

Statutory Declaration

I (Enter your full name)

Morgan John Trotter

of (Enter the address where you live)

26 Bay Rd Warrington

(Enter your occupation - for example, bricklayer, teacher, unemployed)

Fish & Game Officer

solemnly and sincerely declare that

(List the facts in your own words. Number each point to make it clearer)

Note: What you write must be true. You can be prosecuted if you make a false declaration.

I confirm that the attached statement dated 15 October 2019 and signed by myself is true & correct - exhibit "A".

I make this solemn declaration conscientiously believing the same to be true and by virtue of the Oaths and Declarations Act 1957.

Note: Do not complete the following section until you are with the person witnessing your declaration.

Your signature

M J Trotter

Declared at (Place, for example town or city)

Dunedin

(Day/month/year)

15 10 2019

Before me (Name of official witness)

Lyn Shewan

Lyn Shewan
Deputy Registrar
High/District Court
Dunedin

Signature of official witness

(For example, a Justice of the Peace, solicitor or another person authorised to take a statutory declaration)

BEFORE THE OTAGO REGIONAL COUNCIL

IN THE MATTER of the Resource Management Act
1991

AND

IN THE MATTER Luggate Irrigation Company and
Lake MacKay Station. Water
Permit Application RM18.345

This is the document marked A referred to
in the annexed declaration
of Morgan Trotter

Taken and sworn/affirmed/declared at DUNEDIN
this 15 day of October 2019

OK
Deputy Registrar
High/District Court
Dunedin

Lyn Shewan
Deputy Registrar
High/District Court
Dunedin

STATEMENT OF EVIDENCE FOR MORGAN TROTTER ON BEHALF OF
THE OTAGO FISH AND GAME COUNCIL

Dated 15 OCTOBER 2019

MS
OK

1. My name is Morgan John Trotter.
2. I hold a Postgraduate Diploma (with distinction) in Environmental Science gained at the University Otago in 2001 and a Master of Science (MSc) in Zoology (with distinction) gained in 2016, also at the University of Otago. My masters research was on the effects of flow reduction on trout populations in the Lindis River.
3. I am currently employed as a Fish and Game Officer at the Otago Fish and Game Council, which is located at 247 Hanover Street, Dunedin 9016. I have held this position for 15 years. Prior to this, I was employed at the Otago Regional Council as Field Advisor for 2 years. I have extensive knowledge of trout fishery values in Otago waters. I have presented evidence on trout fishery values at a number of hearings including the Nevis and Lindis River Environmental Court cases.
4. I am basing this advice on my general knowledge of the impacts of flow reduction on stream ecosystems, information gained from reading supporting material for this hearing, plus the Cawthron and the NIWA Review of the Rational for Assessing Fish Flow Requirements and Setting Ecological Flow and Allocation Limits for Them in New Zealand (2019). I have also read the s42A report, including summaries of updated applications, the Evidence of Dr Allibone, the Evidence of Mr Hickey, the Sworn affidavit of Ian Jowett and the Management Flows for Aquatic Ecosystems in Luggate Creek, Otago Regional Council Report 2006 report.
5. Other than conducting observations of spawning brown trout runs in the lower river and a limited amount of electric fishing surveys near SH6 I have not conducted fieldwork in Luggate Creek. As I have limited experience with this catchment, I am only able to provide general comments and advice. These comments refer to the impacts of water abstraction and do not consider the influence of flood events on stream ecosystems which will periodically impact on fish and invertebrate populations.

ex wgh

Scope of evidence

6. I have been asked by the Otago Fish and Game Council to present a short advisory note on the ecological impacts of various flow regimes on trout populations in Luggate Creek. This scope is within my area of expertise.
7. I have read the expert witness code of conduct and agree to comply with it.
8. I have not omitted to consider material facts known to me that might alter or detract from the opinions I have expressed.

Executive summary

9. In my opinion adherence to the minimum flow and the proposed reduction in primary allocation described in the Future Flow Regime would be likely to result in improvements in general ecosystem production and juvenile trout rearing habitat. Further significant reductions in allocation and/or increases in environmental flows (minimum/residual levels) would be likely to result in more ecological improvements. From an ecological perspective, it is advisable to consider environmental flows and allocations limits simultaneously as both can impact on stream ecosystems.

Fish species present

10. I am familiar with Dr Olsens and Allibones work and believe they will have done a comprehensive job of describing the known fish populations of Luggate Creek.
11. Luggate Creek is an important brown trout spawning stream, and historically experienced runs of rainbow trout as well (Cliff Halford, pers. Comm.). However, rainbow trout runs have not been documented in recent years (Paul van Klink, pers. Comm.).

Flow regimes used in this evidence

12. I have been asked to consider the catchment under different flow regimes:
- a. *Naturalised Flow Regime*: the catchment without the impact of abstraction.
 - b. *Existing Flow Regime*: the current abstraction regime using current deemed permits, consents and permitted activities, with a 180l/s minimum flow.
 - c. *Existing Environment Flow Regime*: after October 2021 (when the deemed permits are surrendered), the catchment without the impact of abstraction from activities covered in the Luggate Irrigation Company (LIC) and Lake MacKay Station (LMS) and Criffel Water Limited (CWL) applications but with water takes permitted by the Regional Plan: Water and other takes as currently granted.
 - d. *Application Flow Regime*: the existing environment with activities as described in the most up to date version of the LMS & LIC application.
 - e. *Future Flow Regime*: The application flow regime with the additional impact of the CWL application, if granted in the form recommended in the s42A report.

Existing Flow Regime

13. I have been informed that under the status quo the minimum flow (180 l/s) has not always been adhered to. The primary allocation is very high, approximately 1000 l/s, and there are no residual flow requirements on some of the points of take. It is my opinion that this regime has the potential to have a significant negative impact on the ecology of the stream due to lowering or dewatering of stream reaches under summer flow conditions.

Naturalised Flow Regime

14. I am aware that different naturalised MALF estimates have been developed. One of 550 l/s and one of 367 l/s at the minimum flow monitoring point near SH6. This somewhat complicates ecological assessments of the abstraction regimes when compared to the natural state (with no takes). It would be helpful to improve the accuracy of the MALF estimate in the future.
15. Without abstraction, I would expect that the lower mainstem would provide higher level of riffle habitat and juvenile trout production throughout its length (provided there are no fish passage barriers). Looking at hydrographs provided in Mr Hickey's evidence (figures 4,5 & 6) I would also expect that there would be more holding water in the lower reaches and potential increased habitat for larger fish such as adult trout. I doubt there would be any substantial ecological difference between naturalised flow regime and the existing environment flow regime which I understand to include a limited number of small domestic takes.

Existing Flow Regime and the Future Flow Regime

16. I understand the proposal put forward by LIC, LMS and CWL would involve a reduction in actual primary allocation taken from 785 to 538 l/s and adherence to the minimum flow of 180 l/s at the SH6.
17. After considering Mr Hickeys hydrograph figures 4, 5 and 6 I expect that this regime would provide a significant ecological improvement to the existing flow regime. This reduction in allocation should reduce the time spent at minimum flow and improve flow variability. I expect there would be more riffle habitat production resulting in more invertebrates and small fish such as juvenile trout.

Upper Lake MacKay Station take

18. I understand that F&G have proposed at least a 50/50 flow sharing arrangement which would maintain residual of at least 46 l/s below the main take. This is in an attempt to maintain ecological functioning/invertebrate population of the upper tributary. This area

is very high in altitude and gorgy in nature. There is no known fish population.

Application Flow Regime

19. I understand that the LIC takes will have a combined primary allocation of 87l/s and the LMS takes will have a combined primary allocation of 93l/s, in addition to supplementary allocations, and all will adhere to a minimum flow of 180 l/s at SH6. Without knowing what the actual allocation for each take or what the residual is below each point, it is hard to determine the ecological impacts. If the allocation is shared equally amongst the combined takes, the impact would be expected to be less than if one take took the majority. I presume this will be the case.

20. If the MALF is 550 l/s, 180 l/s represents 32% of MALF. In the recent Review of the Rationale for Assessing Fish Flow Requirements and Setting Allocation Limits in NZ allocation limits of up to 10-20% are considered to likely be precautionary. This allocation is outside that envelope, but I would consider it to be relatively moderate in comparison to other Central Otago catchments.

21. I understand much of the upper river habitat is gorgy and/or incised. I would expect that the ecological impacts of flow reduction in these areas would be less than for more open riverbed/riffle habitat.

Future Flow Regime

22. The primary allocation of these takes combined is 538 l/s and represents 98% of a 550 l/s MALF. This would not be considered a precautionary allocation amount and may have an impact on ecological processes and habitat during low flow conditions when compared to the natural state (as shown in hydrographs 4,5 & 6) of Mr Hickey's evidence. In general, "the potential effect of allocation on drift feeding opportunities for trout and other drift feeding fish has not been given sufficient consideration in flow decisions" Hayes et al 2019. Assessing the impact of allocation rate on fish and invertebrate communities remains challenging. I would expect the impact of flow reduction will depend on the shape of the riverbed If

the channel is largely incised the impacts of flow reduction may be less than on a more open braided riverbed. But it should be noted that the proposed primary allocation block appears to be relatively high for a small stream with a minimum flow that could be less than 50% of MALF.

The importance of riffle habitat

23. In my experience stream, riffle habitat (as opposed to runs and pools) is most affected by flow reduction. As flows reduce the amount of turbulence (bubbly white water) which provides habitat for invertebrates and small fish declines. Under these conditions, the amount of cover for small fish is reduced and they become more vulnerable to predation pressure. Small fish generally hide in the riffles and stream edges during daylight hours and avoid deeper pool habitat which can contain larger fish and occasionally shags. If riffles lose the cover provided by turbulence, herons are able to wade the shallow water and easily spot small fish on which to feed. The longer and more severe the flow reduction, the greater the impact on the fish population. Rainbow trout fry appear to be more dependent on bubbly fast-water riffle habitat than brown trout fry.

Minimum flow and allocation limits

24. As both environmental flows (minimum or residual limits) and allocation amount influence stream ecosystems it would be preferable to review the allocation when the minimum flow is next considered. As Luggate Creek is an important juvenile trout rearing stream I would prioritise baseline environmental flows (minimum and residual flows) that protect shallow water edge and riffle habitat over allocation when considering requirements to sustain juvenile trout populations.

Reintroduction of eels into the catchment

25. I understand there is a proposal to reintroduce longfin eels into Luggate Creek. In my opinion, reductions of primary allocation and

adherence to the minimum flow would be likely to increase the potential food production (invertebrate and small fish/trout biomass) of the stream. I am not an expert in eel ecology, but I would expect this to provide more food for longfin eels. In my experience streams in Otago that provide habitat diversity (riffles and runs with food production and cover for small fish, plus pools which provide cover for larger fish) sustain both trout and eel populations (this is not taking migration issues into account).

DATED this 14th day of October 2019

Morgan Trotter



Otago Fish and Game Council

Reference

Hayes, et al 2019. Review of the Rationale for Assessing Fish Flow Requirements and Setting Allocation Limits in NZ. CAWTHRON Report no. 3040