



Operation Wallacea
New Zealand Course Booklet 2021

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1. Study area and research objectives

The New Zealand field ecology and data analysis course will be based in the Makarora Valley, an area comprising of a suite of unique habitats giving rise to significant indigenous biodiversity value.

The iconic braided river is an important breeding habitat for wrybill **ngutuparore** (the only bird in the world with a bill that bends to the right), black-fronted tern **tarapirohe**, black-billed gull **tarapuka** (rarest gull in the world), and many more. The kaka and long-tailed bat **pekapeka-tou-roa** utilise the botanically rich beech/podocarp forest while the pristine upper river catchments provide habitat for whio (blue duck). The alpine habitat of the Southern Alps Kā Tiritiri o te Moana is also core territory for rock wren and kea (the only alpine parrot).

The course itself will be led in conjunction with the Aspiring Biodiversity Trust aspiringbiodiversity.co.nz and their “Threatened Species Project From Ridge to River” which is partly located within the Tititea Mt Aspiring National Park and a UNESCO World Heritage Area.

The three core elements or objectives of this project are to:

- Monitor and survey threatened species
- Manage threats and control predators
- Educate and raise awareness to promote the future kaitiakitanga of the environment

The work of Aspiring Biodiversity Trust contributes to the national goal of Predator Free 2050, the National Biodiversity Strategy (2020), Local Biodiversity Strategies, Species Specific Action Plans, the Parliamentary Commissioner for the Environment Report – Taonga of an Island Nation: Saving New Zealand’s Birds (2017) . The Global Convention on Biological Diversity and the Department of Conservation Battle for the birds. This work is also supporting National Policy of Freshwater Management (2020) through the monitoring of environmental indicator species.

2. Itinerary

The students on site will complete five days of training and research. The school groups arrive at the site on Sunday and settle in with an evening orientation lecture. Groups will spend the next 6 nights at the camp in single tents to allow social distancing, before being transferred by bus back to Queenstown airport on Saturday morning.

Table 1. Indicative timetable for one group, groups will be rotated across activities throughout the week. N.B. this table is just an example timetable, the exact timetabling will vary depending on level of fitness, research activities taking place and weather conditions. We endeavour to ensure all students participate in each activity at least once during the trip.

Time	Activity
Sunday Evening	Arrive at Makarora Camp Site Introduction to camp, and health and safety talk Briefing on forthcoming research activities

Monday morning	Research activities. One from: - Introduction to Tier 1 vegetation plots with possum & ungulate detection - Bird mist netting and banding - Standardised point counts and bird transects
Monday afternoon	Data Analysis Session 1: An Introduction
Monday evening	Lecture: Geophysiography of the Makarora area
Tuesday morning	Research activities. One from: - Introduction to Tier 1 vegetation plots with possum & ungulate detection - Bird mist netting and banding - Standardised point counts and bird transects
Tuesday afternoon	Data Analysis Session 2: Introduction to R Software
Tuesday evening	Lecture: Detector Dogs: Blue Duck Detection and Kea
Wednesday morning	Research activities. One from: - Introduction to Tier 1 vegetation plots with possum & ungulate detection - Bird mist netting and ringing - Standardised point counts and bird transects
Wednesday afternoon	Data Analysis Session 3: Statistics 1
Wednesday evening	Lecture: ABT Ridge to River Conservation Programme
Thursday morning	Research activities. One from: - Braided river ecology and species monitoring - Predator control and elimination techniques
Thursday afternoon	Data Analysis Session 4: Statistics 2
Thursday evening	Lecture: Careers in Wildlife Management
Friday morning	Research activities. One from: - Braided river ecology and species monitoring - Predator control and elimination techniques
Friday afternoon	Data Analysis Session 5: Scientific Writing
Friday evening	Science report completion Leaving party

3. Research activities

Tier 1 Vegetation Plots with Mammal Detection

An introduction to the method of Tier 1 vegetation plot monitoring based on the RECCE method. At each sampling location, a series of vegetation, soil and animal surveys will be carried out: 20 × 20 m vegetation plot measurement; RECCE; soil sampling; possum monitoring; ungulate, rabbit and hare faecal pellet counts. These surveys will all be centred on the 20 × 20 m vegetation plot. The primary aim of this inventory and monitoring technique is to provide unbiased, repeatable data.

Bird point counts and transects

During a static point count, the majority of observations are actually of bird calls.

In the course of a point count activity, students will walk along a sample route in the early morning with an ornithologist, stopping at several sample sites for 5 minutes to undertake point counts. When a group of birds is detected the team will record the species, the group size, the estimated distance to the birds and the method of observation (seen, heard, seen and heard).

Bird mist netting

Mist netting is undertaken in order for students to see this sampling technique first hand and to sample bird species which might not be detected by point counts. The area of nets and the time open will be recorded in order to compare against other sampling efforts, no matter the duration or time of day.

When birds are caught, the ornithologist will demonstrate how they are removed from the net and handled. Each individual will be identified to species and students will be encouraged to make the identifications themselves, if necessary with reference to copies of field guides. The ornithologist will demonstrate how to take standard morpho-metric measurements (wing, tarsus, head, and tail with metal rulers) and weights are taken with a Pesola balance and bag. Birds will also be banded for population studies.

Braided river ecology & monitoring

Experience the unique braided river environment of the South Island, an often underestimated biodiversity hotspot. Learn about the cryptic avifauna that depend on this often-harsh habitat to sustain their life cycle. Students will find out about annual braided river bird walkover surveys, nest monitoring and the multiple threats experienced by these threatened species. A telescope will be provided to aid bird viewing, binoculars recommended.

Predator control and elimination techniques

With the ambitious national goal of predator free 2050 in mind, students will learn about Makarora's key pest species threatening indigenous biodiversity and the techniques being used to control and monitor these animals. Demonstrations provided.

4. Data analysis course and learning outcomes

Students will choose from a selection of projects they wish to work on, including Caribbean coral reefs and their fish communities, spider monkey behaviour and large mammals in an African savannah. With these, they will complete this week-long programme designed to support them through the entire research process.

This starts from project conception and data collection, to data analysis and science communication, before finally producing a scientific report that would be ideal as an independent research project towards their broader studies. This could even be used for IB Internal Assessments or as the start of an Extended essay or EPQ.

The programme includes introductions to computer coding in R, GIS and the production of maps, and statistical analysis of data, which are transferable skills that would look great on any students' CV and university application.

5. Links to A Level

The following table (Table 2) highlights how your Opwall expedition relates to the AS and A level syllabuses across all exam boards for Biology. The blue blocks indicates that the keywords listed are covered on our expedition (through lectures, practicals or in discussion topics) and that these keywords are also within AS or A level topics as shown.

Table 2: Highlighted in Black are topics that you might experience at your research site. Key: C.int = Cambridge International; NCEA = NCEA Biology; IB = International Baccalaureate

Topic	Biology	C.Int		NCEA	IB
	Levels: S=AS 2=A2	S	2	Levels 1-3	
Evolution, Classification and DNA	Evolution; Speciation; Species; Endemism; Gene pool; Allopatric; Sympatric; Isolation; Variation; Adaptive radiation Adaptation; Wallace; Darwin		◆	◆	◆
	Classification; Taxonomy; Binomial system; Dichotomous Keys		◆	◆	◆
	PCR; Genome sequencing; Genetic fingerprinting; DNA profile				
Ecology and Ecosystems	Ecology; Habitat; Niche; Abiotic; Biotic	◆		◆	◆
	Biome; Ecosystems; Rainforests; Deserts; Coral reefs; Mangroves; Marine; Coasts; Hot arid; Semi-arid; Woodland Bush; Tropics; Tropical	◆		◆	◆
	Populations; Competition; Interspecific; Intraspecific; Predator Prey; density dependent; independent: Symbiosis	◆		◆	◆
	Succession; Climax community			◆	◆
	Biodiversity		◆	◆	◆
	Practical work; Field techniques; Ecological sampling; Random sampling; Transects; Capture, mark, release and recapture; Biodiversity indexes; Data handling and presentation; Quadrats; Statistical testing; Measuring; GIS; Research tools			◆	◆
	Written reports; Research project; Report; Case studies			◆	◆
Agriculture, Human activities, Conservation and Sustainability	Sustainability				
	Agriculture; Agricultural impact; Agricultural exploitation; Cultivation crops; Food production; Sustainable agriculture; Sustainability; Forestry; Timber; Deforestation; Fisheries; Over fishing; Deforestation; Human management; Human effects; Human activities			◆	◆
	Fair-Trade; Coffee; Rain Forest Alliance; Ecotourism; Tourism; Carbon trading; Greenhouse gas emission control (REDD)				
	Indicator species; Pollution; Climate change; Global warming Carbon footprint; Fossil fuels			◆	◆
	International conservation; Endangered species; Invasive species; Biological control; Pests; CITES; Ethical, Local; Global		◆	◆	◆
	National Parks; Wildlife reserves		◆	◆	◆
	Environment; Environmental monitoring; Environmental impact; SSSI			◆	◆
Behaviour	Animal behaviour; Primate Social behaviour; Courtship; Territory; Co-operative hunting; Herbivores; Grazing		◆	◆	◆