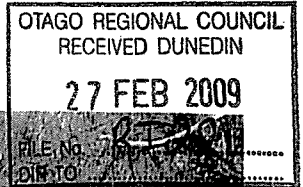


21



Submission on a publicly notified proposed change to the Regional Plan: Water for Otago

To: Otago Regional Authority.

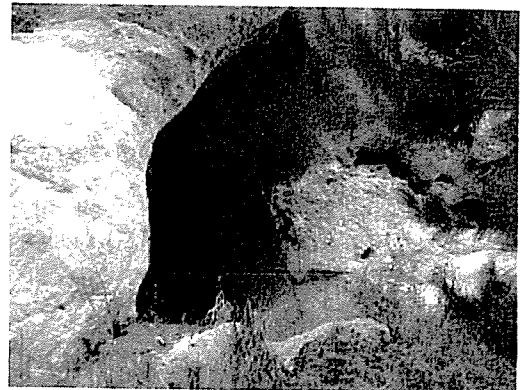
Name of submitter: Michael Malthus Trotter.

This is a submission on the **Proposed Plan Change 1B (Minimum Flows)** for Trotters Creek. I seek an amendment to the Proposed Change.

I lived alongside Trotters Creek in North Otago from 1935 to 1965. From 1965 to 1996 I was employed at Canterbury Museum in Christchurch, being Chief Executive Officer for the last thirteen years of that period. I am now semi-retired, operating a part-time heritage consulting business.

My submission is:

1. The Trotters Creek catchment has been utilized by humans for nearly a thousand years. During that time major changes have been wrought on the local environment, particularly on the vegetation, mostly through fire and farming.
2. Populations of indigenous fauna – birds, fish and invertebrates – have been reduced in numbers, but those that remain are worthy of protection.
3. The Swaggers Cave (pictured at right), near the creek, exemplifies an aspect of the area's human history. Although best known for its association with itinerant nineteenth and twentieth century travellers, it had been used for Maori occupation for hundreds of years before the advent of the Pakeha. The Maori people who used it for shelter caught fish in the stream and birds in the surrounding forest, though they also brought shellfish with them from the coast.



4. Today, the 3200 hectare Trotters Creek catchment includes 640 hectares of exotic forestry, 490 hectares of Department of Conservation land (which incorporates the 152 hectare Trotters Gorge reserve) and less than a thousand hectares of lowland farmland. It is in this last area that the existing fauna are most likely to be affected by the proposed minimum flows. Some summarized general information on the area can be found in Harry Evison's *Trotters Gorge – a Field Guide* (1978) and the Otago Regional Council's *Trotters Creek Catchment Information Sheet* (2008a). Water from the creek was first used for irrigation in the 1930s using a single-cylinder stationary engine to operate a pump.
5. Thirteen species of fish have been recognized by the Otago Regional Council (2006: 6; 2008a) as inhabiting Trotters Creek – these are listed as:

Giant kokopu	Inanga	Bluegill bully
Longfin eel	Common bully	Giant bully
Canterbury galaxias	Upland bully	Brown trout
Koaro	Redfin bully	Lamprey
Shortfin eel		

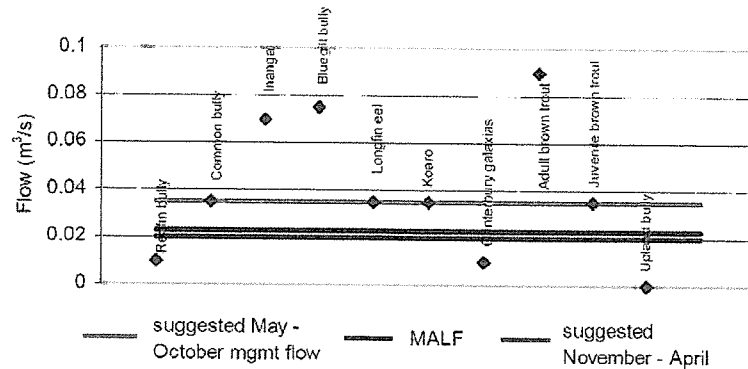
Reference is also made to seasonal runs of Sea trout in the lower section of the stream (2008a) – this is a variant of the Brown trout but which attains greater size in this location. Besides these, flounders live near the mouth of the stream (where I have personally seen and caught them).

6. The Otago Regional Council completed a study of the management flows for aquatic ecosystems in Trotters Creek in 2006 to establish the flow required to maintain an acceptable habitat for nine of the fourteen or fifteen fish species found there (Otago Regional Council 2006). The results as provided by the IFIM instream habitat modelling technique were as shown in the following table:

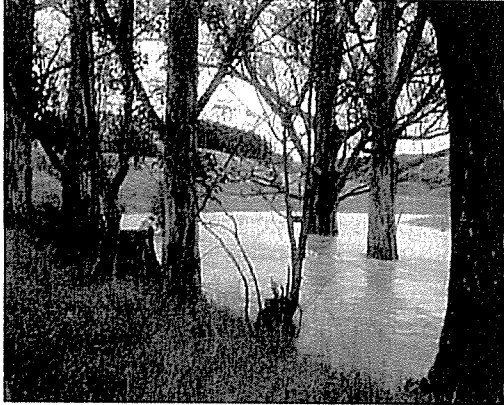
Fish species	Optimum flow (m ³ /s)	Flow below which habitat declines sharply (m ³ /s)
Redfin bully	0.12	0.01
Common bully	0.12	0.035
Inanga	0.12	0.07
Bluegill bully	0.25	0.075
Longfin eel	0.06	0.035
Koaro	0.20	0.035
Canterbury galaxias	0.035	0.010
Upland bully	0.12	–
Adult brown trout	>0.3	0.09
Juvenile brown trout	0.12	0.035

7. The 2006 report went on to suggest minimum flows for Trotters Creek: “A flow of **0.035 m³/s** is likely to ensure the sustainability of the diverse indigenous fish community in Trotters Creek during the high flow period from May to October inclusive. A flow of **0.02 m³/s** is likely to ensure the sustainability of the diverse indigenous fish community in Trotters Creek during the lower flow period from November to April inclusive, and it is recommended that flows should not be allowed to drop below those outlined above due to consumptive use.”
8. The report stressed, however, that the suggested 0.02 m³/s minimum flow was “well below” the point at which the habitat declined sharply for “all fish species in Trotters Creek, with the exception of redfin bullies and Canterbury galaxiids.”
9. Reference was also made in the report to Mean Annual Low Flow (MALF), which is the average of the lowest flows measured for any seven-day period. As there was no permanent flow recorder for Trotters Creek this was estimated by other means to be 0.023 m³/s.
10. Following a draft dated March 2008, the Otago Regional Council produced an Information Sheet on the Trotters Creek Catchment in October 2008 (2008a). This summarized the

information given previously without change, and included the following graph showing the proposed minimum flows for the summer and winter periods as well as the Mean Annual Low Flow, the figures for these being: May to October 0.035 m³/s, November to April 0.02 m³/s and MALF 0.023 m³/s.



11. Although most interest seems to centre on the fish life in Trotters Creek, there are two other groups of fauna that could be affected by a reduction of the water flow. These are the aquatic invertebrates and periphyton in the stream, and some of the birdlife that inhabit the adjacent area.
12. Small aquatic fauna are a source of food for the fish in the stream, and the adults of particular insects (such as caddisflies) form an important part of the diet for some birds.
13. While many species of invertebrates can survive extremely low flow rates (Storey and Quinn 2007), they are generally no longer available to either aquatic or terrestrial fauna under such conditions.
14. A number of bird species, ranging from black shags to fantails, feed on the aquatic fauna of Trotters Creek in one form or another, while other species, such as ducks, make use of the stream's plant life. The effect that managed very low water flow would have on these needs to be considered as well as that on the fish life.
15. The Otago Regional Council called a public meeting at Moeraki for 3 November 2008 "to discuss proposed changes [to minimum water flows for Trotters Creek] before they are notified" and on 20 December 2008 proposed changes to the Regional Plan were published (Otago Regional Council 2008d). At some stage about this time an illustrated pamphlet on Flow Levels and Effects (Otago Regional Council 2008b) – in lieu of an earlier proposed field trip – a public notice, and a summary brochure (Otago Regional Council 2008c), were produced.
16. These publications gave for the first time a proposed minimum flow of eight litres per second (= 0.008 m³/s) from October to April – well below the twenty litres per second (= 0.02 m³/s) that had previously been proposed for November to April – and 35 litres per second (= 0.035 m³/s) for May to September.
17. Although both are dated October 2008, the very considerable discrepancy between the data and recommendations given in the Trotters Creek Information Sheet (Otago Regional Council 2008a) and the Flow Levels and Effects pamphlet (Otago Regional Council 2008b), makes it seem likely that the latter was actually published some time later.
18. The Flow Levels and Effects pamphlet (Otago Regional Council 2008b) appears to ignore most of the work that had previously been done on the aquatic ecosystem of Trotters Creek – and conversely, data appear in this pamphlet that have not been included in earlier publications. Consequently, much of the information presented in the pamphlet must be open to question – some of these uncertainties are outlined in the following paragraphs.

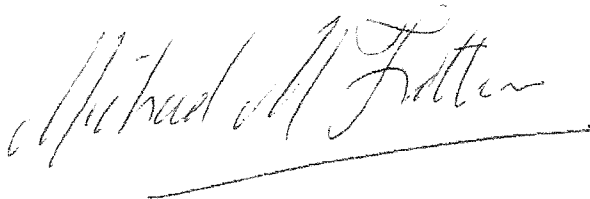
19. The complete lack of any reference to instream habitat modelling to support the present proposal is puzzling and requires explanation. The IFIM procedure that has been used by the Otago Regional Council in the past is internationally recognized and used for just such purposes as are required here. To abandon it and discard the data already obtained without explanation can only cast doubt on the motives behind the extremely low flow proposal.
20. The pamphlet contains series of photographs taken at “State of the Environment” monitoring sites at different locations along the creek. These are presumably intended as a visual assessment of the creek’s state or “values.” There are no accompanying data on such matters as water temperature, oxygen availability, or pollutants that might more accurately reflect faunal habitat conditions.
21. The first monitoring site is situated in Trotters Gorge (page 2). At this point a large amount of the creek’s water is flowing through the creek-bed gravel and although this site is considered to be indicative of natural flow, it should be noted that much of the total water in the creek is fed by springs further downstream. The flow rates cited here must be questioned, but even if correct, cannot be taken as representative of the whole creek.
22. The second monitoring site is at the Gorge Road [Horse Range Road] culvert not far from the road’s northern junction with State Highway 1 (page 3). This is actually an artificial canal dug some years ago to avoid having to replace a road bridge over a large pool, and it is likely that a large amount of the creek water still flows through gravel along the line of the original bed. The flow rates given for this site can relate only to the canal.
23. On page 4 of the pamphlet is a detailed graph of flows measured during water abstraction from Trotters Creek between 30 September 2006 and 18 April 2007. The graph shows four major unexplained peaks in natural water flow during this period, the largest being about 240 litres per second. These may represent floods, to which the creek is subject – example photograph at right – though they do not usually occur with such frequency. The graph also shows that the rate of abstraction was a fairly constant 50 litres per second for five months and about 40 litres per second for the remainder of the six-and-a-half month period depicted.
 
24. The pamphlet notes that the weir used to divert water into a holding pond is designed to allow a minimum flow of eight litres per second downstream and to enable up to 30 litres per second to be diverted into the pond. This appears to be the only reason for lowering the minimum flow from the recommended twenty litres (Otago Regional Council 2006) to eight litres (Otago Regional Council 2008d), and it seems to have been made without any consideration for the aquatic ecosystem.
25. I suggest that this is not in accordance with the *Regional Plan: Water for Otago* (Otago Regional Council 2004) and certainly contrary to the recommendations made by the Council between then and October 2008.
26. For this reason and to better maintain the creek based ecosystem I oppose the present proposal in regard to Trotters Creek as given in Otago Regional Council documents (2008b; 2008c; 2008d) and seek to have it amended to conform with the earlier recommendation of **0.035 m³/s** (35 litres per second) during the high flow period from May to October inclusive and **0.02 m³/s** (20 litres per second) during the lower flow period from November to April inclusive (Otago Regional Council 2006; Otago Regional Council 2008a).

I do not wish to wish to be heard in support of my submission.

Address for service of submitter:

Michael Trotter
170 Tuahiwi Road, R D 2, KAIAPOI 7691
Telephone: (03) 313 6454 E-mail: summerwine@xtra.co.nz

Signature:

A handwritten signature in black ink that reads "Michael Trotter". The signature is written in a cursive style and is underlined with a single horizontal line.

Date:

26 February 2009

References:

- EVISON, Harry, 1978. *Trotters Gorge – A Field Guide*. Friends of Trotters Gorge, Dunedin.
- OTAGO REGIONAL COUNCIL, 2004. *Regional Plan: Water for Otago*. Dunedin.
- OTAGO REGIONAL COUNCIL, 2006. *Management Flows for Aquatic Ecosystems in Trotters Creek*. Dunedin.
- OTAGO REGIONAL COUNCIL, 2008a. *Trotters Creek Catchment*. Information Sheet, October 2008. [Also draft Information Sheet, March 2008.] Dunedin.
- OTAGO REGIONAL COUNCIL, 2008b. *Trotters Creek Flow Levels & Effects*, October 2008. Dunedin.
- OTAGO REGIONAL COUNCIL, 2008c. *Changes to the Regional Plan: Water for Otago*. Summary Brochure. Dunedin.
- OTAGO REGIONAL COUNCIL, 2008d. *Proposed Plan Change 1B (Minimum Flows)*, Section 32 Report, Regional Plan: Water for Otago, 20 December 2008. Dunedin.
- STOREY, Richard, and QUINN, John, 2007. When the rivers run dry: invertebrate communities in intermittent streams. *Water and Atmosphere*, Vol.15 No.2: 16-17.

SUBMISSION FORM
Proposed Plan Change 1B Minimum Flows
to the Regional Plan: Water for Otago

Form 5, Clause 6 of the First Schedule, Resource Management Act 1991.

22

Office use only

Full name of submitter: Michael Charles Rawlinson

Name of organisation (if applicable): —

Postal address: 1 Dalkeith Street

North East Valley, Dunedin

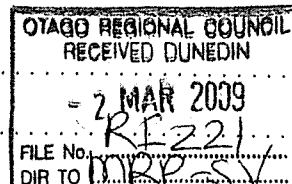
Telephone: (03) 473 8394

Email: —

Postcode: 9010

Fax: —

Contact Person: As above



I wish / (do not wish) (circle preference) to be heard in support of my submission.

If others made a similar submission, I will consider presenting a joint case with them at a hearing.
(Cross out if you would not consider presenting a joint case).

Signature of submitter: M. Rawlinson
(or person authorised to sign on behalf of person making submission).

Date: 26.2.09

Please note that all submissions are made available for public inspection.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

Schedule 2A: Policy 6.4.3 Trotters catchment

Submission Reference (Below)

- Section 32 Report: ORC: 20 December 2008. Page 5.
- Management Flows for Aquatic Ecosystems in Trotters Creek (ORC) August 2006: Pages 12, 14.
- Proposed National Environmental Standard on Ecological Flows and Water Levels: Ministry for the Environment: March 2008: Page 27.

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

- I wish to have the minimum flow amended. In my opinion 8 litres per second will NOT provide protection for in-stream values as claimed.
- Trotters Creek has 13 species of fish present (Refer page 6). Flow below which habitat declines sharply is higher than 8 litres per second for all 10 fish species listed in Table 4.1. A flow of 20 litres per second is recommended from November to April.
- Using the criteria in the Proposed NES, 20.7 litres per second is almost identical to the 2006 Report figure.

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

Raise the Minimum flow for the Trotter catchment at Matheson's Weir to 30 litres per second (October to April), to match the Primary Allocation limit, consistent with the 50:50 flow-sharing basis between in-stream and out of stream use, as in Policy 6.4.9 Explanation.
As proposed, a natural flow of 40 litres per second could be reduced by 75% by out of stream use and still be above the Minimum flow of 8 litres per second.

SUBMISSIONS MUST BE RECEIVED BY 5.00 PM, MONDAY 9 MARCH 2009.

Please ensure you secure with a small piece of tape.

Freelost Authority ORC 1722



Otago Regional Council
Private Bag 1954
Dunedin 9054

Attention Policy Team



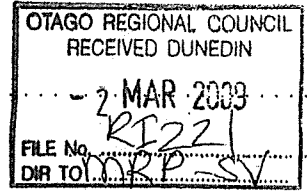
SUBMISSION FORM
Proposed Plan Change 1B Minimum Flows

to the Regional Plan: Water for Otago

Form 5, Clause 6 of the First Schedule, Resource Management Act 1991.

(22)

Office use only



Full name of submitter: Michael Charles Rawlinson

Name of organisation (if applicable): —

Postal address: 1 Dalkeith Street

North East Valley, Dunedin

Postcode: 9010

Telephone: (03) 473 8394

Fax: —

Email: —

Contact Person: As above

I wish (do not wish) (circle preference) to be heard in support of my submission.

If others made a similar submission, I will consider presenting a joint case with them at a hearing.
(Cross out if you would not consider presenting a joint case).

Signature of submitter: M. Rawlinson
(or person authorised to sign on behalf of person making submission).

Date: 24.2.09

Please note that all submissions are made available for public inspection.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

Schedule 2A: Policy 6.4.3: Waianakarua catchment.

Submission Reference: (Below)

1. Management Flows for Aquatic Ecosystems in the Waianakarua River (ARC) August 2006. Page 12.

2. Proposed National Environmental Standard on Ecological Flows and Water Levels: Ministry for the Environment: March 2008: Page 27

3. Otago Daily Times 16 January 2009.

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

I wish to have the minimum flow amended: 200 litres per second (October to April) is too low for the following reasons:

1. Of the 10 fish species listed in table 4.1, only 4 in the column "Flow below which habitat declines sharply" require flows of 200 litres per second or less (2 are blank) leaving at least 4 requiring higher minimum flows.
2. A minimum flow of 200 litres per second is 26% less than the proposed National Environmental Standard.
3. Prolonged low flows which could occur at such a low minimum would surely make toxic algal blooms (Phormidium) more likely.

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

Raise the proposed Minimum Flow for the Waianakapaia catchment at Browns Pump to 300 litres per second (October to April.)

OR require primary allocation takes to be reduced by 50% (October to April) when flows are between 400 and 200 litres per second at Browns Pump

OR some other fair and effective method of keeping flows from falling below the natural MAWF as long as possible

SUBMISSIONS MUST BE RECEIVED BY 5.00 PM, MONDAY 9 MARCH 2009.

Please fold and secure with a small piece of tape.

FreePost Authority ORC 1722



Otago Regional Council
Private Bag 1954
Dunedin 9054

Attention Policy Team

SUBMISSION FORM
Proposed Plan Change 1B: Minimum Flows
to the Regional Plan: Water for Otago
December 2008

Form 5, Clause 6 of the First Schedule, Resource Management Act 1991

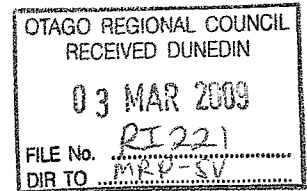
23

Office Use Only

Full name of submitter: Mark Bingham

Name of organisation (if applicable): Van Leeuwen Dairy Group

Postal Address: Number/Street: 63 McNaughtons Road
Suburb:
Town/City: Waimate
Postcode: 7979



Telephone: 03 689 4929

Fax: 03 689 4989

Email: v.lg@xtra.co.nz

Contact person: Mark Bingham

I wish/do not wish to be heard in support of my submission.

If others make a similar submission, I will consider presenting a joint case with them at a hearing.

Date: 3/03/2009 09:24:06

Please note that all submissions are made available for public inspection.

Signatures are not required for submissions made electronically.

Submissions must be received by 5pm, Monday 9 March 2009.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

Reference policy 1B Minimum Flow Rates for the Waianakarua River. Public Meeting at the Mill House Cafe proposal for minimum flow rate of the river was suggested to be 200 litres per second. There are now proposals being brought forth that minimum flow rates are to be increased to 400 litres per second and perhaps as high as 450 litres per second?

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

We oppose any increase of a minimum flow rate from 200 litres per second from the original proposal discussed at the public meeting held in December 2008 at the Mill House Cafe in Waianakarua. According to the public forum in December, it was stated that there had never been a minimum flow rate imposed on the river. It was also stated that there has never been an incident which was deemed critical to the river's ecological state. The majority of the water is taken out at the end of the river just before the tidals end. The river is ranked 8/77 for water quality. It also has good fish life and has very good macro invertabrae density and has not had a minimum flow rate in place over the past forty years. Farmers and land owners using the Waianakarua River for irrigation purposes recognize the importance of sustaining this natural resource and thus have managed it successfully!

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

While it has been declared that the Waianakarua River has never had a minimum flow rate imposed on it, we as dairy farmers recognize the importance of our natural resources and realize the important balance of assessing minimum flow rates to the river play both ecologically and economically to all interested parties. We would propose a minimum flow rate in the area of 150 to 200 litres per second on the Waianakarua river and look forward to the opportunity of further discussions on this matter.

SUBMISSIONS MUST BE RECEIVED BY 5.00PM, MONDAY 9 MARCH 2009

Please send submissions to:

Email: policy@orc.govt.nz

Post: Attn: Policy Team, Private Bag 1954, Dunedin 9054

Fax: (03) 479 0015 (Attn: Policy Team)

Deliver: 70 Stafford Street, Dunedin; or

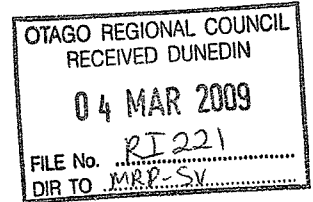
William Fraser Building, Dunorling Street, Alexandra; or

The Station, 1st Floor, Cnr Shotover and Camp Streets, Queenstown

Full name of submitter: Gerry Closs

Name of organisation (*if applicable*):

Postal Address: Number/Street: 17 Ferntree Drive
Suburb: Wakari
Town/City: Dunedin
Postcode: 9010



Telephone: 476 4014

Fax:

Email: gerry.closs@stonebow.otago.ac.nz

Contact person:

I do not wish / wish to be heard in support of my submission.

If others make a similar submission, I will consider presenting a joint case with them at a hearing.

Date: 3/03/2009 15:59:23

Please note that all submissions are made available for public inspection.

Signatures are not required for submissions made electronically.

Submissions must be received by 5pm, Monday 9 March 2009.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

Schedule 2A Trotters Catchment, Reference Number 5

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

I believe the proposed minimum flow of 8 litres per second to be too low. Trotters Creek supports an exceptionally high diversity of fish species for the Otago coastal region. This diversity is most likely due to the diversity of habitats available within this stream. An extended period of low flow would reduce the available habitat diversity. Further, many of the fish in the stream are drift feeding species (e.g. koaro, Canterbury galaxias, brown trout) and are hence dependent on the supply of food brought to them by flowing water. Low periods of low flow will reduce food supply, thus reducing overall fish abundance.

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

I seek a minimum flow of at least 20 litres per second for Trotters Creek from October to April

SUBMISSIONS MUST BE RECEIVED BY 5.00PM, MONDAY 9 MARCH 2009

Please send submissions to:

Email: policy@orc.govt.nz

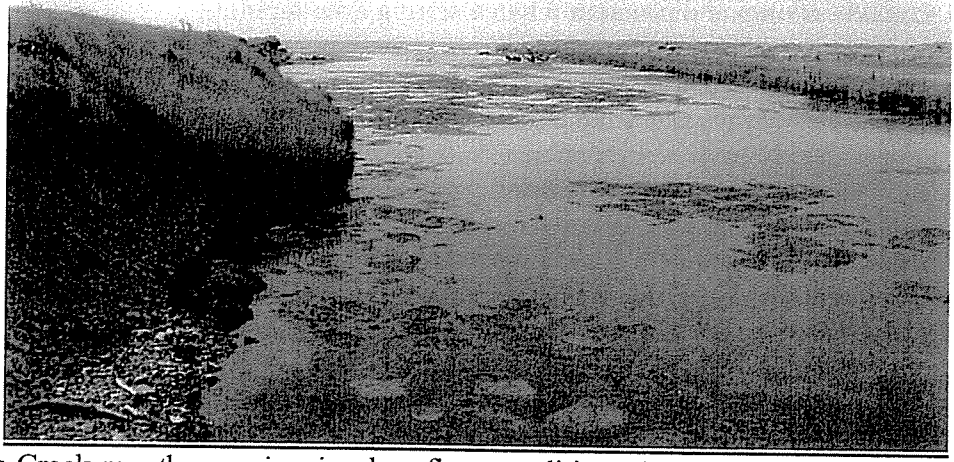
Post: Attn: Policy Team, Private Bag 1954, Dunedin 9054

Fax: (03) 479 0015 (Attn: Policy Team)

Deliver: 70 Stafford Street, Dunedin; or
William Fraser Building, Dunorling Street, Alexandra; or
The Station, 1st Floor, Cnr Shotover and Camp Streets, Queenstown

MORGAN JOHN TROTTER
MINIMUM FLOW SUBMISSION
TROTTERS CREEK

OTAGO REGIONAL COUNCIL
RECEIVED DUNEDIN
04 MAR 2009
FILE No. R1221
DIR TO MJE-SV



Trotters Creek mouth experiencing low flow conditions (compounded by abstraction for irrigation) during mid February 2009.

My name is Morgan John Trotter; my family have lived and farmed beside Trotters Creek since the 1840s. The creek has significant historical, recreational and ecological values which are held in very high regard by my family and members of our community.

I grew up beside the creek and since a very early age I have gone swimming, eeling, white baiting, floundering and trout fishing in the creek. When I worked for the Regional Council I assisted with electric fishing studies of the creek and conducted compliance inspections of the irrigation take. In my own time I have walked the length of the creek and explored every tributary. I hold a double major zoology/ecology degree and a post graduate diploma in environmental science (passed with distinction).

I support the proposed winter period minimum flow of 35 litres a second. I understand that the weir used to divert water into the storage pond is to be removed during winter.

I oppose the proposed summer period minimum flow of 8 litres a second for the following reasons:

1. The Trotters Creek Management Flows report commissioned by the Regional Council (at no small expense) clearly identifies that at least 20 litres a second is

required to protect the 13 different fish species that are known to live within the creek which includes giant kokopu, long finned eel, short finned eel, koaro, Canterbury galaxiids, common bully, upland bully, giant bully, red fin bully, blue gill bully, lamprey, brown trout and inanga. The report states that although 20 liters a second is well below the point of habitat inflection for all fish species in the creek expect red fin bullies and Canterbury galaxiids it is likely to ensure the sustainability of the diverse native fish community and that flows should not be allowed to drop below 20 liters a second due to consumptive use.

2. In addition to the species listed above, flounder and smelt have been known to live in mouth of the creek. Such high biodiversity should be given significant consideration and protection when setting a flow regime.
3. The summer low flow period is when the health of the creek is under stress (caused by high water temperatures, reduced habitat, low oxygen levels and algal blooms) and requires protection from over abstraction the most. The Management Flows report states that the (natural) mean annual low flow restricts the amount of habitat available for most of the native fish species found in the creek. The proposed minimum flow would compound the effect of these low flows and the creek would be flat lined unnaturally for extended periods. This would result in low oxygen levels, reduced aquatic habitat, more algal blooms, increased water temperatures and higher nutrient concentrations.
4. The North Otago area experiences severe droughts and is expected to become even drier under the influence of climate change (Ministry for the Environment website). This would extend the period of summer low flows in Trotters Creek and makes a meaningful minimum (of at least 20 liters a second) flow absolutely necessary to protect the health of the creek.
5. The creek mouth can become blocked near the ocean during prolonged low flow periods or after storm events. This often results in the build up of a sand spit that prevents fish passage and requires a large flushing flow to blow it out or significant flows to build up over time and run over the top of the sand bar. The hydrological interactions between the creek mouth and the ocean are very complex and have not been adequately considered or addressed in studies to date.
6. The present abstraction regime provides for only 8 liters a second in the creek during low flow periods. This summer the mouth of the stream dried up and became blocked off from the ocean for an extended period (see cover photo) until there was a flood event. During an inspection of the creek mouth no flounders could be found and the creek was experiencing the worst algal bloom that I have seen in the mouth. Trout numbers (and size) were also very low. It was not a particularly dry year in the Trotters Creek catchment. If the minimum flow is set at only 8 liters a second permanently, it is likely that the mouth of the creek will become blocked off far more often and for longer periods than would occur naturally.

7. Many (10) of the native fish species that live in the creek have a sea going life cycle stage. It is vital that water abstraction does not result in the blockage of the stream mouth near the ocean which would prevent fish access to and from the sea.
8. The creek has been an important resource for commercial eeling. It is important to protect the health of the creek and the surface flow connection with the ocean to ensure the sustainability of this fishery.
9. The mouth of the creek will be the area worst affected by the proposed minimum flow of only 8 liters a second during summer. Traditionally this area has been the most productive part of the creek for recreational activities such as white baiting, floundering and trout fishing. The proposed minimum flow will have a significant negative impact on these recreational activities.
10. It is a mistake to consider that only a small section of the creek will be affected by the proposed minimum. The hydrologic functioning of the length of the creek and connection with the ocean is vital for 10 species of fish which have a sea-going life cycle. The entire length of the creek must be considered in order to protect the ecology of the stream.
11. Reasonable flows are required in the mouth of the creek to maintain water quality for stock drinking purposes.
12. The proposed minimum flow of 8 liters a second and the primary allocation limit of 30 liters a second will result in approximately 75% of the flow being taken for irrigation during the summer low period when the creek often runs at 40 liters or less. This is too high and does not leave enough water to sustain the ecosystem.
13. Some of the white bait species such as inanga spawn in the lower part of the creek during the summer low flow period (January to March). Good water quality and flow levels are an important part of their spawning and juvenile habitat requirements.
14. The proposed level and present weir would not provide for trout passage during summer.
15. It has been estimated in the Management Flows For Trotters Creek report that a minimum flow of 20 liters a second would only impact on water abstraction on 4 days a year. I understand that there is 3.5 days of storage in the dam beside the creek. With a slight increase in storage a minimum flow of 20 liters a second would allow for water abstraction and better protect the health of the stream at the same time.

16. It is likely that during prolonged summer low flow periods there will be times when there is not enough water in the creek to allow for abstraction and ensure the functioning of the ecosystem. In this case direct abstraction for irrigation should cease.
17. In the hand out on Trotters Creek supplied by the ORC it is stated that 8 liters a second will maintain the cultural, recreational and social needs of the community. The needs of the community can not be met without protecting the basic ecology of the stream and the local community certainly has not agreed on this figure. The information supplied in the handout is misleading and incorrect. Furthermore it preempts the decision making process. Members of the public seeking to make an informed decision will have been misled by the information supplied in the handout.
18. Flat lining of the creek at 8 liters a second for extended periods would destroy the natural character of Trotters Creek.
19. The mean annual low flow of Trotters Creek has been estimated at 23 liters a second in the Management Flows report. Later ORC staff questioned this value after flow comparisons with other nearby rivers and after doing a flow gauging in May. Although the catchment area of Trotters creek may not be as large as the Shag or Waianakarua Rivers, during droughts the surface flows between pools in Trotters Creek often continue when the surface connection between pools in these other rivers has dried up (this may be related to localised weather patterns, the swampland and vegetation in the upper catchment and the structure and geology of the stream bed). A one-off gauging of the creek flow is not enough data to accurately estimate the mean annual low flow.
20. Continuous flow records over several years are required to gain an accurate mean annual low flow estimate. This data is not available so the ORC should err on the side of caution when setting a minimum flow to protect the aquatic habitat.
21. The mean annual low flow value can not be accurately estimated at this stage, but the habitat modeling studies have clearly identified that at least 20 liters a second is required to protect the aquatic habitat of the creek.
22. Many of the native species require riffle habitat for their survival. When the creek becomes low the riffle habitat is the first to be lost. A minimum flow of only 8 litres will reduce riffle habitat the most. This will force small native species (such as bullies) into the remaining pools where their predators (trout, eels and giant kokopo) exist. This could result in the local extinction of species which find refuge in riffle habitat.
23. Riffle habitat is very important for aquatic invertebrates such as mayflies and is most affected by low flows. The riffles below the weir provide habitat for invertebrates which help sustain fish life in pools further downstream.

24. A rare species of burrowing mayfly (*Ichthybotis*) is found in the creek, but there is no reference to the habitat requirement of this insect in studies to date.
25. The suggested summer minimum flow of 8 liters a second is so low that evaporation could have a significant impact and further reduce the health of the stream.
26. Since abstraction for irrigation began the actual amount of water used for irrigation and the amount of water that has over flowed from the storage pond back into the creek is not known. When there is uncertainty about flow and abstraction levels the Council should take a precautionary approach when setting permanent minimum flow levels to allow for hydrological estimate errors and ensure the protection of the environment.
27. I believe that the amount of fish life in the creek (and in many North Otago streams) has decreased over the last 25 years. I suspect that the main cause of the loss of fish life is decreased water yield from the catchment, probably due to land use change and possibly climate change as well. I have not seen flounders in the creek mouth for several years. Smelt which were present when my father was a boy are no longer seen. Many of the native species (such as the threatened lamprey) in the creek are found in low numbers and are just holding on and no more. I have not seen a large trout or a sea run trout in the creek for several years. The numbers of long finned eels and invertebrate life in the creek also appears to have decreased significantly. A meaningful minimum flow is required to protect the life giving qualities of the creek from increased stress during low flow periods.
28. New Zealand's primary production and tourism industry is marketed under a "clean green" image. If it becomes known internationally that streams and rivers in New Zealand are being degraded to irrigate farmland there will be a negative impact on our export and tourism markets. Over abstraction from rivers for irrigation is short sighted management and will have a negative impact on our economy and environment in the longer term.

I would also like the Council to note the following points:

1. The Trotters family was the first to be given permission to irrigate out of Trotters Creek. This permission was never used (and lapsed) because of my families concerns about the effects of abstraction during low flow periods on the health of the creek.
2. My family was originally told that water for the irrigation take that is now active would only be harvested during high flow periods for storage, and that irrigation would not affect low flow levels. We were not given an opportunity to have input on minimum flow levels when abstraction for irrigation first began. Given the

chance, we would have opposed abstraction from the stream at low levels from the onset.

3. In recent years ecological studies commissioned by the Council have revealed a far higher level of biodiversity in the creek that was previously known and the flow levels required to sustain fish species. Management decisions made prior to these studies should be reviewed.
4. I understand that the weir that has been used to divert water into the storage pond has restricted fish passage. It is important that fish passage for all species is provided for at all times.
5. Recent willow control works by the Regional Council have been very successful in removing obstructions and improving flow between pools. These works have also flushed a lot of sediment out of riffle areas and this has resulted in more clean gravels and improved habitat for some fish species. This habitat improvement will not account for anything if the creek does not have a reasonable minimum flow.
6. The minimum flow regime and abstraction allocation limits should be designed to mimic natural flow patterns and provide for flow variability as much as possible. During dry years flushing flows, small freshes and peaks are vital for the health of the stream.
7. I understand that the over flows from the storage dam run back into the creek several hundred meters further downstream from the weir. If the point of take and the return from the storage pond were located close together the unnecessarily dewatering of a section of the creek could be avoided.

Finally, the intrinsic, recreational and ecological values of Trotters Creek are important for many members of our local community and people from outside the area as well. A meaningful minimum flow and conservative abstraction limits are required to ensure that the irrigation of water does not jeopardize these values and the health of the stream. Any financial gains from irrigation of farmland by one member of the community will not benefit the greater community unless the health of the stream is protected the first instance. Eight litres a second is not enough water to protect the health of the stream and the community values, the minimum flow during summer should be at least 20 liters a second.

I would like to be heard in support of my submission.

Yours Sincerely

Morgan Trotter
2RD Palmertson
9482
Otago

SUBMISSION FORM
Proposed Plan Change 1B: Minimum Flows
to the Regional Plan: Water for Otago
December 2008

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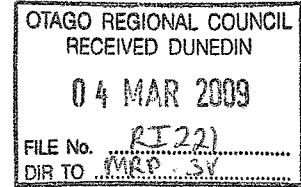
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Form 5, Clause 6 of the First Schedule, Resource Management Act 1991

Full name of submitter: Bronwyn Judge

Name of organisation (if applicable):

Postal Address: Number/Street: PO Box 351,
Suburb:
Town/City: Oamaru
Postcode: 9444



Telephone: 34395660

Fax:

Email: mjjudge@xtra.co.nz

Contact person: Bronwyn Judge

I do wish to be heard in support of my submission.

If others make a similar submission, I will consider presenting a joint case with them at a hearing.

Date: 4/03/2009 14:31:16

Please note that all submissions are made available for public inspection.

Signatures are not required for submissions made electronically.

Submissions must be received by 5pm, Monday 9 March 2009.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

Minimum flows for the Waianakarua and Trotters Gorge Rivers. In particular adverse effects the proposed min flow would have on 2D.1 and 2D.2

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

Amend The report indicates that flow estimates are based on very little reliable data .Given that the catchments for the North and South Branch of the Waianakarua are different in nature and that the rate of flow in the North branch appears to be much faster than in the south the Waianakarua is really for most of its length two separate rivers and should be viewed as such.The proposed minimum flow would mean the rivers could be taken to a level where the mouths would close and if this occurs for any length of time fish would be

affected. There is little information as to the effect of changing land use round the river and the effect it has on ecological values and water quality. In past cases although minimum flows may have been instigated to protect rivers such as the Waitaki the result is just the opposite and ways have been sought push minimum levels down further. There seems to be no data on what the results would be if everyone with water allocation took their full allocation although we are told the river is already over allocated. The wishes of the majority of people at the workshops for a higher minimum level seems to be over ridden by the wishes of those who have an economic interest. Furthermore the data as to days of restricted irrigation at various minimum flows doesn't make it clear that although restricted that doesn't mean on those days no water at all would be available to irrigators. As locals we consider the river has outstanding character and value that is not immediately apparent for those who have not visited the river and while the proposed minimum flow may not destroy that character it would do nothing to enhance it and could possibly result in increased algae growth and further unforeseen adverse results.

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

To really protect the river the plan should err on the side of caution until there has been a reasonable period of time to do specific research on these rivers given the limited data available and given that some data is based on neighbouring rivers that actually differ in nature and character significantly from the Waianakarua Reiver and Trotters Gorge. The changing economic climate and global environmental changes that are affecting the planet, also indicate a conservative approach is warranted especially as this area's rivers have a low base flow and abstraction has more effect. Catchments are shorter, drier and flows more variable. This is highlighted in data put out by the Ministry for the Environment in their draft guidelines for methods to determine ecological flows and water levels. The minimum flow should be higher 500 l/s or a better system for preserving the character of the river devised. Policies are also needed to ensure that the rivers have adequate flow variability to maintain habitat and provide for key aquatic function in case of consents for supplementary take being sought in the future.

SUBMISSIONS MUST BE RECEIVED BY 5.00PM, MONDAY 9 MARCH 2009

Please send submissions to:

Email: policy@orc.govt.nz

Post: Attn: Policy Team, Private Bag 1954, Dunedin 9054

Fax: (03) 479 0015 (Attn: Policy Team)

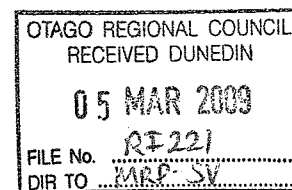
Deliver: 70 Stafford Street, Dunedin; or

William Fraser Building, Dunorling Street, Alexandra; or

The Station, 1st Floor, Cnr Shotover and Camp Streets, Queenstown

27

From: Andy Hicks [ashicks@gmail.com]
Sent: Wednesday, 4 March 2009 16:37
To: Policy Reply
Subject: Trotters Creek minimum flow



Minimum Flow Submission : Trotters Creek

My name is Andy Hicks. I am currently a PhD student at the University of Otago. I have an Arts/Science honours degree with majors in geography, environmental science and marine ecology, which I completed at the University of Melbourne. I have been researching the habitat requirements of different life stages and migration patterns of native fish in both New Zealand and Australia for about five years. I have also conducted research exploring how estuary geomorphology affects the amount of suitable spawning habitat of inanga, the most common whitebait species.

Pumping directly out of rivers over summer months when the river is at its lowest natural flow is a bad idea. Toxic algal blooms in the lower reaches, the risk of which is already increased by nutrient inputs from the catchment, increase exponentially with decreasing water flow. Extreme summer low flows are a critical period and can define the fish community for the remainder of the year, as massive mortality from heat stress and anoxia can occur. The low flow period over summer can thus be seen as a bottleneck for the biodiversity of the lower reaches of Trotters Creek – and the minimum flow requirements set by the ORC will effectively define the severity of this bottleneck. Allowing extractions to continue after the river drops below the 0.02 m³ recommended for aquatic ecosystem maintenance would be agreeing to deteriorate the ecological integrity and biological diversity of Trotters Creek.

I do not believe studies have adequately addressed whether protracted extraction-induced periods of low flow have resulted in increased levels of mouth closure of Trotters Creek. I am surprised this has not been given more attention. Creeks on open coasts have a greater tendency to close over, due to the continued deposition of wave supplied sand at river mouths (spits). If river discharge is not great enough to remove sand deposited at the mouth, estuary closure can result. Mouth closure is not so much of an issue within harbours or enclosed bays because wave energy and sand supply is reduced in enclosed waters. But mouth closure is an issue for Trotters Creek because the mouth drains onto an exposed open coast. A decrease in discharge will increase the chance for, and duration of, mouth closure. River-sea access for the native diadromous fish fauna is crucial, and estuary dynamics and “character” change dramatically upon mouth closure. Although peak whitebait migration occurs during spring, recruitment can occur well into the summer months. And most recruitment of giant kokopu is often considerably later than the peak whitebait recruitment, extending into December. Even if complete river mouth closure does not occur – decreased freshwater output would provide less of a cue for returning whitebait, which hone in on the freshwater and associated cues (conspecific pheromones and other habitat cues). Decreasing discharge would result in decreasing cue strength and provide less attraction to whitebait.

Peak inanga spawning in this part of New Zealand is during March, a period of time with typically low flows. Inanga require low salinity habitat (for successful fertilisation) in the upper reaches of estuaries, and utilise tidal height differences for egg stranding. The egg stranding strategy results in faster embryonic development and less aquatic predation. If water extractions during this time resulted in river mouth closure, the tidal cues used by spawning inanga would be lost. An overall decrease in freshwater discharge due to water extraction in the absence of mouth closure would also decrease the amount of freshwater habitat within the estuary. Both of these effects would have a negative impact on inanga spawning.

The clean green image of New Zealand results from low population size and low intensity farming,

not sustainable management practices. This pattern is changing – with agricultural intensification resulting in chronic deterioration of environmental values across the country. The Waikato River System and its horrendous water quality is a depressing example of what happens when development proceeds without concern for the environment. The diversity of native fish represented within river catchments is on the decline, and it has become obvious during my PhD research that the large galaxiids (four out of five whitebait species) are under recruitment limitation (not enough new individuals entering populations) across much of their range, particularly on the east coast of the south island. The greatest tragedy is that New Zealand is fortunate with the availability of the most crucial natural resource, water. But it is the mismanagement of water and water catchments that is resulting in declining environmental values. This is unnecessary, because both knowledge and affordable technology is available for development to continue without causing so much damage.

Being Australian, I was surprised to realise New Zealand does not have more irrigation dams, where water from high flow events is stored for use during the low flow periods. It is a constant battle keeping irrigation dams full in Australia, because we rarely get high flow and rainfall events to fill the dams. Much of New Zealand does not have that problem, however, both due to higher rainfall, and the potential to extract from rivers during the ice/snow melt. The water extraction battles are thus a problem that New Zealand does need not face – because it should be fairly straightforward to store rainfall/floodwater/ice melt in storage dams and have them available for irrigation during the summer months. In the case of Trotters Creek, farmers could either build their own storage dams and fill them during winter (preferably from rainfall runoff), or the current communal storage dam could be increased and flow levels in Trotters gorge maintained above the natural minimum summer flow (above 0.02m^3). That would be a better solution for providing water for irrigation rather than threaten both the ecological integrity and natural character of Trotters Creek by allowing water extraction to reduce summer flows to 0.008m^3 . Greater water storage would also give farmers more flexibility for irrigation and drought insurance by not having to rely on pumping from a river that they will at some point not be able to pump from (when it drops below whatever threshold is set).

It is the ORC's responsibility to balance the degree of environmental protection against the value of water for other users. Increasing water storage, either by permitting farmers to build their own irrigation storage dams (in gullies not classed as waterways, or hillside dams), or increase storage capacity in communal dams, would mean the value of water is retained for farming purposes.

Allowing water extraction to reduce November-April flows below 0.02 m^3 would decrease ecological integrity of the creek. With greater use of irrigation dams, the value of water in the Trotters Creek catchment can be retained for both ecological integrity and farming use without allowing extractions to reduce flows below 0.02 m^3 . With this in mind, I cannot see how the ORC could support the request for continued water extractions until flow rates reach 0.008 m^3 .

The suggestions made for “management flows for aquatic systems in Trotters Creek” were clear. Extractions should not continue during the low flow period when discharge drops below 0.02 m^3 . A lot of money is spent on environmental consultancy and ecological impact studies, but this advice is often completely ignored. It highlights that development decisions are often made before receiving environmental information, and any consultation with environmental specialists is undertaken merely as a token measure. I hope this is not the case with decisions regarding minimal flows in Trotters Creek.

I am happy to discuss any matters in person – and can be contacted via email ashicks@gmail.com or by mobile 027 2077 604.

Yours sincerely,

Andy Hicks



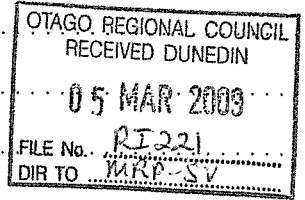
SUBMISSION FORM
Proposed Plan Change 1B Minimum Flows
to the Regional Plan: Water for Otago

Form 5, Clause 6 of the First Schedule, Resource Management Act 1991.

28

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Full name of submitter: ERROL JOHN TROTTER
 Name of organisation (if applicable):
 Postal address: 1540 HORSE RANGE ROAD
 Postcode: 9482
 Telephone: 03 4394 836 Fax:
 Email: Contact Person: JOHN TROTTER



I wish/ do not wish (circle preference) to be heard in support of my submission.

If others made a similar submission, I will consider presenting a joint case with them at a hearing.
 (Cross out if you would not consider presenting a joint case).

Signature of submitter: E.J. Trotter Date: 03/03/09
 (or person authorised to sign on behalf of person making submission).

Please note that all submissions are made available for public inspection.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

PROPOSED 8 LITRES A SEC. MINIMUM FLOW Oct/ May

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

I oppose the 8 litres/sec and wish this amended to 20 litres/sec minimum flow

My name is John Trotter and I own the property that boundaries above the Matheson farm, and the Trotter's Creeks runs through it. I have lived here since 1944 and remember sea run trout in the lower reaches

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

and... smelt... shall... many... (kilometers)... above... the... mouth... now... it is... an... event... to... see... a... trout... in... the... length... of... the... river.....

If... it... was... not... obvious... to... me... the... irrigation... take... was... detri-
-mental... regarding... the... mouth... I... would... not... be... writing... this... submission,

Because... of... the... willow... clearance... undertaken... by... the... O.R.C... the... creek
appears... healthier... than... it... has... for... decades... Whereas... even... three... years
ago... trout... were... numerous... in... the... pools... above... the... weir... it... is... now... a
rarity... to... see... even... small... eels... Can... or... do... fish... negotiate... it... I... do... not... know

It... is... very... disappointing... to... note... the... mouth... closes... now... in... years... of
good... flows... and... it... takes... a... good... flood... to... unblock... it,.....

The... past... four... years... have... shown... Trotters... creek... is... too... small
for... an... irrigation... take... -... except... harvesting... high... flows... for... storage... -

In... the... pamphlet... Trotters... Creek... Flow... Levels... &... Effects... Oct
08... the... writer... concludes... 'the... 8... l/s... will... maintain... the... recrea-
-tional... cultural... &... social... values... including... drinking... water... quality'.
The... 8... l/s... benefits... only... the... irrigator;

SUBMISSIONS MUST BE RECEIVED BY 5.00 PM, MONDAY 9 MARCH 2009.

I have to support the O.R.C initial recommendation of ;
; 20 l/s October to May
35 l/s Winter

Please fold and secure with a small piece of tape.

FreePost Authority ORC 1722



Otago Regional Council
Private Bag 1954
Dunedin 9054

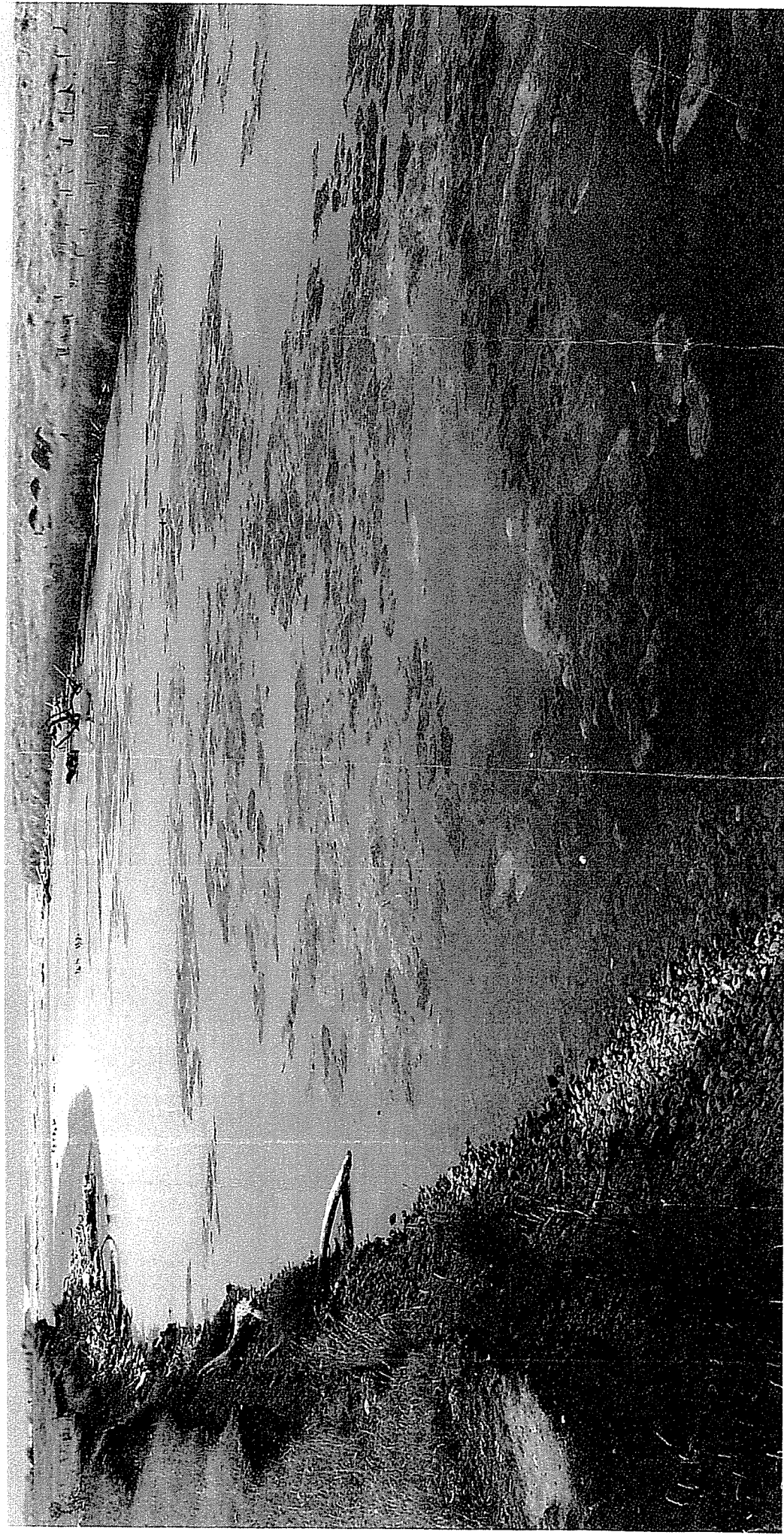
Attention Policy Team

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MOUTH OF
TROTTERS CREEK

FEB. 009



OTAGO REGIONAL COUNCIL

PROPOSED FLOWS FOR TROTTERS CREEK

OTAGO REGIONAL COUNCIL RECEIVED DUNEDIN 05 MAR 2009 FILE No. <u>RF221</u> DIR TO <u>MRP-SK</u>
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SUBMISSION BY D. SCOTT ON PROPOSED FLOW REGIME FOR TROTTERS CREEK.

29

Personal

I am at present retired but was formerly Associate Professor at the University of Otago. My research and teaching interests were in the field of freshwater biology and I continue to maintain an active interest in the area mainly through my work with Otago Fish and Game..

Trotters Creek

In March 2008 the Otago Regional Council published an information sheet on Trotters Creek Catchment which gave a good description of all the values associated with the creek. The catchment is not extensively developed for agriculture, but there is significant forestry development. One distinctive feature is the amount of limestone in the catchment which results in a relatively high pH (median 7.6, ORC Handout October 2008). This could be regarded as a positive feature for the ecology. The fish fauna is diverse with 13 species and a threatened lamprey, and it is doubtful if any East Otago river could exceed this level. The creek has high recreational and human use values and ten are listed. In order to provide information on setting minimum flows , instream modelling was carried out for all the fish species This provided information on the habitat values for the different species in relation to flows and indicated to what extent the habitats available for each species would decline with falling flows. Although a detailed flow assessment covering a significant time period has not been made, it was recommended that for the critical summer period a minimum flow of 20 l/sec would provide protection for the fish fauna and general ecology. This a little below the estimated MALF of 23 l/sec, but would have restrictions on primary intakes of approximately four days for the irrigation season. This seemed reasonable in terms of protection for ecological values and would also probably be acceptable for the various other values associated with the creek.

In October 2008 the Otago Regional Council published a final information sheet on Trotters Creek catchment. In the section entitled Flow Levels and Effects it is stated that the flow downstream of the weir is a minimum of 8 l/sec and that water often spills back in to the creek from the storage pond. This leads on to photographs (Site 4 pool and riffle downstream of weir) and it is asserted that there is very little difference in the riffles between flows of 8 l/sec and 25 l/sec. It then states that the flow naturally falls below 25 l/sec without any consented abstraction.

The difficulties with the above presentation are :

1. No measurements were made of the depth and velocity of the riffles at 8 l/sec. Reduction in depth and velocity increases temperature and oxygen risks during high temperatures.

2. The assumption is made that riffle dwelling species will exist in pools for periods of time. However there is increased risk of predation if all the species occupy pools.
3. The mouth of the river is likely to remain closed for longer periods of time at flows of 8 l/sec, thus inhibiting access from the sea.
4. The amount of water used for irrigation and the amount that overflows from the storage pond back into the creek is unknown. A precautionary approach would be the preferred one here.
5. The decrease from the estimated MALF of 23 l/sec to a summer minimum of 8 l/sec is too great to be ecologically safe

In ORC Report No. 2008/475 1.10.08, a Proposed Plan Change 1B asserts that the values identified by the community are provided for by the low flow of 8 l/sec. and the minimum summer flow is reduced accordingly.

CONCLUSION

In view of the contrast between the detailed analysis of fish habitat in the March draft, and the dubious unsubstantiated conclusions of the October statements, I oppose the proposed minimum flow of 8 l/sec for the summer period. I do not wish to be heard in support of my submission.



D. Scott,
55, Riccarton Road,
Mosgiel.
1.3.09



SUBMISSION FORM *B Minimum Flows*
Proposed Plan Change 1C ~~Water Allocation and Use~~
to the Regional Plan: Water for Otago

Form 5, Clause 6 of the First Schedule, Resource Management Act 1991.

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 05 MAR 2009
 FILE No. RI 221
 DIR TO M.P. SV

Full name of submitter: *R. G. Pagel*

Name of organisation (if applicable):

Postal address: *30 Kennington Road, Maori Hill*
Dunedin Postcode: *9010*

Telephone: *03 4672 431* Fax:

Email: Contact Person:

I wish / do not wish (circle preference) to be heard in support of my submission.

If others made a similar submission, I will consider presenting a joint case with them at a hearing.
 (Cross out if you would not consider presenting a joint case).

Signature of submitter: *R. G. Pagel* Date: *3-3-2009*
 (or person authorised to sign on behalf of person making submission).

Please note that all submissions are made available for public inspection.

The parts of the proposed plan change that my submission relates to are:

(Give clear references if possible e.g. reference number, policy x, rule y)

.....

My submission is:

(Include whether you support, oppose, or wish to have amended the parts identified above, and give reasons)

*I oppose the proposed minimum flows of 8 litres
 a second because I do not think that quantity
 would be enough to support the aquatic fish
 species to survive during the hot dry summer
 weather. I think that the river flow would ^{not} enable
 the mouth of the creek to penetrate an entrance
 to the sea at the mouth and so become stagnant*

I seek the following decision from the local authority:

(Give precise details e.g. changes you would like made)

I have known the area for over 60 years, as I have fished at times. At times when there is very little flow, algal has formed so reducing the flow would increase formation of the algal and be detrimental to the aquatic life.

I feel that the minimum flow should at least be 20 litres per second to protect the health of the stream.

SUBMISSIONS MUST BE RECEIVED BY 5.00 PM, MONDAY 9 MARCH 2009.

Please fold and secure with a small piece of tape.

FreePost Authority ORC 1722



Otago Regional Council

Private Bag 1954
Dunedin 9054

Attention Policy Team