

**BEFORE THE ENVIRONMENT COURT
I MUA I TE KOOTI TAIAO O AOTEAROA**

**AT CHRISTCHURCH
KI ŌTAUTAHI**

ENV-2018-CHC-000036

IN THE MATTER

of the Resource Management Act 1991

AND

of an appeal under clause 14 of the First
Schedule of the Act

BETWEEN

**Director-General of Conservation Tumuaki
Ahurei**
Appellant
(ENV-2016-CHC-000036)

AND

Southland Regional Council
Respondent

**Will Say Statement of Emily Pearl Funnell for
Director-General of Conservation Tumuaki Ahurei, Appellant
in Preparation for Topic B Expert Caucusing
Dated 29 October 2021**

Department of Conservation Te Papa Atawhai
Planning, Permissions and Land
RMA Shared Services
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Solicitor Roia: Pene Williams

Introduction

1. My full name is Emily Pearl Funnell. My experience and qualifications are set out in my evidence in chief dated 1 March 2019.
2. I have been involved in the proposed Southland Water and Land Plan (pSWLP) process in the following ways:
 - a. Evidence in Chief as a Section 274 Party in Support (Topic A hearing) dated 1 March 2019, and associated Environment Court Hearing – Topic A;
 - b. Expert Conferencing – Water Quality and Ecology (Rivers and Wetlands) 7-9 May 2019 and resulting Joint Witness Statement;
 - c. Statement of Rebuttal Evidence as a Section 274 Party, dated 20 May 2019;
 - d. Expert Conferencing and resulting Joint Witness Statements dated 16 October 2019, and 22 November 2019; and
 - e. Environment Court facilitated mediation on Topic B4.
3. I have been asked by the Director-General of Conservation *Tumuaki Ahurei* (D-G, Director-General) to provide a “Will Say” statement ahead of the expert planning caucusing and subsequent evidence drafting in relation to the outstanding appeal Topic B matters on the proposed Southland Water and Land Plan (pSWLP):

Code of Conduct

4. I confirm that I have read the code of conduct for expert witnesses as contained in section 7.1 of the Environment Court’s Practice Note 2014. I have complied with the practice note when preparing my written statement of evidence and will do so when I give oral evidence before the Court.
5. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in the evidence to follow.

6. Unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope

7. This Will Say Statement is confined to the outstanding proposed Southland Water and Land Plan (pSWLP) Director-General's appeal matter on Rule 78 – Weed and sediment removal for drainage maintenance.

Will Say Statement

8. In preparing this Will Say statement, I have received a memorandum from Dr Nicholas Dunn, dated 18 June 2021 (attached as Appendix 1). This memorandum provides an analysis of the extent of co-incidence of native freshwater fish habitat that is potentially affected by Rule 78. This is the memorandum that is considered in the following paragraphs.
9. I note that the term “non-migratory galaxias” in the Director-General's appeal¹ should be replaced with the term “non-diadromous galaxias”. This is because the term non-diadromous galaxias is more technically appropriate to describe the species that the D-G sought to include in Rule 78, as “non-diadromous” refers to fish that do not migrate between freshwater and marine environments, completing their entire life-history in freshwater. “Diadromous” refers to fish that have a regular life-history phase of migration between freshwater and the marine environment.
10. Paragraphs 41 to 49 of my Evidence dated 1 March 2019² give an overview of the freshwater fish values of Southland. In particular, I note the presence of five threatened non-diadromous galaxiids within the Southland region. Pomahaka galaxias and Clutha flathead galaxias have populations on the edges of the Southland region, however, other species such as Southern flathead galaxias and Gollum galaxias are widespread across Southland (Table 1).³ Populations of non-diadromous galaxiids are small and fragmented within the landscape.

¹ Notice of Appeal dated 17 May 2018, paragraph 8.1

² Evidence in Chief of Emily Pearl Funnell for Director-General of Conservation as a section 274 Party in Support (Topic A hearing) dated 1 March 2019

³ *Supra*, pages 10-12 of my Evidence in Chief.

Reasons for decline in these populations are cited as being loss of habitat and predation by introduced fish (Allibone, 2010).

11. Dr Michael Greer has provided Southland Regional Council (the Council) with technical advice on Rule 78. I proceed on the basis that Dr Greer's advice will become a "Will Say" statement for the Council.
12. Dr Greer interrogated the New Zealand Freshwater Fish Database (NZFFD) to identify species that have been found in modified watercourses. Two of the four non-diadromous galaxiids found in the Southland Region (Gollum galaxias and Pomahaka galaxias) are likely to occur in modified water courses. Southern flathead galaxias (*Galaxias* southern sp.) distribution is across large parts of Southland and this species is also likely to be found within modified water courses. The only threatened non-diadromous galaxias species in the region that is not likely to be found in the modified water courses is the alpine galaxias (Southland).
13. Dr Nicholas Dunn has carried out analysis of the extent of co-occurrence of native freshwater fish habitat potentially affected by Rule 78. The result of this analysis is presented in a memorandum dated 18 June 2021 (see Appendix 1). Two approaches were taken:
 - 1) Coincidence of freshwater fish and freshwater invertebrate tāonga species (data from NZFFD) with water courses managed by Southland Regional Council as drains, and water courses identified on Land Information New Zealand (LINZ) Topo50 maps as drains, and
 - 2) Coincidence of threatened non-diadromous galaxias for which known distributions have been created in GIS with water courses managed by Southland Regional Council as drains, and water courses identified on Land Information New Zealand (LINZ) Topo50 maps as drains.
14. For approach 1, assessments were made by visually comparing fish distributions and mapped drains. Lamprey/kanakana (Threatened, Nationally Vulnerable) was identified as a threatened species with a high coincidence with managed drains.
15. Based on the assessment in approach 2, a total of 43 (30 %) of Council managed drains were found to coincide with mapped non-diadromous

freshwater fish habitats. There was coincidence of Gollum galaxias (*Galaxias gollumoides*) and southern flathead galaxias (*Galaxias* “southern”) with Council managed drains, but not for alpine galaxias (*Galaxias affinis paucispondylus* “Southland”), Clutha galaxias (*Galaxias* “species D”) or Pomahaka galaxias (*Galaxias* “Pomahaka”). In addition, 9% of LINZ Topo50 identified drains were found to coincide with mapped non-diadromous freshwater fish habitats. Only alpine galaxias (Southland) didn’t have coincidence with LINZ Topo50 identified drains.

16. Dr Dunn also identified an issue with the amount of water courses identified as drains. It is likely the LINZ Topo50 drain layer is an underrepresentation of the water courses subjected to weed and sediment removal. The overlay of the LINZ Topo50 drain layer with topographic maps reveals additional straightened water courses (illustrated in Dr Dunn’s memo).
17. Dr Greer’s advice to the Council details adverse effects of drainage management on threatened species. I agree that key effects on threatened species are: fish stranding, increased suspended sediment, habitat loss and effects on inanga spawning.
18. Weed and sediment removal is not just limited to effects on inanga spawning, but on all native fish. Removal of vegetation prior to spawning limits availability of suitable habitat, whilst the removal of vegetation during spawning will result in crushing or removal of eggs. Removal of weed and sediment prior to and during spawning of non-diadromous galaxiids and bully species, may have a significant impact on spawning success, as these species spawn instream on vegetation and gravel.
19. I consider that the most effective method of minimising the effects of weed and sediment removal is to reduce the frequency and extent of the activity. I consider the activity is destructive, and the adverse effects on threatened species and non-diadromous galaxiids are likely to be significant.
20. The conditions in the pSWLP Council decision version of ‘*Rule 78 – weed and sediment removal for drainage maintenance*’ fail to protect native fish values in waterways. Where threatened fish are found, they can be physically removed, their habitat be altered, and spawning be disrupted.

21. In my opinion mechanical clearance should avoid sensitive spawning periods of all threatened species (not just inanga). Further, enduring changes to habitat of threatened native fish should be avoided e.g., Gollum galaxias, Southern flathead galaxias and alpine galaxias (Southland). I consider that for important/key habitats (identified in a schedule) of threatened species, a higher level of protection is required. In these habitats, the activity should be discretionary.

Emily Pearl Funnell

29 October 2021

**Appendix 1: Memorandum from Dr Nicholas Dunn, dated 18
June 2021**

Date: 18 June 2021

To: Linda Kirk – RMA Planner, RMA Team, Operations Group

Amelia Ching – RMA Planner, RMA Team, Operations Group

Pene Williams – Lawyer, Legal Services, Corporate Services Group

Emily Funnell – Freshwater Technical Advisor, Aquatic Unit, Biodiversity Group

CC: Alexander Macdonald – acting Freshwater Manager, Aquatic Unit, Biodiversity Group

From: Nicholas Dunn – Freshwater Science Advisor, Aquatic Unit, Biodiversity Group

Memo: **Assessment of Southland Regional Council proposed Southland Water and Land Plan – Rule 78 weed and sediment removal rule testing**

The purpose of this memo is to provide an assessment of the Southland Regional Council proposed Southland Water and Land Plan – Rule 78 weed and sediment removal rule, in the sense of testing of the extent of co-occurrence of native freshwater fish habitat potentially affected by the rule.

Two approaches have been taken:

Approach 1 - Coincidence of freshwater fish and freshwater invertebrate taonga species recognised in Appendix M of the plan with water courses managed by Southland Regional Council as drains, and water courses identified on Land Information New Zealand (LINZ) Topo50 maps as drains. In essence this list includes all native freshwater fish occurring within the Southland Regional Council boundary. Three freshwater fish species present in Southland were omitted from this Appendix, but have been mapped in this assessment (Appendix 1 – high resolution files in DOC-6695243) for completeness, being

- *Aldrichetta forsteri* - Yelloweye mullet: Not Threatened
- *Forsterygion nigripenne* - Estuarine triplefin: Not Threatened
- *Galaxias* species D - Clutha flathead galaxias (Clutha River): Nationally Critical

Approach 2 – Coincidence of threatened non-diadromous galaxias (Table 1) for which known distributions have been created in GIS with water courses managed by Southland Regional Council as drains, and water courses identified on Land Information New Zealand (LINZ) Topo50 maps as drains.

The following datasets were used in the assessment:

- New Zealand Freshwater Fish Database (NZFFD; <https://nzffdms.niwa.co.nz>) as at 8 June 2021.
- Known distributions of non-diadromous freshwater fish based on the methods of Dunn (2017) as at 8 June 2021.
- ES_DrainageNetwork shape file provided by Southland Regional Council to DOC on 4 June 2021.
- Southland_Topo50_drains shape file provided by Southland Regional Council to DOC on 4 June 2021.
- World_Imagery (<http://services.arcgisonline.com/arcgis/services>) as at 8 June 2021.
- Topo50 from LINZ Data Service (<https://www.linz.govt.nz/data/linz-data-service>).

Table 1. Freshwater fish taxa, their conservation status (Dunn et al. 2018) and distribution in Southland, included in this assessment.

Species	Common name	Conservation status	Catchments	Number of habitat fragments
<i>Galaxias</i> "species D"	Clutha flathead galaxias (Clutha River)	Nationally Critical	Taieri, Tokomairiro, Clutha, Catlins, Purakaunui, Tahakopa, Waikawa rivers, Karoro, Longbeach creeks	2
<i>Galaxias gollumoides</i>	Gollum galaxias	Nationally Vulnerable	Clutha, Catlins, Purakaunui, Tahakopa, Waikawa Tokanui, Mataura, Waihopai, Oreti, Freshwater, Robertson, Aparima, Waiau rivers, Titiroa Stream, Kowhai Creek	185
<i>Galaxias</i> "Pomahaka"	Pomahaka galaxias (Southland, Otago)	Nationally Vulnerable	Clutha River	9
<i>Galaxias</i> "southern"	Southern flathead galaxias (Southland, Otago)	Nationally Vulnerable	Clutha, Mataura, Oreti, Freshwater, Rakeahua, Aparima, Waiau rivers	85
<i>Galaxias affinis paucispondylus</i> "Southland"	Alpine galaxias (Southland)	Nationally Vulnerable	Clutha, Mataura, Oreti, Waiau rivers	8

Assessments were made by visually comparing fish distributions and mapped drains. The following categories of co-incidence were recognised:

Southland Regional Council managed drains:

1. No co-incidence of a Southland Regional Council (SRC) managed drain and a known fish distribution.
2. Partial co-incidence of a SRC managed drain and a known fish distribution, including confluent tributaries.
3. Complete co-incidence of a SRC managed drain and a known fish distribution.
4. No co-incidence of a SRC managed drain when a known fish distribution is extended by a buffer of 1 km (this allows for fish presence in a drain beyond the known distribution, and thus giving effect to the caveats identified by Dunn (2017)).
5. Partial co-incidence of a SRC managed drain and a buffered known fish distribution, including confluent tributaries.
6. Complete co-incidence of a SRC managed drain and a buffered known fish distribution.

LINZ Topo50 identified drains:

7. No co-incidence of a Topo50 identified drain when a known fish distribution is extended by a buffer of 1 km (this allows for fish presence in a drain beyond the known distribution, and thus giving effect to the caveats identified by Dunn (2017)).
8. Partial co-incidence of a Topo50 identified drain and a buffered known fish distribution, including confluent tributaries.
9. Complete co-incidence of a Topo50 identified drain and a buffered known fish distribution.
10. No co-incidence of a drain identified on a LINZ Topo50 map and a known fish distribution.
11. Partial co-incidence of a Topo50 identified drain and a known fish distribution, including confluent tributaries.
12. Complete co-incidence of a Topo50 identified drain and a known fish distribution.

A total of 4 summary GIS files were created during the assessment:

- Non-diadromous freshwater fish habitats - derived from DOC data
- Buffered non-diadromous freshwater fish habitats - derived from DOC data
- SRC drainage network – derived from Southland Regional Council data
- LINZ Southland Topo50 drains – derived from LINZ data

These files are located in the zip folder: [SRC pSWLP Rule 78 non-diadromous galaxias and drain coincidence assessment 170621](#) (DOC-6695243).

Each file was appended with columns denoting the coincidence categories given above. An individual row identifier was appended to the SRC drainage network.

Interpretation of the buffered reach

A 1 km buffer was applied to mapped fish habitats. This was used to assess whether drains occurred within 1 km upstream or downstream of a mapped habitat on the same waterway. Interpretation was required where the buffer extending laterally from a waterway incorporated a drain, and as to whether that drain could be considered habitat for that species (Figure 1; based on the authors knowledge of the species habitat preferences and/or locations in question), and whether the drain directly entered the focal waterway as a tributary.

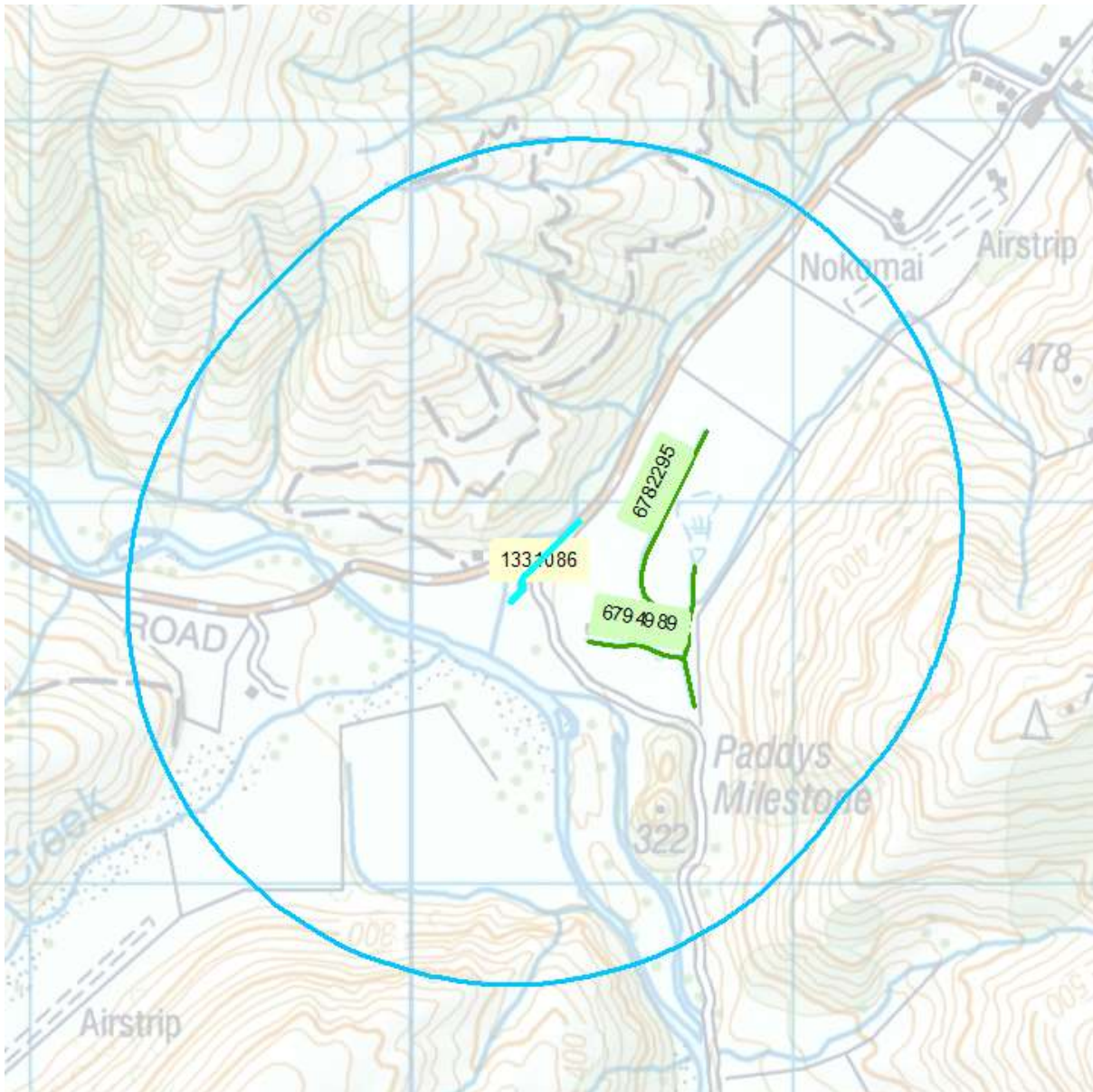


Figure 1. Nokomai River tributary, *Galaxias* “southern” habitat, an example of mapped habitat and drains in close proximity but on different water courses – drain management is not considered to affect mapped habitat for this species at this location.

Identification of drains

An issue was identified that means the amount of water course identified as drains is an underrepresentation of the actual situation on the ground, arising where only a subset of straightened watercourses that are likely subjected to weed and sediment removal have been identified on the LINZ Topo50 drain layer. This situation is illustrated in Figures 2 and 3. At present the extent of the under-representation is unknown. This is a serious planning issue and needs to be resolved before further assessments are undertaken, i.e. the scope of habitats to which the proposed rule will apply needs to be agreed.

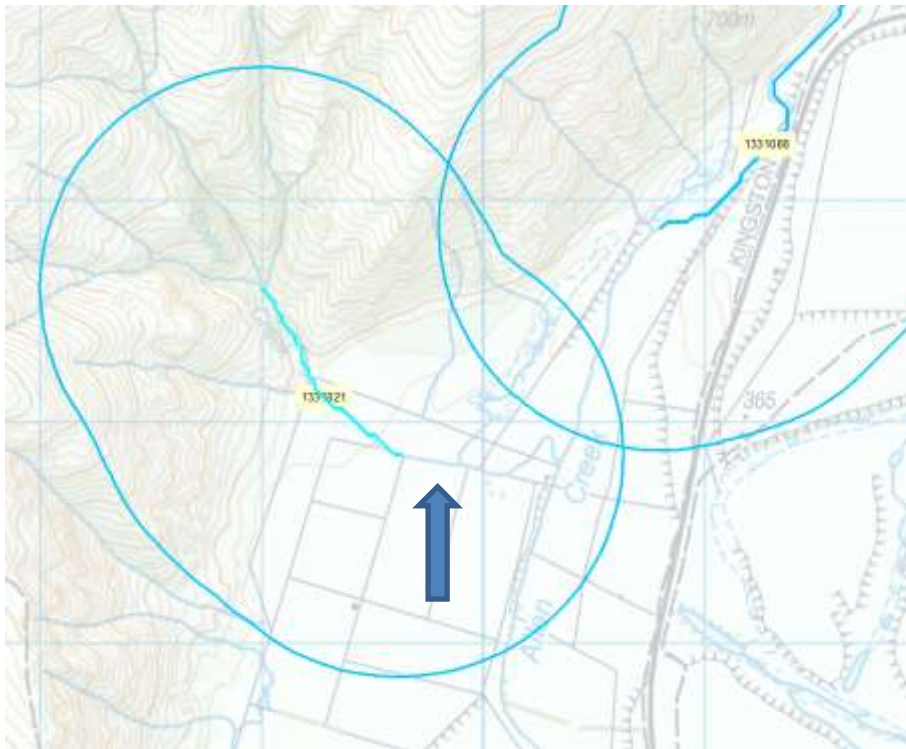


Figure 2. Bushy Creek near Fairlight identified here as *Galaxias* “southern” habitat in its mid reaches, with a straightened lower reach (arrowed) which is not identified as a drain.

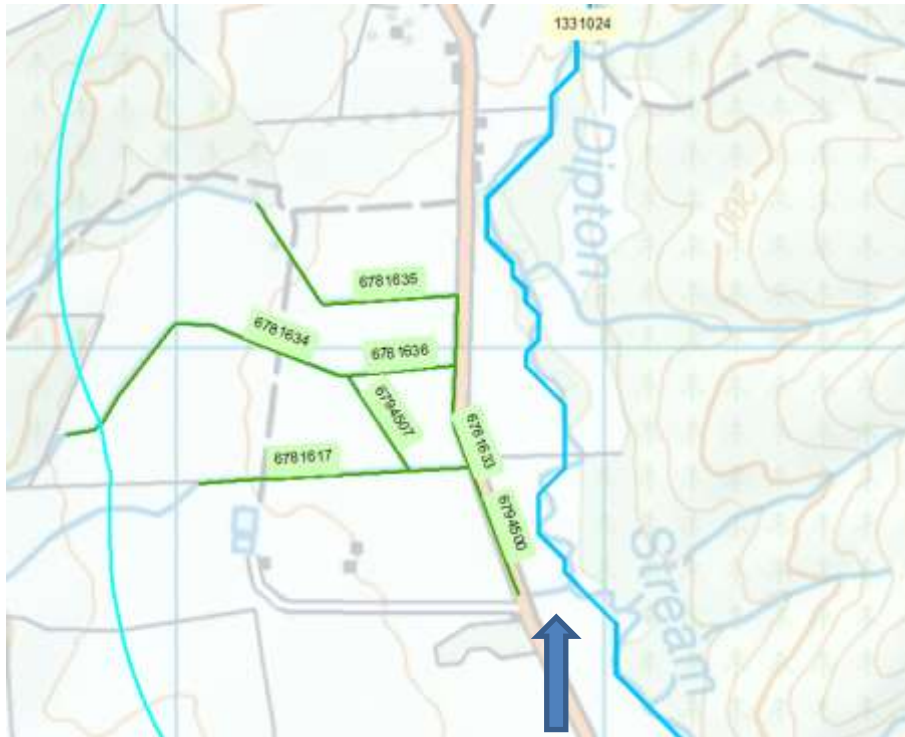


Figure 3. Dipton Stream tributary identified here as confluent with *Galaxias* “southern” habitat. Upper reaches have been identified as drains, but not the downstream reach (arrowed) entering Dipton Stream.

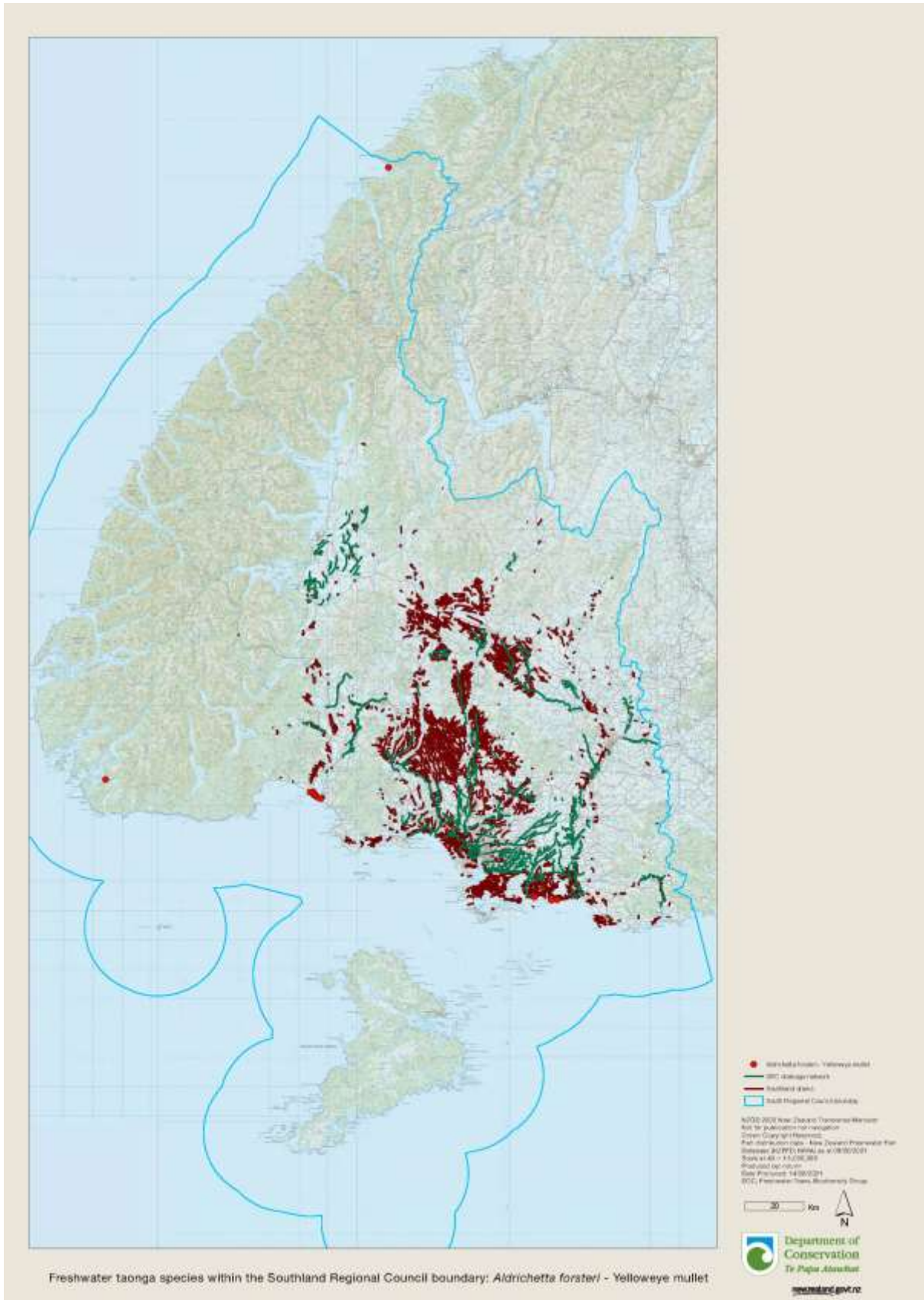
Findings

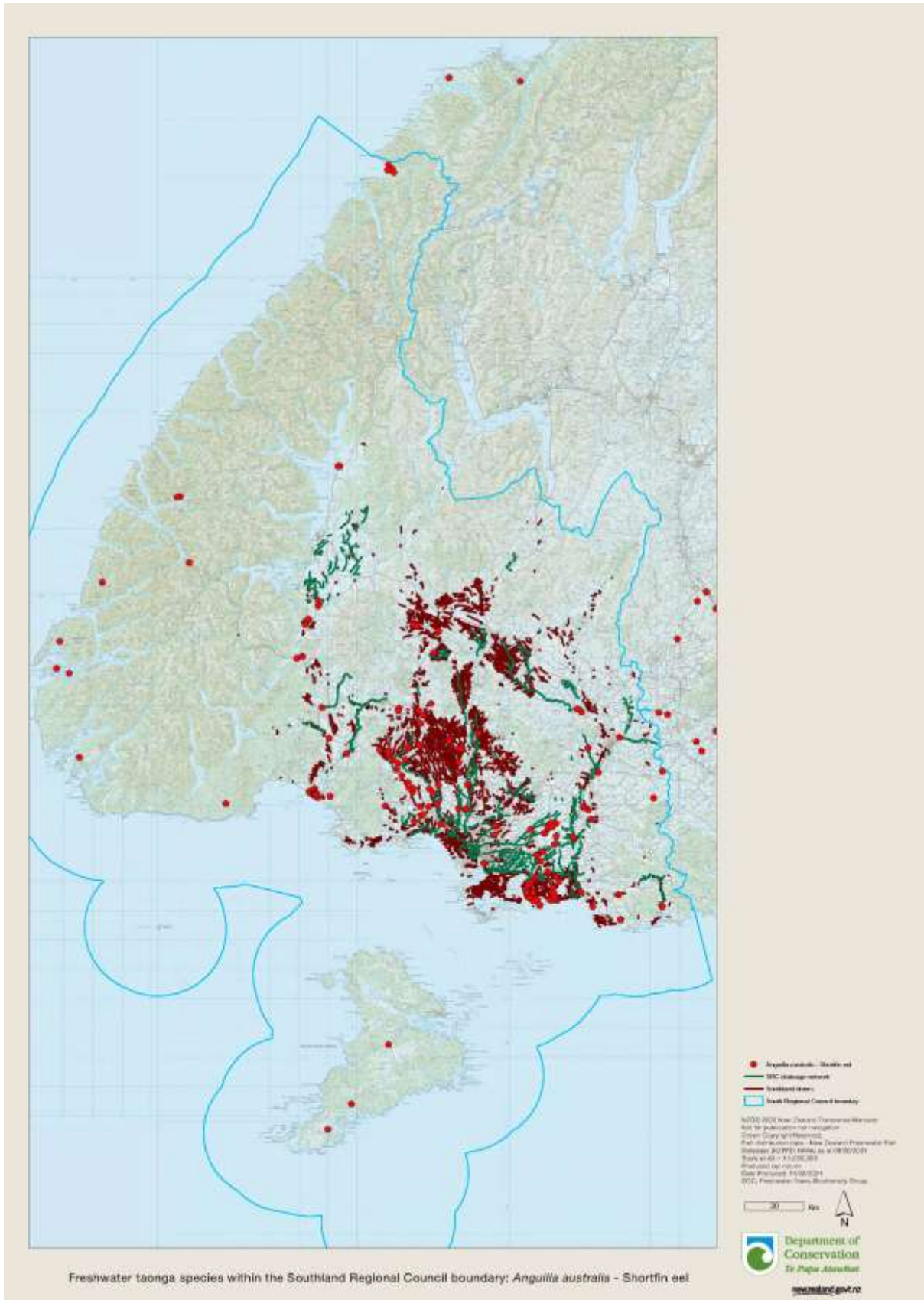
The assessment undertaken in Approach 2 should be considered as interim until the scope of which water courses and species are included in the rule are resolved.

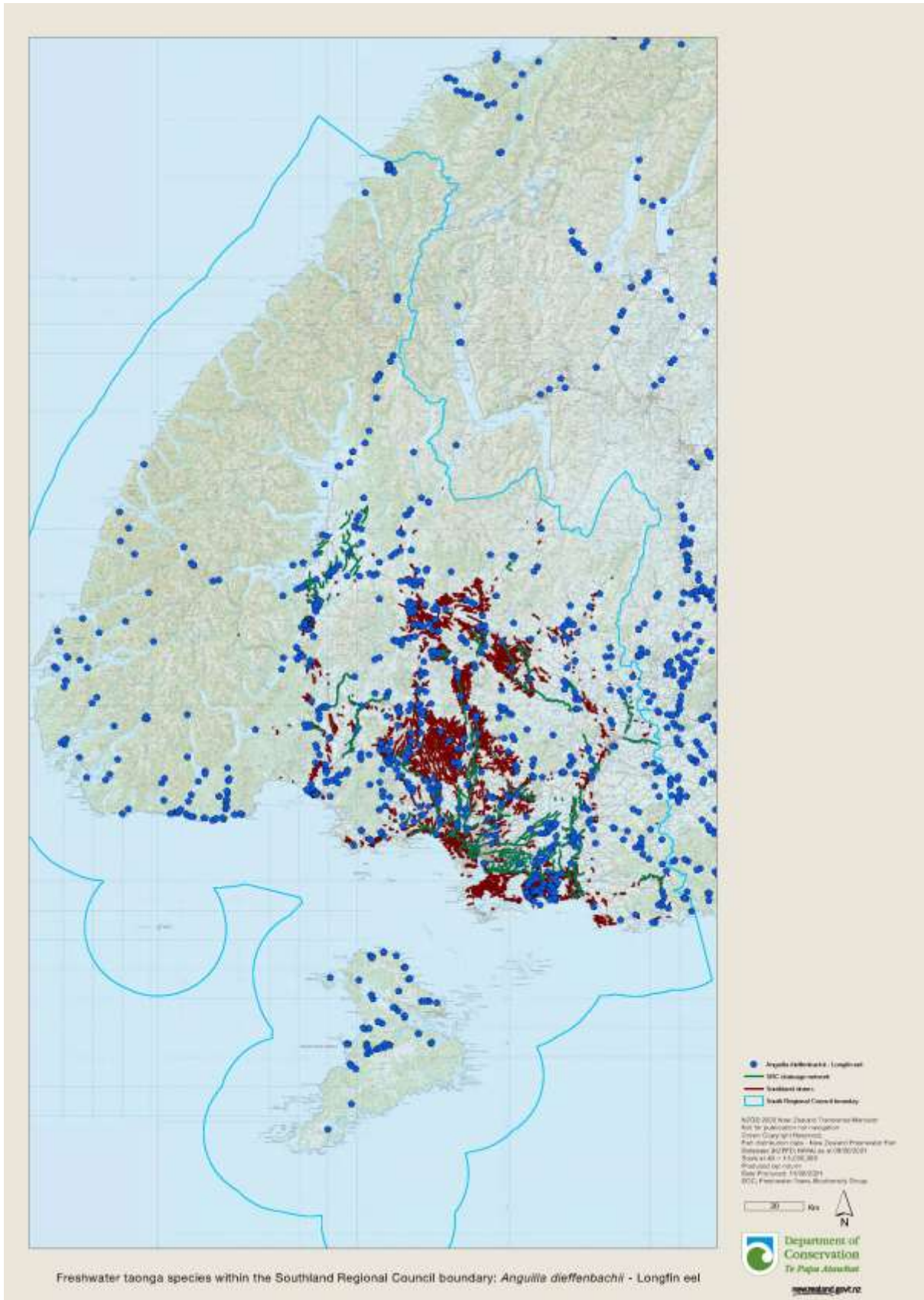
Based on the assessment in Approach 2, the following was found:

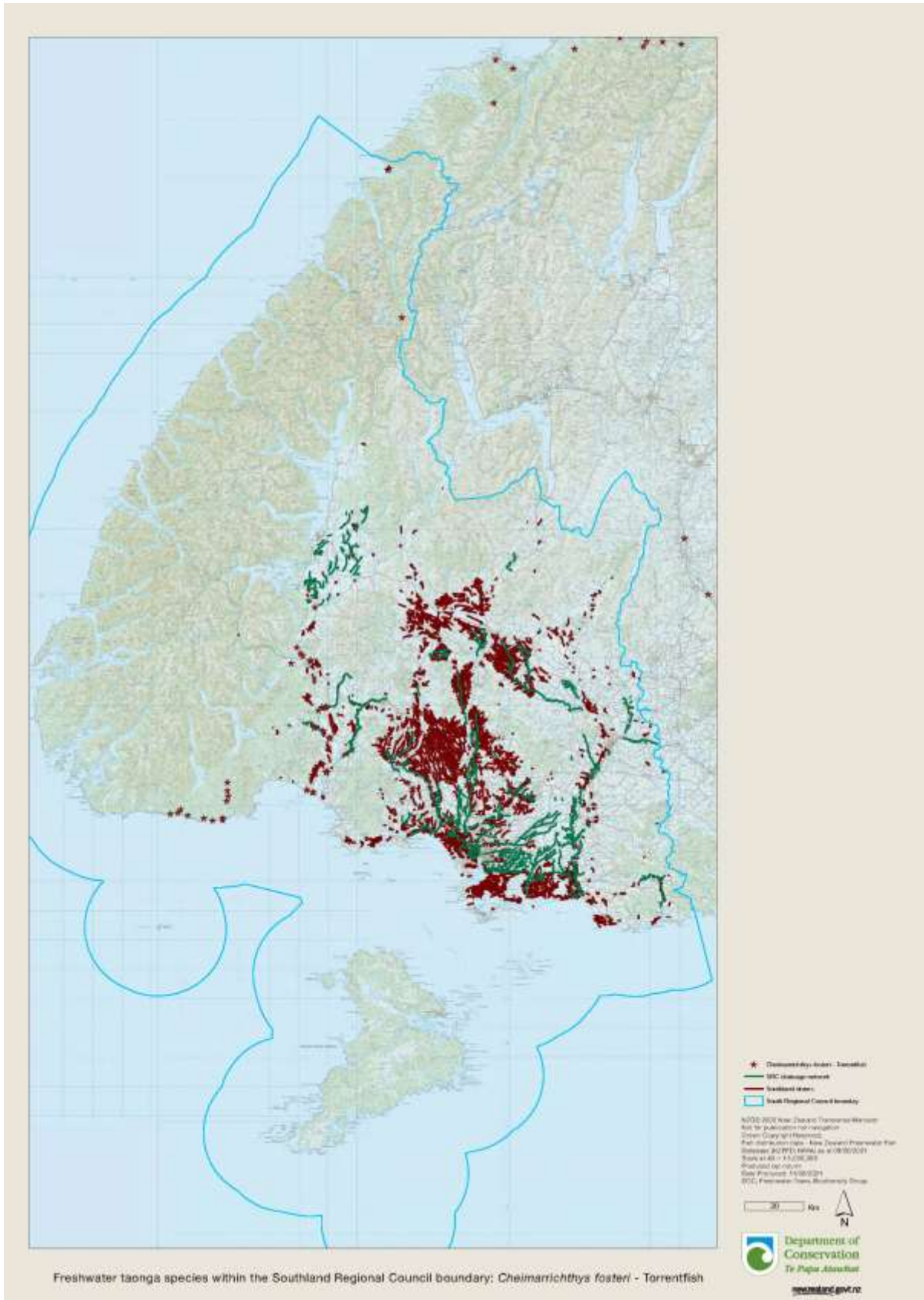
- A total of 43 (30 %) of Southland Regional Council managed drains were found to coincide with mapped non-diadromous freshwater fish habitats (Appendix 2 - high resolution file in DOC-6695243)
- There was coincidence of *Galaxias gollumoides* and *Galaxias* “southern” with Southland Regional Council managed drains, but not for *Galaxias affinis paucispondylus* “Southland”, *Galaxias* “species D” or *Galaxias* “Pomahaka”
- A total of 662 (9 %) of LINZ Topo50 identified drains were found to coincide with mapped non-diadromous freshwater fish habitats (Appendix 3 - high resolution file in DOC-6695243))
- There was coincidence of all taxa with LINZ Topo50 identified drains except for *Galaxias affinis paucispondylus* “Southland”
- Council managed drains extended beyond the extent of known habitats indicating the large extent of drains and the small fragmented nature of fish habitats

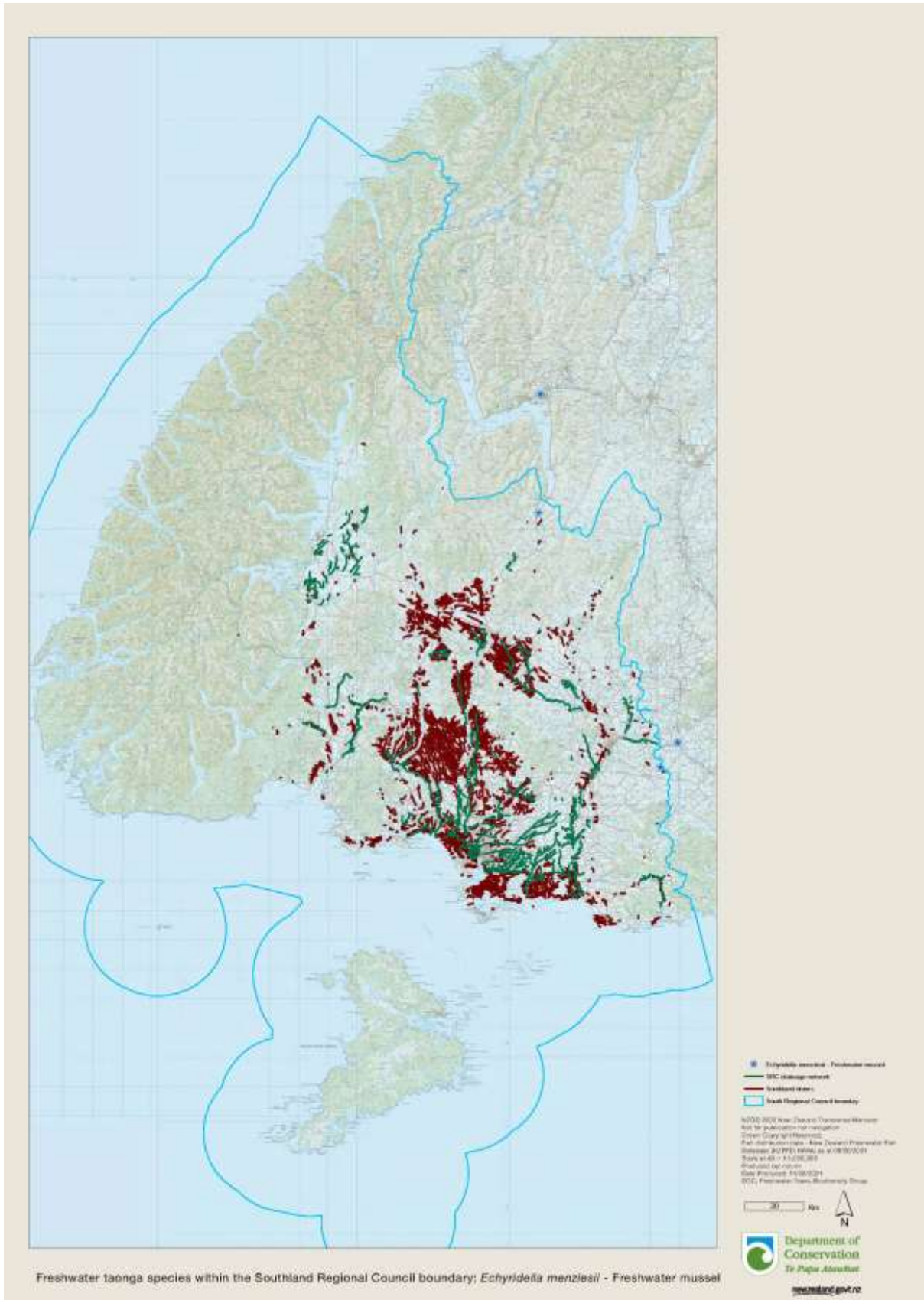
Appendix 1. Approach 1 Maps

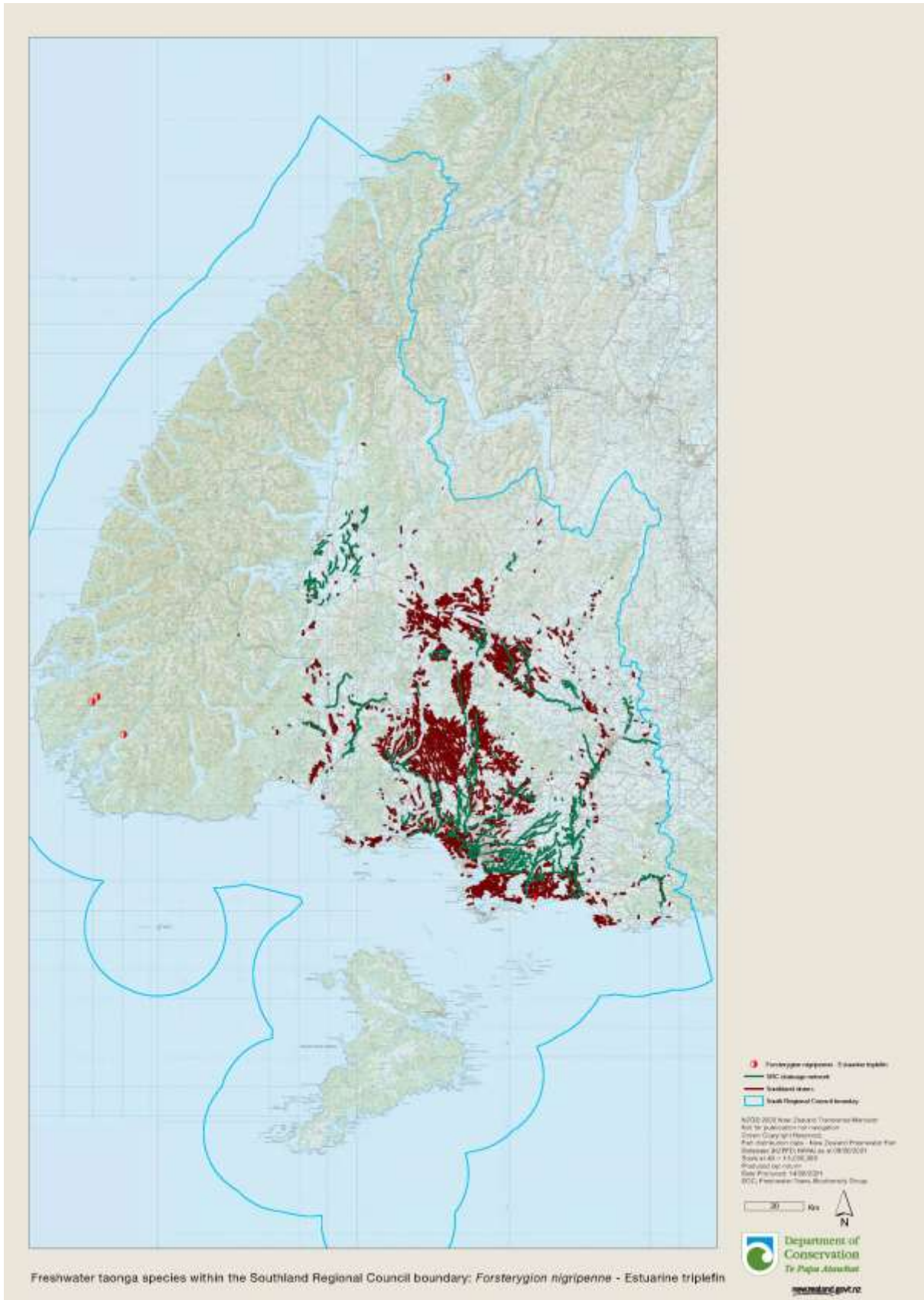


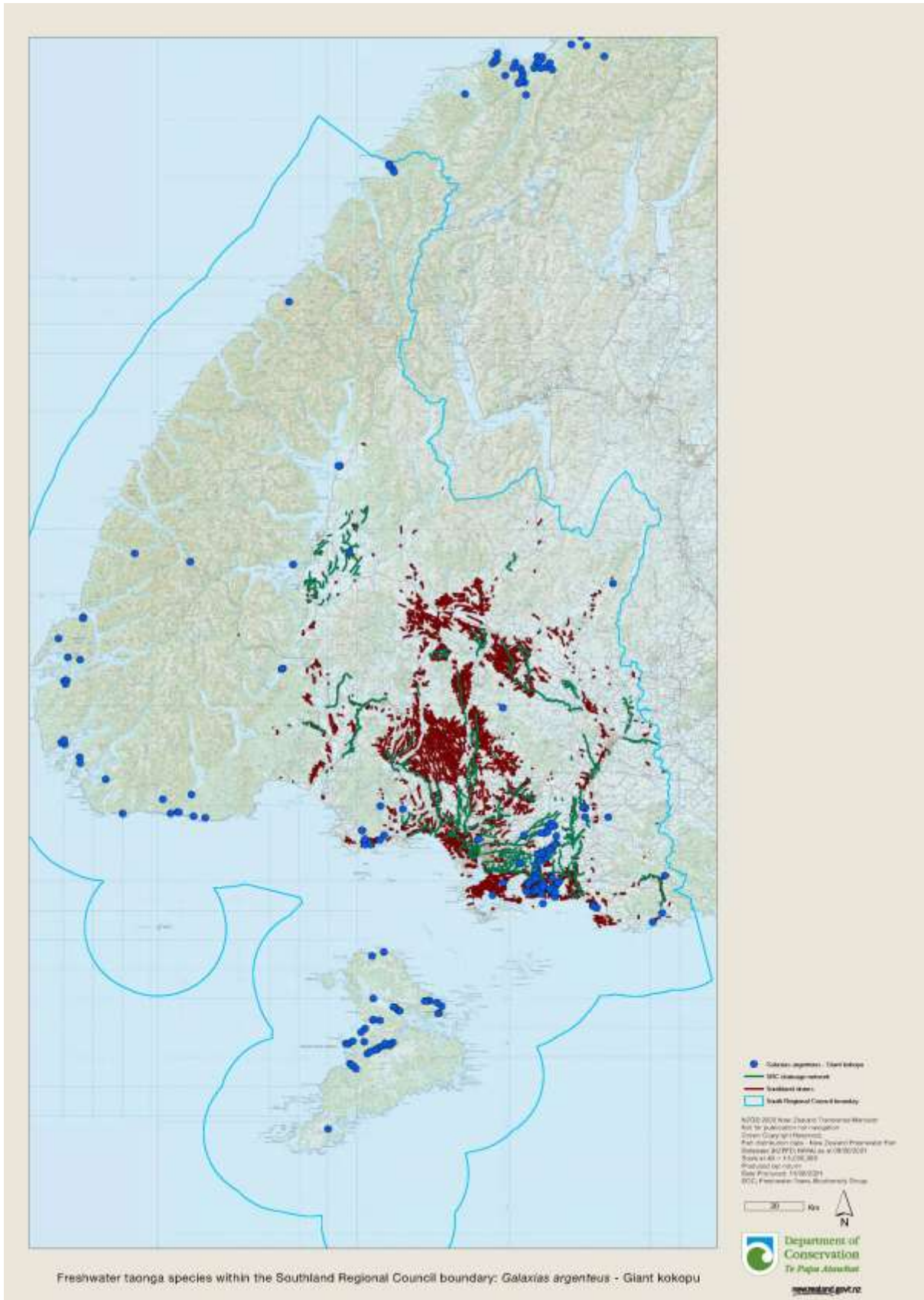


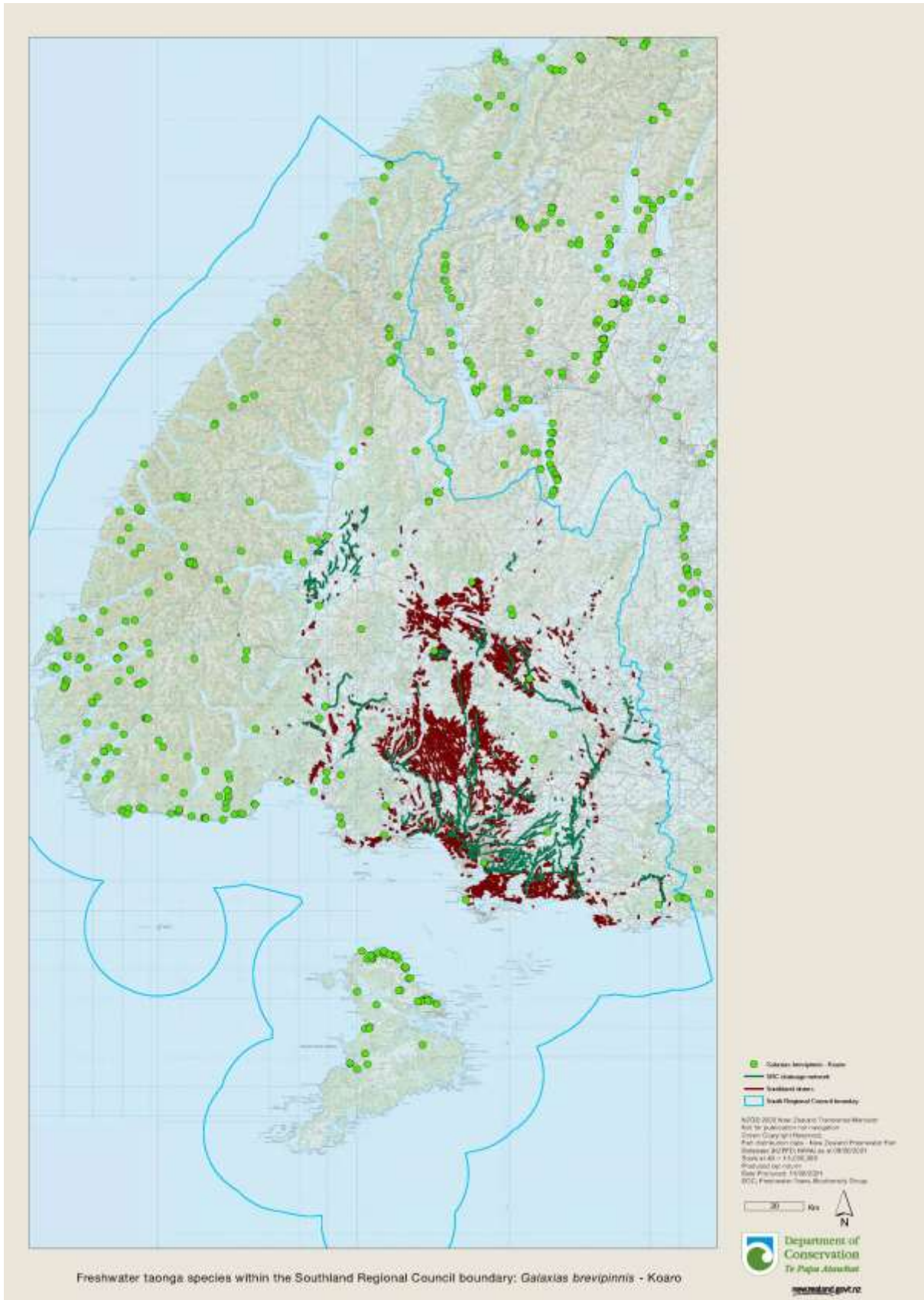


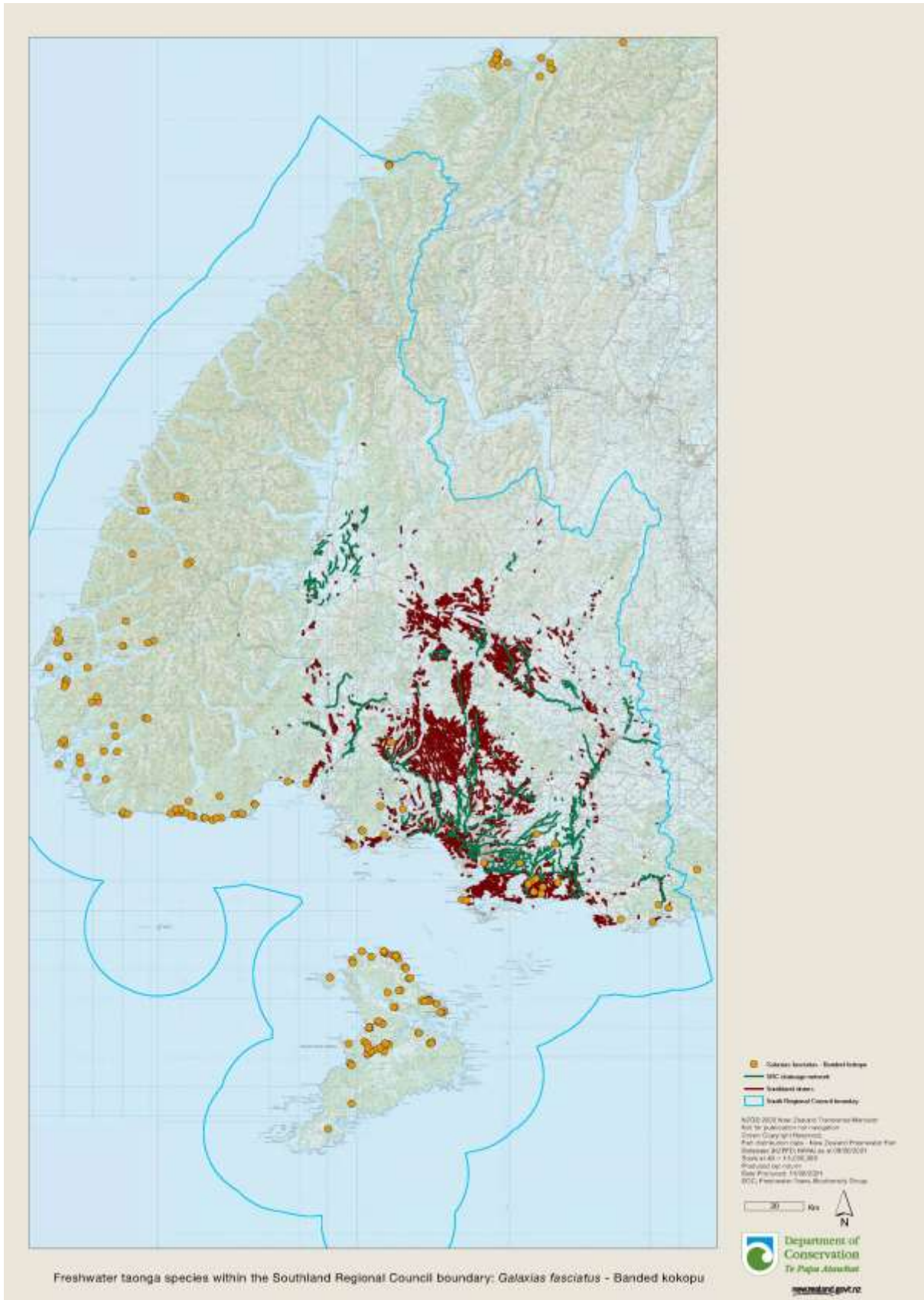


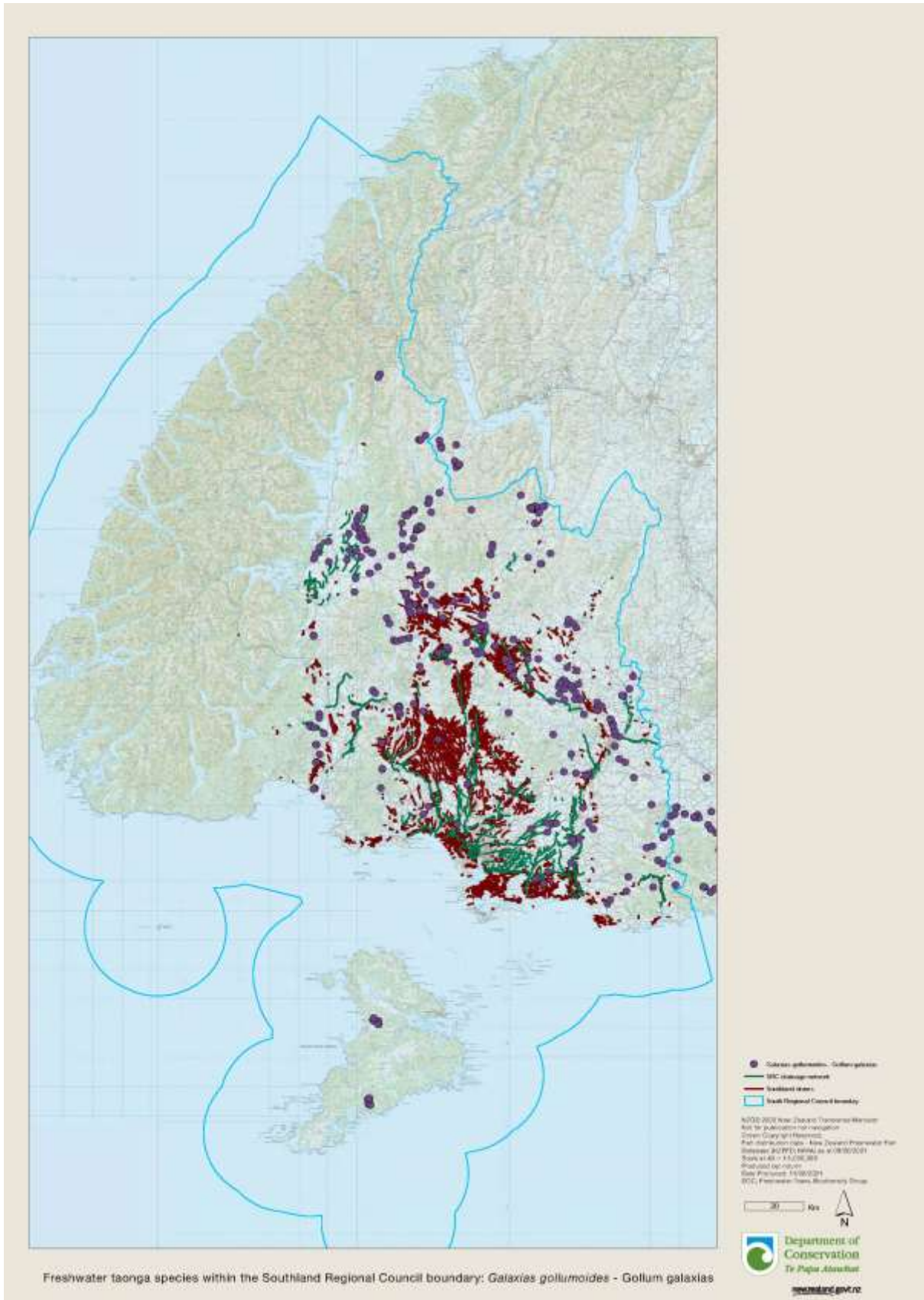


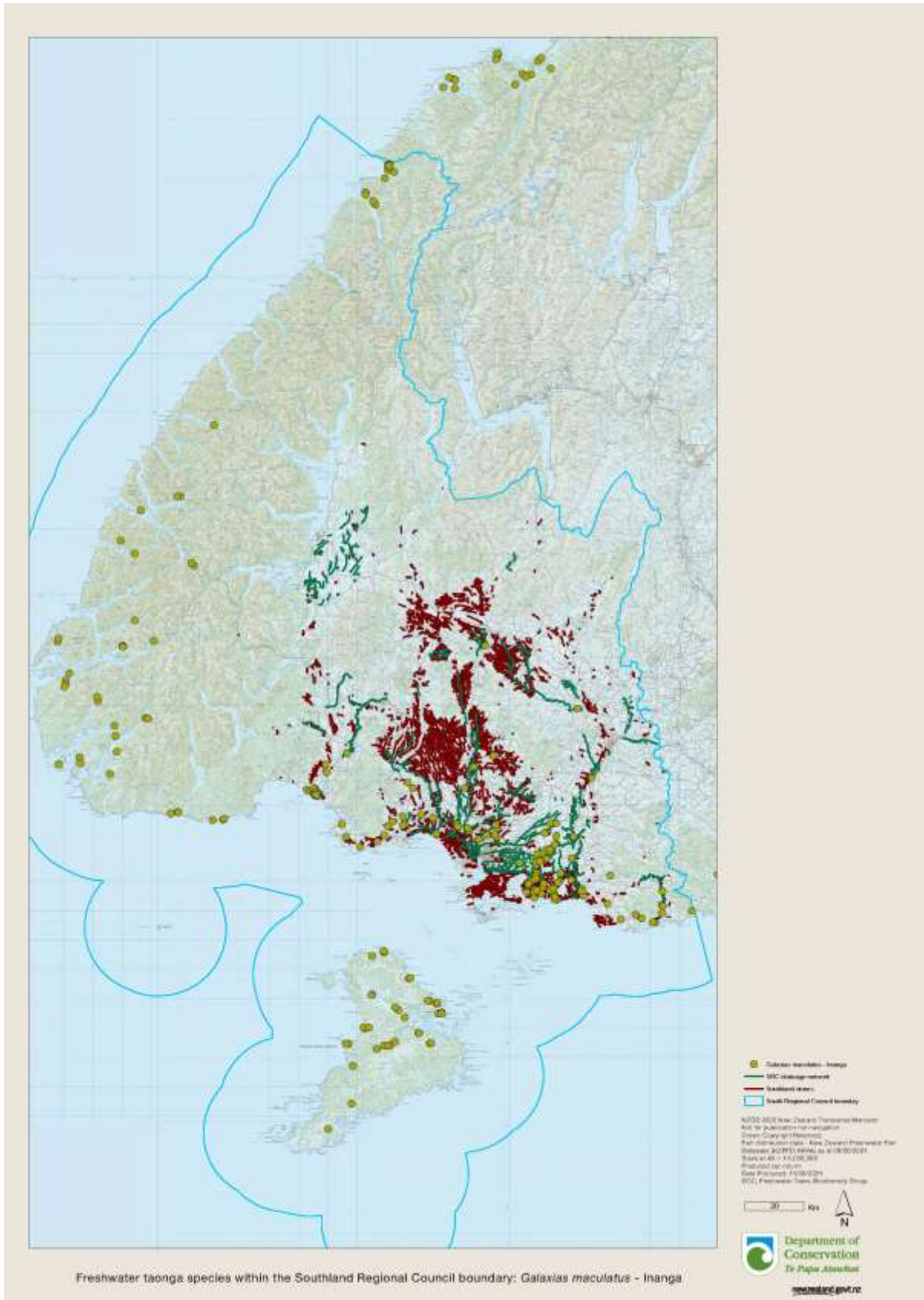


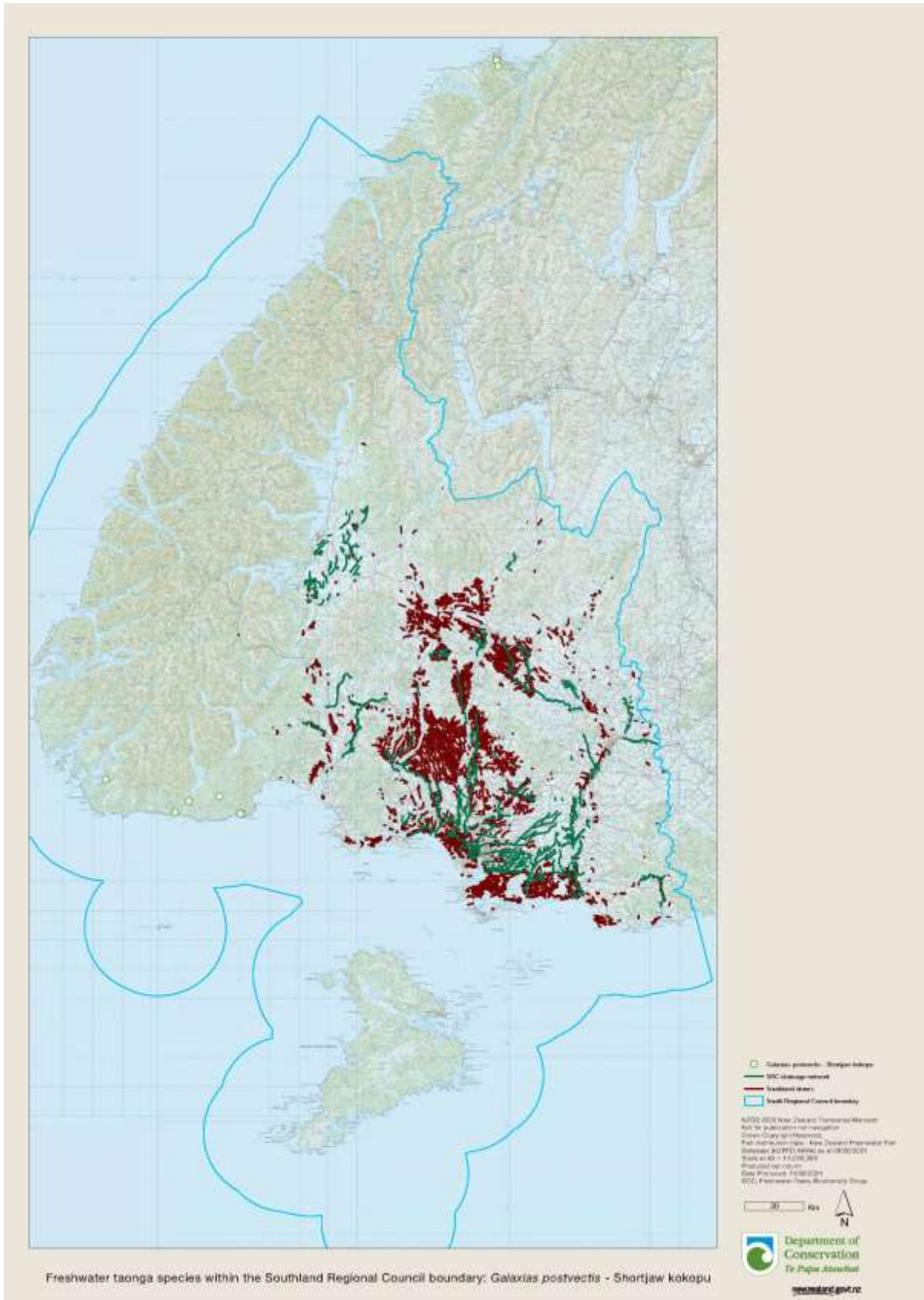


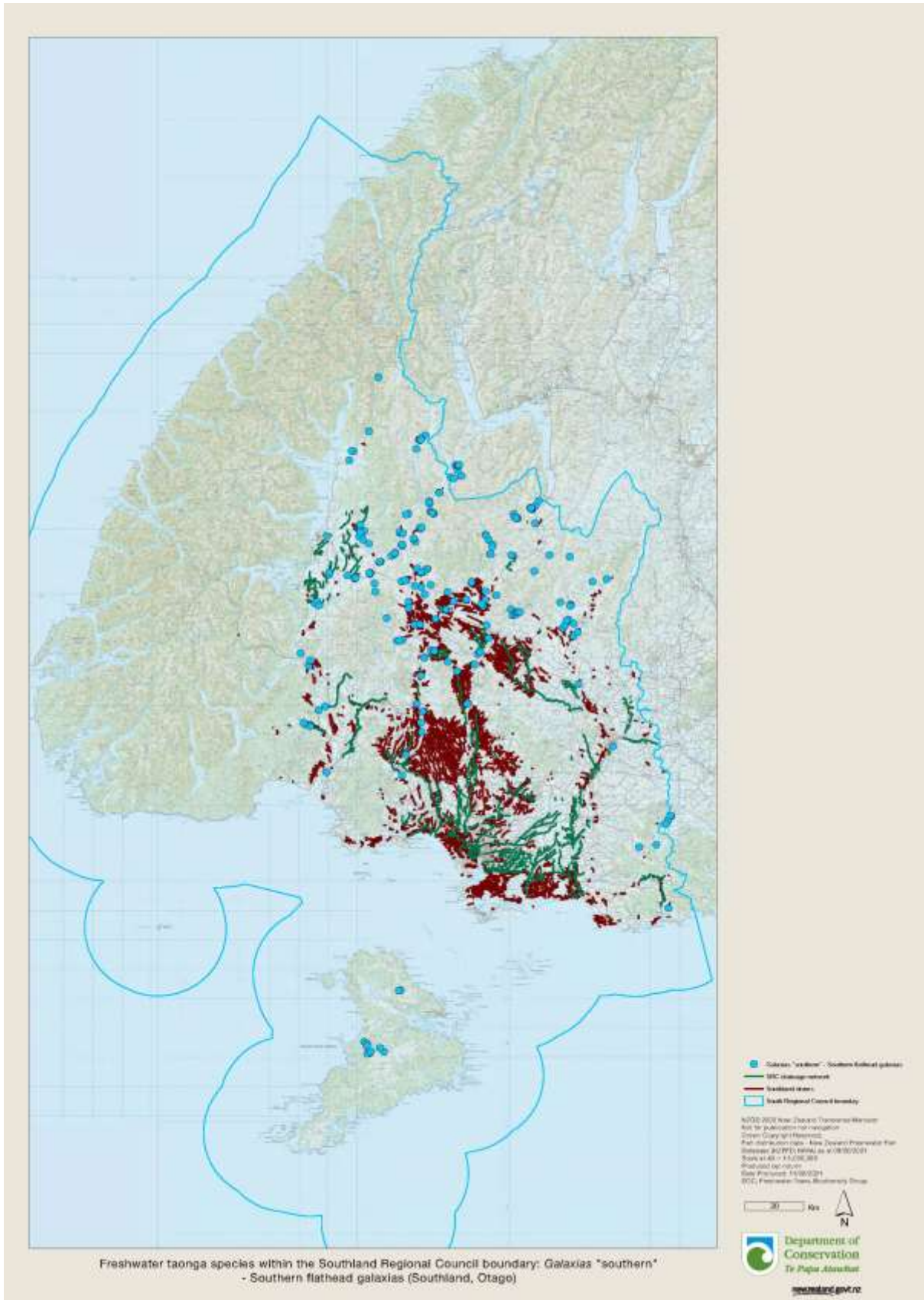


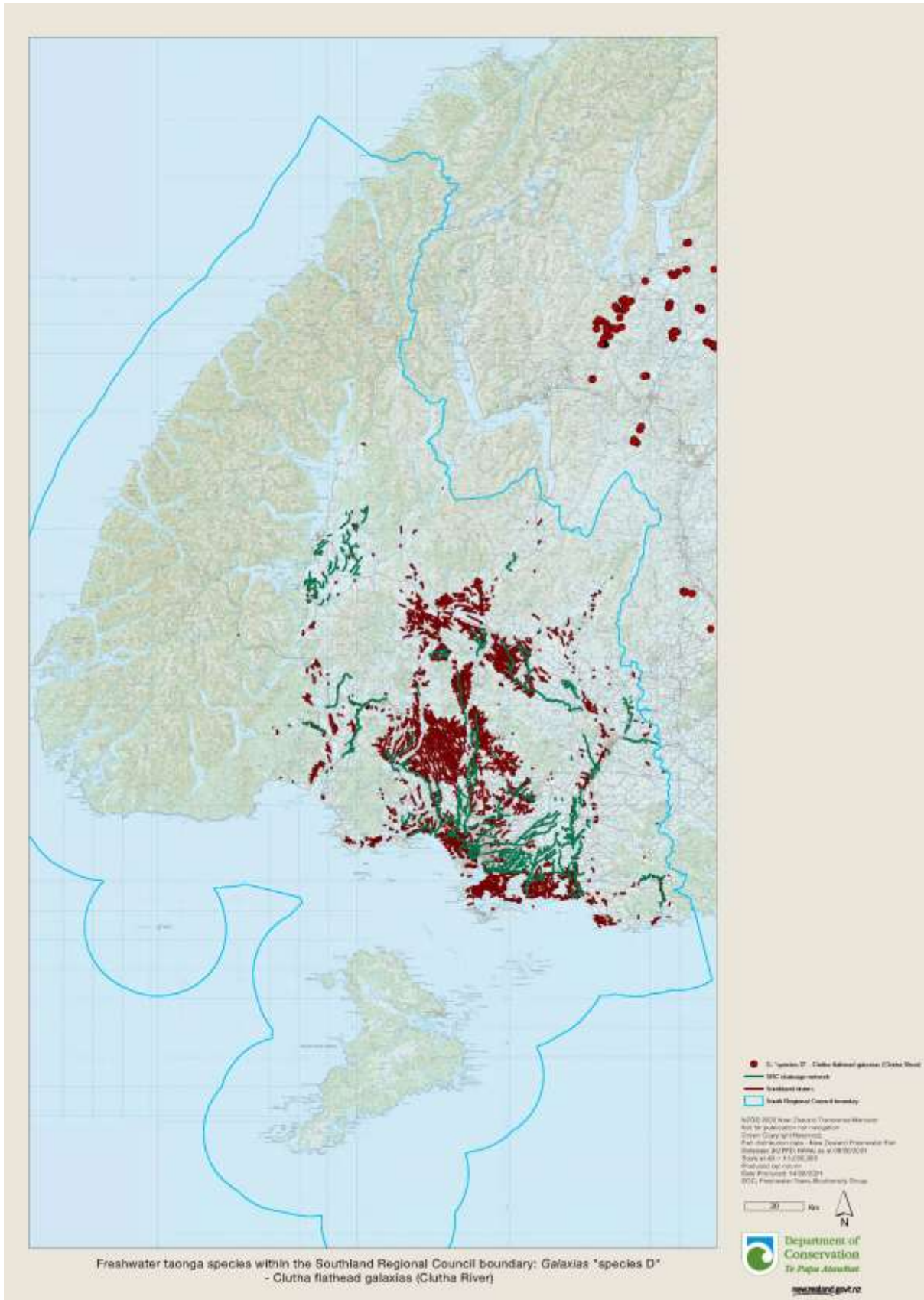


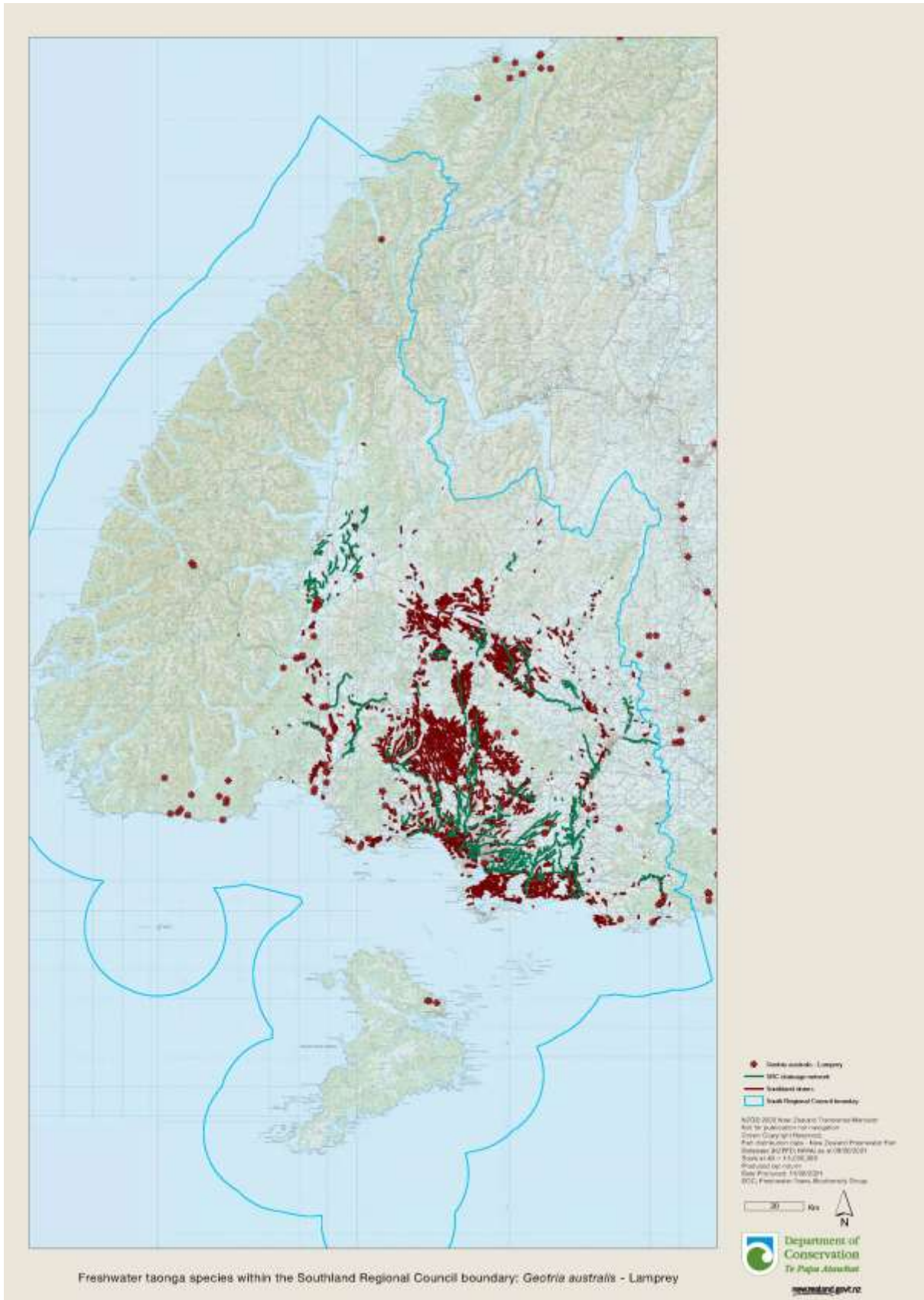


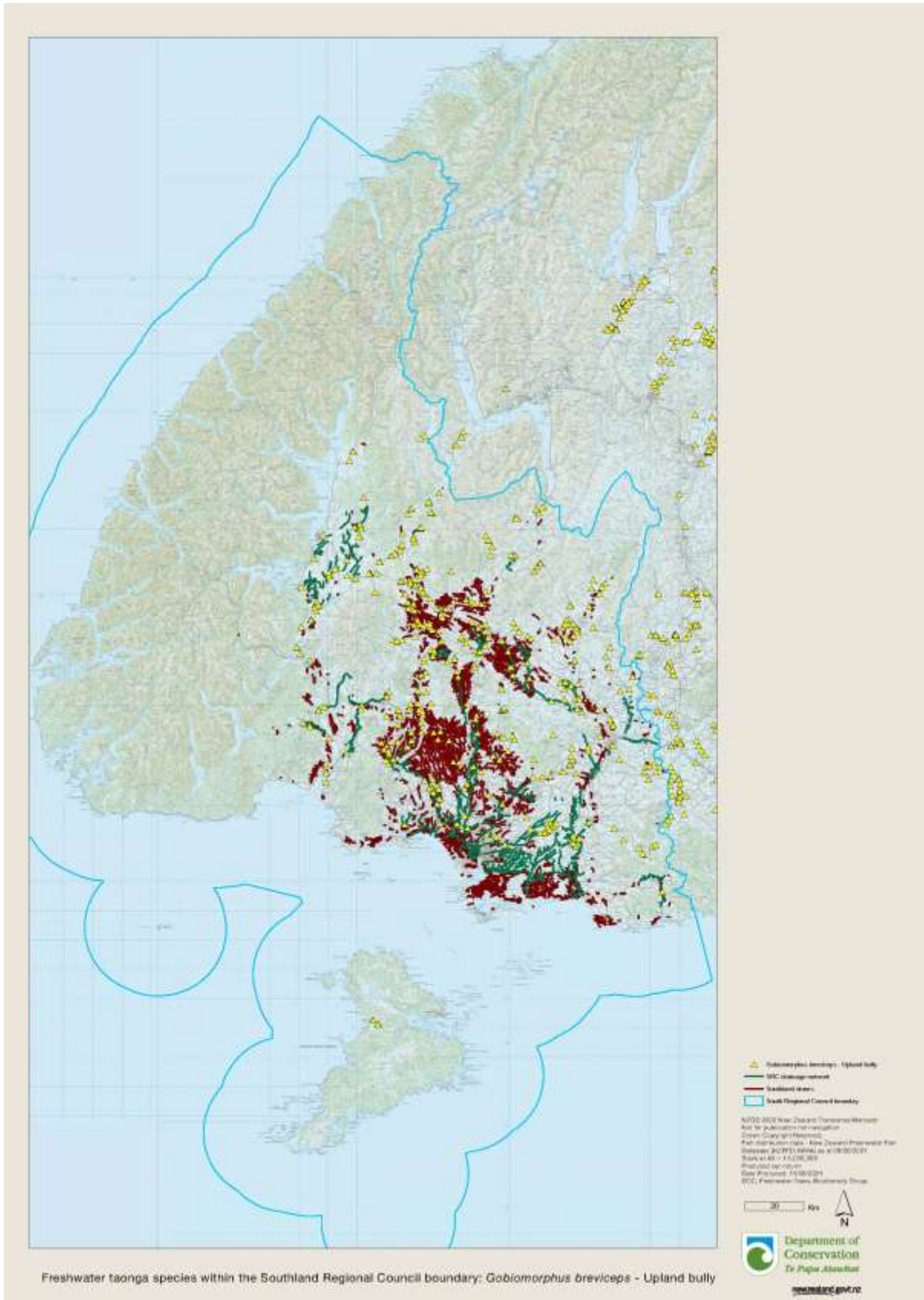




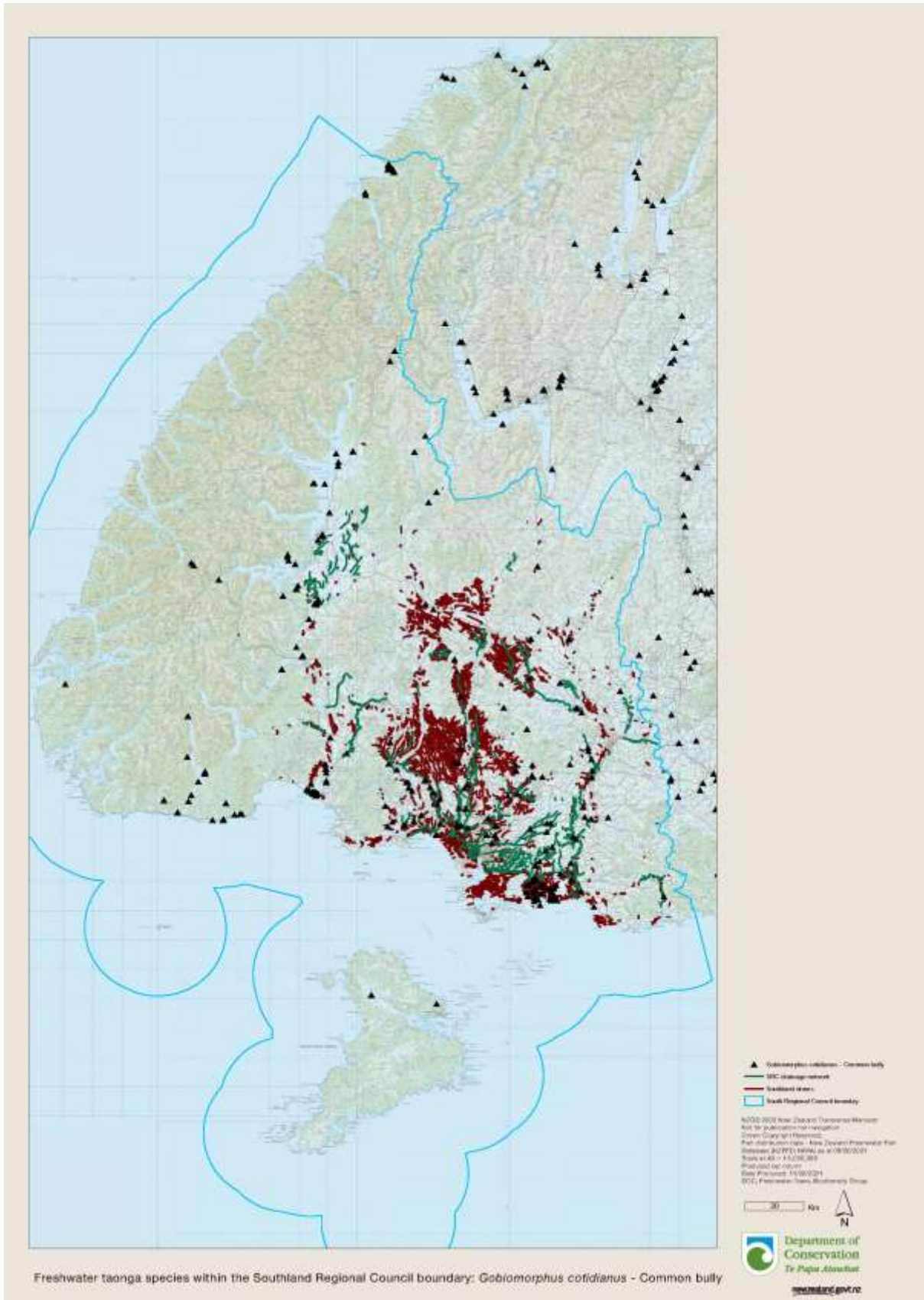


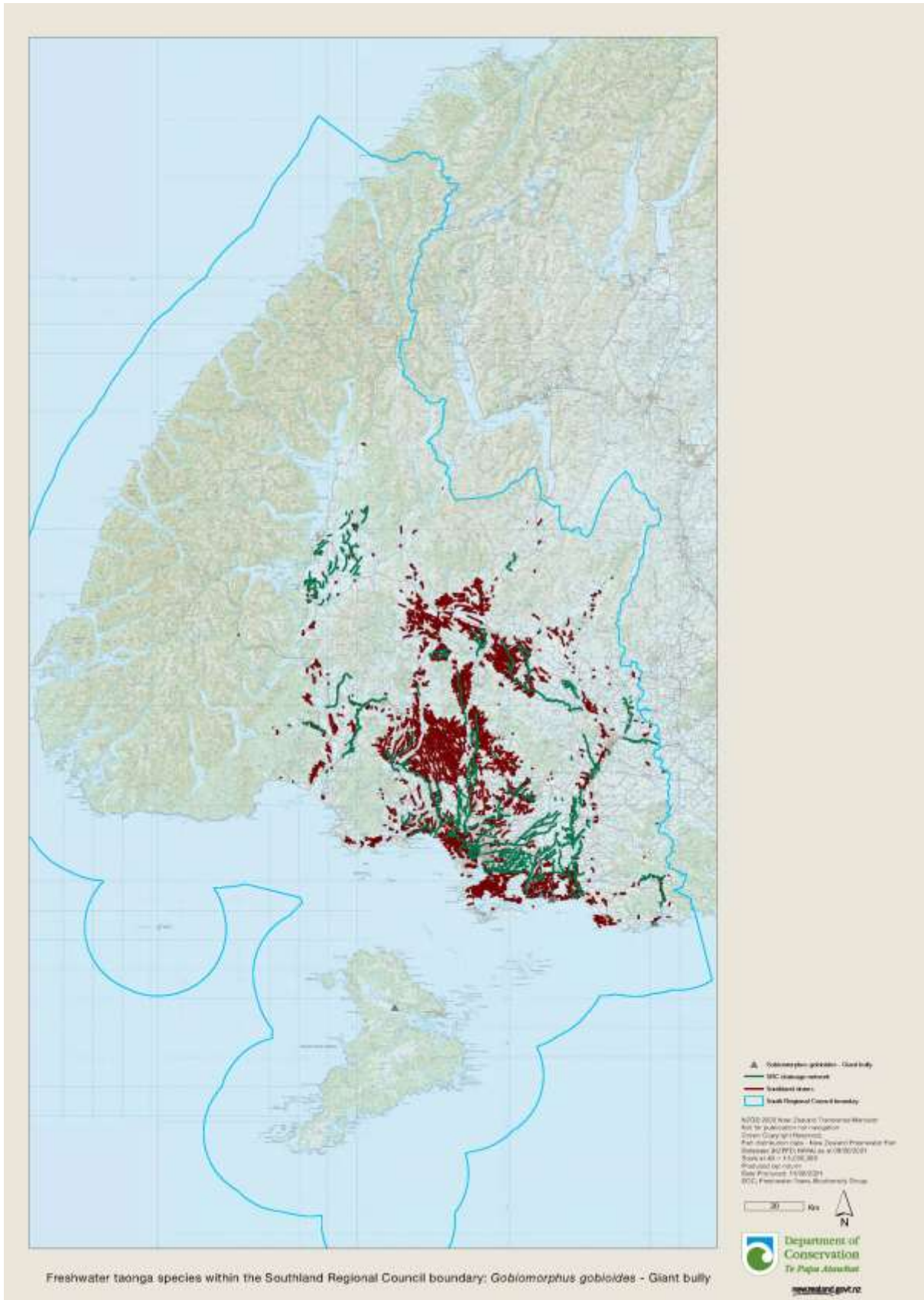


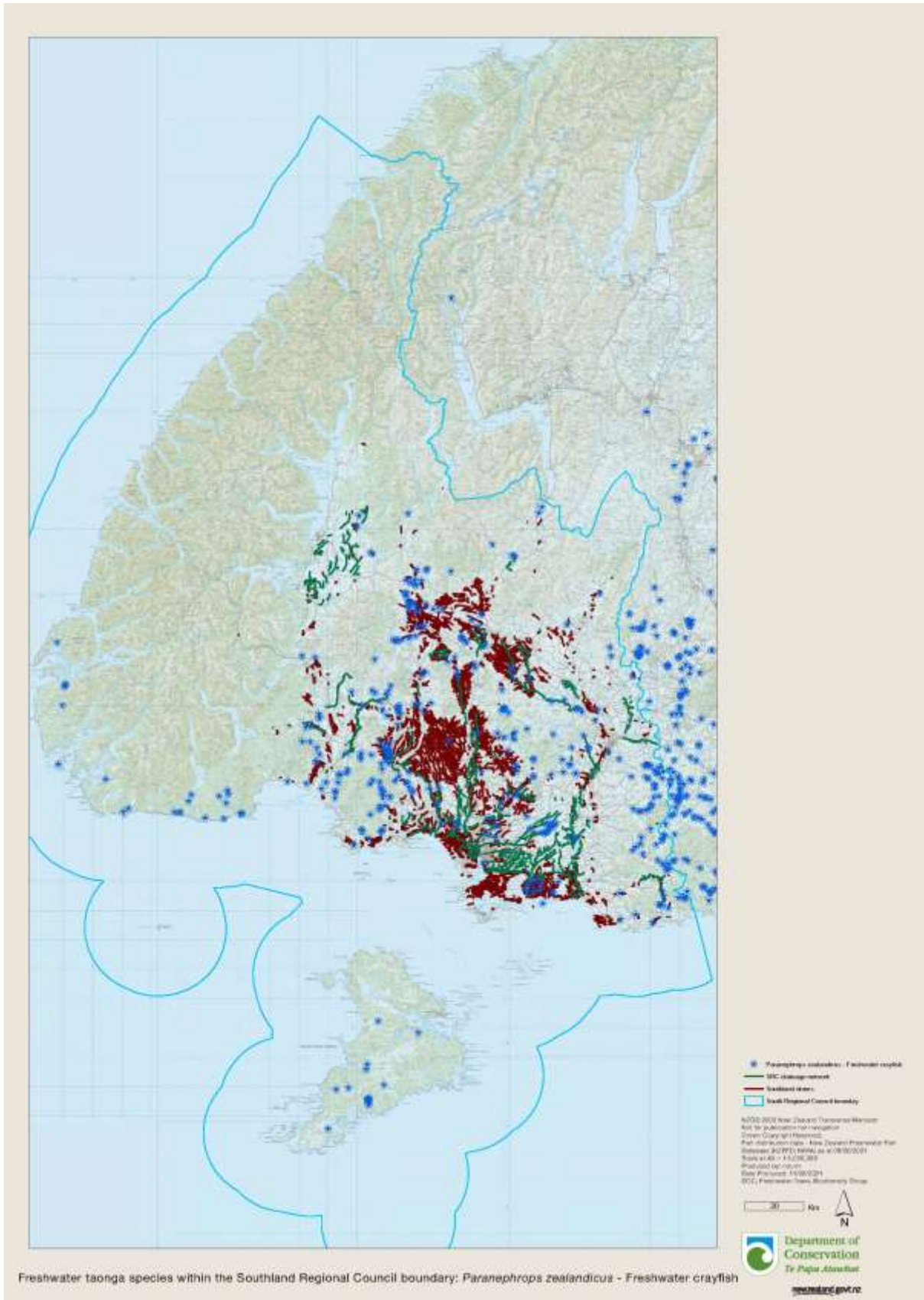




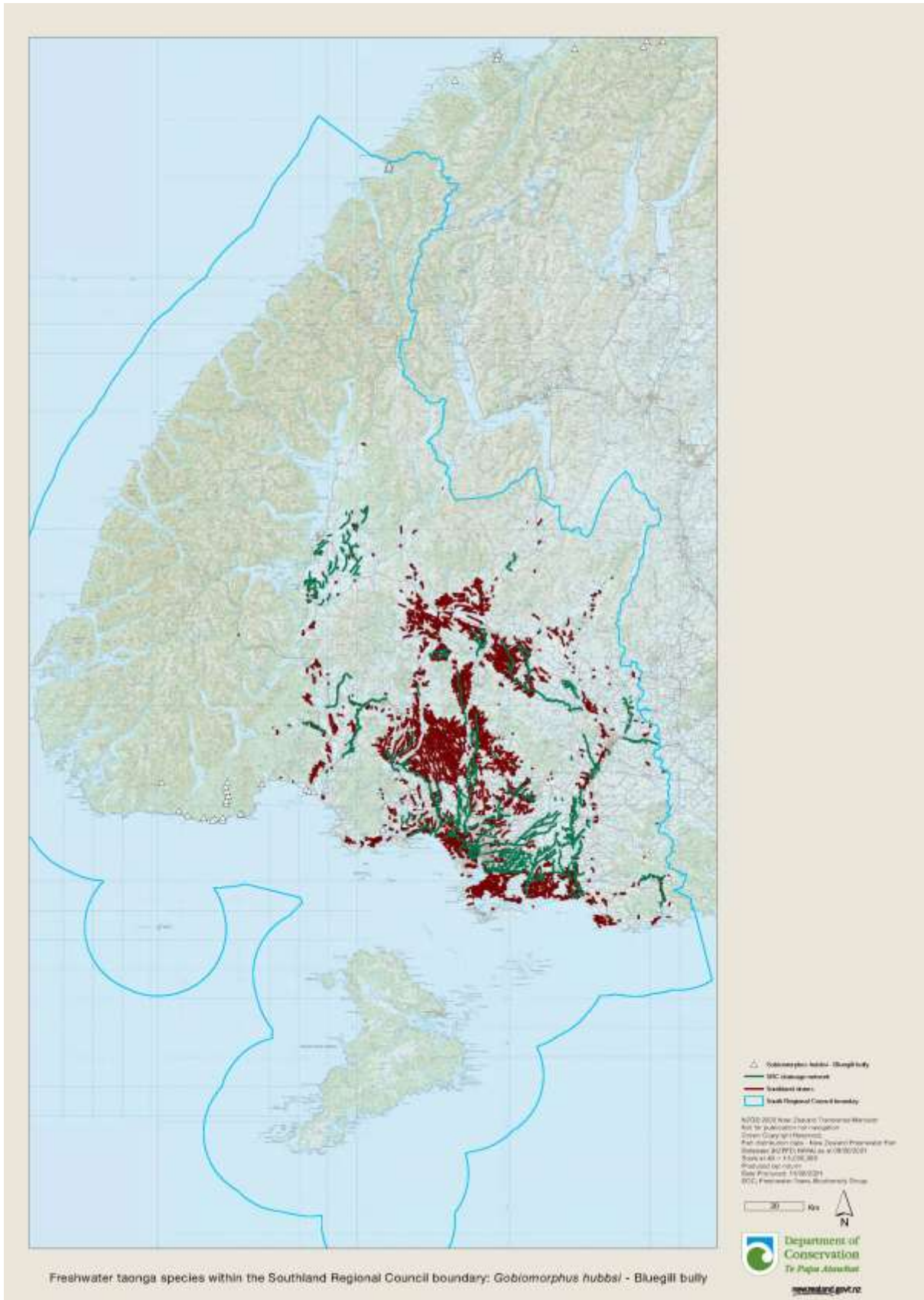
Freshwater taonga species within the Southland Regional Council boundary: *Gobiomorphus breviceps* - Upland bully

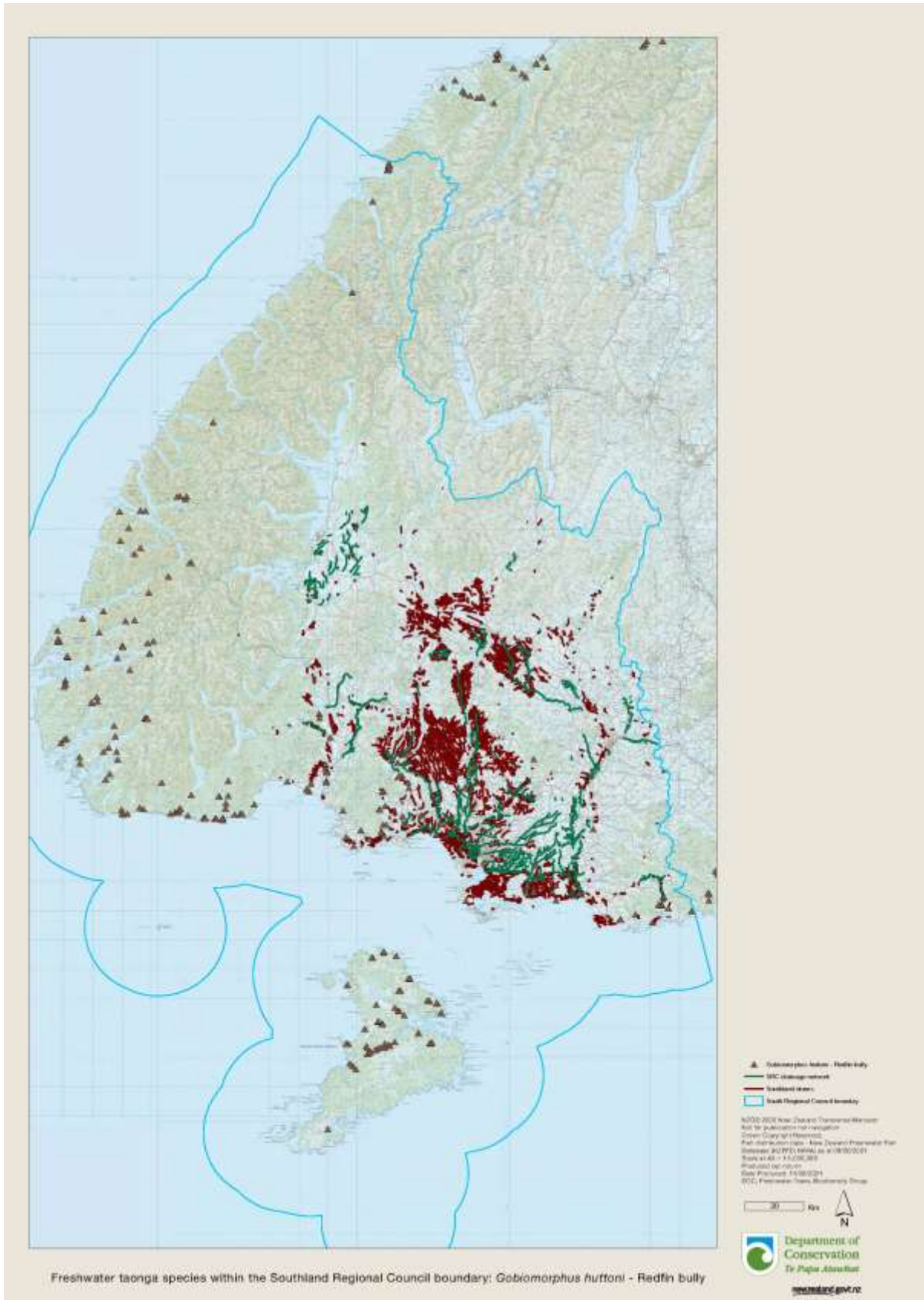


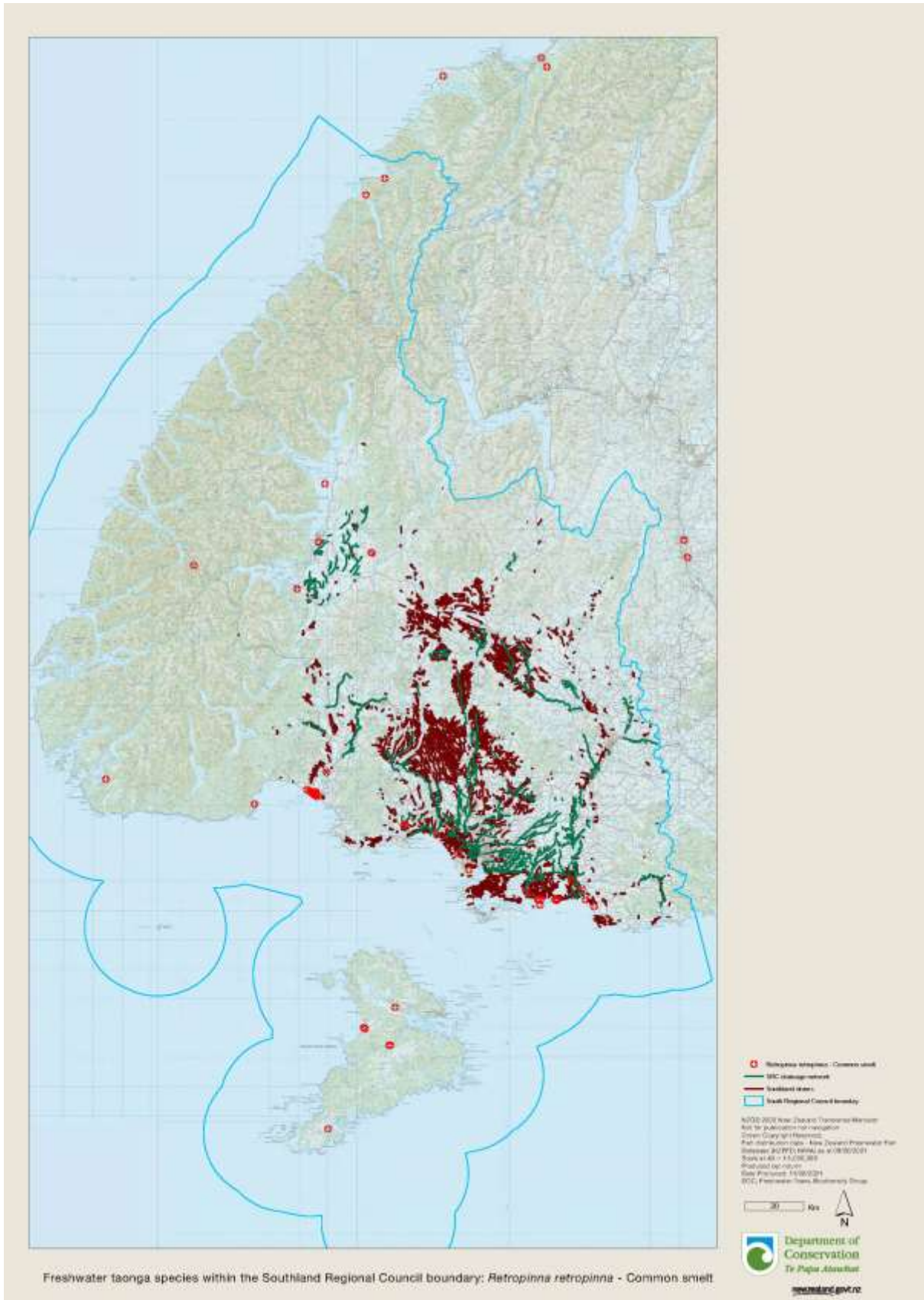




Freshwater taonga species within the Southland Regional Council boundary: *Paraneohpops zealandicus* - Freshwater crayfish

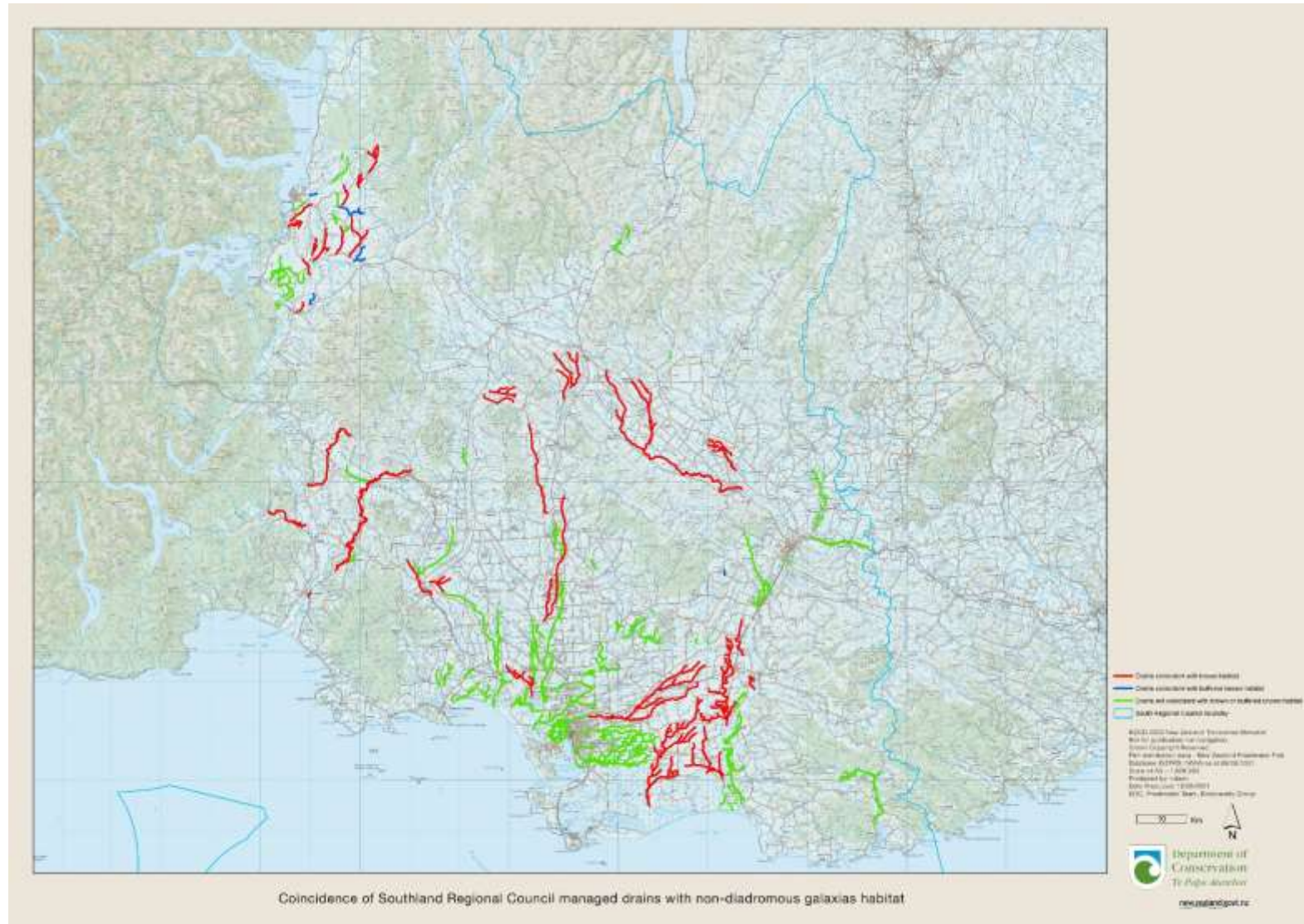






Freshwater taonga species within the Southland Regional Council boundary: *Retropinna retropinna* - Common snielt

Appendix 2. Southland Regional Council managed drains coincidence with non-diadromous galaxias habitat



Appendix 3. LINZ Topo50 identified drains coincidence with non-diadromous galaxias habitat

