which were grass and tussock covered with numerous large outcrops of rock.

The substrate was composed of flattened, rectangular stones and boulders with pockets of rock chips and sand in eddies, covered by dark brown water. The stones were lightly covered with a brown diatomaceous algae and a few clumps of green free floating algae were seen as well. During this survey in August large sections of the stream were covered with thick ice.

An extremely sparse population of bottom living animals was noted; in order of abundance they were: Mayfly larvae (deleatidium), caddisfly larvae (hydroptilidae), true fly larvae (simulidae) and stonefly larvae (stenopenla).

No fish of any kind were observed.

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McHARDYS CREEK: (Figure 3) This major inlet to the swamp flows in a southwesterly direction and joins the Loganburn Stream $1\frac{1}{2}$ miles from the swamp. It is very similar to the Loganburn Stream but smaller, and flows through rolling, tussock covered hills with frequent rock outcrops: It was largely ice-covered during the survey.

The average width of McHardys Creek is approximately eight feet, the depth two feet, with occasional holes up to four feet deep, and possesses stable banks. Water was dark brown and flowed over a bottom usually composed of solid rock with some areas of flattened, rectangular shaped stones and boulders, and a few beds of rock chips and sand. The substrate was lightly covered with brown diatomaceous algae, and balls of free-floating green algae were also present. A sparse population of bottom fauna was noted, empty caddies-fly larvae cases being found under stones, and a few annelid worms under stones and in sand near the banks. No fish were seen.

SUTTON STREAM: (Figure 4) This stream rises on the southern side of the Lammermoor Range and flows northeast for half its length, then turns east and joins the Taieri River near the settlement of Sutton.

The stream flows in a shallow gorge, the sides of which are 60 to 160 feet high, gently to steeply sloping, grass and tussock covered, and with a few rock outcrops.

The stream banks are almost completely stable, two to four feet high and tussock and grass covered with a few stands of Willow. The substrate consists of over 50% bedrock, with large flattened, rectangular stones and boulders; pockets of coarse sand and rock chips are found in eddies.

The area included a cascade three feet high. The water was brown in colour and the flow was estimated at 15 cusecs, probably being slightly above normal.

The survey area was electric-fished (Figure 5) and a series of three bottom fauna samples were taken using a Surber square foot sampler.

Results of the electric-fishing are plotted in Figure 5, and the bottom fauna sampling results are set out in Table 1.

In all 79 brown trout were caught, ranging from 5.7 cm to 17.5 cm, with a mean fork length of 10.1 cm (four inches). The 42 fish of 10 cm or over were weighed and the mean was found to be 23 gm (less than one ounce).

Three fish were of spawning age, i.e., one female 13.4 cm., one female with ova at 14.3 cm., and one male with milt at 16.2 cm. The evidence is far from conclusive but it appears that fish in the survey area of the Sutton Stream may mature at a very small size. If true this evidence indicates an abnormally low growth rate in the system.

No native fish were captured or seen.

STONY CREEK: This stream rises in the Lammermoor range west of Sutton stream, flowing north-east for three-quarters of its course before turning east and joining the Sutton Stream.

Stony Creek was photographed but not given more than a cursory examination being almost completely frozen over. It flows through rolling tussock country in a gentle to steep-sided valley before entering a gorge near the old Dunstan Road. The bottom, near the road, is the same as for McHardys Creek, i.e., solid rock with areas of stones and boulders. The flow is approximately the same as McHardy's Creek and the water is dark brown.

SHEPHERDS HUT CREEK: This, the other major tributary to the swamp, rises in the Lammermoor Range and flows in a northwesterly direction, joining the swamp in its southwest corner. Due to difficulty of access it was not examined.

BURGAN STREAM: The stream originates in the hills to the east of Great Moss Swamp and flows south to join Stoney Creek four miles from the confluence of Stoney Creek and Sutton Stream.

This water was not examined.

THE POWER SCHEME

It is proposed to dam the Loganburn Stream at its outlet from the swamp, creating a reservoir at least 50 feet deep and approximately six square miles in area where the swamp now lies. The headwaters of Sutton Stream will be diverted and will flow in a water-race to Stony Creek which will be dammed approximately $\frac{1}{2}$ mile above the present pond on the Old Dunstan Road. The combined waters of these two streams will then flow through a water race into Great Moss Reservoir. The outlet from the reservoir will be in the southwest corner, a tunnel or an open cut and a conduit leading to the upper powerhouse on the banks of Sutton Stream approximately 1000 feet below the reservoir level. The water will continue, in an open race, to a holding pond near the Hopefield Homestead, and then to the lower powerhouse on the banks of Sutton Stream.

This lower powerhouse will be situated approximately three miles upstream from the main road to Middlemarch and water from the Great Moss Reservoir will join the Sutton Stream at that point. The fall from the reservoir to the lower powerhouse is in the vicinity of 1900 feet.

Loading on the powerhouses is uncertain at present but it is expected that they will run continuously at first at a load fraction of 40 or 50 per cent. Maximum flow will be a little over 100 cusecs. Later, when other powerstations in the same power district are brought into operation and the Great Moss

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scheme is run in parallel with them, flow will vary inversely with rainfall and the Great Moss powerstations may be shut down at times of heavy rainfall for periods of up to several days.

The effects of the proposed scheme are as follows:-

1. The Loganburn Stream will be completely dried up except for spillway overflow and seepage, the volume of which is unknown at present.
2. McHardys Creek will be submerged for over half the present length.
3. Shepherds Hut Creek will be submerged for over half the present length.
4. Stony Creek will be completely dried up except for spillage and seepage until joined by a small tributary $1\frac{1}{2}$ miles below the diversion to the reservoir.
5. Burgan Stream will be dried up for two miles above the confluence with Stony Creek and will not contribute to the latter except for spillage and seepage.
6. The headwaters of Sutton Stream will be largely dried up below the direct diversion to the reservoir, and flow in the middle reaches reduced considerably by the diversion of Stony Creek and the Burgan Stream. Several small creeks and seepages do join the Sutton Stream below the diversion points and should ensure a certain amount of permanent water remaining in the stream bed. When the powerhouses are in operation, the lower Sutton will be subjected to increased flows with probable fluctuations.

DISCUSSION

Although field work was greatly hampered by climatic conditions it was obvious that the immediate catchment of Great Moss Swamp does not support a large or healthy trout population.

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All streams examined in the area, which have similar physical characteristics, are subject to temperature extremes which must effect their productivity. Bottom fauna was scarce to the point of non-existence and growth rate of the trout examined was very low.

According to local reports the streams are of little or no value as a fishery and are not utilized except in the lower reaches of Sutton Stream where some large fish are caught.

It is conceivable that in the future, when the power scheme is in operation, a useful fishery may develop but it is not considered necessary for any structure to be incorporated into the planned dams to achieve this goal.

RECOMMENDATION

That no fish pass is required over or around any diversion or dam to be constructed within the proposed Hydro-Electric scheme.

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TABLE I Bottom Fauna Samples:

SPECIMEN		FLAT Sample 1	POOL Sample 2	RIPPLE Sample 3
Annelida	Unidentified	12	-	-
Mollusca	<u>Potamopyrgus</u> sp.	1	4	-
Ephemeroptera	<u>Deleatidium</u> sp.	24	69	10
Plecoptera	<u>Stenoperla</u> sp.	-	-	1
Trichoptera	<u>Pycnocentria</u> sp.	2	31	3
	<u>Olinga</u> sp.	11	2	1
Coleoptera	Parnid larvae	4	6	2
Diptera	Simulidae	9	-	1
	Chironomidae	3	4	26

FIG. 1

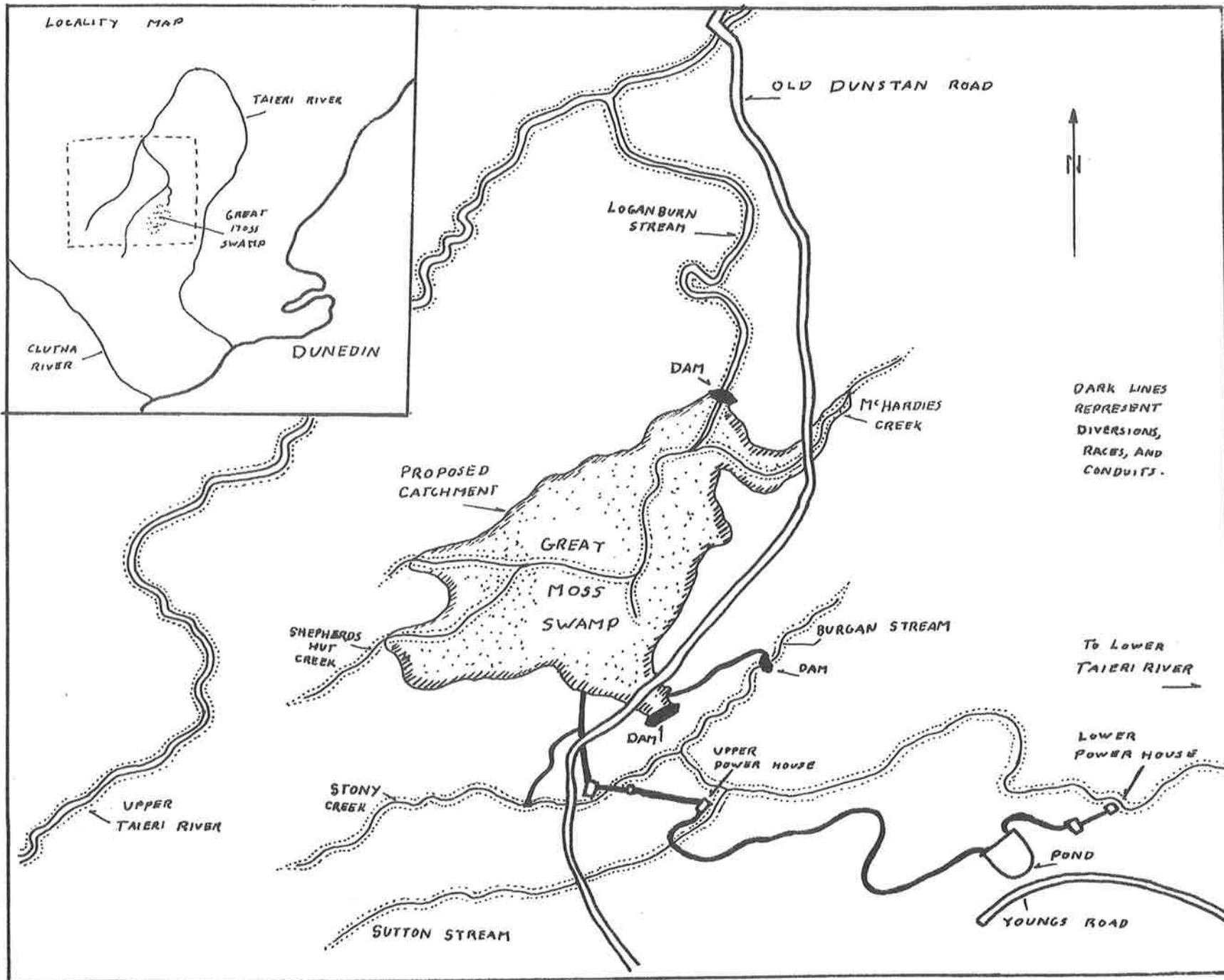




FIGURE 2, LOGANBURN STREAM, VIEW SOUTH TOWARD
GREAT MOSS SWAMP



FIGURE 3. MCHARDYS CREEK



FIGURE 4. SUTTON STREAM



FIGURE 5. ELECTRIC FISHING IN SUTTON STREAM