

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 70.

ACCLIMATISATION DISTRICTS : Waitaki, Waimate, South
Canterbury.

TITLE OF JOB : Spawning survey Waitaki river system.

OBJECTIVES : 1) To assess if current spawning
streams will be adequate when flow is stopped in
the main rivers by the proposed Hydro Electric
Schemes.

2) To ascertain the flood frequencies
in the dry river beds.

3) To assess whether the Residual
flow in the Tekapo, Pukaki and Ohau rivers, and
their tributaries will be adequate to attract
spawning fish from Lake Benmore.

FINDINGS : This investigation was carried out be-
tween 5 August, 1965 and 22 August, 1965.

SPAWNING :

SECTION A - TEKAPO RIVER

1) FORKS RIVER

The Forks river rises on the north side of the
Burnett Range, between the Tasman and Godley rivers.
It flows south through rugged tussock covered country,
before joining the Tekapo river two miles below the
Tekapo Power Station. This river is a swift flowing
mountain stream restricted by high tussock covered
terraces.

4. The only spawning available for fish in the new lake which is to be formed in the Ohau river bed, will be lake edge spawning. It is possible that re-stocking will be needed here.

5. The natural falls which occur in the Twizel should be removed to allow spawning fish free access to the upper area of this stream. Also a channel should be cut at the mouth to allow free access from the Ohau River.

6. The Forks be allowed to flow into the Tekapo river by use of a porous dam. This could create sufficient flow, coupled with some seepage, to allow a flow down the whole of the Tekapo river.

EXECUTED BY :- J. Galloway Technical Field Officer
S.J. Wing Technical Field Officer

SUPERVISED BY :-

Bad erosion occurs in places where the river, striking the terrace, causes a shingle slide. The river-bed is mainly composed of boulders, fast rapids and runs with no pools caused by the large amount of fall per mile. A slight brown-green algal growth covers the boulders. In places the river has a flood bed up to 200 yards wide, this river being subject to flash floods, and large amounts of debris are visible on the banks.

Although this river does not provide good spawning facilities it does contribute water to the Tekapo river system.

FORKS RIVER MOUTH

EST. FLOW	DISTANCE COVERED	REDDS	FISH	% SPANNING GROUND
102 Cusecs	1 mile	0	0	2%

The present Ministry of Works plans for this river are as follows :-

They intend to divert this stream into the Joseph stream which runs into the Cass river. The area in which this diversion is to take place is directly west from the Glenmore end of Lake Alexandrina. At the present time two types of control structures are under consideration.

- a) A weir type boulder dam of a porous nature diverting flow only in flood times, allowing normal river flow at other times.
- b) A solid dam structure diverting the entire river flow.

In the case of b) a small flow will probably still exist in the lower Forks from seepage and small side creeks. From a fisheries point of view if the Forks

were still allowed to flow into the Tekapo, it is possible that a small flow could be kept over the complete length of the Tekapo River. This would allow more spawning area, and better access to existing spawning streams.

2) GRAYS RIVER

Grays river rises in the hilly area surrounding Burkes Pass, picking up from many small swamp streams, and underground flow from Edwards stream, Sawdon stream, and Snow river. As Grays river it flows in a large stream from a swampy area five miles above its junction with the Tekapo River. It joins the Tekapo 18 miles below the Tekapo Lower station.

For the last two miles Grays river is very thickly willow lined and in several places divides into multiple channels. The bed mainly consists of boulders and stones covered with heavy brown-black algal growth. There are many large deep pools, with muddy bottoms and in places swampy edges, also some large weed-beds (milfoil).

This river is similar to Deep Creek (Upper Rangitata) but does not appear to be a good spawning stream. Recent draglining is evident from above five miles from the Tekapo into the swampy area. This has given many new channels, muddy, but some new shingle has been exposed.

Edwards stream and Sawdon stream, although carrying water at the time of the survey, are normally dry. Both flow in unstable shingle flood-beds showing signs of recent bulldozing. Snow river is similar also flowing in a wide flood-bed, however, no water was evident in this river at the time of the survey.

During the survey Grays river was running high and discoloured, as about half an inch of rain had fallen

the previous day, visibility was about 60%. Debris on the river bank indicates that this stream can rise up to 4 - 5 feet and spread across the surrounding river flats.

GRAYS RIVER

EST. FLOW	AVERAGE WIDTH	AVERAGE DEPTH
300 Cusecs	30 feet	24"

DISTANCE FROM MOUTH	REDDS	FISH	% SPAWNING GROUND
1 mile	0	0	less than 1%
2 mile	0	0	less than 1%
3 mile	0	1	1%
4 mile	0	0	1%
5 mile	0	0	less than 1%

3) MARYBURN

Maryburn rises near the north side of Lake Pukaki, flowing parallel to the Forks river. It joins the Tekapo river opposite Grays river. Maryburn is joined by Irishmans creek approximately $3\frac{1}{2}$ miles above its junction with the Tekapo.

This stream is an excellent spawning stream, similar to Glenariffe stream (Upper Rakaia). The river banks are tussock covered, giving good cover as in places they are well undercut, the bed is extremely stable. There are some deep pools, brown algal growth abounds, this makes redds from previous spawning seasons easily discernable.

Although Maryburn does flood these are not serious. At the time of the survey Maryburn was dropping from a

previous flood and the water was tea-coloured. The lower part of the stream flows through large flats, which tend in some areas to be swampy. In places the stream divides into several channels.

Five miles above the junction with the Tekapo river a small irrigation dam and a channel are used to divert part of the river flow, however this was not in use during the survey. Just below the main Tekapo - Pukaki Highway a new killing chamber has been constructed on the river bank. Maryburn station, the owners, are allowing offal to be released into the stream from this point.

MARYBURN (MOUTH)

ESTIMATED FLOW

43 cusecs (above junction of Irishmans creek)

DISTANCE COVERED (UPSTREAM)	REDDS	FISH	% SPAWNING GROUND
1 mile	32	4	12%
1½ mile	32	0	15%
2½ mile	4	0	20%
3½ mile	3	0	20%
4½ mile	6	0	12%
5½ mile	3	0	12%

MARYBURN (MAIN ROAD BRIDGE)

DISTANCE COVERED	REDDS	FISH	% SPAWNING GROUND
1 mile	21	0	15%
2 mile	12	0	15%

4) IRISHMANS CREEK

Irishmans creek rises between the upper waters of Maryburn, and the Forks river. It flows southeas_t,

finally joining Maryburn 3½ miles up from the latter's confluence with the Tekapo river.

This stream flows through similar country to Maryburn. However, it has been established from the Ministry of Works, Pukaki, that under normal conditions Irishmans creek goes underground from just below the Main Tekapo - Pukaki Highway bridge until a point approximately two miles before it joins Maryburn. At the time of the survey there was a small flow of approximately eight - ten cusecs at the Maryburn - Maryhill boundary fence. This, however, can be attributed to the previous heavy rain. There was no algal growth and the river at this point closely resembled the Selwyn river (North Canterbury), being an extremely porous shingle bed, spawning gravel being plentiful at this point.

Irishmans creek appears only to present spawning water to fish from the Tekapo - Benmore area for two miles. Above here swamp and underground flow prevent spawning access. In the lower area it is an excellent spawning stream; very similar to Maryburn, splitting in places into many small channels. The algal growth ranges from brown in the lower region to black in the upper area near the swamp. Old redds are also easily distinguished.

IRISHMANS CREEK (LOWER)

ESTIMATED FLOW : 38 Cusecs

DISTANCE COVERED	REDDS	FISH	% SPAWNING GROUND
1 mile	15	0	30%
2 mile	8	0	20%

IRISHMANS CREEK (UPPER)
(MAIN ROAD BRIDGE)

ESTIMATED FLOW : 92 Cusecs.

5) TEKAPO RIVER

The Tekapo river flows from Lake Tekapo in a south-easterly direction joining up with the Pukaki river and finally flowing into the top end of Lake Benmore.

At the time of the survey the river was running high thus allowing only a few access points. It consisted of numerous channels in a wide shingle flood bed and these are divided in many places by willow covered islands.

The following was noted in side channels of the river below the mouth of Grays river.

DISTANCE COVERED	REDDS	FISH
3 miles	2	1

In some channels large areas of spawning gravel were evident but owing to the volume and colour of the river visibility was limited.

A check below the Tekapo control structure revealed ten redds in a small area of gravel. As all flow in the river was coming through the power station the short length of river between the control and the power station tailrace was dry. Some of the redds were exposed and several fish were also noted.

This indicates that it is possible that spawning occurred over the whole length of the river.

SECTION B - PUKAKI RIVER

The Pukaki river flows out of Lake Pukaki in an easterly direction finally joining the Tekapo River just above Lake Benmore.

This river was considered too turbid to survey, however, catches of trout are reported from the river. It is doubtful that they would spawn in here owing to

the extremely large amount of glacial silt in suspension in the water. It is probable that if spawning did occur redd mortality would be extremely high owing to the above factor.

SECTION C - OHAU RIVER

1) TWIZEL RIVER

The Twizel river rises in the mountain area between Lake Ohau and Lake Pukaki. It flows for nineteen miles across a large plain before joining the Ohau three quarters of a mile above the latter's junction with Lake Benmore.

a) Twizel (Main Ohau - Pukaki Highway bridge).

This section of the Twizel is a good spawning area, but it is subject to severe floods rising up to four feet. Recent bulldozing has been done near the bridge. Many good pools with excellent cover, broom and willow, also heavily undercut banks. There is a light brown algal growth, also moderate filamentous algae in the first two miles. A natural falls occurs about three miles downstream from the main road, this fall approximately three feet high is caused by the river flowing over a clay shelf. As this could present a barrier to spawning fish its possible removal would allow greater usage of the facilities.

TWIZEL (UPPER)

ESTIMATED FLOW : 88 Cusecs.

DISTANCE COVERED (DOWNSTREAM)	REDDS	FISH	% SPAWNING GROUND
1 mile	11	7	12%
2 mile	11	1	30%
3 mile	3	3	30%
4 mile	2	2	30%

b) Twizel (mouth).

There is a good spawning area for approximately one mile above the confluence with the Ohau. Above here the bed changes to larger boulders and patches of mud. There are few pools, which are mainly on the bends, and cover is not as good as in the upper area. In several places the river divides into multiple channels.

At the point where the Ohau is joined, access for spawning fish is very poor. There are three channels and only one has sufficient water for fish passage.

There is little algal growth, moss being more apparent. The banks are grassy with small shingle beaches and the river flows here between two high terraces a quarter of a mile apart.

TWIZEL (MOUTH)

ESTIMATED FLOW 21 Cusecs.

DISTANCE COVERED (UPSTREAM)	REDDS	FISH	%SPAWNING GROUND
1 mile	12	1	30%
2 mile	3	0	15%
3 mile	0	0	5%
4 mile	0	0	5%

2) OHAU RIVER

The Ohau river flows out of Lake Ohau, from there flowing in an easterly direction and finally joining Lake Benmore near the mouth of the Tekapo River. It is joined by the Twizel about three quarters of a mile above where it flows into Lake Benmore.

a) Lake Outlet

The river flows out through a narrow gap in the rocky eastern shore of the Lake. The bed here is mainly composed of large boulders and stones, but no gravel. There is one deep channel extremely swift-flowing, with few

deep pools mainly fast runs. There is no cover for fish at this point and no spawning facilities.

The river appeared to be running lower than normal at the time of the survey, it was extremely clear with good visibility.

LAKE OUTLET

DISTANCE COVERED (DOWNSTREAM)	REDDS	FISH	% SPANNING GROUND
1 mile	0	0	0
2 mile	0	0	0

b) Ohau (main road bridge).

The river here flows through a narrow rock outcrop (approximately 50 yards wide) becoming wider above and below the bridge. The river bed here is still composed of boulders however some small patches of shingle present in side channels and pool edges. River mainly in one channel, but in a few places divides into several channels. Thick brown algal growth present. The river being deep and swift flowing with few pools presents no cover for fish.

Visibility at the time of the survey was good however due to the bright glare only one third of the river counted.

OHAU (MAIN ROAD BRIDGE)

DISTANCE COVERED (UPSTREAM)	REDDS	FISH	% SPANNING GROUND
1 mile	6	16	71%
2 miles	3	0	71%
3 miles	5	0	71%

c) Ohau (Mouth)

The river here divides into many channels, flowing in a shingle flood-bed, some of the channels are deep,

fast flowing with large pools. The bed is mainly boulders, however, some shingle at pool edges and in smaller channels. There is little cover here, and not a great amount of algal growth.

The river was clear but bright glare reduced the amount counted to one fifth of the total river.

OHAU (MOUTH)

DISTANCE COVERED (UPSTREAM)	REDDS	FISH	* SPAWNING GROUND GR
1 mile	19	4	3%
2 miles	8	23	5%
3 miles	14	6	5%

SECTION D : STONEY STREAM

Stoney stream flows into the eastern side of Lake Benmore approximately three miles from the mouth of the Tekapo River. It has a muddy bed in the lower area, however, above Haldon Station it has been draglined allowing shingle to be exposed. Below Haldon it divides into several channels before flowing into Lake Benmore.

During the survey the stream was running high and discoloured, visibility nil. Stream width 12 feet, depth 2 feet, approximate flow 150 cusecs, good cover, deep pools and runs, overhanging tussock covered banks willow lined.

It is possible that numbers of spawning fish use this stream, no change will occur when the proposed schemes take effect.

SECTION E : AHURIRI RIVER

The Ahuriri river rises in the area between Lakes Hawera and Ohau. It flows down through a narrow valley

to a point just below the Lindis Pass where it emerges out into the large plain west of Omarama. It flows across this plain passing near Omarama and finally flowing into Lake Benmore.

As this river will not be affected by the proposed Hydro scheme no actual survey was carried out. However the river was studied at two places, just above the mouth and above Omarama. In both areas large numbers of spawning fish were seen, gravel being plentiful. There appeared to be adequate spawning facilities for even more fish than are using this river at the present time.

SECTION F : LOWER WAITOKI TRIBUTARIES

1) KUROW CREEK

This small stream rises in the mountain area south of Kurow. It crosses the main Kurow-Oamaru Highway a half a mile east of Kurow. It is not a suitable spawning stream as it tends to dry up in the summer months.

The stream-bed is mainly composed of boulders and large stones. In the upper area it flows in a wide flood-bed, in places dividing into several small channels. There is a slight brown algal growth present, no cover and very few pools. The wide unstable flood bed indicates that this stream can flood severely during the winter period.

There is an irrigation race crossing the stream by means of a syphon at the main road; it was dry at the time of the survey. Two miles upstream a small race approximate flow 2 cusecs, is taken off the stream.

MAIN ROAD BRIDGE

ESTIMATED FLOW ; 5 Cusecs

TWO MILES UPSTREAM

ESTIMATED FLOW : 15 cusecs.

DISTANCE COVERED	REDDS	FISH	% SPAWNING GROUND
2 miles	0	1 (possible native fish)	2%

2) OTIAKE RIVER

This river rises east of the watershed area of Kurow creek. It crosses the highway five miles east of Kurow. This stream is also unsuitable for spawning purposes, as it carries no permanent water in its lower reaches. It has a wide unstable shingle flood-bed. At the time of the survey there was no flow until approximately one mile above the main highway, here a flow of about three cusecs was found.

3) OTEKAIKE RIVER

The Otekaike river rises near the Dansey Pass area flowing down a small valley, crossing the Main highway eight miles east of Kurow. This stream has plentiful spawning gravel but however there is no cover or suitable holding water. The river appeared to be unstable showing signs of recent flooding (Flood height 3 - 4 feet). Below the main Highway the river divides into several channels in a wide shingle flood-bed (approximately half a mile wide). This river flows into a side channel of the Waitaki, approximately 15 feet wide.

One mile of the river was surveyed near the concrete bridge above the Otekaike Special School.

ESTIMATED FLOW : 40 Cusecs

DISTANCE COVERED	REDDS	FISH	% SPAWNING GROUND
1 mile	0	0	25%

Two miles above this bridge a water race of approximately 10 cusecs flow is taken off on the western side. This race has stable banks and would provide good cover, its bed is mainly pea gravel with a little shingle.

Recent bulldozing has been done below the main highway bridge, also some shingle removed. A bulldozer was working in the stream at the time of the survey, making the lower river dirty. This stream is possible used for spawning by lower Waitaki fish. Flow at the mouth was approximately 10 cusecs. The drop in flow, compared to the upper area, can be attributed to seepage.

4) MAEREWHENUA RIVER

This river rises in the Dansey Pass area close to the headwaters of the Otikaika river. It is confined in a steep sided gorge until about 7 miles above Duntroon, where it emerges into a small valley. It crosses the main highway at Duntroon finally flowing into the Waitaki river.

a) MAEREWHENUA ROAD BRIDGE.

This bridge is approximately four miles above Duntroon. The river here flows through a 1½ mile wide shingle flood bed, dividing into several channels in places. The bed is mainly composed of stones and boulders with large areas of quartz gravel and sand. There are a few good pools in this area, also some good runs and plenty of willow cover. Brown and green filamentous algal growth present, this tending to be heavy towards the river edges. In places it is unstable and shows signs of flooding.

MAEREWHENUA ROAD BRIDGE

ESTIMATED FLOW :	86 Cusecs		
DISTANCE COVERED (downstream)	REDDS	FISH	% SPAWNING GRAVEL
2 miles	0	1	10%

b) MAEREWENUA RIVER (UPPER SECTION)

Here the river is fed by two branches.

i) Left Branch This branch runs through a steep gorge. The bed is extremely stable, and there are a few pools, mainly on the bends. The bed is made up of quartz gravel with boulders and stones in places. The bottom is coated with brown algal growth. Where the quartz gravel occurs redd identification is difficult.

ESTIMATED FLOW : 53 cusecs

DISTANCE COVERED (upstream)	REDDS	FISH	% SPAWNING GRAVEL
1½ miles	3 Possible	0	3%

ii) Right Branch The bed in this branch is rocky, mainly large boulders. A number of deep pools, some 8' to 10' deep. Algal growth is green and in places filamentous. All the quartz gravel in this branch appeared to come from the first small side creek.

ESTIMATED FLOW : 80 cusecs.

DISTANCE COVERED (upstream)	REDDS	FISH	% SPAWNING GRAVEL
3 miles	0	0	3%

5) HAKATARAMEA RIVER

No survey was carried out on the Hakataramea river this time. However a previous job has been done by the Technical Field Service on the Hakataramea. This is Job. No. 36.

SPAWNING DISCUSSION :

A present adequate spawning facilities exists for Lake Benmore fish. However, when the proposed Hydro scheme takes place, not only will some existing spawning

water be barred from Benmore fish, but fish, at present populating rivers which are to dry up, will increase the population of Lake Benmore.

However as the Ahuriri river will not be affected it is possible that some fish from the Tekapo Arm of Lake Benmore will use this river for spawning.

It is doubtful that many fish will use the Twizel river as access from Lake Benmore will probably be poor. Also, the Ministry of Works propose building a housing centre as large as Otematata near the Twizel river. This brings up the possibility of interference to spawning fish and some pollution troubles.

Although Maryburn and Irishmans creek can provide substantial spawning facilities, it will be necessary to ensure that their flow plus the flow from Grays river, reaches Lake Benmore in sufficient volume to attract spawning fish. It seems possible that if flow was still allowed in the Forks river (by use of a porous dam) this flow plus seepage could produce sufficient flow in the Tekapo river right down to Lake Benmore.

Stoney river provides a small spawning area at present and it is possible that silt could be cleared from the lower part of the river to provide for further spawning.

At present only a small spawning area exists on the Lower Waitati, apart from the Hakabaramea river. Until firm plans for this area are announced it is not possible to say what alteration will occur to present spawning.

PROPOSED MINISTRY OF WORKS PLANS.

The Forks river is to be diverted into the Joseph stream. This runs into the Cass river which flows into Lake Tekapo. A control structure near the present Tekapo Power House will divert the Tekapo water into a channel.

This channel will flow across country via Maryburn power station finally flowing into Lake Pukaki. It seems possible that the level of Lake Pukaki will be raised by up to 100 feet. Water from Lake Pukaki is taken out of the Lake close to the present control structure, it is then taken in a channel to a point near the present main road bridge over the Ohau river. The Ohau is to be dammed at two points, at the present lake outlet, and at the main road bridge. A new lake is to be formed above this bridge. A channel will be taken out of Lake Ohau and allowed to flow into the new lake. Water from this lake will then be channelled down to Lake Benmore.

The following rivers will be dry at all times except during heavy floods :-

1. Tekapo river from Tekapo Control down to Grays river.
2. The whole Pukaki river bed.
3. The Ohau river from the Lake down to the proposed new lake. From the main road bridge down to Lake Benmore.

At present no proposals for altering Maryburn, Irishmans creek, Grays river and river Twizel are at hand.

CONCLUSIONS AND RECOMMENDATIONS

1. At present it is possible that adequate spawning exists for Lake Benmore fish, provided access to Maryburn and Grays river is possible (ie. sufficient flow in lower Tekapo).
2. Fish using the Ahuriri Arm have sufficient spawning area.
3. Floods are not liable to occur very frequently and no consequent danger to spawning fish is envisaged from this source.