Proposed Otago Regional Policy Statement Hearing – Land and Freshwater Chapter ('LF')

Speaking notes for Dr Marine Richarson – 2 May 2023

1. I provide here some further reflections following questions and remarks from the Panel.

2. **Key point 1: Climate change is not the highest current threat for freshwater biodiversity and ecosystems, although its effects compound and worsen the impacts of current threats. The pORPS must not only provide a planning and policy framework for future climate-related issues, but also address current pressures that are made worse in a changing climate context.**

3. In May 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published a report that charted the human-induced biodiversity loss on a global scale. The report provided data detailing the comprehensive effects of human activities on ecosystems. Human impacts are found on approximately 75% of the planet's land surface (Venter et al., 2016) and 87% of its oceans (Jones et al., 2018).

4. Human-induced ecosystem disruptions are varied and far-ranging. They affect ecosystem structure, processes, and dynamics by altering habitat quality, biodiversity, composition and abundances of species assemblages, as well as global dispersal and biological interactions such as competition and predation. They might create biotically homogeneous communities, induce losses in native species diversity, disrupt nutrient cycles, and reduce resource availability.

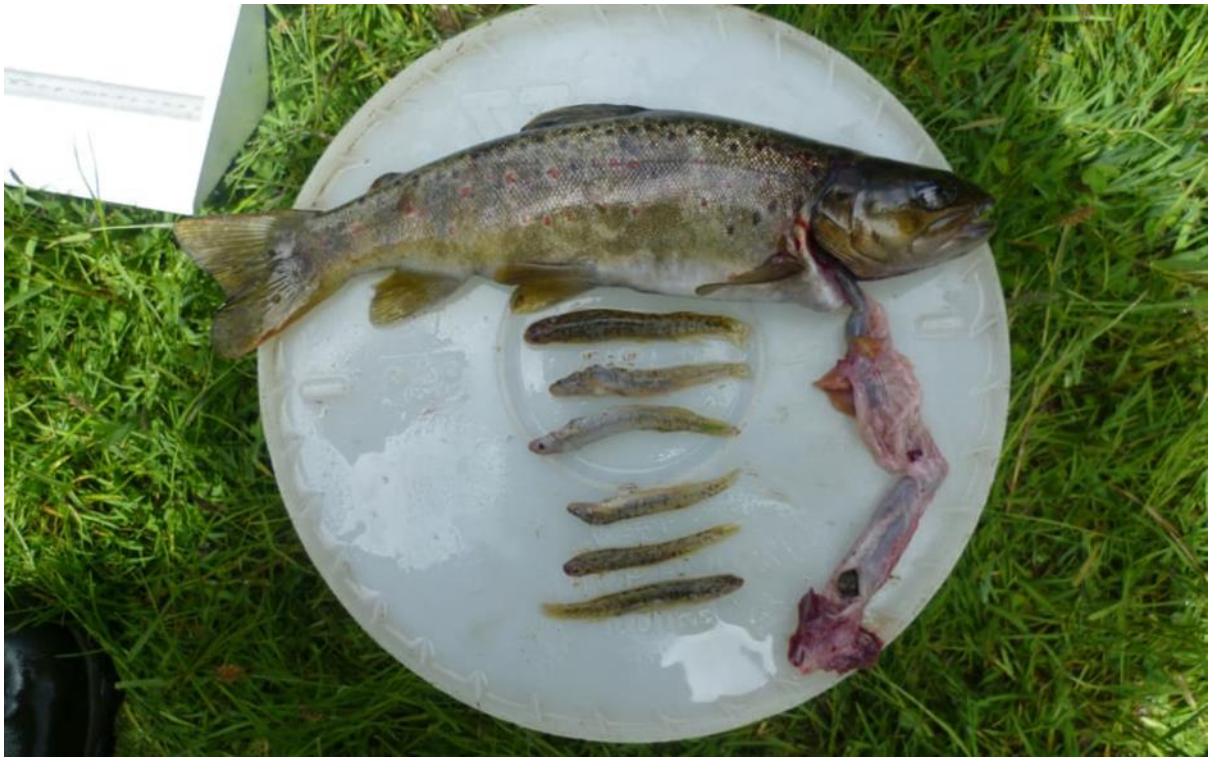
5. Climate change is but a significant addition to this host of pressures and threats, that might exacerbate their effects and bring native ecosystems closer to the brink. Incidentally, although its effects are predicted to worsen over time, it is not a "future" threat – for instance, a recent study established that 28% of mass mortality events of freshwater taxa in New Zealand, where causes were known, were climate-related, i.e., involving weather extremes, low flows, and high temperatures (Burrell, 2022).

6. However, the global decline in biodiversity, particularly in freshwater, has been acknowledged by many for at least 30 years (Cowie et al, 2022). Academic debates exist around identifying when it started exactly[1], although it is widely agreed that it is primarily driven by human activities and their global effects on ecosystems. Habitat destruction, unsustainable harvest, deforestation, pollution, introduced species and the transmission of infectious diseases and

[1] Cowie and colleagues (2022), for example, propose to define it as "*all anthropogenic extinctions since modern humans expanded out of Africa between 200,000 and 45,000 years ago, although extinction rates are now much greater than they were at the start*".

pathogens, are generally identified amongst its primary drivers. The significance of this decline is illustrated by terminology used in academic literature and policy, such as the "Anthropocene extinction", "Holocene extinction", or more commonly the "Sixth Mass Extinction" of Earth's biodiversity.

7. To illustrate the point in the New Zealand and Otago context, I invite you back to the overview of the threat status of Aotearoa's fish and macroinvertebrate species I provided in my evidence dated 23rd November 2022. As main threats to native freshwater species, I cited habitat degradation and alteration due to, for instance, changes in land use, agricultural intensification and water abstraction, reduced connectivity and the incursion of pest species.



Galaxiids found in the gut contents of a brown trout. Salmonid predation is one of the key considerations in decision-making around built barriers (Photo: Daniel Jack).

8. Planning for future climate change impacts does not forgo the necessity in the pORPS to address current threats that are not caused by or related to climate change, but are inherited from existing land usage, practices, and management.

9. **Key point 2: Protecting fragile and charismatic species and habitats must be ecologically, economically, and socially viable.**

10. My evidence focuses on describing the Threatened and At-Risk freshwater taxa present in Otago and the pressures and threats they face. A purpose of the pORPS is, in my view, to achieve more

than the status quo for these species and their habitats: it is also to enable their recovery over time. A good illustration of the importance of integrated management to protect individual species concerns the Devil's Hole pupfish.

11. Somewhere in Death Valley, Nevada, a geothermal pool within a limestone cavern called Devils Hole is the only natural habitat of the Devils Hole pupfish, a small, critically endangered species that belong to the Cyprinodontidae family. While Devils Hole is more than 130-m deep, pupfish are only found on a small, shallowly submerged rock shelf at the cavern's entrance, which provides its critical feeding and spawning habitat. The species has the smallest range of any vertebrate on the planet.

Left: The Devils Hole pupfish. Right: Devils Hole from the viewing overlook. Nearly the entire range of the pupfish is visible in this photo (Credit: Death Valley Conservancy)

12. This pupfish was the object of an impassioned and lengthy legal battle, which essentially confronted two opposing arguments: one being that the species should be allowed to go extinct, and the other asserting that this would be akin to "bombing the Louvre to make way for a parking lot". During the legal battle over ground water in the 1960s and 1970s, bumper stickers were distributed that read "Kill the Pupfish" or "Save the Pupfish". To achieve the latter, a barbwire fence and 24-hr camera surveillance keeps Devils Hole out of reach from potential intruders; the aquifer that maintains the water levels is protected from industrial use; and after extensive research and development efforts to cultivate the species, *ex situ* facilities help maintain refuge populations (e.g., aquaria that rear the pupfish from eggs removed from the wild). The latest surveys indicate signs of population growth for the species, which was

estimated at 263 individuals in September 2022, the highest number observed in 19 years (U.S. Fish & Wildlife Service press release, 30 September 2022).

13. The pupfish and other charismatic species – like the kiwi, kākāpō and other takahē – draw enough public attention, human ingenuity, and money to be saved or, at least, not be left to just disappear. This often means placing them, figuratively, under a glass jar. This approach to conservation is problematic: it is not sustainable and less popular organisms are left to fend for themselves.

14. Such approaches often are developed on a case-by-case basis, most times through much trial and error which can in the worst case contribute to decline. I mentioned the example of built barriers as a means to protect non-diadromous galaxiids in my evidence (paragraphs 52, 57 and 131), urging caution as to when, where and how they should be considered[2].

15. Further, taking the example of freshwater offsetting in New Zealand, Price and her co-authors note that it has mostly failed at ensuring No Net Loss after four decades of practice (Price et al, 2022). They attribute these failures to "*inadequate regulation, and poor consideration for ecological outcomes*", and further pinpoint "*systematic and persistent challenges in integrating scientific knowledge and best practice with regulatory practice*".

16. To avoid these ineffective methods the PORPS must include directive policy to protect indigenous freshwater species and their habitats from the well documented threats. This is why I recommend explicit reference to the NZTCS in the ECO objectives, recommend changes to the criteria for recognising outstanding water bodies in APP1 in my evidence and oppose the proposal by Transpower to replace APP1.

17. **Key point 3: However, the effects of human activities on all ecosystems and indigenous biodiversity must be addressed *holistically* by the pORPS.**

18. Charismatic organisms – and significant habitats – are useful to draw attention to biodiversity decline and help further conservation goals. However, achieving the purpose of the pORPS, i.e., providing a policy framework focused on long-term environmental sustainability and promoting a thriving and healthy natural environment, requires taking a broader view of environmental stewardship and what it requires. Focusing solely on the large, the beautiful and the striking and ignoring the "*endless forms most stupid, icky, and small*" (Czekanski-Moir, J. & Rundell, R. J.

[2] The New Zealand Fish Passage Guidelines talk at length about the conditions under which built barriers should be considered, as their usefulness and effectiveness very much depend on the situation, target species, and conditions at site (Franklin et al, 2018).

2020) – the non-charismatic yet essential building blocks of ecosystems – is a conceptual mistake that could fundamentally jeopardise successful environmental stewardship. In other words, picking winners and losers of environmental policies might simply be incompatible with the idea of integrated management or with a ki uta ki tai approach. To a large extent, the pORPS achieves an integrated management approach that maintains biodiversity in general.

19. In my evidence, I suggested several changes to APP1 that were designed to work with the changes proposed by Transpower and within the imposed confines of the pORPS; and, as Mr McKinlay and I have previously pointed out, the JWS on APP2, focused on the intricacies and details of a list of criteria, rather than considering the pORPS policy framework around those criteria. I do maintain the opinions and recommendations expressed on these two appendices.

20. However, fundamentally, I support a policy framework that addresses all elements of biodiversity and, when required, can add effective layers of protection to habitats and species that face imminent issues and threats[3]. This is achievable, in my view, by using strong, well-framed, outcome-driven objectives and policies, such as the ones suggested by Mr Brass for the D.-G. in the ECO and LF-FW chapters. Clear objectives and policies are important because when ecologists undertake assessments using the discrete criteria in APP1 or 2 in the field, they must place those criteria in the immediate policy framework for context. In addition, the two new objectives proposed by Mr Brass in relation to the LF-LS chapter help to ensure integrated management across domains and ensure that the PORPS does not lose sight of the importance of addressing direct *and* indirect effects on freshwater values.

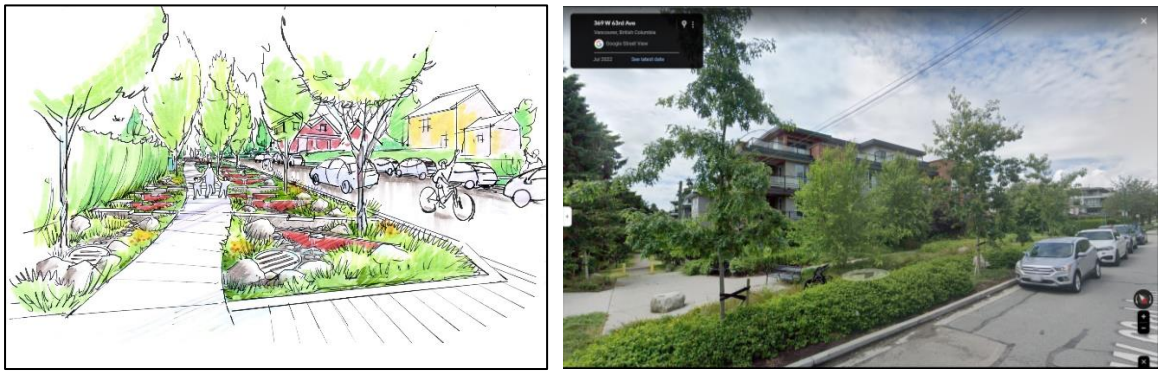
21. Key point 4: Instruments such as the pORPS can drive cross-sectoral approaches that assist in managing freshwater values and move away from existing harmful policies.

22. I suggested that policies in the pORPS should be flexible and integrative. One key element that I overlooked is that they should also be adaptive and allow learning from experience, monitoring and feedback loops, to prepare for and manage the inevitable uncertainties and complexities associated with environmental and social changes. Methods in the pORPS must allow choices that are robust across a range of future outcomes – choices that guide immediate decisions and allow flexibility as the future unfolds. In that regard, I overall support the recommendations of the IPBES towards decision makers developed and discussed in their 2019 report.

[3] In fairness, some domains are better suited than others to take a broad view. Fish passage provisions or, more generally, well-executed restoration of waterway connectivity, are one type of intervention that allows a variety of economic, environmental and social gains, e.g. flood risk management, by affecting the structure and function of the physical environment and supporting its natural ecological dynamics.

23. As outlined by the IPBES, "*cross-sectoral approaches, including landscape approaches, integrated watershed and coastal zone management, marine spatial planning, bioregional scale planning for energy and new urban planning paradigms, offer opportunities to reconcile multiple interests, values and forms of resource use, provided that these cross-sectoral approaches recognize trade-offs and uneven power relations between stakeholders*". In particular, I encourage the integration of policies that would support nature-based approaches, green infrastructure and multi-functional landscapes[4].

24. Working <u>with</u> natural systems rather than against them can provide multi-layered social and environmental benefits. Restoring urban waterways, for example, may help flood management by diverting rainfall away from sewer systems, help mitigate carbon emissions by capturing carbon, reduce urban heat and benefit human health. For instance, the city of Vancouver has opted for green rainwater infrastructure[5] as part of its Rain City Strategy, stating that it is mandated by the multi-layered imperatives of "*population growth, chronic aquatic water quality crisis, the climate emergency, affordability, equity and reconciliation with Indigenous Peoples*" (Conger et al, 2019, pp. 5-9).



Example of green infrastructure. Gardens filled will hardy native plants are meant to help support biodiversity and clean contaminants from the rainwater runoff. Left: Illustration by Matthew Thompson / City of Vancouver. Right: Bioretention installation at Yukon Street and 63rd Avenue, Vancouver in July 2022. Plantings are predominantly native species, supplemented with targeted non-native species. The installation features seating areas, a drinking water fountain, interpretive signage and a bioretention system to capture and remove pollutants from urban rainwater runoff. Google Street View capture, 08-05-2023.

[4] i.e., consisting of mixed land systems that include intensive and extensive forms of land use.
[5] Green water infrastructure is an approach to rainwater management that uses both engineered and ecosystem-based practices to protect, restore and mimic the natural water cycle, involving natural (e.g., soils, plants, trees) and built structures (e.g., roofs, rainwater tree trenches, rain gardens) to capture, store and clean rainwater before it is absorbed in the ground or returns to the waterways and atmosphere.

25. In institutional terms, providing routes for knowledge holders to work together within a policy framework can create significant benefits. While I recommend substantial amendments to the new proposed method LF-FW-M8A, I also acknowledge that it empowers different stakeholders (ORC, DOC, Kai Tahu and Fish and Game) to work together to address interspecies interactions and prevent the incursion of undesirable species in fragile ecosystems and habitats. Similarly, a platform such as the New Zealand Fish Passage Advisory Group[6] gathers scientists, environmental advisors and engineers across a wide range of organisations and entities, national and local, public and private, and enables them to work together to develop solutions to address fish passage issues in New Zealand.

26. In conclusion, supporting experiential learning, sharing solutions, stimulating innovations in science and technology, replicating promising business models and financial services, and combining traditional knowledge with modern scientific and technological tools can all be part of a transformative policy toolbox. By integrating Te Tiriti o Waitangi principles and adopting a ki uta ki tai approach, the pORPS already shows promise in that regard.

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[6] The New Zealand Fish Passage Advisory Group is coordinated by the Ministry for the Environment and DOC. It supports and develops resources for fish passage, and advocates for improved fish passage management. https://www.doc.govt.nz/nature/habitats/freshwater/fish-passage-management/advisory-group/

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