

POSTGRADUATE



# Zoology

## Postgraduate Handbook

ONLY  
**OTAGO**

## MIHI WHAKATAU

*Ka taki te Tītī  
Ka taki te Kākā  
Ka taki hoki ahau  
Tihei Mauriora!*

*He mihi I te tuatahi ki ō tātou tini aitua.  
E kā mate o kā motu, haere rātou ki kā  
tipuna i muri i te tatau pounemu o te po.  
Haere kā mate katoa.*

*Apiti hono tatau hono, kā huka mate ki kā  
huka mate. Apiti hono tatau hono, kā huka  
ora ki kā huka ora.*

*He mihi ki a Papatuanuku kōrua ko Raki  
hoki, tēnā kōrua, tēnā kōrua.*

*He mihi mahanga tenei ki ka  
takatawhenua o kā marae maha o  
Aotearoa me Te Wai Pounamu ā kā iwi  
katoa o Te Ao, tēnā koutou katoa!*

*He karaka atu tēnei nō te whanau o Te  
Tari Mātai Kararehe, o Te Whare  
Wānanga o Otāgo ki ka takata o ka hau e  
wha. Haere mai, nau mai ka tauira hou ki  
roto to tatou whare wānanga kia whai ai  
te maramataka nei.*

*Nō reira, e kā iwi o te ao marama, tenei ao  
hurihuri, tēnā koutou, tēnā koutou, tēnā  
koutou katoa.*

## GREETINGS

The titi cries out  
The parrot cries out  
And I cry out also  
Behold, life!

Firstly to the deceased from all islands,  
Let them be gone to the ancestors  
behind the greenstone door of the night.  
All the dead go forth.

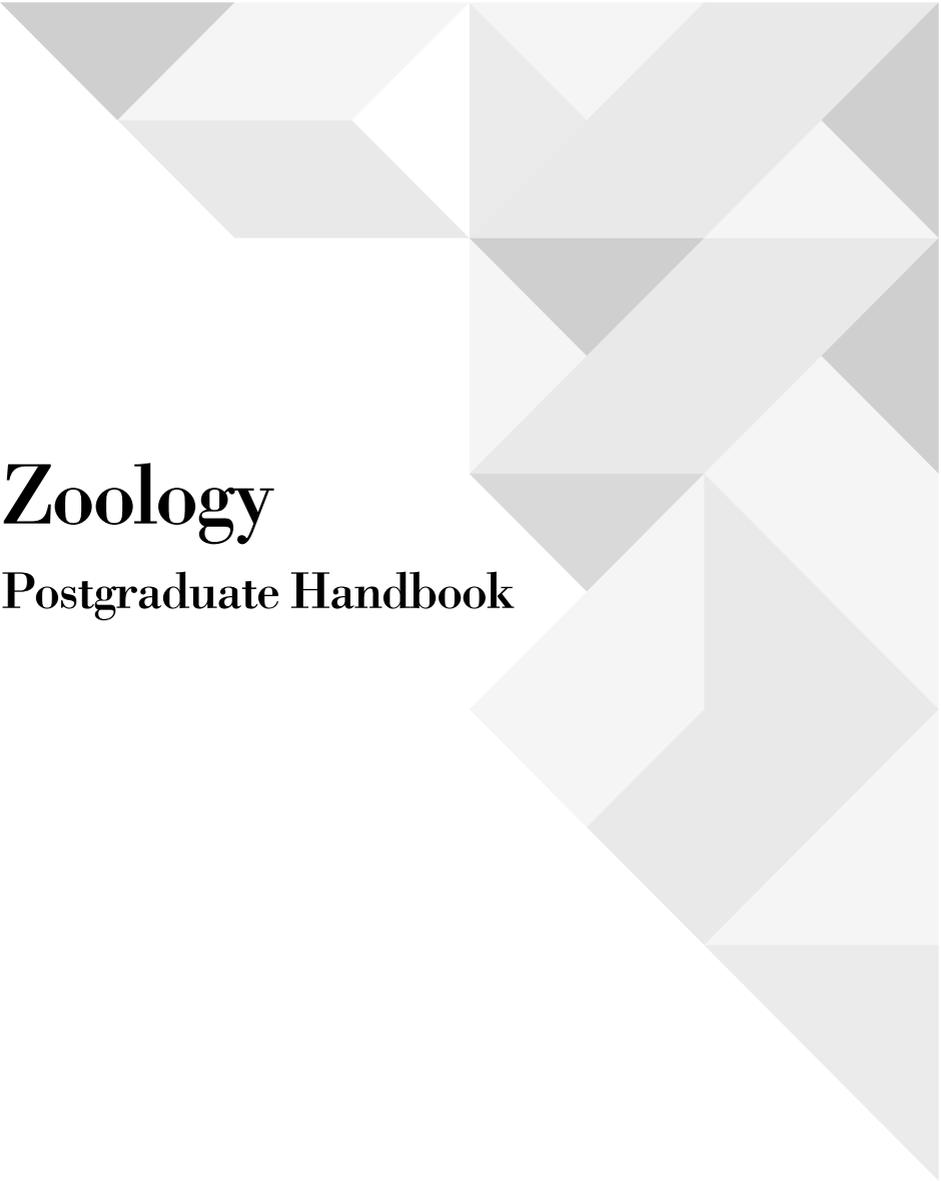
Join the descent lines of the dead to the dead.  
Join the descent lines of the living to the living.

Greetings to the earth mother and sky father.  
Greetings, greetings, greetings.

This is a warm greeting to the first people  
of the many marae of the North and South  
Island and to all the peoples of the world.  
Greetings to you all!

This is a call of introduction to you from  
the Department of Zoology of the University  
of Otago. We greet new students to our  
University and the pursuit of knowledge.

Therefore all the peoples of the living  
world, this changing world, greetings,  
greetings, greetings to you all.



# **Zoology**

## **Postgraduate Handbook**

## Foreword

*Tēnā koe, Nau mai, Haere mai ki Te Tari Mātai Kararehe*

Hello and welcome to the Department of Zoology

Building a career by following your own interests is a common pattern amongst many scientists. From early childhood and into my teenage years, I spent much of my time exploring local rivers, ponds and lakes for fish and wildlife. My interests were then focused into postgraduate research studying the distribution of freshwater fish and invertebrates, which has subsequently led to my current job teaching and lecturing in freshwater ecology. I consider myself extremely fortunate to have spent much of my time studying the animals that have fascinated me for most of my life.

Today we look forward to working alongside and assisting with your own postgraduate research and building a career. As members of a strong, research-led department, we aspire to help you learn to do innovative research that meets the highest international standards. Our goal is to guide you towards producing research that is sound in theory and practice, whilst building your awareness of the social, cultural and environmental context in which your studies are placed.

To find out more about our research interests and expertise, please read the profiles of our research staff. Our department is recognized as the leading biological/life-sciences department for research in New Zealand, and many staff members have high national and international profiles. If you would like further information about our research activities, including copies of our scientific publications, we will be happy to provide it.

As a postgraduate student, you will also be seeking an environment that provides professional and moral support. Our department is renowned for a friendly and supportive atmosphere, and for involving students in our academic and social activities. If you would like to correspond with one of our current students for their view of life in our department, we can arrange this. If you would like to know more about support available for Māori students, or Kaiāwhina Māori will be happy to assist (see page 7).

The University of Otago is close to the Dunedin city-centre, providing a vibrant university experience unlike any other in New Zealand or Australia. Dunedin is small enough to be easy to navigate, while large enough to offer excellent facilities, including art galleries, museums, gardens and a sports stadium – and the café scene is fairly fine too. Coastal landscapes with fascinating wildlife, including seals, sea lions, shags, penguins and albatrosses are within a short drive of the city. A community-based ecological restoration project, Orokonui Ecosanctuary, is also just a short drive away. Within a few hours, the mountains, fiords and lakes of Fiordland and the Southern Alps can be reached and enjoyed.

We look forward to welcoming you to Dunedin and the University of Otago.

Professor Gerry Closs  
Head of Department



If our department meets your basic requirements then read on!

The Department of Zoology welcomes applications from students wishing to undertake postgraduate study.

This booklet outlines the information relevant to the following postgraduate courses in Zoology and Wildlife Management at the University of Otago:

1. BSc(Hons)
2. Postgraduate Diploma in Wildlife Management
3. Postgraduate Diploma in Science (Zoology)
4. Master of Science (MSc) (Zoology)
5. Master of Science (MSc) Wildlife Management
6. Master of Wildlife Management (MWLM)
7. Doctor of Philosophy (PhD)

There are currently 33 academic staff members, including 11 postdoctoral or research fellows, 9 teaching fellows and our Kaiāwhina, with research interests in a diverse range of fields. The Department has an active postgraduate programme with 59 PhD and 42 MSc thesis students currently engaged in research, in addition to 24 4th year Honours, MSc papers and Postgraduate Diploma students.



You are encouraged to make contact with staff members to discuss the content of postgraduate courses and to explore potential research topics for Postgraduate Diploma, MSc or PhD degrees. Written enquiries should, in the first instance, be addressed to:

Professor Gerry Closs  
Head, Department of Zoology  
University of Otago  
PO Box 56  
Dunedin 9054  
New Zealand

Tel: 64 3 479 7976 (international)  
03 479 7976  
Fax: 64 3 479 7584 (international)  
03 479 7584  
Email: [hod@zoology.otago.ac.nz](mailto:hod@zoology.otago.ac.nz)

We are very keen to have more Māori students in our midst. Te Huka Mātauraka (the University's Māori Centre) will help advise about student life, costs of study, scholarships, course and career choices for Māori. Give them a call (03) 479 5163 or check out their website at [otago.ac.nz/māoricentre](http://otago.ac.nz/māoricentre). Alternatively you can make contact with the Department of Zoology's Kaiāwhina to inquire about opportunities for Māori-oriented research and learning.

In that case write to us:

Professor Alison Cree, Kaiāwhina  
Department of Zoology  
University of Otago  
PO Box 56  
Dunedin 9054  
New Zealand

Email: [alison.cree@otago.ac.nz](mailto:alison.cree@otago.ac.nz)

## The University of Otago

Otago was New Zealand's first university. Founded in 1869, it is older than the majority of universities in the world. While maintaining the best elements of tradition in scholarship and teaching, Otago is progressive and innovative.

The University of Otago is recognised internationally as a leader in many areas of scientific research and has first-class status as a teaching institution. The University offers excellent facilities for study, including laboratories, field equipment, computing services and libraries.

There are now over 20,000 students on the University of Otago's roll and with more than 70% of them coming from outside the region, Dunedin has its own special flavour as New Zealand's only true university town.

The Department of Zoology is one of the largest and busiest departments in the University and is known nationally and internationally for its research in freshwater ecology, wildlife and conservation ecology, neurobiology and animal behaviour, parasitology, environmental physiology and evolutionary biology.

Our aim is to integrate postgraduate students into both the social and academic life of the Department. In addition, we wish to foster equality of opportunity for all, regardless of age, sex, race, socio-economic status or physical disability. Please let us know of any special needs so that we can make our environment available and friendly to everyone.

The Department effectively blends the architecture and traditions of a long-established university with access to up-to-date facilities which include research photomicroscopes, automatic chemical analysers, equipment for a range of genetic analyses, histology and radioisotope laboratories, photographic and video facilities, access to transmission and scanning electron microscopes and a wide range of fieldwork equipment. Five vehicles, a caravan and small boats powered by outboard motors are available for fieldwork. A support staff of 16 is available for help and assistance relating to teaching and research within the department.

Student computing facilities are provided by the University through Student Computing Services.

As a postgraduate student you will interact frequently with your research supervisor(s), whose responsibility it is to guide you through the challenges and rewards of becoming a professional researcher. The relationship can be enormously fulfilling on both sides, and by the time you have completed your degree your supervisors are likely to be learning as much from you as you will be learning from them! Other academic staff within the Department will also take an interest in your work and you will be encouraged to discuss your plans widely and seek feedback from as many people as possible at the various stages of your research.

Regular research student workshops are held to introduce you to topics such as experimental design, statistical analysis, how best to use library resources, effective writing, how to publish a paper, how to prepare a poster for a scientific conference and how to conduct research in a bicultural way. Special emphasis is placed on oral communication and you will have a number of opportunities to talk to a friendly audience about your work. This will culminate, on completion of your studies, with participation in the annual Research Student Colloquium.

Your period of postgraduate study provides an opportunity to develop teaching skills that are likely to be of great benefit in your academic career. As a research student you will be encouraged to demonstrate in undergraduate practical classes (receiving payment at the appropriate salary level).

We consider training in effective teaching practice to be an integral part of your studies.



## Kaiāwhina Māori

The Department's Kaiāwhina Māori/ Māori student support role is taken by Alison Cree, an academic staff member. Alison's research involving native New Zealand ngārara (reptiles) has led over the years to relationships with several iwi. Alison has been involved in science wananga and other hui, and is keen to support Māori students in their studies. Please contact Alison if you would like to discuss study opportunities and/or the department's engagement with things Māori.

The University's Māori Centre encourages Iwi Māori to participate and succeed in tertiary education. The Centre offers support for academic, cultural and social needs from kaupapa Māori base.

## Research Links

A crucial first step in the planning of a research programme is correct experimental design. Postgraduate students are encouraged to plan their experimental design and statistical analyses at the start of their research programme. Expert assistance in computing and analysis is also available from staff within the Department.

The study of marine animals is a long-established area of teaching and research activity in Zoology at Otago. Links are particularly strong with the Department of Marine Science, which operates the Portobello Marine Laboratory, a well-equipped facility which is situated on the eastern shore of Otago Harbour, 25 km by road from the main campus.

The Department of Zoology is involved in collaborative research with other departments in the Sciences and Health Sciences Divisions of the University, the Otago Museum, the Department of Conservation, Crown Research Institutes and other government research agencies.



There is a wide range of job opportunities in New Zealand open to postgraduates in Zoology. These include positions in:-

- Government departments e.g. Conservation, Fisheries, Environment.
- Regional and local authorities.
- Crown Research Institutes e.g. NIWA, Landcare.
- Medical and veterinary laboratories.
- Wildlife and fisheries management e.g. Fish & Game Council.
- Iwi and other Māori interests.
- Education.
- Scientific publishing.
- Ecotourism.

Many of our graduates are now working overseas.

As a postgraduate student, you will not only acquire specific knowledge about specialist areas of zoology, you will also gain communication, computing, mathematical and analytical skills which are applicable to a wide range of careers.

## **Pros and cons of choosing to study for a BSc (Hons) or an MSc in Zoology**

If you plan to go on and do a PhD:

- The BSc (Hons) degree provides ample professional training and research experience to proceed directly to a PhD (if you gain high enough marks). Studying for a BSc (Hons) can thus be viewed as a particularly efficient use of time and resources (one year's study rather than two or more for an MSc). Many students have followed this route to a PhD, finding it challenging but very rewarding, and proceeded to successful careers. A good proportion of these have also published their research in a peer-reviewed journal – an excellent opening step in a research career.
- On the other hand, the MSc format gives greater time to dedicate to your research project, providing a more comprehensive initiation to the world of independent research. The MSc can also be less stressful because papers are done in year one and research in year two, instead of papers plus a reduced research project in a single year. Furthermore you can apply for an MSc scholarship (covers tuition fees plus living allowance) for your final 'Thesis only year', based primarily on the marks attained during your papers year. Progress to a PhD depends, as with BSc (Hons), on gaining high enough marks for papers and thesis. Many students have also followed this route to a PhD and proceeded to successful careers. The more substantial research effort probably increases the likelihood, compared to BSc (Hons), that part of the research will be published in a peer-reviewed journal.

- It is worth noting that students pursuing an MSc and who perform particularly strongly as they commence research can be considered for transfer to PhD research. In this case the student would not take out an MSc, and would gain a PhD in about the same length of time as one following the BSc (Hons) route.
- Note that also having gained a BSc (Hons) degree, and having therefore already completed the necessary papers, it is possible to proceed in a subsequent year to an MSc by thesis only.
- In either case, the nature of the research project students wish to do may determine the degree path they are able to take.

If you **do not** plan to pursue a PhD:

- The BSc (Hons) degree is recognised as prestigious in many parts of the world, but in some places it will be less familiar. Even within New Zealand, some universities do not provide a BSc (Hons) degree programme, although all offer an MSc degree.

Nevertheless, reports from the Head of Department and referees can be used to make it clear what a BSc (Hons) represents. The BSc (Hons) can be used as a 'final' degree in its own right. However, if you do not intend to proceed to a PhD, studying for an MSc is probably a better option – being recognised more widely and containing a more substantial research training.



# Postgraduate courses in Zoology

## 1. The Honours Course

The BSc(Hons) degree is a one-year programme taken after the completion of a BSc. If you think you might wish to do a BSc(Hons) you must complete the prerequisites listed below during your BSc programme. All students should have a confirmed supervisor before applying for postgraduate courses. Applications for entry to this course should reach the Administrator, Division of Sciences, by 10 December for the following year.

If you are doing a double major you will complete 8, 300-level papers (4 in each subject). Your Zoology 300-level papers should include ZOOL 316. This can lead onto a combined Honours degree.

### Programme requirements

Bachelor of Science with Honours (BSc(Hons) in Zoology)

### Papers

ZOOL 490

Three of ZOOL 410, ZOOL 411, ZOOL 412, ZOOL 414, ZOOL 415, ZOOL 416, ZOOL 417, ZOOL 418, ZOOL 419, ZOOL 420, ZOOL 421

### Prerequisites

ZOOL 316, three of ZOOL 313, ZOOL 314, ZOOL 315, ZOOL 318, ZOOL 319, GENE 312, and one further paper from ZOOL 313, ZOOL 314, ZOOL 315, ZOOL 318, ZOOL 319, GENE 312, GENE 314, MARI 301, MARI 302

### BSc (Hons) Dissertation

During the BSc (Hons) degree, students undertake a research project which consists of original research of the student's own choosing. Please see the research interests of staff on the pages that follow for the types of areas in which they may supervise projects. Some examples of Honours Dissertations are:

- |                     |  |
|---------------------|--|
| Lacey Briars:       | Variation in brain dopamine receptor levels in the honey bee: effects of nutritional state and season.   |
| Jamie-Leigh Jonker: | Heat-shock proteins in <i>Xenopus laevis</i> , their role in regeneration and the effect of the flavonoid quercetin.                                 |
| Bailey Lovett       | Early development of the New Zealand freshwater crayfish <i>Paranephrops zealandicus</i> (Decapoda: Parastacidae): implications for aquaculture.     |
| Rachael Sagar:      | The effects of sub-chronic exposure to polybrominated diphenylethers on the stress response of the Antarctic rock cod <i>Trematomus bernacchii</i> . |
| Romana Salis:       | The effects of agricultural antibiotic monensin, dairy effluent and light in stream algal communities.   |

Ingrid Tarr	Social modulation of appetitive learning ability and responsiveness to sensory stimuli in worker honey bees <i>Apis mellifera</i> .
Olivia Tidswell	Knowing your noggin from your trunk: how did the arthropod Noggin-like proteins evolve?

## 2. Postgraduate Diploma in Science (Zoology)

The Postgraduate Diploma in Science is completed in one year by full-time students and consists of four papers (as specified under MSc papers below) and a research project consisting of original research in an area of the student's own choosing. It is a similar course to that followed by Zoology Honours students in their fourth year at Otago (though with one extra paper and a smaller research project) and is appropriate for students with a three year BSc degree in zoology, biology or ecology awarded elsewhere, or for mature students returning for a period of advanced study.

Applications for entry to this course should reach the Administrator, Division of Sciences, by 10 December for the following year.

## 3. Postgraduate Diploma, coursework Masters and MSc in Wildlife Management

Otago University is one of New Zealand's leading research-oriented universities and provides an excellent base for wildlife studies, being within easy reach of largely untouched mountains, fiords, rainforests and wetlands, as well as landscapes modified by agriculture. There are a number of rare or threatened species within a few kilometres of the campus, including albatross, yellow-eyed penguins, native passerines and skinks. The University has a concentration of ecologists active in research on wildlife species and endangered habitats. University staff maintain strong links with conservation and research agencies, both within New Zealand and internationally.

The major objective of the Otago Wildlife Management Programme is to train students with the skills necessary for employment in some aspect of wildlife management or research. Other important goals of the course are to develop in students:

- An understanding of the ecological basis of conservation management;
- Skills in handling, marking, observing and counting wild animals;
- Skills in the analysis of radio-telemetry and abundance estimation data;
- An appreciation of the practical realities of wildlife management from;
- A knowledge of the ecology and behaviour of wild animals in New Zealand;
- Skills in communicating about management and research.

Course content is a mix of seminar and lecture material, and hand-on experience gained through fieldwork. Students are responsible for designing and carrying out various wildlife surveys, and writing reports on their findings. While emphasis is placed on Australasian examples, teaching also draws on international case studies and management approaches.

The Post-graduate Diploma in Wildlife Management (PGDipWLM) is a one-year full-time course commencing in February.

The coursework Master of Wildlife Management (MWLM) is completed over 3 semesters (18 months)

The MWLM includes a research placement project, WILM 501 Wildlife Management Research Placement (40 pts)

This paper is designed to provide wildlife management research experience and provides an opportunity to conduct a study within a wildlife management organisation. This should allow you to experience the practical realities of wildlife management and research in a way that the university can't teach. For practical reasons, placements most often take place at the end of the year. Throughout the year we seek and receive placement offers from host organisations such as the Department of Conservation, Fish & Game Councils, Crown-funded Research Institutes and Regional Councils. A register of potential placements is maintained and updated throughout the year. A placement should entail fairly independent work and should be seen as an opportunity to undertake a small piece of research without the pressure to achieve major scientific break-throughs. Previous students have been involved in data collection, analysis and report writing, or in assessment and revision of monitoring protocols or management plans.

All PGDipWILM and MWILM students take WILM 401 and WILM 402

#### **WILM 401 Principles of Wildlife Management (20 pts, compulsory)**

Wildlife management is interdisciplinary, drawing from many fields of study (too numerous to cover in this course alone), imagination, and logic. Advances/discoveries in science are the raw material for improving wildlife management decisions and best practice. A successful wildlife manager is one who can synthesise knowledge and science from a range of fields to improve management practices. In this course you will have the opportunity to discuss a diverse range of topics in wildlife management with expert researchers and active wildlife managers. We will examine these topics using a case-study approach highlighting current best practice and the application of various principles of wildlife management. These discussions will demonstrate that improvements in best-practice wildlife management come from existing and new knowledge.

#### **WILM 402 Techniques of Wildlife Management (20 pts, compulsory)**

Wildlife management must proceed from knowledge. Any assessment of the degree of intervention necessary to reach management goals must be based on an understanding of the natural system of concern. To achieve this understanding you must first ask the right questions, and gather and process the data necessary to answer these questions or explore alternatives. In this course we present a toolkit of practical skills for wildlife management and research data collection and analysis. The course will include topics such as: assessing abundance of animals; design of survey and monitoring programmes; measuring biological diversity; catching, marking, tracking and observing wild animals; examining habitat use and resource selection; data analysis and interpretation, report writing and communication skills. The course gives 'hands-on' experience wherever

practicable of 'real-life' management issues, often involving NZ animals, but using wider examples as appropriate. The emphasis, however, is not simply on developing a suite of technical skills in isolation, but rather on developing your ability to apply the appropriate data collection and analysis techniques to address management questions and needs. You will be exposed to a wide variety of techniques that may be applied in your future management or research work. The course includes seminars, group and individual projects, and several field excursions where you will participate in a variety of data collection schemes.

### **Other Wildlife Management papers:**

#### **WILM 404 Data Analysis for Wildlife Management (20 pts, compulsory for PGDipWLM students who have not passed ZOOL 316 or its equivalent)**

This paper gives you the statistical skills essential to ecological research and wildlife management. You will learn about many aspects of experimental design and data analysis, and how to use various statistical packages on the computer. This paper is based on the lectures, assignments and examination for ZOOL 316 (Biological Data Analysis and Computing) but, in addition, you will analyse a data set using the skills you have gained in class. Approval from the Head of Department is required for non-PGDipWLM students.

#### **WILM 406 Conservation Biology for Wildlife Management (20 pts) combines ZOO 319 with an extra assignment and is highly recommended for students with little formal training in conservation biology**

The ecological, genetic and biogeographic principles underlying biological conservation; rationale for conservation; genetics and population dynamics of small populations; threats to species from habitat loss, over-exploitation, invasive species, climate change and genetically modified organisms.

Any other paper can be chosen from the range of MSc papers outlined below. Alternatively, students may consider Planning, Tourism, Spatial Information, Botany, Mathematics, Sociology, Political Studies and Geography papers. Students are encouraged to study the University Calendar for relevant papers in these disciplines.

The closing date for applications is 1 October for those who require a study permit for entry into New Zealand and 1 December for other applicants.

It is also possible to study part-time for either course. Candidates with experience in wildlife management or administration, but lacking formal tertiary qualifications, are also encouraged to apply. Successful completion of the PGDipWLM or the MWLM qualifies students to enrol in a one-year Master of Science in Wildlife Management, by-thesis-only.

The course is designed to be flexible and offer maximum choice so as to cater for the different career aspirations, wildlife interests and academic backgrounds of students.

For course and application details please refer to the Wildlife Management website at: [otago.ac.nz/wildlife/](http://otago.ac.nz/wildlife/)

If you have any question please contact:

Prof Phil Seddon  
Department of Zoology  
University of Otago  
PO Box 56  
Dunedin  
New Zealand  
Email: [philip.seddon@otago.ac.nz](mailto:philip.seddon@otago.ac.nz)



## 4. Master of Science (MSc)

The degree of Master of Science is awarded on a research thesis alone or, more usually, by passing appropriate papers in the first year (as below) and submitting a thesis after a further year of research. Suitable research topics for the thesis should be discussed with academic staff. A list of their research interests is given later in this booklet, and a thesis topics booklet is available from the department. Students are required to have arranged a thesis topic and supervision before enrolment.

The prerequisite for entry to the MSc by papers and thesis is a BSc degree with suitable grades, normally in Zoology, Ecology or Biology. Applications for entry to this course should reach the Admissions and Enrolment office by 10 December. Applications for the MSc by thesis only can be submitted at any time. To be eligible for the latter degree students must have completed an Honours degree or an ordinary degree followed by a

Postgraduate Diploma. Entry is dependent on the quality of previous research experience and academic performance and the availability of appropriate supervisory expertise.

Staff in the Department of Zoology are also involved in teaching and supervision of MSc students in other programmes, most commonly Ecology and Genetics.

### Papers

Students enrolled for a Postgraduate Diploma in Science take four papers and a research project (ZOOL 480). BSc(Hons) students take three papers and a research project (ZOOL 490). Those in the first year of a Masters degree take four papers and the relevant 495 (Thesis preparation) paper. Teaching is normally by directed reading, seminars and essays.

#### **ZOOL 410 Evolutionary Genetics (20 pts)**

This paper deals with contemporary issues in evolutionary genetics. Emphasis is placed on our understanding of species and speciation, as well as defining genetic units for conservation. We also look at applications of phylogenetic analysis, particularly in relation to phylogeography. Some familiarity with basic concepts in population genetics will be useful.

#### **ZOOL 411 Behavioural and Evolutionary Ecology (20 pts)**

This paper examines the processes of science, using behavioural and evolutionary issues/controversies as examples. It is not a course on animal behaviour, but does evaluate past and current controversies and theoretical issues in the area of behavioural and evolutionary biology.

#### **ZOOL 412 Neurobiology and Behaviour (20 pts)**

There are remarkable similarities in nervous system structure and function between animals as different as fruit flies (*Drosophila*) and humans. This pattern of diversity superimposed upon common underlying themes provides fascinating opportunities to explore and test ideas about brain function. Do fruit flies get Alzheimer's disease? Do sharks have episodic memory? This paper focuses on some of the exciting advances that have been made in recent years using animal model systems to explain how brains work.

**ZOOL 414 Comparative Physiology (20 pts)**

This paper focuses on issues in reproductive physiology of vertebrates. The major themes are stress and reproduction, hormones in the embryonic environment and molecular reproduction. Although the main emphasis is on comparative endocrinology, applied aspects (e.g. for wildlife conservation and aquaculture) are considered.

**ZOOL 415 Parasitology (20 pts)**

Parasites are key drivers of animal evolution, as well as major forces shaping natural ecosystems and plaguing agricultural systems. This paper will focus on selected aspects of the complex interactions between hosts, parasites and the environments, with particular emphasis on current debates or controversies. Topics covered may include the impact of parasites on host behaviour, host-parasite coevolution, the interaction between parasitism and climate change in aquatic ecosystems, the control of nematode infections of sheep, etc.



**ZOOL 416 Freshwater Ecology (20 pts)**

In this course specific topics in freshwater ecology are developed in depth and are chosen to reflect the interests of participating students. Themes have included the interactions among organisms in lakes and rivers, from microbes to fish, the influence of land uses and climate change on aquatic communities and the conservation, restoration and management of freshwater ecosystems.

**ZOOL 417 Harvest Management (20 pts)**

Harvest Management is considered within the framework of Sustainable Use of Wildlife Resources. We examine why sustainable use is considered so important; to investigate the components of a sustainable harvest regime; and to consider why harvests seem so often to be unsustainable. We do not limit ourselves to a biologist's perspective of population regulation and estimation of sustainable yields, but also consider the ways in which scientific perspectives mesh with cultural, social, political and economic factors. The course is divided into three sections: the first considers the types of harvest and the factors influencing their sustainability. The second section looks at a series of case studies, supported by guest speaker presentations. The third section involves assessments of harvests chosen by students for the main project.

**ZOOL 418 Conservation Biology of Marine Mammals (20 pts)**

This course deals with major conservation problems faced by marine mammals and the scientific techniques needed to quantify and solve these problems. Case studies discuss a range of human impacts on marine mammals, including fishing, pollution, marine mining, energy generation and tourism. An integrated approach, including science and management, is used to help determine the most effective way of dealing with these impacts.

**ZOOL 419/420 Special topic in Zoology (20 pts)**

Small research projects or specific lab skills taught by individual lecturers. Only available in some years and normally advertised within the Department during enrolment week.

**ZOOL 421 Essentials of Molecular Zoology (20 pts)**

Polymerase chain reaction and downstream molecular genetics techniques have revolutionised biology. Today, molecular techniques are often the tools of choice to address pertinent questions in zoology, including studies on gene expression, population genetics, conservation genetics and ecology. A good understanding of molecular genetics, thus, is key for research in zoology to conduct research and to understand published contemporary biological science. This course focuses on molecular genetic techniques by combining fundamental concepts and ideas with practical, hands-on training (PCR, primer-design, sequence analysis, etc).

Participation is subject to approval from the Head of Department.

### **WILM 401 Principles of Wildlife Management (20 pts)**

Wildlife Management is interdisciplinary, drawing from many fields of study (too numerous to cover in this course alone), imagination and logic. Advances/discoveries in science are the raw material for improving wildlife management decisions and best practice. A successful wildlife manager is one who can synthesise knowledge and science from a range of these fields to improve management practices. You will have the opportunity to discuss a diverse range of topics in wildlife management with expert researchers and wildlife managers. We will examine these topics using a case-study approach, which will highlight current best practice and the application of various principles of wildlife management. These discussions should also highlight that improvements in best practice in wildlife management come from the synthesis of existing and new knowledge.

First places in this course are reserved for Wildlife Management students to allow them to complete their course requirements, but BSc (Hons) and MSc students from Zoology, Marine Science, Environmental Science, Ecology, Geography or Botany are very welcome to fill remaining spaces. If you want to take the course but are not a WILM student, apply in writing to the Head of the Department of Zoology by the last day of enrolment week at the start of Semester 1. Places will be allocated on that day according to the relevance of the WILM401 course to the student's research project or career plans.

### **ZOOL 480 Research Project (for PGDipSci) (40 Pts)**

A supervised research project involving original research and leading to the production of a dissertation worth 40 points.

See additional comments relevant to this paper under ZOOL 490. These are marked with an asterisk.

### **ZOOL 490 Dissertation (BSc Hons) (60pts)**

A supervised research project involving original research and leading to the production of a dissertation worth 60 points.

Students design and conduct research to address a question of current interest in Zoology. This will involve the development of a research hypothesis, the design of appropriate data collection methods, and the analysis of data obtained in the study.

*\*Both, ZOOL 480 and ZOOL 490 are designed to develop research skills, and to encourage students to think critically. All students are required to have a confirmed research supervisor before they enrol for ZOOL 480 or ZOOL 490. The research interests of staff can be viewed on the Zoology Department website: [otago.ac.nz/zoology](http://otago.ac.nz/zoology). A list of suggested research topics is also available on the Zoology Department website:*

### **ZOOL 495 Masters Thesis Preparation (40 pts)**

Preparation of thesis research including literature review, written proposal and oral presentation of proposal and any preliminary results. There are no formal classes, but four pieces of assessment.

### Research Thesis

In working towards your research thesis you will develop a number of important skills. You will be encouraged to develop the ability to communicate effectively in writing and to present clear and well illustrated talks – both are crucial to a professional zoologist.

You will also learn to make efficient use of the scientific literature related to your research topic and become an expert in your chosen area. We can help guide you on how to research a topic of substantive interest to Māori or to communicate the results back to the Māori community in a culturally appropriate manner. Finally, and most importantly, you will acquire expertise in experimental design, statistical analysis and critical interpretation of results from an original piece of research. Masters students are encouraged to publish their thesis research in international scientific journals. Some examples of recent thesis titles are given later in this booklet.



## 5. Doctor of Philosophy (PhD)

A doctorate is the ultimate step in university education. Those awarded the degree will become the next generation of researchers, university teachers and leaders in science. The prerequisite for entry into the PhD programme is a BSc (Hons) or MSc degree in which performance has been of a sufficiently high standard to satisfy the University Senate of the student's ability to successfully complete a doctorate.

The degree is awarded upon the presentation of a thesis after a minimum of two and a half years of full-time research or four years of part-time research. The research is conducted under the supervision of one or more members of the academic staff of the Department of Zoology. A joint supervisor may also be a member of academic staff from another department or research organisation (e.g. Department of Conservation or Crown Research Institutes). There is no compulsory course work associated with the PhD. However, some students pursue their interests by taking postgraduate courses such as those outlined in the MSc section of this booklet.

As a PhD student you will learn how to identify a problem and devise hypotheses, design a series of experiments and observations to address these hypotheses, analyse data in an appropriate manner, interpret results critically and place your work into the context of the existing literature in your field of research. You will develop expertise in written and oral communication, with the ability to argue a scientific case and to spot weaknesses in other people's arguments. Close support, particularly in the early stages of work, is available to PhD students from their research supervisor(s), an appointed advisory group and others in the Department. Past experience has shown that PhD students gradually acquire the skills and confidence required until they are fully on a par with their supervisors.



## Financial support for MSc and PhD students

University of Otago Doctoral Scholarships are awarded to candidates for the degree of Doctor of Philosophy. Normally the minimum standard required is an average grade of high A- or above in the fourth year of an Honours degree, or in a postgraduate Diploma or equivalent, or in a Master's degree. For international students, most successful applicants will have their most relevant grades and/or a grade average in the US equivalent A range. Tenure is for up to three years (subject to satisfactory performance) and the scholarship consists of an annual emolument (currently \$25,000), plus payment of tuition fees (at the level payable by New Zealand citizens).

Research Master's Scholarships support students during the thesis part of a research Master's degree. Normally the minimum standard required is an average grade of high A- or above in the fourth year of an Honours degree, or a postgraduate Diploma or equivalent. Tenure is for one year and the award consists of an emolument (currently \$13,000), plus payment of tuition fees (at the level payable by New Zealand citizens). The award can be held only in the first year of full-time research for a Master's degree. Masters Scholarship applicants must be admitted to the masters programme before a scholarship application can be made.

For domestic applicants the main research Master's scholarship is the University of Otago Master's Scholarship. In addition there are some discipline-specific scholarships and/or scholarships for Māori and Pacific Island applicants. For international applicants there is a very small number of University of Otago International Master's Scholarships; we recommend applying for these only if your grades are at the A or A+ level.

Application for scholarships is made online and an invite to apply for scholarship funding will be automatically sent once a student has completed their application for programme admission.

For further information please contact:

Scholarships Office  
Graduate Research School  
University of Otago  
PO Box 56  
Dunedin 9054  
New Zealand  
Email: [scholarships@otago.ac.nz](mailto:scholarships@otago.ac.nz)

## Important notes

- (i) All applicants, whether or not they are currently studying at the University of Otago, should make contact with their intended supervisor and/or the Head of Department of Zoology to discuss their plans prior to submitting their application.
- (ii) International students should contact the International Office international.admissions@otago.ac.nz or [otago.ac.nz/international](http://otago.ac.nz/international) to enquire about applying for a place at the University and to view scholarships that may be available to them. Māori scholarships are available for students of Māori descent, even where the whakapapa (genealogical) link is quite distant. Contact the Māori Centre Te Huka Māturaka ([otago.ac.nz/māoricentre/services/liaison-scholarships/index.html](http://otago.ac.nz/māoricentre/services/liaison-scholarships/index.html)) or the Graduate Research School Te Kura Rangahau Tāura ([otago.ac.nz/graduate-research/scholarships/](http://otago.ac.nz/graduate-research/scholarships/)) for details.
- (iii) For further information on doctoral scholarships please refer to [otago.ac.nz/graduate-research/scholarships/phd/index.html](http://otago.ac.nz/graduate-research/scholarships/phd/index.html) or for masters [otago.ac.nz/graduate-research/scholarships/master/index.html](http://otago.ac.nz/graduate-research/scholarships/master/index.html).



## Selected Topics of Recent Postgraduate Theses, Dissertations and Reports

### PhD

Bastian Egeter	Detecting frogs as prey in the diets of introduced mammals.
Maddalena Fumagalli	Conservation of the spinner dolphin in the Egyptian Red Sea.
Andrew Hicks	Faculative amphidromy in galaxiids and bullies: the science, ecology and management implications.
Scott Jarvie	Reintroduction biology of tuatara ( <i>Sphenodon punctatus</i> ): identifying suitable founder animals and conservation translocation sites.
Travis Monk	The evolutionary origin of nervous systems and implications for neural computation.
Dominik Paschke	Cold tolerance mechanisms of the New Zealand alpine weta, <i>Hemideina māori</i> .
Amy Taylor	The role of epigenetics in amphibian regeneration.
Amy Weaver	Low-intensity land use in grassland catchments: effects on a large, oligotrophic lake.
Kerry Anne Weston	Conservation genetics of the Alpine Rock Wren ( <i>Xenicus gilviventris</i> ).

### MSc

Samantha Botting	An investigation of sex identification methods in New Zealand reptiles.
Luke Easton	Determining the feasibility of a translocation by investigating the ecology and physiology of the threatened Hochstetter's frog ( <i>Leiopelma hochstetteri</i> ).
Emily Frost	The effects of reduced seawater pH on the early life history of three key echinoderm ( <i>Echinodermata</i> ) species.
Neka Kater	Getting to the heart of stress reactivity in honey bees.
Rohan Menzies	Indicators of and influences on reproductive success in Yellow-eyed penguins ( <i>Megadyptes antipodes</i> ).
Morgan Trotter	Juvenile trout survival and movement during the summer low flow abstraction period in the Lindis River, Central Otago.

## BSc (Hons)

Georgia Thompson-Laing      The effects of migratory stage and 11-ketotestosterone on the expression of rod opsin genes in the shortfinned eel (*Anguilla australis*).

## PGDipSci

Nikita Fox      Digit-length ratios and other morphological measures of the common gecko (*Hoplodactylus maculatus*) in relation to sex and maternal basking regime.

Nat Lim      The effects of social stability on personality development.

Craig Preston      The role of anti-Mullerian hormone in polycystic ovary syndrome.

## PGDipSci (Ecology)

Maureen McClung      Nature-based tourism impacts on Yellow-eyed Penguins *Megadyptes antipodes*: Does unregulated visitor access to breeding sites affect fledging weight and juvenile survival?



## Staff Research Interests



### **ASSOCIATE PROFESSOR CAROLINE BECK**

Email: [caroline.beck@otago.ac.nz](mailto:caroline.beck@otago.ac.nz)

#### **Research interests**

- Cell communication strategies and their influence on developmental morphology and tissue regeneration in the African clawed frog *Xenopus laevis*.

#### **Current projects**

- Limb development and regeneration.
- Investigation of the multiple roles of bone morphogenetic proteins (BMPs) during tadpole development.
- The molecular basis of lens regeneration in *Xenopus*.



### **PROFESSOR PHIL BISHOP**

(Director, Ecology Degree Programme)

Email: [phil.bishop@otago.ac.nz](mailto:phil.bishop@otago.ac.nz)

#### **Research interests**

- Communication in amphibians.
- The global phenomenon of declining amphibian populations.
- The behavioural ecology of amphibians.
- Conservation management of native frogs.

#### **Current projects**

- Chemical and visual communication in leiopelmatid frogs.
- Acoustic communication in Australian frogs.
- Habitat use by Hochstetter's frogs.
- Breeding behaviour of leiopelmatid frogs.
- Using citizen scientists to monitor native frogs.
- Preventing further amphibian declines through environmental education.



**EMERITUS PROFESSOR CAROLYN BURNS**

Email: [carolyn.burns@otago.ac.nz](mailto:carolyn.burns@otago.ac.nz)

**Research interests**

- Biological processes in lakes and wetlands, particularly trophic interactions.
- Microbial food webs.
- Eutrophication and water quality.
- Plankton ecology.

**Current projects**

- Benthic-pelagic coupling in lakes and wetlands.
- Suspended sediments and pelagic processes.
- Behaviour and life history strategies of freshwater crustaceans.
- Predation and population dynamics of zooplankton.
- Cyanobacteria-zooplankton interactions.



**PROFESSOR GERRY CLOSS** (Head of Department)

Email: [gerry.closs@otago.ac.nz](mailto:gerry.closs@otago.ac.nz)

**Research interests**

- Ecology of freshwater fish.
- Fish-invertebrate interactions.
- Habitat use of fish and freshwater invertebrates.
- Dynamics of lake littoral communities.
- Dispersal & migration in freshwater fish.

**Current projects**

- Life history of native fish and invertebrates.
- Population dynamics of salmonids.
- Energetics of mysid shrimps.
- Habitat use of native fish and invertebrates.



### **PROFESSOR ALISON CREE**

Email: [alison.cree@otago.ac.nz](mailto:alison.cree@otago.ac.nz)

#### **Research interests**

- Reproduction and thermal biology of cold-climate reptiles.
- Sex determination and sexual differentiation in reptiles.
- Biology and conservation of the New Zealand herpetofauna, including the potential impacts of climate change.

#### **Current projects**

- Spatial and temporal variation in reproductive frequency in a viviparous gecko.
- Sex determination and sexual differentiation in viviparous lizards.
- Reintroduction of tuatara to the Orokonui Ecosanctuary.
- Thermal ecology and reproduction of alpine geckos (with Dr Jo Monks, Department of Conservation).



### **DR STEPHANIE GODFREY**

Email: [stephanie.godfrey@otago.ac.nz](mailto:stephanie.godfrey@otago.ac.nz)

#### **Research interests**

- Influence of behaviour on parasite and disease transmission in wildlife.
- Social structure/contact patterns in wildlife populations and factors that structure them.
- Impact of conservation management on host-parasite communities.
- Lizard ecology and conservation.

#### **Current projects**

- Behavioural variation and its influence on parasite transmission in possums.
- Zoonotic *Giardia* and *Cryptosporidium* transmission across landscapes.
- Native lizard behaviour and social organization.



**DR TRAVIS INGRAM**

Email: [travis.ingram@otago.ac.nz](mailto:travis.ingram@otago.ac.nz)

**Research interests**

- Individual variation in diet, habitat, and behaviour.
- Freshwater fish evolutionary ecology.
- Food web structure and function.
- Macroevolution and adaptive radiation.

**Current projects**

- Individual specialization and movement in wetland fish.
- Adaptive variation in NZ native fish species.
- Consequences of individual variation for food webs.
- Food web experiments in aquatic mesocosms.
- Phylogenetic comparative studies of trait evolution and diversification.



**DR JENNY JANDT**

Email: [jenny.jandt@otago.ac.nz](mailto:jenny.jandt@otago.ac.nz)

**Research interests**

- Social insect behavioural ecology.
- Molecular mechanisms that influence social behaviour.
- Environmental effects on development of social organisms.

**Current projects**

- Environmental influences on bumble bee development and pollination efficiency.
- Social wasp aggression across ecological gradients.
- Gene expression correlates with aggression in wasps.
- Ant colony decision making.



**DR SHERI JOHNSON**

Email: [sheri.johnson@otago.ac.nz](mailto:sheri.johnson@otago.ac.nz)

**Research interests**

- Sexual selection.
- Mating system evolution.
- Sperm biology.
- Aging and fertility.
- Transgenerational epigenetic inheritance.
- Evolutionary traps.

**Current projects**

- Effects of environmental challenges (e.g., hypoxia, predation, toxins, social isolation) on behaviour and/or epigenetic inheritance, primarily in fishes, but other animals are possible.



**ASSOCIATE PROFESSOR MARK LOKMAN**

Email: [mark.lokman@otago.ac.nz](mailto:mark.lokman@otago.ac.nz)

**Research interests**

- Evolution of physiological control of reproduction.
- Egg quality – what makes for a good egg?
- Hormones and metamorphosis.
- Steroidogenesis.
- Growth and reproduction of aquatic animal species with potential for NZ aquaculture.

**Current projects**

- Role of 11-ketotestosterone in oogenesis and metamorphosis in eel.
- Role of growth factors on oogenesis of eel.
- Energy! How lipids accumulate into fish eggs.
- Starfish on steroids – from where and to do what?
- Transcriptome and proteome sequencing.



**DR CHRISTOPH MATTHAEI**

Email: christoph.matthaei@otago.ac.nz

**Research interests**

- Disturbance ecology in running water ecosystems.
- Experimental design and statistical data analysis.
- Effects of human land use activities on running water ecosystems, especially impacts of agriculture and multiple stressors, also water abstraction and other flow regime changes (environmental flow ecology).
- River restoration.
- Estuary ecology.
- Pond ecology and life history strategies of aquatic insects.
- Ecology of shallow lakeshores.

**Current projects**

- Multiple stressor and climate change effects on stream ecosystems.
- The nitrification inhibitor DCD – a new agricultural stressor for freshwater ecosystems?
- Life history strategies of New Zealand damselflies.
- The role of irrigation ditches as habitats for stream fauna.
- Effects of the neonicotinoid pesticide imidacloprid on New Zealand stream invertebrates.



**PROFESSOR ALISON MERCER** (400-level Co-ordinator)

Email: alison.mercer@otago.ac.nz

**Research interests**

- Honey bees, brains and behaviour.
- Learning and memory in invertebrates.

**Current projects**

- Honey bee queens control their kids with chemicals - how?
- Why do queen bees block aversive learning in young workers?
- How do bees learn and remember things?



### **ASSOCIATE PROFESSOR MIKE PAULIN**

Email: [mike.paulin@otago.ac.nz](mailto:mike.paulin@otago.ac.nz)

#### **Research interests**

- Brains, biomechanics and animal agility.
- Cerebellar function.
- Computational models.

#### **Current Projects**

- Vestibular coding – how neurons represent movement.
- Dynamics of animal locomotion.
- Building of agile robots and computer animations.
- Interactive 3D models for research on complex biological systems.

For more information visit my lab website:

[otago.ac.nz/zoology/MGP/index.htm](http://otago.ac.nz/zoology/MGP/index.htm)



### **PROFESSOR ROBERT POULIN (MSc Co-ordinator)**

Email: [robert.poulin@otago.ac.nz](mailto:robert.poulin@otago.ac.nz)

#### **Research interests**

- Evolutionary ecology of parasites.
- Evolution of parasite transmission strategies.
- Effect of parasites on host reproductive success (i.e. mate choice, parental care).
- Biodiversity and biogeography of parasites.
- Manipulation of host behaviour by parasites.

#### **Current projects**

- Molecular ecology of trematode parasites.
- Effect of parasites on host behaviour.
- Evolution of alternative life cycles and transmission modes in parasites.
- Parasitism, climate change and the structure of intertidal communities.



**DR NIC RAWLENCE**

Email: nic.rawlence@otago.ac.nz

**Research interests**

- Ancient DNA: megafaunal extinction.
- Phylogeography.
- Speciation.
- Paleoecology.
- Conservation paleontology.

**Current projects**

- Impact of humans and climate change on NZ's biodiversity.
- Do glaciers drive diversity? Using ancient DNA to retrace the history of NZ's biodiversity.
- Ancient DNA approaches to examine Māori marine resource utilisation.
- Testing for fisheries induced evolution using DNA from modern and ancient snapper.



**ASSOCIATE PROFESSOR BRUCE ROBERTSON**

Email: bruce.robertson@otago.ac.nz

**Research interests**

- Conservation genetics and genomics of NZ natives.
- Behavioural and molecular ecology.
- Wildlife management.
- Invasive pest management.

**Current projects**

- Conservation genetics of kakapo, kea and kaka.
- Resolving the paradox of the great speciator: silvereye population differentiation at the genomics level.
- Population genetics of the NZ storm petrel, black fronted tern, black-billed gull and white-chinned petrels.
- DNA based diet analysis of yellow-eyed penguins.
- SNP-based analysis of population structure in silvereyes, kakapo, black-billed gull, NZ sea lions, and white-chinned petrels.
- Wildlife management of New Zealand sea lion bycatch.
- Fine scale genetic structure and animal personality in NZ sea lion breeding colonies.
- Genetic management units of mammalian predators in NZ glacial valleys.



**PROFESSOR PHIL SEDDON**  
 (Director of Wildlife Management)  
 Email: philip.seddon@otago.ac.nz

**Research interests**

- Reintroduction biology, including all forms of conservation translocation.
- Restoration of threatened species.
- Spatial ecology of introduced and native species.
- Resource selection and habitat use.
- Seabird ecology.

**Current projects**

- Restoration of kaki (black stilt) populations.
- Release site selection for takahe.
- High country landscape restoration in the Mahu Whanua covenants.
- Impacts of gravel extraction on braided river birds.



**PROFESSOR LIZ SLOOTEN**  
 Email: liz.slooten@otago.ac.nz

**Research interests**

- Estimating abundance, survival and reproductive rates.
- Population viability analysis.
- Marine mammal bycatch and other environmental impacts of fishing and aquaculture.
- Effects of tourism on marine mammals.

**Current projects**

- Abundance surveys for Hector's dolphins and sperm whales.
- Population biology of Hector's dolphins and sperm whales.
- Population viability analysis for Hector's dolphin & NZ sealion.
- Assessment of the effectiveness of the Banks Peninsula Marine Mammal Sanctuary.
- Environmental effects of aquaculture.



**PROFESSOR HAMISH SPENCER**

Email: hamish.spencer@otago.ac.nz

**Research interests**

- The maintenance of genetic variation in populations.
- The evolution and population genetics of genomic imprinting.
- New Zealand molluscs.
- History of genetics, including eugenics.
- Applications of phylogenetics to New Zealand taxa (especially birds and molluscs).
- Population genetics of parental effects.

**Current projects**

- Population-genetic models of frequency-dependent selection.
- Evolution of genomic imprinting and other non-Mendelian systems.
- Population-genetic theory of genomic imprinting.
- Population-genetic models of maternal selection.
- Co-evolution of whelks and their trematode parasites.
- Phylogeny and biogeography of New Zealand landsnails.
- Eugenics in New Zealand.
- Phylogenetics of cormorants, darters and pelicans.



**ASSOCIATE PROFESSOR YOLANDA VAN HEEZIK**

Email: yolanda.vanheezik@otago.ac.nz

**Research interests**

- Ecology of wildlife in urban areas.
- Resource selection and habitat use.
- Seabird ecology.

**Current projects**

- Urban green spaces in relation to health and nature connection benefits & biodiversity conservation.
- Ageing and nature engagement.
- Predator profiling in urban habitats.
- Yellow-eyed penguin foraging ecology.

**PROFESSOR GRAHAM WALLIS** (PhD Co-ordinator)

Email: [graham.wallis@otago.ac.nz](mailto:graham.wallis@otago.ac.nz)

**Research interests**

- Molecular systematics and biogeography.
- Genetics of hybrid zones.

**Current projects**

- Evolutionary genetics and systematics of native galaxiid fish.
- Evolutionary genetics and systematics of native insects.

**PROFESSOR JON WATERS**

Email: [jonathan.waters@otago.ac.nz](mailto:jonathan.waters@otago.ac.nz)

**Research Interests**

- Ancient DNA: extinction and recolonisation.
- Genomics and evolution of alpine species.
- River capture and fish evolution.
- Marine biology and dispersal.

**Current projects**

- Long-distance rafting of kelp epifauna.
- Ancient DNA analysis of NZ's coastal vertebrates.
- Extinction and recolonization of kelp communities following tectonic uplift.
- Wing-reduction and evolution of NZ's alpine insects.



For more information on the Department of Zoology please write to:

The Departmental Secretary  
Department of Zoology  
University of Otago  
PO Box 56  
Dunedin 9054  
New Zealand

Email: [zoology@otago.ac.nz](mailto:zoology@otago.ac.nz)  
or check out our website: [otago.ac.nz/zoology](http://otago.ac.nz/zoology)



The Department commissioned this Te Rōpū logo (see above), designed by Simon Kaan, a local Ngāi Tahu artist. The image used is an adaptation of the manaia – a bird or spirit form that is an iwi guardian and protector over air, water and land. Simon Kaan represented these elements of air, water and land as the ellipses within the design.

These elements encompass the fields of study within the Department of Zoology.  
The design is in profile to represent being part of the spiritual world and part of this.



For further information contact:  
The Departmental Secretary  
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