

IN THE MATTER

of the Resource Management Act 1991
(RMA)

AND

IN THE MATTER

of the Freshwater Planning Instrument Parts
of the Proposed Otago Regional Policy
Statement 2021

**STATEMENT OF EVIDENCE OF
STEPHEN KNIGHT-LENIHAN for Wise Response Inc**

26 June 2023

SUMMARY OF EVIDENCE

My name is Stephen Knight-Lenihan, a retired environmental planning academic. I summarise my evidence, according to the key headings in this statement, as follows:

Nature positive and the mitigation hierarchy

- (a) Research globally supports the need for net improvements in ecological health and integrity across all habitats. There has been too much reliance on avoiding and minimising harm, and not enough on compensating for accumulated degradation. Substantial and on-going biodiversity decline is an outcome. Politically, global biodiversity goals have been set, affecting parties to the Convention on Biological Diversity, including New Zealand.

Biodiversity offsetting and net gain

- (b) An example of how this research influences planning is the move away from a no-net-loss (NNL) approach to managing biodiversity offsets, to requiring net benefit. This is part of a global trend and includes corporates and international agencies concerned about the negative economic impacts of biodiversity decline.

Measures, limitations and caveats

- (c) There are many well-established ways to measure improving ecosystem functioning or health, and biological integrity. The planning challenge is agreeing on what is an acceptable level of integrity. In addition, the tools available to measure progress are still being tested, and the resources required for compliance, monitoring and enforcement are very high.

Conclusion

- (d) Continuing decline in global biodiversity has led to a critical need to halt and reverse this decline. This requires protecting, enhancing and restoring ecosystems. Communities globally need to assess how they can contribute. Avoiding and minimising ecological harm, with the possibility of generating benefits in certain circumstances, is no longer adequate. In order to reduce the risk of continuing biodiversity decline, regulatory authorities could put in place mechanisms ensuring on-going improvements in how well ecosystems are functioning. Baselines, goals and targets for improving ecosystem values for any environmental domain can be used as a starting point for this process.

- (e) Among the challenges, the following need to be addressed; how to measure improvements using among other tools indices of biological integrity; deciding what is an acceptable level of enhancement and restoration relative to human development and activity; and establishing the resources needed for monitoring, compliance and enforcement. There is also a need to decide on the balance between ecological health in terms of functionality, and integrity in the sense of 'naturalness' or the ability to support indigenous biodiversity.

INTRODUCTION

2. My name is Stephen Knight-Lenihan.
3. I am a retired New Zealand academic specialising in environmental planning. I hold the qualifications of a B.Sc. (Hons), an M.Sc. (environmental science) and a PhD in planning.
4. I have been asked by the Wise Response Society to provide an overview of global trends on net gains in ecological functioning and biological diversity. I am a member of the Society.
5. I have worked as an environmental consultant specialising in freshwater ecology, and following my PhD, as an academic 2010-2021 at the University of Auckland. My specialist area is the integration of ecological principles into planning practice. This includes considering the practical application of resilience theory, the application of biodiversity net gain, and analysis of New Zealand legislation relating to ecological integrity. Relevant publications include:

Knight-Lenihan, S

- 2023. Ecological health and integrity in New Zealand legislation. *Aust J Envnt Mgmt*
DOI: 10.1080/14486563.2023.2179117.

- 2022 Identifying limits in domestic law delivering net ecological benefit: a New Zealand example. *Urban Sci.* 6, 93.

- 2021 Why the proposed Natural and Built Environments Act might fail. *N. Z. J. Environ. Law* 25, 259–277.

- 2020 Achieving biodiversity net gain in a neoliberal economy: the case of England *Ambio* 49(12): 2052-2060. DOI 10.1007/s13280-020-01337-5

- 2017 Why definitions of resilience matter: the example of funding New Zealand's transport sector. *Urban Policy and Research*, 35:3, 333-346, DOI: 10.1080/08111146.2017.1295937

- 2017 Net environmental benefit in urban centres *Landscape Review* 17(2):44-55.

- 2007 *A Critique of the Influence of Sustainable Development on Ecological Sustainability: a New Zealand application*. A thesis submitted in fulfilment of the requirements for the degree of doctor of philosophy in architecture and planning, University of Auckland, Auckland, New Zealand.

- van Roon, M & .2004. *Ecological Context of Development: New Zealand Perspectives*. Oxford University Press, Melbourne, Australia.

6. This evidence is not related to a specific site nor specific policies or plans. However, in preparing this evidence I have read through the *Proposed Otago Regional Policy Statement 2021* (updated version 30 May 2023) and *Section 42A Hearing Report: Proposed Otago Regional Policy Statement: parts considered to be a Freshwater Planning Instrument under section 80A of the Resource Management Act 1991*, 2 June 2023.
7. I have previously been involved with Dugald MacTavish of the Wise Response Society Inc. in a February 2023 oral submission to the Otago Regional Council on the Significant Resource Management Issues for the Region, Interpretation, Integrated Management and Air chapters of the Proposed Regional Policy statement.

CODE OF CONDUCT

8. I have read the Environment Court Code of Conduct for expert witnesses and agree to comply with it.
9. I confirm that the topics and opinions addressed in this statement are within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

Nature positive and the mitigation hierarchy

10. The concept of *nature positive* influenced the 2022 Kunming-Montreal Global Biodiversity Framework (GBF). The GBF commits signatories to the United Nations Convention on Biological Diversity (CBD) to halting and reversing continuing net global biodiversity loss. New Zealand is a party to the CBD and along with almost 200 other parties adopted the GBF on 19 December 2022.¹
11. The GBF goals include: by 2050 the integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored; extinction rates and risks of all species are reduced tenfold; and the abundance of native wild species is increased to healthy and resilient levels.
12. GBF targets include: by 2030 reduce to near zero the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity; at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity; at least 30 per cent of terrestrial, inland water, and coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed, and integrated into wider landscapes, seascapes and the ocean.
13. In 2020 the International Union for the Conservation of Nature (IUCN) called for the halting and reversing of global biodiversity loss to achieve a nature-positive world by 2030. A Global Goal for Nature (GGN) campaign now promotes the idea of becoming 'net positive' by 2030, and by 2050 having sufficient functioning ecosystems to safeguard the stability and resilience of the Earth's biological, chemical and physical systems.²

¹ See <https://www.mfat.govt.nz/en/environment/biodiversity-and-species-conservation/> accessed 24 June 2023.

² Locke et al. 2021. *A nature-positive world: the global goal for nature*. WBCSD. [Global Goal Nature CEOs Final.docx \(wbcsd.org\)](https://www.wbcsd.org) accessed 21 June 2023. The GGN is supported by a range of agencies including the IUCN, World Business Council for Sustainable Development, World Resource Centre and WWF International. See also <https://www.naturepositive.org/> accessed 24 June 2023.

14. The problem of biotic impoverishment has been recognised for some time.³ The 1992 United Nations Rio Declaration on Environment and Development (Principle 7) says signatory states shall co-operate to conserve, protect and restore the health and integrity of the Earth's ecosystem. WWF estimates globally an average 69 per cent decline in the relative abundance of monitored wildlife populations between 1970 and 2018,⁴ and locally New Zealand demonstrates net declines in a range of environmental domains.⁵
15. Note that use of the term *health and integrity* raises the distinction between a system being healthy and providing certain ecosystem functions, and from an anthropocentric view, particular services⁶, while possibly having low integrity, for example, reduced indigenous biodiversity.⁷
16. Definitions of nature positive include moving away from the mitigation hierarchy toward requiring a gain in natural and biodiversity values.⁸ The mitigation hierarchy is manifested in the Resource Management Act 1991 as the requirement to avoid, remedy and mitigate, with 2017 amendments allowing consideration of compensating for or offsetting of adverse environmental effects (s104(1) (ab)). This includes the concept of restoring. Restoring is potentially net positive, but currently is seen as something to be done once impacts are avoided, remedied or mitigated. This may result in improving ecological health and integrity, but it is not required. Applying the mitigation hierarchy generally may generate overall

³ Karr, J. R. 1996. "Ecological Integrity and Ecological Health are not the Same." In *Engineering Within Ecological Constraints*, edited by P. Schulze, 97–109. Washington, DC: National Academy of Engineering, National Academy Press.

⁴ WWF. 2022. *Living Planet Report 2022: Building a Nature-Positive Society*, edited by R. E. A. Almond, M. Grooten, D. Juffe Bignoli, and T. Petersen. Gland, Switzerland: WWF.

⁵ MfE and Stats NZ. 2019. *New Zealand's Environmental Reporting Series: Environment Aotearoa 2019*. Wellington, New Zealand: Ministry for the Environment and Stats NZ. ME 1416; MfE and Stats NZ. 2021. *New Zealand's Environmental Reporting Series: Our Land 2021*. Wellington, New Zealand: Ministry for the Environment and Stats NZ. ME 1555.

⁶ Gómez-Baggethun et al. 2010. "The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and Payment Schemes." *Ecological Economics* 69: 1209–1218. doi:10.1016/j.ecolecon.2009.11.007.

⁷ Park, G. 1998. *Ecological Integrity – A Key Theme for State of the Environment Reporting in New Zealand*. Wellington, New Zealand: Ministry for the Environment Technical Paper No 13: Land. Ministry for the Environment; Park, G. 2000. *New Zealand as Ecosystems: The Ecosystem Concept as a Tool for Environmental Management and Conservation*. Wellington, New Zealand: Department of Conservation.

⁸ zu Ermgassen et al. 2022. "Are corporate biodiversity commitments consistent with delivering 'nature positive' outcomes? A review of 'nature-positive' definitions, company progress and challenges". *J Cleaner Production* 379:134798. doi.org/10.1016/j.jclepro.2022.134798

benefits, but again this is not required. The difficulty is that in a biophysical system in net decline, adhering to the mitigation hierarchy may only reduce the rate of decline. The GBF and GGN emphasise the need to actively enhance and restore ecosystems.

17. The shift in discourse within corporates and international political community from a 'no-net-loss' to a 'net positive' impact is due in part to realising the economic and financial risks of biodiversity loss.⁹

Biodiversity offsetting and net gain

18. Biodiversity offsetting is an example of environmental compensation. Offsetting has usually been presented as aiming for no-net-loss, and preferably a net gain, in species composition, habitat structure, ecosystem functioning and human cultural values.¹⁰ Biodiversity net gain (BNG) is an example of a policy where 'infrastructure and biodiversity conservation can theoretically go hand-in-hand if infrastructure is planned to avoid and minimise impacts, and residual impacts are compensated for through conservation actions'.¹¹
19. A version of BNG, called biodiversity gain, is included in the United Kingdom's Environment Act 2021. Schedule 14 of that act provides for a condition to be placed on development in England, where the projected biodiversity value attributable to the development exceeds the biodiversity value of the onsite habitat prior to it being developed by at least 10 per cent. The 10 per cent is made up of the post-development biodiversity value of the onsite habitat, the biodiversity value of a registered offsite biodiversity gain allocated to the development, and the biodiversity value of any biodiversity credits purchased for the development.
20. An approach to realising the biodiversity gain goal could be requiring avoiding harm and mitigating on-site impacts while also contributing to

⁹ Ibid at 8.

¹⁰ BBoP. 2012a. *Glossary*. Business and Biodiversity Offsets Programme. Washington, DC: Forest Trends; Brown et al 2013. "Ecological Compensation: An Evaluation of Regulatory Compliance in New Zealand." *Impact Assessment and Project Appraisal* 31: 34–44. doi:[10.1080/14615517.2012.762168](https://doi.org/10.1080/14615517.2012.762168); Pilgrim et al. 2013. "A Process for Assessing the Offsetability of Biodiversity Impacts." *Conservation Letters* 6: 376–384. doi:[10.1111/conl.12002](https://doi.org/10.1111/conl.12002).

¹¹ zu Ermgassen et al. 2021. "Exploring the Ecological Outcomes of Mandatory Biodiversity Net Gain Using Evidence from Early-adopter Jurisdictions in England." *Conservation Letters* 14 (6): e12820. doi:[10.1111/conl.12820](https://doi.org/10.1111/conl.12820): p.2.

net benefit off-site proportional to the scale of the impact.¹² Much depends on how local baselines and targets are set as part of long-term strategic planning, allowing for integrated landscape and catchment-level planning that will improve the integrity of ecosystems. For example, enhancement and restoration projects that already exist within a catchment or region may generate more overall ecological benefit from investment by developers as part of offsetting than focusing on avoiding or mitigating the on-site impacts of a development. However, this depends on the extent to which a strategic plan has identified, prioritised, and resourced such initiatives, along with having identified suitable baselines and targets.

21. I have argued elsewhere¹³ that environmental limits and targets should be subsumed into the need to estimate the extent to which local biophysical capacity has been breached. Planning authorities need to ensure human activity contributes to moving systems back within the local capacity, taking into account accumulated historical impacts. This would contribute to the global biodiversity goals, as increasing biodiversity values would be an outcome of such an approach. All development would contribute to improving priority areas across various ecological domains (fresh water, soils, coastal environments, wetland systems, marine environments) or desired outcomes (improving indigenous biodiversity values). Trading-off would still occur, and allowance would be made for avoiding and mitigating immediate development impacts on the natural and physical environment, but only where other actions were taken to contribute to improving overall biophysical capacity in the long-term. Essentially this is a balancing act between helping communities maintain an acceptable quality of life while expanding the biophysical capacity of the social-ecological system through ecosystem enhancement and restoration.
22. In this context, environmental limits, objectives and targets for any domain, including freshwater, should be seen as part of a set of

¹² Knight-Lenihan, S. 2023. "Ecological health and integrity in New Zealand legislation". *Aust J Env't Mgmt* DOI: 10.1080/14486563.2023.2179117.

¹³ Knight-Lenihan, S. 2022. "Identifying limits in domestic law delivering net ecological benefit: a New Zealand example". *Urban Sci.* 6, 93.

mechanisms designed to support the continuing improvement of all domains, while supporting human well-being.

Measures, limitations and caveats

23. There are many measures of the health and integrity of freshwater. For example, in addition to chemical measures, indices of biological integrity (IBI) such as the freshwater macroinvertebrate community index, have long been used to assess cumulative impacts and trends.¹⁴ The challenge is deciding on what is an acceptable level of integrity. For example, what is the acceptable level of native macroinvertebrate and fish fauna relative to the need to protect the habitat of trout and salmon (RMA s7(h))?
24. Estimating what is a net gain is extremely challenging. For example, globally the evidence is mixed that the method underpinning biodiversity net gain, offsetting, works in practice. This is due to different methodologies making comparisons difficult, many of the projects being too early in their cycle to generate the required data, a significant number of projects failing in the past, and questions over finding the space and opportunity to do the enhancement and restoration required.¹⁵ An assessment of earlier-adopter projects in England underscored the need for further refining.¹⁶

¹⁴ Miller et al. 1988. "Regional Applications of an Index of Biotic Integrity for use in Water Resource Management." *Fisheries* 13 (5): 12–20. doi:10.1577/1548-8446(1988)013<0012:RAOAI0>2.0.CO;2; Stark, J. D., and J. R. Maxted. 2007. *A User Guide for the Macroinvertebrate Community Index*. Nelson New Zealand: prepared for the Ministry for the Environment. Cawthron Report No. 1166. 58pp.

¹⁵ Briggs et al 2009. "Habitat Banking—How It Could Work in the UK." *Journal for Nature Conservation* 17: 112–122. doi:10.1016/j.jnc.2008.12.006; Suding, K. 2011. "Toward An Era of Restoration in Ecology: Successes, Failures, and Opportunities Ahead." *Annual Review of Ecology, Evolution, and Systematics* 42: 465–487. doi:10.1146/annurev-ecolsys-102710-145115; Fletcher et al. 2018. "Is Habitat Fragmentation Good for Biodiversity?" *Biological Conservation* 226: 9–15. doi:10.1016/j.biocon.2018.07.022; Maron, et al 2012. "Faustian Bargains? Restoration Realities in the Context of Biodiversity Offset Policies." *Biological Conservation* 155: 141–148. doi:10.1016/j.biocon.2012.06.003; Bull, J. W., and N. Strange. 2018. "The Global Extent of Biodiversity Offset Implementation under No Net Loss Policies." *Nature Sustainability* 1: 790–798. doi:10.1038/s41893-018-0176-z; zu Ermgassen, et al 2019 "The Ecological Outcomes of Biodiversity Offsets Under "no net Loss" Policies: A Global Review." *Conservation Letters* 12: e12664. doi:10.1111/conl.12664. Knight-Lenihan, S. 2020 Achieving biodiversity net gain in a neoliberal economy: the case of England *Ambio* 49(12): 2052-2060. DOI 10.1007/s13280-020-01337-5

¹⁶ Ibid at 11.

25. There is inherent uncertainty in allowing economic development now for an uncertain future ecological benefit, although there are mechanisms used to try to account for this risk.¹⁷
26. A significant barrier to assessing ecological benefits and nature positive outcomes is resourcing. For example, while extra investment in central government agencies has been committed to by the UK government¹⁸ a survey of local planning authorities prior to the passing of the UK Environmental Act found the majority assessed themselves as significantly under-prepared to handle the extra workload associated with biodiversity net gain decision-making.¹⁹
27. In New Zealand, there is a history of under-resourcing agencies²⁰ and a variable record of compliance, monitoring and enforcement.²¹ The New Zealand government is identifying capacity and capability gaps associated with introducing replacement legislation for the RMA²² but it remains unclear how the gaps will be addressed.

¹⁷ Knight-Lenihan, S. 2020. "Achieving Biodiversity Net Gain in a Neoliberal Economy: The Case of England." *Ambio* 49 (12): 2052–2060. doi:10.1007/s13280-020-01337-5.

¹⁸ Ibid at 11.

¹⁹ Snell, L., and M. Oxford. 2021. *Survey of LPAs Ability to Deliver Biodiversity Net Gain in England. Do LPAs Currently have the Necessary Expertise and Capacity?* London: Association of Local Government Ecologists with the Association of Directors of Environment, Economy, Planning and Transport and the Department for Environment, Food and Rural Affairs.

²⁰ Day, M., M. Backhurst, and N. Ericksen. 2003. *District Plan Implementation under the RMA: Second Planning Under a Co-Operative Mandate (PUCM) Report to Government*. Hamilton, New Zealand: The International Global Change Institute University of Waikato; Borrie et al 2004. *Planning and Governance under the LGA: Lessons from the RMA Experience. Planning Under Co-Operative Mandates (PUCM) Project*, University of Waikato, Lincoln University and the IGCI. Hamilton, New Zealand: International Global Change Institute; Borrie, N., and A. Memon. 2005. *Long Term Council Community Plans: A Scoping Survey of Local Authorities*. Hamilton, New Zealand: The International Global Change Institute University of Waikato; RMRP. 2020. *New Directions for Resource Management in New Zealand*. Wellington, New Zealand: Resource Management Review Panel.

²¹ Brown, M. A. 2017. *Last Line of Defence: Compliance, Monitoring and Enforcement of New Zealand's Environmental Law*. Auckland: Environmental Defence Society; Brown, M. 2018. *Independent Analysis of the 2017/2018 Compliance, Monitoring and Enforcement Metrics for the Regional Sector*. Hamilton, New Zealand: The Catalyst Group, Waikato Regional Council; Brown et al 2013 "Ecological Compensation: An Evaluation of Regulatory Compliance in New Zealand." *Impact Assessment and Project Appraisal* 31: 34–44. doi:10.1080/14615517.2012.762168.

²² MfE. 2022. *Our Future Resource Management System: Overview – Te Pūnaha Whakahaere Rauemi o Anamata: Tirowhānui*. Wellington: Ministry for the Environment.

Conclusion

28. In summary, I conclude that:

- (a) Globally there is a clear shift away from relying on avoiding and minimising ecological harm, and where possible improving ecosystem functioning and biodiversity. Instead, what is required is ecological net gain as the default, that is, an overall improvement in ecological values once the impact of human activity has been accounted for.
- (b) This is because there is a continuing decline in ecological health and integrity, a measure of which is the steady decline in global biological diversity.
- (c) A manifestation of this thinking is the nature positive movement, and the Global Biodiversity Framework which has put in goals to not just halt biodiversity decline, but reverse it.
- (d) This requires all communities globally to assess how they can contribute to overall net ecological benefit across all environmental domains, including fresh water.
- (e) There is also a need to decide on the balance between ecological health in terms of functionality, and integrity in the sense of 'naturalness' or the ability to support indigenous biodiversity.
- (f) Therefore, achieving baselines, goals or targets associated with any environmental domain, including freshwater, is a starting point. Mechanisms to continue to improve the condition of a domain must be included in any regulatory process. Ultimately, halting and reversing biodiversity decline globally, nationally and locally means enhancing and restoring ecosystems impacted by human activity, and this needs to be an on-going process.
- (g) Challenges include measuring actual improvements in various ecological values over time, deciding what is an acceptable level of enhancement and restoration relative to human development and activity, and the resourcing needs for monitoring, compliance and enforcement.

Dated this 26th day of June 2023

A handwritten signature in blue ink, consisting of several loops and a long horizontal stroke extending to the right.

Stephen Knight-Lenihan