

Galaxias affinis paucispondylus
“Southland” (alpine galaxias
(Southland)) habitat description

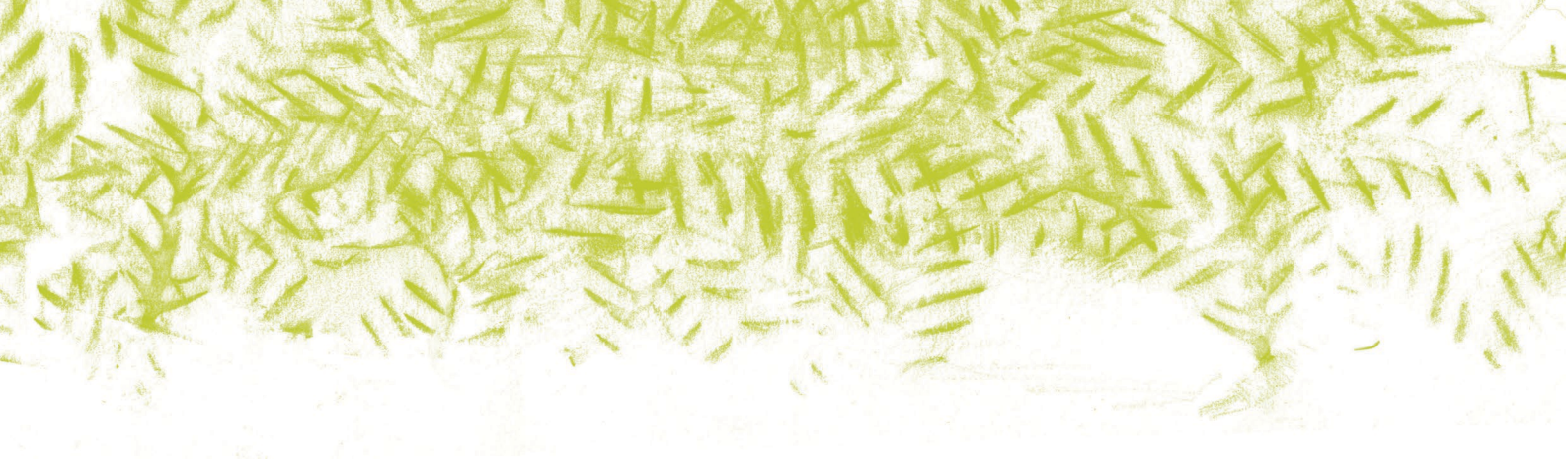


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Cover: *Galaxias affinis paucispondylus* “Southland” habitat, Moat Creek, Waiau River. Photo by Nicholas Dunn.

DOC - 7709842

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Recommended citation:

Dunn, N.R.; Boddy, N.C. 2024: *Galaxias affinis paucispondylus* “Southland” (Southland alpine galaxias) habitat description. Unpublished report DOC-7709842. Department of Conservation, Wellington, New Zealand. 6 p.

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Abstract

Galaxias affinis paucispondylus “Southland” occupy loose gravel-cobble substrate at the upstream end of small, steep, riffle-run sequences created by chute channels in braided riverscapes, as well as smaller single thread streams. Habitats can be vulnerable to invasive woody weeds causing channelisation, sedimentation, and water abstraction activities.

1. Introduction

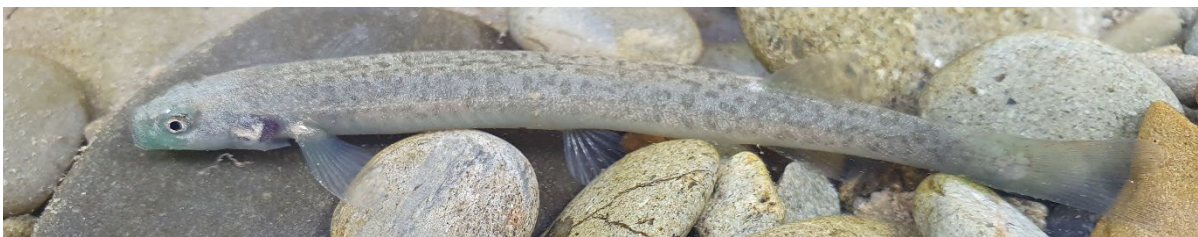


Figure 1. *Galaxias affinis paucispondylus* “Southland” (Southland alpine galaxias). Photo by Nicholas Dunn

Galaxias affinis paucispondylus “Southland” (alpine galaxias (Southland)) is an iteroparous, spring spawning, non-diadromous, undescribed taxon restricted to Otago and Southland on South Island. *Galaxias affinis paucispondylus* “Southland” occurs predominantly in braided reaches of waterways within the Clutha, Mataura, Ōreti and Waiau rivers. *Galaxias affinis paucispondylus* “Southland” has a conservation status of Threatened: Nationally Vulnerable (Dunn et al. 2018).

Qualitative habitat descriptions based on field observations and measurements are given for *Galaxias affinis paucispondylus* “Southland”, complimenting quantitative descriptions following Instream Flow Incremental Methodology (IFIM) assessments of Sinton et al. (2021). Descriptions are designed to typify the range of instream habitat conditions adult *Galaxias affinis paucispondylus* “Southland” occur in, at a mesohabitat scale.

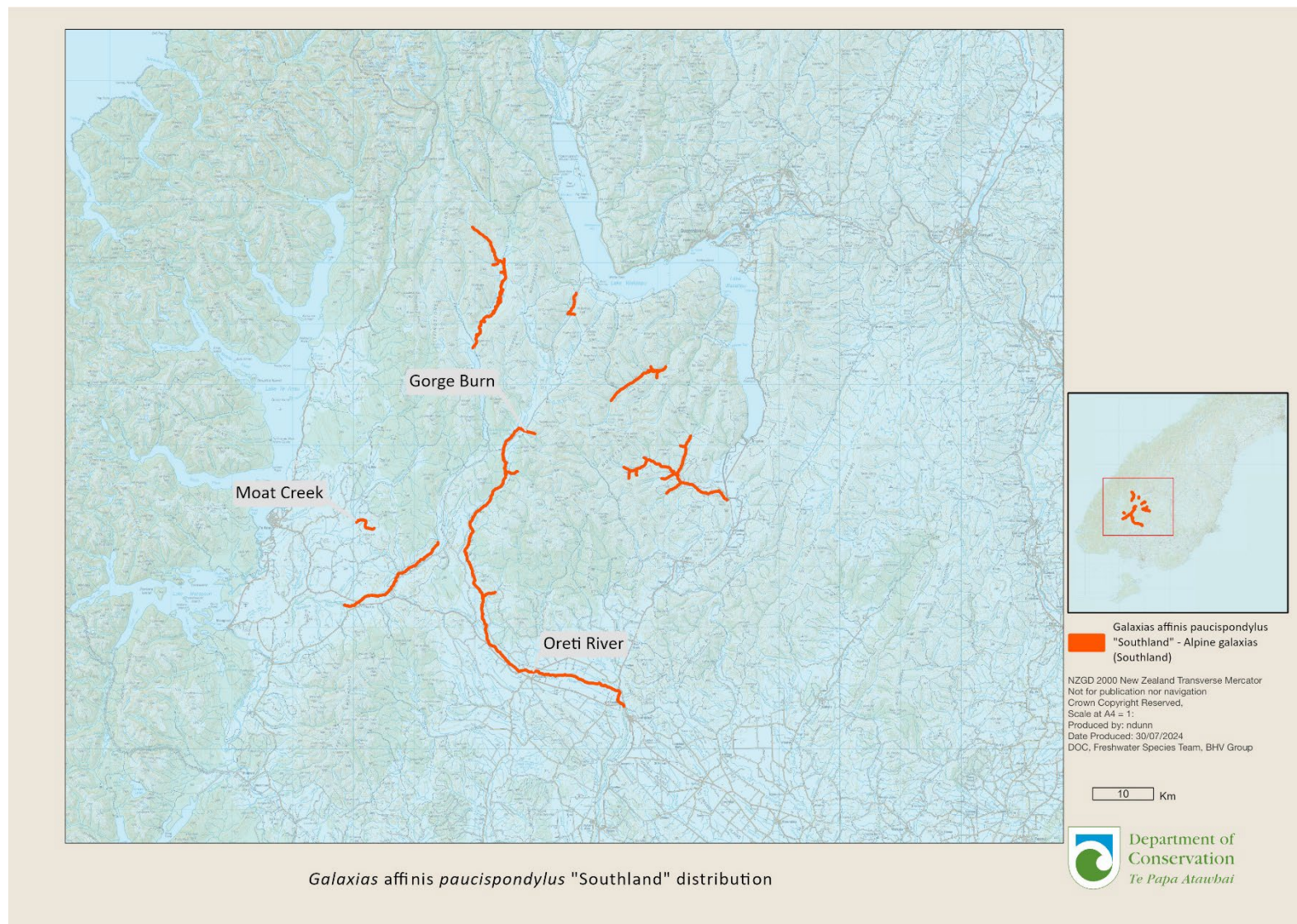


Figure 2. Known *Galaxias affinis paucispondylus* "Southland" habitat fragment distribution with sites included in the current study indicated.

2. Methods

Two waterbodies were sampled in November 2020: Moat Creek and the Ōreti River (Table 1), being the same sites as reported on by Sinton et al. (2021) who also included quantitative data from Gorge Burn collected in March 2016. Site selection was based on *Galaxias affinis paucispondylus* “Southland” being previously known at these locations, with timing designed to coincide with the summer low-flow period, and to not interfere with spawning and larvae/post-larval/juvenile rearing periods.

Table 1. Location of study areas for *Galaxias affinis paucispondylus* “Southland”. Coordinates are for the midpoint of sampled reaches.

| Stream | NZTM Easting | NZTM Northing |
|-------------|--------------|---------------|
| Gorge Burn | 1228097 | 4972377 |
| Oreti River | 1228458 | 4932907 |
| Moat Creek | 1201388 | 4957681 |

In each stream a sampling reach containing a variety of instream habitat types was selected. Starting at the downstream end of reaches, transects were marked at 3.0 m intervals. Within each transect a 0.75 m x 0.75 m quadrat was carefully placed within the stream to cover the dominant flow, water depth and substrata conditions. A 1.0 m wide push net was placed along the downstream edge of the quadrat and three-pass electrofishing of the quadrat was conducted using a Kainga EFM 300 backpack electrofishing machine (NIWA Instrument Systems, Christchurch). Each pass consisted of 5 seconds of electrofishing time in a downstream direction, stopping for a minimum of 5 seconds between passes. Captured fish were identified to taxon and measured to the nearest 0.5 mm, then placed in an aerated bucket of water to recover before being released.

Locations of quadrats were recorded by GPS and water depth and velocity measured at the centre points of quadrats. Water velocity was measured at 0.6 depth using a Marsh McBirney Flo-Mate 2000 electromagnetic current meter. Percentage substrata composition was estimated within the quadrat using modified Wentworth scale size classes: bedrock (>4096 mm), boulder (256-4096 mm), cobble (64-256 mm), large gravel (8-64 mm), fine gravel (2-8 mm), sand (0.06-2 mm) and silt (<0.06 mm). Percentages of algal and macrophyte cover within the quadrat were also estimated.



A



B



C

Figure 2. *Galaxias affinis paucispondylus* “Southland” habitat. (A) chute channels in transverse bar. (B) cobble-boulder dominated run. (C) head of steep pool-riffle sequence.

3. Results

A total of 70 quadrats were sampled across the two waterbodies where qualitative data were collected, with *Galaxias affinis paucispondylus* “Southland” found in 17 of these. Catch rates were relatively low in both waterbodies, with 9/40 quadrats in Moat Creek and 8/30 in the Oreti River containing *Galaxias affinis paucispondylus* “Southland”. Characteristics of the sites *Galaxias affinis paucispondylus* “Southland” were present at are summarised in Table 2. However, it should be noted that both the sample size, and the number of quadrats occupied is small, limiting confidence of inferences able to be drawn.

Galaxias affinis paucispondylus “Southland” were recorded predominantly in moderately fast, shallow, at the heads of small steep riffle-run habitat with loosely packed gravel-cobble substrata, in moderately narrow streams and rivers,

Table 2. Habitat attributes recorded within the 17 quadrats where *Galaxias affinis paucispondylus* “Southland” were present. Units are as presented, and percentages were visually estimated.

| Attribute | Mean | Range (min – max) |
|-----------------------------------|-----------------------|---------------------------------|
| Stream width (m) | 5.8 | 1.72 – 14.9 |
| Flow velocity (ms ⁻¹) | 0.46 | 0.07 – 0.96 |
| Substratum size class | 16-32 (coarse gravel) | 16-512 (coarse gravel – cobble) |
| Water depth (cm) | 10.2 | 5 – 17 |
| Riffle habitat (%) | 58.8 | 0 – 100 |
| Run habitat (%) | 37.4 | 0 – 100 |
| Pool habitat (%) | 3.8 | 0 – 35 |
| Macrophytes (%) | 0 | 0 |
| Algae (%) | 0 | 0 |

4. Discussion

Galaxias affinis paucispondylus “Southland” typically occupy habitats characterised by loose gravel-cobble substrate at the upstream end of small, steep, riffle-run sequences created by chute channels in braided riverscapes, as well as smaller single thread streams. These meso-habitat characteristics create complex stepped boulder dominated pool habitats that provide flow refugia for all life stages of *Galaxias affinis paucispondylus* “Southland”. Smaller stream habitats are located in steeper sided, incised valleys that open into broad shallow valleys. This latter habitat type is vulnerable to invasive woody weeds causing channelisation, sedimentation including through gravel extraction decreasing particle size and increasing imbrication and armouring, and water abstraction activities reducing river flows.

5. Acknowledgements

We appreciate assistance of Emily Funnell (DOC) in the field, and permission from landowners and managers to access streams on their properties.

6. References

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