

PhD Project: Climate change impacts on river and lake biodiversity

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The background

This project is part of the New Zealand Institute for Earth Sciences *Healthy Freshwaters Flagship Programme*, which aims to understand and forecast how freshwater ecosystems respond to environmental change. The programme's goal is to support healthy freshwater ecosystems and sustainable catchments now and into the future.

Traditional conservation efforts often assume that future conditions will resemble those of the past. However, climate change is increasingly pushing freshwater ecosystems beyond historical boundaries, making these assumptions unreliable. Effective freshwater management therefore requires anticipating future risks and adopting adaptive, evidence-based strategies that prioritise vulnerable species and habitats. This PhD project addresses this need by generating new knowledge to support proactive, climate-resilient freshwater biodiversity management.

The PhD project

This PhD will assess the vulnerability of New Zealand's freshwater biota to climate change, with a particular focus on freshwater fishes. The research will examine species' exposure, sensitivity, and adaptive capacity to key climate-driven stressors, including increasing water temperatures and altered flow regimes.

The initial focus will be on the thermal ecology of New Zealand freshwater fishes, an area where current knowledge is extremely limited. This limitation constrains our ability to predict species' responses to climate warming and to design effective management interventions. The project will combine field and laboratory studies to quantify and test realised and fundamental thermal niches of selected fish species. By integrating contemporary observations with experimental data, the research will explore how past temperature regimes have shaped key biological processes and identify potential limits to adaptive capacity under future warming scenarios. The successful candidate will work within the Earth Sciences freshwater team and will have the logistic and mentoring support necessary for a successful PhD.

Skills required

The successful candidate will have a strong interest in freshwater ecology and in understanding how physical and biological processes interact to shape aquatic ecosystems. They should be motivated to work in a cross-disciplinary research environment and engage with scientists across the wider programme. Essential or highly desirable attributes include:

- Background in freshwater ecology, ecology, environmental science, or a related discipline;
- Experience with quantitative methods, including statistical analysis and/or ecological modelling;
- Strong academic record (BSc Honours, Master's degree, or equivalent);
- Ability to work both independently and as part of a collaborative research team

Experience in one or more of the following would be advantageous:

- Field work in freshwater ecosystems;
- Physiology, thermal biology, or climate-change ecology;
- Multi-level or Bayesian modelling approaches;

- Otolith biochronology techniques;
- Aquarium husbandry or laboratory-based animal studies

The scholarship

The successful candidate will be expected to apply for a University of Canterbury Doctoral Scholarship to support a personal stipend and tuition fees. <https://www.canterbury.ac.nz/study/getting-started/scholarships/doctoral-scholarships> The next round opens in August 2026. To be successful, a candidate must have an A-category GPA for at least the post-grad years.

The current stipend is NZ\$32,650 (tax-free) plus tuition fees (around NZ\$10,00 p.a.) for a period of three years.

The candidate will be enrolled in Biological Sciences at Canterbury University, will be affiliated with the Marine Ecology Research Group, but will do significant work through Earth Sciences NZ (formerly NIWA) in Christchurch: <https://niwa.co.nz/christchurch>

Contact and information

Initial contact outlining your background, interests and (unofficial) academic record should be sent to: Andrew Watson (andrew.watson@earthsciences.nz) or Professor David Schiel (david.schiel@canterbury.ac.nz).