

BEFORE THE INDEPENDENT HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND the proposed Timaru District Plan

Evidence of Clement Francois Georges Lagrue
on behalf of the Director-General of Conservation *Tumuaki Ahurei*
Hearing F: Hazards and Risks (Natural Hazards only) – Other District-wide Matters
Submitter No. 166 Further Submitter No.166
Dated: 9th April 2025

Department of Conservation | *Te Papa Atawhai*

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Executive Summary of Key Points

1. My evidence addresses the effects of jetboating on braided river birds present on the Timaru District rivers, especially the Rangitata, Ōrāri, Ōpihi and Pareora Rivers. This evidence is provided in the context of the proposed provisions in the Activities on Surface Water (ASW) chapter of the proposed Timaru District Plan (PTDP) that relate to the use of motorised craft on the Timaru District's rivers.
2. Timaru's braided rivers, especially the Rangitata, are significant nesting habitats for endemic braided river birds including:
 1. black-billed gulls/tarāpuka (*Chroicocephalus bulleri*)
 2. black fronted terns/tarapiroe (*Chlidonias albostratus*),
 3. banded dotterels/Pohowera (*Anarhynchus bicinctus*),
 4. wrybill/ngutu pare (*Anarhynchus frontalis*) and
 5. oystercatchers /Tōrea (*Haematopus finschi*).
3. These species are all threatened according to the New Zealand Threat Classification System (Robertson et al. 2021) and under increasing pressures from anthropogenic activities.
4. Evidence from New Zealand and overseas studies is that motorised craft have a range of direct and indirect negative effects (noise, visual disturbance, speed, wave action, human access to nesting habitat, etc.) on birds, especially during nesting season, and that cumulatively the effects are more than minor.
5. For birds that breed on Timaru's braided rivers, including the Rangitata, Ōrāri, Ōpihi and Pareora Rivers, the best way to address the adverse effects on birds is to avoid using motorised craft during the nesting season (August to January). No other measures seem logistically applicable in the context of New Zealand braided rivers, given the ecology of endemic braided river specialist birds.
6. Alternatives, such as buffer zones, or a minimum flow trigger above which motorised craft would be permitted to use the rivers, would be difficult to implement and monitor. There is no evidence that such options would be effective, and obtaining any evidence would require in depth research and monitoring, for example to identify a flow rate (if there is one) at which effects on birds would be acceptable.

7. Outside of the nesting season, the potential effects of jetboating on these birds are likely to be less than minor and any other effects on biodiversity values are not well documented.

Introduction

1. My full name is Clement Francois Georges Lagrue.
2. I have been asked by the Director-General of Conservation Tumuaki Ahurei ('the D-G') to provide expert evidence on the proposed Timaru District Plan.
3. This evidence relates to Hearing F which includes the Activities on Surface Water (ASW) chapter.

Qualifications and experience

4. I am employed by the Department of Conservation (DOC) as a Senior Science Advisor (Ecosystems). I have worked for DOC since 2019.
5. Previously, I worked for the University of Alberta (Canada) as a lecturer in freshwater ecology and as a Research Fellow in marine and freshwater ecology for the University of Otago. I have broad experience in lake and river ecology through my 14 years of research in academia and I have built specific braided river conservation/management expertise through my role with DOC.
6. My expertise and experience include braided river bird monitoring, habitat restoration, anthropogenic effects on bird nesting, predator tracking and trapping on braided rivers and working with regional councils, DOC, iwi, Fish & Game and operators on best practice guidelines for river work (gravel extraction, flood protection, erosion mitigation, etc.). I advise other DOC staff on concession/consent applications and RMA issues related to braided rivers.
7. My qualifications are a PhD in Zoology from the University of Otago in 2005.
8. I have been leading a braided river restoration project for 5 years on the Aparima River (Southland), collaborating with a commercial gravel extractor, to combine commercial aggregate harvesting with braided river restoration. The project looks specifically at braided river nesting birds. This project has led me to be involved in many aspects of braided river management and conservation through Resource Management Act 1991 (RMA) and concession processes (i.e. under the Conservation Act 1987) across the South Island of New Zealand as well as different working groups for gravel and river management, especially in Southland.

Code of Conduct

9. Although this is a Council hearing, I have read the code of conduct for expert witnesses as contained in the Environment Court's Practice Note 2023 (the Code). I have complied with the Code when preparing my written statement of evidence.
10. 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.
11. 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.
12. For the avoidance of doubt, in providing this evidence as an expert witness in accordance with the Environment Court Code of Conduct, I acknowledge that I have an overriding duty to impartially assist the Panel on matters within my area of expertise. The views expressed are my own expert views, and I do not speak on the D-G's behalf.

Scope

13. I have been asked to provide evidence in relation to the notified proposed Timaru District Plan, the D-G's submission (submitter number 166), and the D-G's further submission, and further submissions lodged on the D-G's submission.
14. My evidence addresses the following matters:
 - a. Braided river birds present on Timaru District's rivers
 - b. Effects of motorised craft/jet boats on braided river birds (direct and indirect effects)
 - c. Measures to reduce these effects

Material Considered

15. In preparing my evidence I have read and relied upon the following documents:
 - (a) Proposed Timaru District Plan 2022
 - (b) The Section 32 Evaluation Reports:

- (i) Overview Evaluation Report dated July 2022
- (ii) Activities on the Surface of Water June 2022
- (c) Background and Assessment Reports including:
 - (i) Significant Natural Area Survey Report for Upper Rangitata River, SNAs 769-774, M Harding, 2019
 - (ii) Significant Natural Area Survey Report for Lower Rangitata River, SNA 853, M Harding, 2019
 - (iii) Significant Natural Area Survey Report for Ōpihi River, SNA 851, M Harding, 2019
 - (iv) Significant Natural Area Survey Report for Ōrāri River, SNA 852, M Harding 2019
 - (v) Significant Natural Area Survey Report for Ōrāri River SH79-SH1 SNAs 83b and 83c, M Harding, 2019
- (d) The D-G's submission dated 15 December 2022 and further submissions dated 4th August 2023 and 18 March 2024.
- (e) The s42a Reports including:
 - (i) Public Access, Activities on the Surface of Water, and Versatile Soil dated 24 March 2025

Braided river birds present on Timaru District's rivers

16. Braided rivers are a naturally rare and threatened ecosystem in New Zealand; their distribution is naturally patchy across the landscape. The ecosystem represents less than 1% of New Zealand's total land area. However, it contains a mosaic of interconnected habitats with disproportionately high endemic biodiversity.
17. Braided rivers across Aotearoa support a variety of specialist braided river bird species. These bird species use the mosaic of vegetation-free gravel substrates and backwater, oxbows and active braids associated with braided rivers for roosting, feeding and nesting.

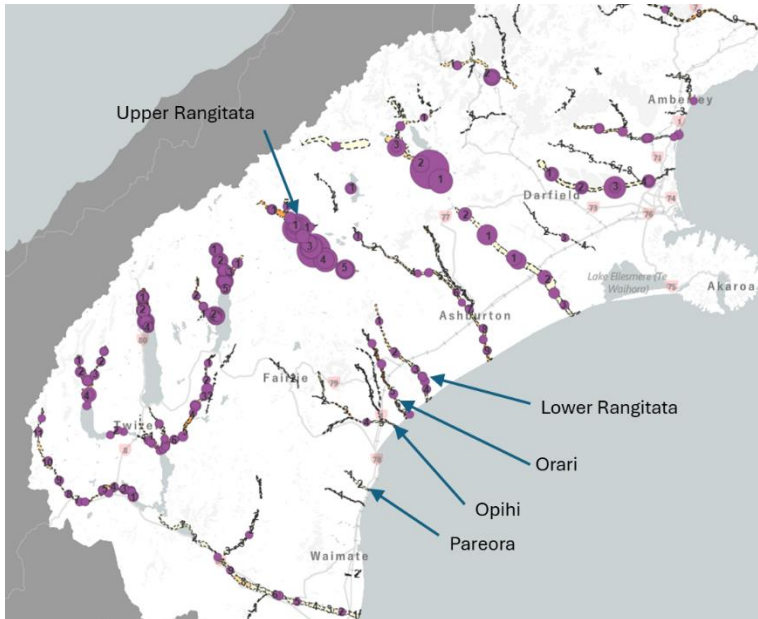
18. Although many bird species will be found on rivers across the Timaru District, my evidence is focused on braided river specialist birds, i.e., bird species that rely primarily or even exclusively on braided river habitats for feeding and roosting, and most importantly for nesting.
19. Braided river specialists that are present on braided rivers within the Timaru District include endemic species such as the wrybill (Threatened – Nationally Increasing),¹ black-billed gull (At Risk - Declining) and black-fronted tern (Threatened – Nationally Endangered). These species have evolved on braided rivers and virtually all individuals nest on braided rivers. Other endemic species such as the banded dotterel (At Risk - Declining) and South Island pied oystercatcher (At Risk - Declining) use braided rivers as their primary nesting/breeding habitats.
20. These species are therefore highly vulnerable to degradation of their river habitat and particularly susceptible to human disturbance, especially during nesting.
21. These species are all migratory to a certain extent. After overwintering in coastal and/or river delta areas, birds begin arriving on braided rivers in numbers in late July and August in preparation for the nesting season.
22. The first nests can be established from early August, especially by banded dotterels. All other species will establish nests/nesting colonies from September onwards. Depending on nesting success, the last fledging will occur across December and January. Most birds have left the rivers by February.
23. The Rangitata River is a key braided river for the above species and is closely monitored by DOC. Wide braided areas with bare gravel islands, beaches and bars, both above and below the gorge, are prime habitats for river birds. Table 1 below presents bird numbers recorded during annual monitoring by DOC over a 35km stretch of the Upper Rangitata River, from the Clyde Havelock confluence to the gorge (Note that these numbers are not absolute bird counts but indices, as surveys do not cover the entirety of the riverbed and bird habitats).

¹ References are to the New Zealand Threat Classification System (Robertson et al. 2021).

Year (month)	2023 (Nov)		2024 (Oct)	
Species/age	Adults	Chicks	Adults	Chicks
Banded dotterel	709	31	706	55
Black billed gull	380	54	139	1
Black fronted tern	662	5	498	2
Wrybill	329	21	333	13
Oystercatcher	332	18	392	8

Table 1: Results of yearly braided river bird survey (2023, 2024) on the Upper Rangitata River during nesting season.

24. The number of chicks counted likely underrepresents the actual number of nests/chicks present, as chicks and eggs are extremely cryptic and difficult to accurately monitor during standard bird surveys. However, the numbers in Table 1 clearly indicate that the upper Rangitata is a key breeding site for all the listed bird species as was also highlighted in previous SNA surveys (Harding, 2019).
25. The Ōpihi, Ōrāri and Pareora are smaller in scale but still contain key habitats for threatened river birds as they provide areas of bare gravel surfaces that these bird species require to nest. See for example Map 1 below showing the distribution of wrybill across the Timaru District rivers: although the Rangitata is the key river for endemic river nesting birds in the Timaru District, wrybill are found on the other smaller rivers.
26. In addition to wrybill, other endemic braided river birds such as black fronted tern and black billed gulls (colony nesters), and banded dotterel and oystercatchers (solitary nesters) were reported by Mike Harding's SNA surveys on the Ōpihi and Ōrāri Rivers (2019).



Map 1: Map of wrybill counts across the different rivers. Purple pie chart size represents relative abundance of wrybill indexed on survey efforts (Map produced by DOC)

27. Map 1 also shows that smaller rivers such as the Te Ngawai River are used by wrybill and likely other braided river birds. Other small tributaries of the rivers considered here such as the Te Moana and Waihi Rivers are also likely to be used by braided river birds for feeding, roosting and nesting but data is scarce for these smaller catchments.

Effects of motorised craft / jetboats on braided river birds

28. The primary effects of motorised craft on the Timaru District's braided river birds will be seasonal, because (as described above) the birds are all migratory to an extent – i.e., the birds are only present between July and February, and most nest between August and January.

Direct effects

29. Some direct evidence of the effects of jetboat wakes on river bird feeding behaviour and wave avoidance has been recorded. It showed that New Zealand endemic birds are indeed affected by jetboats (McKinlay & Smale, 2001). However, generally speaking, there is currently little data on the direct effects of jetboating (via noise, visual disturbance or physical effects (wave action or direct strike)) on river nesting birds in New Zealand, as indicated in a stocktake by Hughey (2011). This is due to a

lack of specific studies on the effects of motorised craft on New Zealand braided river birds. But paucity of evidence does not mean absence of effects; there is also no evidence conclusively showing that jetboats do not affect river birds.

30. Despite the lack of formal research in New Zealand, it is clear from worldwide studies that motorised boat activity has significant effects on most if not all bird species. Boats usually induce birds to swap from feeding or nesting activities to flushing (i.e., standing up from incubation or resting positions) and leaving the nest, flying away and or hiding from the disturbance. It generally takes some time for birds to resume normal activities and/or come back to their nest or even the general area.
31. Disturbance potentially induces long-term increased vigilance behaviour. Flushing, flight and hiding behaviours have significant metabolic costs for birds through reducing feeding intake and increasing energetic costs, especially with repeated occurrences. These costs can be particularly problematic during periods of high energy requirements or when moving away from the disturbance is impossible (e.g., during nesting; Bright et al. 2003).
32. It is often argued that these effects are less than minor, and birds seem to resume normal activities once a single disturbance has disappeared. However, repeated exposure to boat activity can disturb birds and prevent normal feeding, roosting or nesting behaviours at such frequency that cumulative effects can become significant. Repeated and cumulative disturbance can lead to decreased fitness or mortality of individuals on a short-term and local scale, or of entire populations on a long-term and large scale (Loong, 2002).
33. Overseas studies have shown that tern colonies are significantly disturbed by repeated boat traffic, especially fast-moving jet skis, with birds flushing and flying away repeatedly, and eventually abandoning nesting colonies (Burger, 2002, 2003).
34. A recent New Zealand study showed that in Black-backed gulls (BBGs), stress levels (assessed by measuring stress hormones) increased significantly when the gulls were exposed to jetboat activity (Safavian, 2022). The results contrasted with the observed behavioural response of BBGs, which showed minimal negative behavioural response to jetboats. The study demonstrated that observation alone could lead an observer to conclude, wrongly, that gulls are not disturbed by jetboats. Whereas in fact the study demonstrated that exposure to boat activity creates significant spikes in physiological stress.

35. Repeated spikes in stress hormones can have long-lasting effects. Such repeated stress may not be immediately obvious but nonetheless can have significant consequences in the mid to long term at the individual and population levels. It is also worth noting that BBGs are a large, aggressive, predatory bird. In comparison, it can be assumed that smaller bird species such as black fronted terns and black billed gulls, which do exhibit behavioural responses to boat activity, will be equally if not more strongly affected at the physiological level.
36. All the effects of disturbance are cumulative and compounding. I understand that the perceived effects of jetboats on river birds, especially during nesting, may often be considered individually and on a single occurrence basis: e.g., the noise from one jetboat only disturbed birds for a short time. However, anecdotal reports of short-term disturbance, based on single occurrences are not a reliable means of assessing cumulative effects. Repeated noise and visual stimuli from boats have been shown to cause birds to alter their behaviour, move to different locations, or even abandon a site or entire water body if craft usage persists/increases (Murphy et al. 1995; Warrington 1999).
37. Altered behaviours and their potential consequences can be temporary or permanent, depending on the size and nature of the water body, availability of alternative habitats, type and duration of disturbance, and the species and flock size of the bird affected. Impacts vary but can induce breeding failure through neglect or by increased predation. Even as few as one or two disturbance events a week may result in increased predation (Morgan 1972).

Indirect effects

38. In addition to direct effects, one key indirect effect of jetboating is the increased accessibility of many parts of a river by jetboat users for land-based activities such as fishing, hunting, walking or just taking the family, including dogs, to secluded parts of rivers that cannot be accessed by any other means. While this is indeed an appealing aspect of jetboating, it also exposes areas relatively free of human disturbance, and thus favourable to bird nesting, to sudden anthropogenic effects. While these effects will clearly be less than minor outside of bird nesting season, they could have catastrophic consequences during nesting, as is regularly reported by river care groups. Again, these effects are cumulative and compounding to the potential effects of jetboating itself.

39. While each incident of such disturbance may appear to have transitory and minor effects, if you add them and multiply by the number of jetboating days across nesting season, the results are most likely more than minor. Disturbance repeated across a nesting season could be significant. Braided river birds will re-nest up to two or three times following nesting failure, but that is usually accompanied by decreasing nesting success and increased energetic costs on adult birds that may translate into increased overwintering mortality.

Effects of jetboating in the context of other effects

40. The bird species most likely to be affected by jetboating on Timaru's braided rivers are endemic braided river specialists that are under increasing threat from multiple anthropogenic pressures, whether direct (walkers, anglers, 4WD, jetboat, etc.) or indirect (introduced predators, habitat loss, weeds, dogs, etc.). These are cumulative and compounding pressures.
41. In my opinion, whether jetboating is the "worst" of these pressures is not relevant; jetboating is the relevant pressure being considered here. It is part of the combination of threats on endemic, threatened birds and is key to the management and conservation of braided river birds.

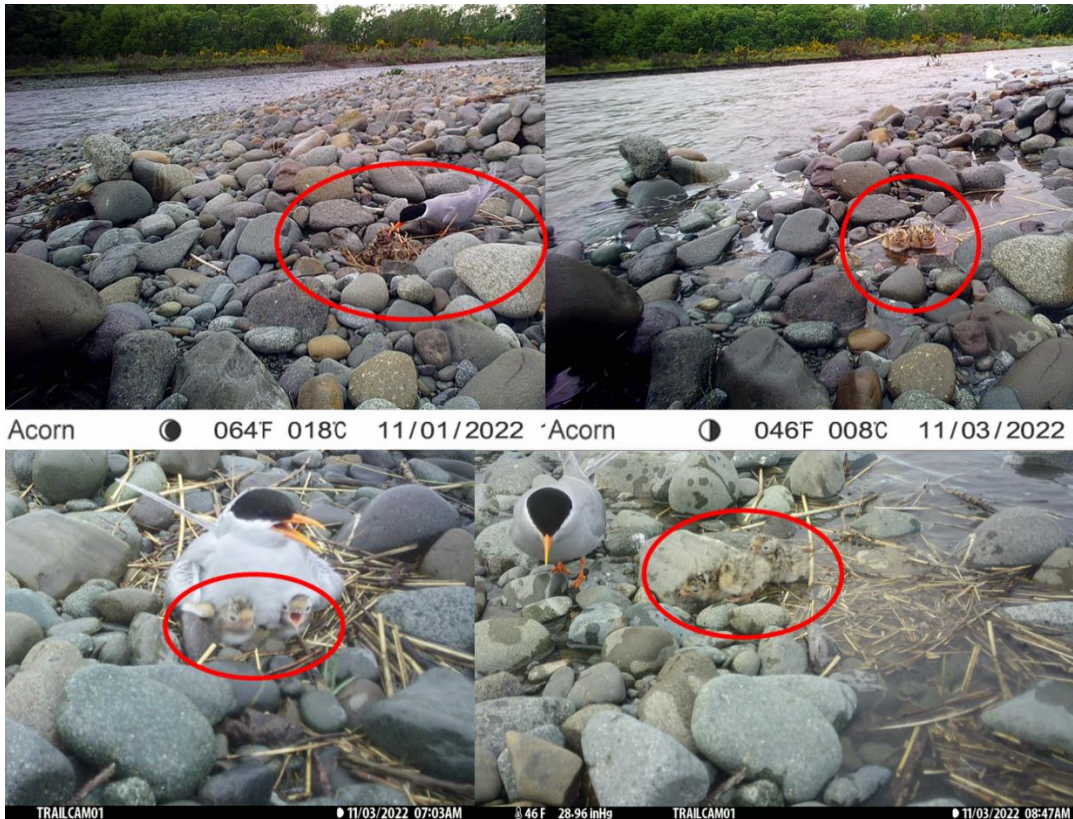
Measures to address effects of jetboats on birds

42. The only measure that will be 100% effective at eliminating direct and indirect effects of motorised craft on river nesting birds on the rivers within the Timaru district is to not use motorised craft on the rivers during nesting season: i.e., August to January inclusive.
43. Other measures such as adopting minimum flow rates below which boats may not use the river, and/or implementing setback or buffer zones, will not remove the effects of disturbing nesting birds and would be difficult to implement and monitor. I discuss these options below.

Restricting motorised craft during specified flow rates

44. I understand limiting boat use during low flows has been proposed as means of reducing effects on birds. In my opinion, adopting a flow rate limit for motorized craft to use the rivers would be complex to implement and is unlikely to be effective.

45. Unless the river flow is high enough to flood all available nesting habitats within a river, and thus physically wash out nests/chicks, nesting birds will not abandon their nests. Once established, nest/nesting colonies will remain unless physically flooded and all nesting habitat (gravel islands, bars and beds) are covered by water.
46. If jet boat use is permitted when flow rates are high, but not so high that all nesting habitat is flooded, motorised craft will have increased negative effects on nesting birds during higher flows as boats could get closer to nests and produce wake that is more likely to reach nests and chicks. For species already nesting close to the shoreline at normal flow, increased wave action generated by boats during even small floods will cause low-lying nests to be flooded (O'Donnell et al. 2016).
47. The pictures below illustrate the potential counterproductive effects of a minimum flow rate trigger for allowing jetboating during bird nesting season. The nests pictured have survived small flooding events but would be flooded and washed away by jetboat wave action. While more major floods would have washed away the nests, minor flooding events or temporary increases in flow rates that eggs and chicks can survive could be dramatically exacerbated under a flow-triggered authorization for jetboat activity during high flows that would add increased wave action.



Photos show black fronted tern chicks on nests established at low Spring flow rate in late October. In early November, a small flood came through, washing away some nests/chicks but others made it through, just, as illustrated above. In that situation, if a minimal flow trigger had allowed jetboating to take place during that flood, the nest/chicks shown in the pictures above would have been washed away by even small additional wave action. These photos illustrate the risks presented by adopting a flow rate trigger for allowing jetboat activities during nesting season. **(Photos taken by trail cameras monitoring nesting success as part of the Aparima River Restoration Project (DOC))**

48. An extreme example below shows an oystercatcher actively preventing his eggs from being washed away in a flood.



Extraordinarily, this oystercatcher managed to save its eggs, resume incubation after the flood receded and raise two chicks to fledging. Braided river birds have evolved with floods and can respond to these events. Unfortunately, they have no adaptations to deal with the added effects of human activities, including jetboats. **(Photo taken by trail cameras monitoring nesting success as part of the Aparima River Restoration Project (DOC))**

Exclusion zones

49. One approach that I have seen applied in other contexts to address the effects of human activities on braided rivers (e.g., gravel extraction) is the implementation of exclusion zones (i/e/ buffer zones or setbacks) around bird nests or nesting colonies. Exclusion zones have also been used overseas in the context of motorised craft activities for bird protection.
50. The efficacy of such an approach depends on the size of the buffer needed to avoid flushing the relevant species as flushing distances can vary among bird species. Recommended buffer zones for nesting birds are usually greater than 100m for motorised craft activities (Rodgers & Schwikert 2002; Borgmann, 2011).
51. Such distances would obviously be impossible to implement on the Ōrāri, Ōpihi and Pareora Rivers, as well as other smaller tributaries present across the Timaru District (such as Te Ngawai, Waihi and Te Moana Rivers), as their active beds are about 100m wide at a maximum. The active braided bed of the Rangitata River reaches about 1km wide in places so such setbacks could theoretically be implemented. However, this assumes two things that are logistically difficult, if not impossible, and

likely cost prohibitive: All nests/nesting colonies would need to be identified and located, and these nests/nesting colonies would have to all be at least a 100m from a navigable channel. And that process would need to be repeated in case of major flooding as birds would be re-nesting at different locations.

52. I therefore do not consider that exclusion zones are a viable option.

Conclusion

53. The Rangitata, Ōpihi, Pareora and Ōrāri Rivers are significant habitat for a number of threatened braided river bird species during bird nesting season (August to January inclusive). The Rangitata is particularly significant.

54. Even though we do not fully understand the effects of motorised craft on braided river birds, we know about:

- Physical effects of motorised craft on air (noise and visual disturbance), land (waves reaching shore) and water (wake and physical presence);
- Indirect effects through access to parts of the river not accessible via any other means (road or walking access) and potential effects of human activity on land;
- Likely cumulative/compounding effects of these disturbances on feeding, roosting and nesting birds;
- Threat levels and population trends of river bird species as well as heightened vulnerability of adult, eggs and chicks of such species during nesting season.

55. From that information we can deduce that motorised craft, and the access to the river they provide, have the potential to cause significant disturbance to nesting birds during nest/nesting colony establishment, egg incubation and chick rearing phases as well as direct mortality of eggs/chicks.

56. In my opinion, the safest and most robust approach to appropriately address the identified effects is to adopt an exclusion period so that motorised craft are not used on braided rivers within the Timaru District during the bird breeding season (August to January inclusive). I acknowledge that jet boat use during the period from February to July (inclusive) is unlikely to have any effect on river birds.



Clement Francois Georges Lagrue

DATED 9th April 2025

Appendix 1

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