LA TROBE UNIVERSITY

2023-2024 Student Cadetship Program

CENTRE FOR FRESHWATER ECOSYSTEMS

La Trobe University science undergraduate (completing second or third year) students are invited to apply for a cadetship with the Centre for Freshwater Ecosystems. We deliver world-leading research focused on healthy freshwater ecosystems. Our research covers a range of themes and provides critical knowledge that supports the sustainable management of these important ecosystems.

Students will undertake a research project under the guidance of the Centres scientific research staff. The role is full time and may involve remote, multi-day field trips. Successful applicants will be paid $450 per week. Project timing and duration can be negotiated with supervisors. Students can apply to have this cadetship fulfill the requirements of the Industry Placement Subject LTU3IND Industry Placement subjects, Careers and Opportunities, La Trobe University

Applicants are required to submit a cover letter, a copy of their current resume, copy of driver's licence and their unofficial academic transcript (available from student online). The cover letter must address the following:

- All applications must apply for a specific project. Students can apply for multiple projects in the one application.
- Why you would like to undertake a cadetship with the CFE.
- What you would hope to gain by doing a cadetship.
- Your areas of interest related to freshwater sciences.
- Dates you would be available for the cadetship.
- Ability to undertake physical work, including your swimming competency (may be a requirement for some roles).
- Cover letters should be kept to 2 pages and emailed to cfe@latrobe.edu.au

Field Base Research

Experimental Design

Laboratory Analysis

Centre for Freshwater Ecosystems

Street address:
Nancy Millis Building
(Building 8)
La Trobe University
133 McKoy Street
(North entrance)
Wodonga Victoria

Postal address:
PO Box 821
Wodonga Vic 3689

Contact details:
T 02 6024 9650
E cfe@latrobe.edu.au

Potential Projects

Project title: Understanding physico-chemical effects on the eDNA detectability within freshwater systems

Project overview: This project will undertake fundamental research on the effects of various physico-chemical parameters on the detectability of eDNA within a freshwater system. This project will predominantly use lab-based methods to investigate the impacts of free DNA available for collection with across varying physico-chemical parameters. These experiments will use a targeted species for which single species primers are designed and will be controlled for all aspects other than the varied parameter. Additional, experiments will be undertaken looking at the impacts of the volume of biomass on detectability and the variation of this over a series of volumes of water. This question is particularly pertinent for rarer taxa and smaller organisms. qPCR techniques will be used to assess the detection of the organism and nanodrop/qubit measurements taken to assess differences in available DNA.

Student outcomes: This project will involve some literature review, experimental design and undertaking the experiment. The project will provide hands on laboratory work both using chemical and molecular techniques. Some field work may also be undertaken.

Project timing: Up to 10 weeks.

Supervisor: Michael Shackleton.

Project title: Freshwater turtle conservation

Project overview: Freshwater turtles have declined in the Murray-Darling catchment by 70-90% since the 1970s. Invasive red foxes appear to be the major threat, because they destroy turtle nests before they can hatch. We are working on a range of projects to develop and test ways to protect turtle nests from foxes, including individual nest protection, fencing off nesting beaches, and floating islands. The project involves turtle population surveys across a range of locations, mark-recapture, and radiotelemetry of hatchling turtles. Student projects at all levels are available to focus on either components of the nest protection work directly, or on broader adult and hatchling turtle ecology, which are relatively unexplored topics.

Student outcomes: Students will learn a variety of field techniques focusing on freshwater turtle trapping, mark-recapture, telemetry, endocrinology, microbiology, and basic ecology. You will help conduct field work, learn turtle trapping and handling methods, and have the opportunity to develop your own mini-project around turtle ecology and conservation.

Project timing: We will be doing fieldwork more-or less continuously from early November to early April, and can be flexible to work with students throughout this time period.

Supervisor: James Van Dyke.

Project title: Understanding the thermal niches of freshwater invertebrates

Project overview: This project aims to quantify and compare the temperature ranges over which different species can exist. Temperature is a key driver of the distributions of organisms. Understanding how organisms respond to changes in temperature regimes allows us to predict how they will respond to future projected warming. This project will predominantly be lab based but will also involve some field work.

Student outcomes: Students will learn a variety of laboratory techniques including the rearing of freshwater invertebrates, study design and respirometry. Students will help collect animals, set up enclosures and respirometry equipment, and collect and analyse data.

Project timing: Up to 12 weeks.

Supervisor: Michael Shackleton.

Project title: Invertebrates as indicators of alpine stream condition

Project overview: This project aims to provide a familiarity with invertebrates as indicators of ecosystem condition in alpine areas to a range of potential effects including feral animals, altered flow regimes and management actions.

Student outcomes: Students will learn a variety of laboratory techniques including the identification of alpine freshwater invertebrates, study design and processing techniques. They will also gain an understanding of analysis techniques to understand response.

Project timing: Up to 12 weeks.

Supervisors: Sally Maxwell and Michael Shackleton.

Project title: Seeing through mud: Estimating freshwater fish population densities with SONAR (ARIS Explorer)

Project overview: It is difficult to estimate fish populations visually in freshwater systems given the generally turbid conditions in Australian freshwaters. Non-intrusive visual methods commonly used in marine and estuarine environments such as BRUVS, RUVS, and diver operated video or survey lack compatibility in many lowland freshwater environments given the generally turbid nature of these waters. This has influenced the method of fish population assessments towards representative sampling via nets and electrofishing, both of which have specific biases based on the behaviour and habitat (e.g., structure, water depth, water clarity, physico-chemical conditions) used by certain fish species. As a way to measure densities of moderate to large sized fish (> 150 mm) independent of most gear biases this project would be focussed on developing methods for the collection of fish abundance and size distributions using an ARIS (Adaptive Resolution Imaging Sonar) Explorer 1800 SONAR unit (*Sound Metrics Corp, Bellevue, WA, USA)*. ARIS systems produce video-like imagery using sound energy instead of light to produce the image and can be used at night or in turbid conditions where light is limiting.

The project aims to refine current methods of assessing fish densities in experimental and field conditions to assess appropriate methods (e.g., Max N measurements, pseudo-random temporal sampling) of accurately measuring fish abundance, size structure and biomass. The findings from this project would inform larger projects occurring at the Centre for Freshwater Ecosystems (Albury-Wodonga Campus) more accurately representing fish populations in the Murray-Darling Basin using non-intrusive methodology.

Student outcomes: Students will learn how to effectively sample fish populations in freshwater environments and gain understanding of the use of various techniques to do so. Additionally, students will learn to analyse data associated with these projects for reporting.

Project timing: Up to 12 weeks (preferable Spring-Summer start)

Supervisor: Dr Luke McPhan. **Co-supervisors**: Sam Lewis and Prof. Nick Bond.