

MEMORANDUM

To: Danielle Korevaar
From: Pete Ravenscroft
Date: 7/11/2023
Re: Advice on suction dredging

Name	Role	Date Completed
Pete Ravenscroft	Author	8/11/2023
Richard Allibone	Reviewer 1	8/11/2023

Purpose

The purpose of this memo is to provide information to inform policy development regarding the management of activity of suction dredging. This memo is providing advice for permitted activity rules, and therefore relates to recreational suction dredging.

For the purposes of this advice small scale suction dredging is considered that the internal diameter of the nozzle does not exceed 150 mm.

Background

Historic gold mining tended to be concentrated on inland waterbodies of Otago. Modern small scale suction dredging operations follow suit and focus on gold bearing waters of inland Otago. Due to the size of the individual suction dredging equipment, operators tend to focus on small order waterbodies, or when larger rivers experience low surface flows. Small suction dredging for gold involves sucking riverbed material up a pipe, passed over a sluice box which sorts out the gold, and discards the tailings over a separate section of the riverbed.

Effects

The result of this activity is that there is bed disturbance from both components of the operation. The sucking up of the material tends to deepen the bed and or creating pools, the tailings can either infill the hole created by the sucking operation or create gravel bars.

Thompson (2001) noted that in their study on the impacts of dredging on macro-invertebrates on the Pomahaka River that the discoloration of water clarity in the immediate vicinity of the dredging operation was obvious. However, the lack of clear evidence of detrimental effects on benthic macro-invertebrates suggests this effect is relatively short-term. This is probably due to the disturbed nature of the habitat, which has resulted in the presence of a disturbance resistant fauna. The effects of dredging operations, as compared to the effects of a flood are likely to be extremely small as the area disturbed is much smaller and fish and macroinvertebrates can escape the localized disturbance effect. Also mining activity often works downwards into the stream bed and the riverbed surface disturbance area is relatively limited. In general, benthic invertebrates (McKay 1992) and hyporheic invertebrates (Boulton et al 1991) and periphyton all rapidly recolonize small patches of new or disturbed substrate streams.

The effects of suction dredging on New Zealand fish communities are well considered but there have been limited peer reviews. The effects vary according to size of stream, fish species present, season of dredging, and frequency and intensity of dredging. Direct effects include trapping invertebrates and small fish in the dredges, altering the habitat that supports fish food supply, and changing channel structure to make it less favorable for fish. However, the loosely packed rock piles may provide good cover for smaller fishes. Providing the scale operation is small then the effects to these are small, localised, and persist until the next flood disturbance event that restores the natural stream bed contour.

The highest sensitivity to instream values occurs during fish spawning seasons but outside of spawning activity the effects of a small-scale operation are minor and localised. Therefore, there will be need to prevent operations occurring during spawning season within waterbodies that contain threatened non-migratory galaxiid species and important salmonid spawning habitats.

The timing of spawning and spawning habitats of Otago non-migratory galaxiid are well understood. Although there is some plasticity in habitats used, the galaxiids either are benthic or terrestrial spawners. Benthic spawners adhere their eggs to the underside of rocks, or within the gravels, in rock crevices in splash zones or within the hyporheic zone. Terrestrial spawning occurs within bank margin vegetation or on the roots of exposed plant roots on undercut riverbanks.

Timing of the spawning can be variable, but a period of the 1st August to the 30th November is considered to cover the spawning period.

There is also a need to ensure that bed disturbance for salmonid during spawning is minimised, which a timing factor, spawning generally occurs from 1st - 30 September.

Data and methods

Providing the potential effects that can occur during fish spawning season are managed appropriately then the existing Rule 13.5.1.7 of the current Otago Regional Plan: Water are sufficient to allow for recreational suction dredging to be a permitted activity.

13.5.1.7 Suction dredge mining within the bed of a river is a permitted activity providing:

- (a) The internal diameter of the nozzle does not exceed 150 mm; and
- (b) The mining activity does not occur in those rivers, or parts of rivers, listed in Schedule 7 during any identified time period; and
- (c) The mining activity is not carried out within 20 metres of any structure which has foundations in the riverbed, or any ford or pipeline; and
- (d) The activity does not cause any flooding or erosion; and
- (e) No refuelling is carried out while the dredge is within the wet bed of the river unless an effective spill tray has been installed; and
- (f) The area dredged lies within the wet bed of the river, and no material is removed from within or under the banks of the river; and
- (g) No suction dredge is operated within 500 metres of another dredge; and

(h) No explosives or earthmoving machinery apart from the dredge is used to move material in the riverbed; and

(i) Any rocks moved to allow suction dredging to occur are returned as close as possible to the site from which they were removed; and

(j) There is no conspicuous change in the colour or visual clarity of the water body beyond a distance of 100 metres downstream of the point of discharge of the dredge; and

(k) No lawful take of water is adversely affected as a result of the bed disturbance.

The wording of these existing rules except for 13.5.1.7 (b) are sufficient and providing that they are applied then suction dredging could be managed as a permitted activity.

13.5.1.7 (b) *“The mining activity does not occur in those rivers, or parts of rivers, listed in Schedule 7 during any identified time period”; and*

Schedule 7 “identifies water bodies in Otago, or parts of waterbodies, that are sensitive to bed disturbance caused by suction dredge mining due to their unique value for spawning fish or rearing, or importance for water supply”. This results in the requirement of the need for consent.

Recommendations

- Small scale means “The internal diameter of the nozzle does not exceed 150 mm.”
- Adopt existing Rule 13.5.1.7 of the current Otago Regional Plan: Water
- Reword existing rule 13.5.1.7 (B) To say there will be no suction dredging in water bodies that contained any Otago non-migratory galaxiid during spawning season from 1st August to 30th November.
- To cover the timing of salmonids, no suction dredging to occur from 1st May – 30th September.
- A maximum of 30m² per day of bed disturbance in any single day.

- Recreational gold suction dredging is permitted for 30 days between 1 December and 30 April with records kept and reaches mined recorded using GPS and forwarded to ORC.

References

Boulton, A. J., S. E. Stibbe, N. B. Grimm, and S. G. Fisher. 1991. Invertebrate recolonization of small patches of defaunated hyporheic sediments in a Sonoran Desert stream. *Freshwater Biol.* 26:267-277.

Hamer, M.P (2023) brief of evidence for a resource Consent hearing of an application for resource consent for Suction Dredge Mining on the Clutha River/ Mata Au

Mackay, R. J. 1992. Colonization by lotic macroinvertebrates: a review of processes and patterns. *Can. J. Fish. Aquat. Sci.* 49:617-628. Mapstone, B. D. 1995

Thompson, R. (2001). Impacts of gold-dredging activities on benthic macro-invertebrates of the upper Pomahaka River. Dunedin: BioLogic Consultancy.

Maybe the pictures below are useful.

The pictures are of a dredge in the Arrow River – the sediment plume went around 10 m downstream. The most obvious effect is the holes and humps on the riverbed. One other thing this shows is that small streams won't be dredge (or at least not easily) as dredges may not fit in streams under 2-3 m wide. So we could also limit the permitted active rule to streams say 3 m wide or wider. This won't bother the miners too much and would put a lot of galaxiid streams off limits.





Downstream river hump – rather loose material that will be redistributed by the first flood.



Mining