

Animal Research Statistics Tasmania

Annual Report

Number 27 (2022)

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Department of Natural Resources and Environment Tasmania



This report has been compiled in accordance with Section 35 of the *Animal Welfare Act 1993* from animal usage statistics submitted by institutions licensed under the Act for the period 1 January 2022 to 31 December 2022.

Animal Research Statistics Tasmania Annual Report Number 27 (2022)

Animal Biosecurity and Welfare Branch

Biosecurity Tasmania

Department of Natural Resources and Environment

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Summary

This report details animal use for research and teaching purposes in Tasmania from 1st January to 31st December 2022. The summaries and analyses in this report are compiled from project data submitted by licensed institutions as required by the *Animal Welfare Act 1993*. The report complies with nationally agreed definitions for the collation of statistics of animal use for scientific purposes and includes data collected on live, non-human vertebrates and cephalopods.

Of the 58 licensed institutions required to report, 32 used animals during the reporting period, comprising 16 Tasmanian resident institutions and 16 institutions head quartered interstate. The Department of Natural Resources and Environment Tasmania (NRE Tas), The Australian Museum and Commonwealth Scientific and Industrial Research Organisation (CSIRO) were the only government departments reporting animal use in 2022. There were also 10 academic, 10 not-for-profit institutions and 9 commercial entities.

There were 2 animal ethics committees (AECs) resident in Tasmania supervising projects within the Tasmanian jurisdiction during 2022 – the NRE Tas AEC and the University of Tasmania (UTAS) AEC.

The NRE Tas AEC provided project assessment and monitoring services to 30 external licensed institutions during 2022. 17 of these external institutions reported animal use in 23 projects. The NRE Tas AEC also supervised 19 internal departmental projects that reported animal use during the reporting period.

A total of 201 individual projects were reported in 2022, which is a small decrease on the previous year when 205 projects were reported. Of these, 82 were projects involved in understanding biology and 68 were environmental studies. The remaining projects were undertaken for the purposes of education, health and welfare and/or management and production. In 2022, a total of 114,401 animals or sightings of animals were reported, recording a decrease from the 322,842 reported in 2021. Several large bird and native mammal surveys were completed in 2021 and thus these were the animal categories accounting for the majority of this decrease in animal use numbers or sightings of animals in 2022.

A project using drones to monitor wildlife on Macquarie Island was undertaken by NRE Tas in 2022. However, at the time of reporting, camera footage from this project had not yet been viewed or analysed, so relevant data was unavailable. Estimates based on past surveys were submitted, pending actual data. These estimates are noted in Table 2.4 but have not been included the animal use totals.

UTAS continued to be the most active research institution using animals for scientific purposes in Tasmania, reporting data from 130 projects representing 65% of all projects reported. The number of animals reported by UTAS decreased from 285,163 in 2021 to 83,787 in 2022. Completion of several wild bird and native mammal observational projects in 2021 accounted for most of this change. Such significant fluctuations in specific animal use from one year to the next is common in a dynamic research context.

Fish were the most numerous category recorded in 2022, accounting for 52,362 animals in 41 projects. Native mammals were the next most common animal categories reported, accounting for 28,948 of animals used. Camera trap sighting or observations with minor interference accounted for 27,395 (94.6%) of native mammal use. Birds (mainly in observational studies) accounted for 8,488 in 47 projects. Consistent with this, most animals reported were in environmental studies. Domestic mammals (mainly cattle and sheep) were used in 17 projects, involving 10,066 animals

Laboratory rodent use during 2022, involved 8,644 rats and mice. This is a decrease from the 14,686 reported in 2021. A proportion of these laboratory mammals are used in colony establishment or maintenance which fluctuates from time to time, and accounts for some of the variation in laboratory animal use numbers from year to year. The other major contributor to overall numbers was the exotic feral animal category representing 4,010 animals, of which most were camera trap sightings. Relatively small numbers of reptiles and amphibians were reported in 2022, as occurred in 2021.

Relatively low impact procedures were applied to 82.7% of animals and were utilised in 63.6% of projects in 2022. Only two projects in Tasmania in 2022, involving the eradication of feral cat species, had procedures where death was an end point or deliberate measure.

I Introduction

This report details animal use for research and teaching purposes in Tasmania from 1 January to 31 December 2022. Section 1 provides background information about the legislative requirements for reporting and how the data is compiled each year, noting any significant changes to the procedures that may affect comparisons. Section 2 outlines the animal use in Tasmania during the reporting period. Summary statistics are provided in Section 3.

I.1 Regulation of animal research in Tasmania

Animal research in Tasmania is regulated via several mechanisms:

(a) *Animal Research Legislation*

Part 4 of the *Animal Welfare Act 1993* (the Act) deals with animal research including teaching. Since proclamation of this part of the Act on 1 April 1996, institutions are required to be licensed by the Minister if they wish to use animals in research and teaching in Tasmania.

The Act allows licensed institutions to conduct animal research as approved by Animal Ethics Committees (AECs) in a self-regulatory environment. The institutions are, however, subject to inspection by Inspectors of Animal Research at least on an annual basis. In practice this is applied as an ongoing monitoring program with emphasis on ensuring the respective AECs are compliant and functioning and institutions are fulfilling their responsibilities according to the approved Code of practice.

The definition of 'animal research' in the Act is:

'a procedure, test, experiment, inquiry or study on an animal which –

- (a) is undertaken to develop, demonstrate or acquire knowledge, or techniques, in an area of science or teaching; and
- (b) is likely to have a significant adverse effect on the welfare of the animal.'

Regulation 7 of the *Animal Welfare (General) Regulations 2013* provides for an inspector to determine whether an activity is or is not animal research. A precautionary approach is used in these determinations, based on an assessment of the risk of welfare compromise from the proposed use of, for example, novel techniques, therapeutics, nutrients, or changes in habitat. It should be noted that an institution may permit their AEC to approve research activities that require approval, for example for funding or publishing purposes, that have been previously determined by the inspector not to be research.

The Act has provision for the inclusion of additional species by regulation within the meaning of 'animal' for particular purposes under the Act. The class *Cephalopoda* which includes octopus, cuttlefish, nautilus and squid, was afforded this status of 'animals' for the purposes of research in January 2009. The reporting of cephalopods has been mandatory since then.

(b) *The Code*

A core condition of licensing is compliance with the approved Code of Practice. Currently this is the nationally agreed *Australian Code for the Care and Use of Animals for Scientific Purposes 8th edition (2013)* (the Code). The Code and associated reference documents are published by the National Health and Medical Research Council (NHMRC) and provide specific requirements and guidance for the use of animals for scientific purposes to investigators, teachers, institutions and AECs. The eighth edition of the Code received Ministerial approval in October 2013, superseding the seventh edition. The Code was updated in 2021 to incorporate a new Section 7: Cosmetic Testing. No change in statistical reporting came about as a result of the new Code coming into operation.

The Code requires that a decision to use animals must be properly justified, and animals may only be used after due consideration of the '3Rs' (replacement, reduction and refinement). The principles of the '3Rs' are, in brief, that animals may only be used where there are no alternatives enabling **replacement** of animals with other methods; where **reduction** is applied such that the number of animals used is absolutely necessary to achieve the aims of the project; and where **refinement** of techniques is used to reduce the welfare impact on animals approved for use and promote the animals' wellbeing.

Provided research and teaching activities are properly approved and monitored within a licensed institution by its AEC, and the institution, its AEC and researchers and teachers comply with the Code, the use of animals for research and teaching is protected from sections 8 and 9 of the Act (cruelty and aggravated cruelty). While sections 8, 9 and 10 of the Act do not apply to the reasonable use of fish in commercial and recreational activities, the research provisions do apply to aquatic vertebrates and cephalopods as well as terrestrial vertebrates.

Research project proposals are examined, approved and monitored by an AEC that has been constituted and authorised by the institution in compliance with the approved Code. Institutions that have too few projects or are not sufficiently resourced to have their own AEC may use the services of another institution's AEC. For instance, in 2022, 30 external institutions were approved to use the NRE Tas AEC services for project assessment and monitoring: of these institutions, 17 used animals in the reporting period.

(c) Licensing

Any individual or organisation may apply to be a licensed 'institution' for the purposes of conducting animal research in Tasmania. The conditions of the licence require compliance of the institution and any persons under its auspices with the Tasmanian animal welfare legislation and the approved Code.

Licence applicants from outside Tasmania must agree to comply with the Code and provide evidence that they are equivalently licensed in their resident jurisdiction to ensure adequate monitoring of their AEC's compliance with the Code by an equivalent regulator.

Institutions that share another institution's AEC must do so via a formal sharing agreement that complies with the principles set down in the Code and that also address any other issue specific to the host or external institution.

(d) Annual reporting

Institutions are required to provide an annual report to the Minister on their activities in relation to animal research under section 35 of the Act. The report is to contain *the numbers and types of animals used and the types of animal research carried out*. A report summarising the institutional reports (this document) is to be tabled in both Houses of Parliament prior to 30 September each year.

(e) Inspectors

The Minister appoints inspectors under section 36 of the Act. Inspectors advise the Minister on matters relating to the granting and cancellation of licenses, the conduct of the AECs and general compliance with the approved research Code of Practice. The monitoring of compliance includes the inspection of animal holding facilities within each institution, attending meetings of AECs and the collation of the annual State report. Inspectors have specific powers to investigate suspect non-compliance with the animal research provisions of the Act.

(f) Permits for wildlife and fisheries

Institutions intending to use wildlife, including native fish, for scientific purposes must also apply to the NRE Tas Environment Heritage and Land Division and Inland Fisheries Service for appropriate permits.

1.2 Annual reporting in Tasmania

A reporting format was developed by the then Code Liaison Group (now known as the Code Reference Group or CRG) of the NHMRC for the purpose of compiling annual national statistics. It was endorsed by the Tasmanian Animal Welfare Advisory Committee as suitable for State reports to avoid NHMRC-funded institutions having to duplicate reporting effort.

During 2007, regulators from all states and territories agreed on an amended animal category and type list with animals grouped into more logical categories. This list was supported by the CRG and was used for the 2007 report in Tasmania and nationally from 2008. The calendar year reporting period is used as it is consistent with most other agencies collecting animal use statistics.

Data is submitted by the responsible investigator for each project during the calendar year and collated into a standard spread sheet by their institution. If no animals were used in the reporting period despite approval to do so, the project is not included in this report.

Meaningful reporting of wild animal use that may be described as using indirect or proxy procedures, such as the collection of feathers from vacated nests, remains a contentious area and is best resolved on a case-by-case basis by the AEC involved during the project approval process where factors such as animal disturbance and damage to habitat can be explored.

Only animals used in the Tasmanian jurisdiction are required to be noted in this report. There are, however, animals used in other jurisdictions or Commonwealth waters that are reported by licensees where they have no alternative means of reporting. Where these reports impact significantly on the data or interpretations presented in this report they are noted.

Each jurisdiction collects data on animals that fall within its legislative scope. If comparing data across jurisdictions, it should be noted that, for example, fish or cephalopods may not be required to be reported in some jurisdictions. Similarly, Tasmania does not require reporting of decapod crustaceans although 'crustaceans' are included if reported.

The Tasmanian animal use statistics are published on the NRE Tas website once they have been tabled in Parliament (<https://nre.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-welfare/animal-research/#Annualreportingofanimalusestatistics>). Most other Australian jurisdictions also publish a summary report at least. A national repository of animal use statistics is no longer maintained.

1.2.1 Explanation of the reporting format

The reporting spread sheet requires the selection of one option from a drop-down list in each of the three main areas listed below (purposes, procedures, and animals). All projects are reported separately.

A project sometimes has multiple purposes, and it is quite common for a project to deploy multiple procedures and use multiple animal categories, and these are reported separately for each project. Examples of the types of activities that should be reported within each procedure group are provided in the reporting spread sheet to improve reporting precision.

Like previous reports, animals may be deployed to or simply observed in multiple projects in the reporting period. This leads to a degree of double counting that cannot be avoided. The overall number of individual animals used is therefore likely to be an overestimate and may be more precisely understood to be 'uses'. The numbers reported against purposes and procedures are considered accurate, however.

The inclusion of comments within the reporting format enables some contextualisation of the animal use and assists with resolving double counting issues.

1.2.2 Application of categories

Animal categories - within each animal category there are several types. Sub-types may also be included where it is considered they are of particular interest to the State. For reporting purposes, the term 'animal' covers fully metamorphosed juveniles, embryos in the latter half of gestation, eggs in the latter half of incubation and larval fish that can feed independently. This definition complies with the National Statistics of Animal Use for Scientific Procedures and is consistent with the Code. All life stages of relevant species are included under the Act, however.

The categories routinely reported against are:

- Amphibians
- Aquatic animals (non-mammalian)
- Birds
- Domestic mammals (including livestock species)
- Exotic feral mammals
- Exotic zoo animals
- Laboratory mammals

Native mammals (including marine mammals)

Primates

Reptiles

Projects involving exotic zoo animals or primates have not been conducted in Tasmania for some time although those options remain available.

Purpose of Project – categorises the reason/s for the study.

Understanding Biology eg comparative anatomy studies, animal physiology, adaptations of wild animals, wildlife survival studies.

Health and Welfare eg cancer research, drug therapy, residue and toxin testing, vaccine development.

Management or Production eg effect of nutrition supplements, evaluating husbandry techniques, animal production trials.

Education eg classroom studies on animal behaviour or physiology.

Environmental Study eg population surveys, acquisition of museum specimens.

Procedures used – broadly describes the severity of the procedures used (ie the impact on the animal).

The following procedures are reported on:

Camera Trapping Only: This category was introduced in the 2014 report. It was previously included in *Observation Involving Minor Interference*). It refers to studies exclusively using continuous or motion-triggered photographic recording of animals via fixed cameras with or without lures/baits in the aquatic or terrestrial environment. Note that camera trap numbers relate to sightings rather than individual animals as it is usually not possible to differentiate between individuals of the same species.

Observation Involving Minor Interference: studies in which the normal activities of animals are impacted in a minor way.

Examples of Observation Involving Minor Interference:

- Wildlife studies involving repeated spotlighting or intrusion into groups of animals or nursing animals.
- Feeding trial, such as Digestible Energy determination of feed in a balanced diet.
- Behavioural study with minor environmental manipulation.
- Teaching of normal, non-invasive husbandry such as handling, grooming, etc.
- Production of products, such as hormones or drugs, in milk or eggs from genetically modified animals that are subject to normal husbandry procedures only.

Note some observational data collection has no conceivable impact on animals. For instance, the detection of bat species by recording echolocation calls or collection of scats in the wild environment. Where an institution identifies and reports such activity it is recorded against their name but no further reference is made in the report.

Minor Conscious Procedure: animal is subjected to minor procedures that would normally not require anaesthesia. Any pain is minor or short term and analgesia is usually considered unnecessary although it may be used; some distress may occur as a result of trapping or handling.

Examples of Minor Conscious Procedure:

- Tail tipping and toe clipping for identification of animals.
- Injections, blood sampling in conscious animal.
- Minor dietary or environmental deprivation or manipulation, such as feeding nutrient-deficient diets for short periods.
- Trapping and release as used in species impact studies, etc.
- Trapping and humane euthanasia for collection of specimens.
- Shearing and similar livestock management practices.

Minor Operative Procedure with Recovery: animal is rendered unconscious, with as little pain or distress as possible. A minor procedure such as cannulation or skin biopsy is carried out and the animal is allowed to recover. Depending on the procedure, pain may be minor or moderate and post-operative analgesia may be appropriate.

Field capture using chemical restraint methods is also included here.

Examples of Minor Operative Procedure with Recovery:

- Biopsies under anaesthesia or sedation.
- Cannulations under anaesthesia or sedation.
- Sedation/anaesthesia for relocation, examination, or injections/blood sampling.

Major Surgery With Recovery: generally, animal is rendered unconscious, with as little pain or distress as possible. A major procedure such as abdominal or orthopaedic surgery is carried out and the animal allowed to recover. Post-operative pain is expected to be considerable and requiring analgesia if possible.

Examples of Major Surgery with Recovery:

- Orthopaedic surgery.
- Abdominal or thoracic surgery.
- Transplant surgery.

Minor Physiological Challenge: animal remains conscious for some or all of the procedure. There is interference with the animal's physiological or psychological processes. The challenge may cause only a small degree of pain/distress or any pain/distress is quickly and effectively alleviated.

Examples of Minor Physiological Challenge:

- Minor infection, minor or moderate phenotypic modification, early oncogenesis.
- Arthritis studies with pain alleviation.
- Prolonged deficient diets, induction of metabolic disease.
- Polyclonal antibody production.
- Antiserum production.

Major Physiological Challenge: animal remains conscious for some or all of the procedure. There is interference with the animal's physiological or psychological processes. The challenge causes a moderate or large degree of pain/distress which is not quickly or effectively alleviated.

Examples of Major Physiological Challenge:

- Major infection, major phenotypic modification, oncogenesis without pain alleviation.
- Arthritis studies with no pain alleviation, uncontrolled metabolic disease.
- Isolation or environmental deprivation for extended periods.
- Monoclonal antibody raising in mice.

Animal Unconscious Without Recovery: the animal is rendered unconscious under controlled circumstances with as little pain or distress as possible. Any pain is minor and brief and does not require analgesia. Procedures are carried out on the unconscious animal that is then killed without regaining consciousness.

Examples of Animal Unconscious Without Recovery:

- Laboratory mammals killed humanely for dissection, biochemical analysis.
- Teaching surgical techniques on live, anaesthetised animals that are not allowed to recover following the procedure.

Note that in Tasmania research involving trawling of wild fisheries is included within this procedural group as it is considered to describe more accurately the impact on the individual animal captured this way. Although trawling results in the death of most animals captured, death is not a measure in itself and is thus not considered to be a 'death as the end point' activity (see below).

Death as the End Point: the aim of the experiment requires the animal to die unassisted, ie not euthanased, as death is a critical measure of the experimental treatment.

Examples of Death as the End Point:

- Toxicological experiments (eg ascertaining LD50s)
- Assessing the relative resistance to the effects of infections if euthanasia cannot be provided at any stage to achieve the aim of the experiment.

2 Animal research activities for 2022

2.1 Institutions

There were 58 licensed institutions required to report animal use during 2022. They are listed below.

ADE Consulting Group (QLD) Pty Ltd, Queensland (no animal use in 2022)

Apiam Animal Health, Victoria (no animal use in 2022)

Australian Museum, New South Wales

Australian National University (ANU), Australian Capital Territory

Australian Ocean Biotechnology Pty Ltd, Tasmania (no animal use in 2022)

Biosis Pty Ltd, Victoria (no animal use in 2022)

Birdlife Tasmania (Birdlife), Tasmania

Bush Heritage Australia, Victoria

Central Queensland University, Queensland (no animal use in 2022)

Charles Sturt University, New South Wales

Commonwealth Scientific and Industrial Research Organisation, (CSIRO)

DairyTas, Tasmania

Dawbuts Pty Ltd, NSW

Deakin University (Deakin), Victoria

Department of Natural Resources and Environment Tasmania (NRE Tas), Tasmania

Derwent Estuary Program (DEP), Tasmania

Eco Logical Australia Pty Ltd, New South Wales (no animal use in 2022)

Elanco, New South Wales (no animal use in 2022)

Entura (Hydro Tasmania Group), (Entura), Tasmania

Fonterra Co-operative Group Limited, Victoria

Freshwater Biomonitoring (Freshwater), Tasmania

Friends of Maatsuyker Island (FoMI), Tasmania

Gallagher eShepherd Pty Ltd (formerly Agersens IC Pty Ltd), Queensland (no animal use in 2022)

GHD Tasmania Pty Ltd (GHD), Tasmania

Gray, Paul, (Independent researcher), Tasmania

Huon Aquaculture Co Pty Ltd, Tasmania (no animal use in 2022)

Jacobs Group, Victoria (no animal use in 2022)

James Cook University, Queensland (no animal use in 2022)

Jurox Pty Ltd, New South Wales (no animal use in 2022)

Macquarie University (Macq Uni), New South Wales

Monash University (Monash), Victoria (no animal use in 2022)

Mooney Nick Independent researcher, Tasmania

Murdoch University (Murdoch), Western Australia

Natural Resource Management – South (NRM Sth), Tasmania

Natural Resource Management –North (NRM Nth), Tasmania

Nature Advisory P/L, Victoria
 New South Wales Department of Primary Industries, New South Wales (no animal use in 2022)
 North Barker Ecosystem Services (North Barker), Tasmania
 Pinion Advisory, Tasmania (no animal use in 2022)
 Pocus Team (Point of Care Ultrasound Scanning), New South Wales (no animal use in 2022)
 Robertson, Dr Bruce Ingram, (Independent researcher), Victoria (no animal use in 2022)
 Scibus, New South Wales (no animal use in 2022)
 Sustainable Timber Tasmania (STTAS), Tasmania (no animal use in 2022)
 Tasmanian Land Conservancy, Tasmania
 TasNature (Peter Tonelli), Tasmania
 Tassal Operations Pty Ltd (Tassal), Tasmania (no animal use in 2022)
 Treidlia Biovet Pty Ltd (Treidlia), New South Wales (no animal use in 2022)
 University of Adelaide (UAdelaide), South Australia
 University of New England, New South Wales (no animal use in 2022)
 University of New South Wales (UNSW), New South Wales
 University of Queensland (UQLD), Queensland (no animal use in 2022)
 University of Sydney (USydney), New South Wales
University of Tasmania (UTAS), Tasmania
 University of Technology Sydney, New South Wales (no animal use in 2022)
 Victorian Department of Energy, Environment and Climate Action DEECA (formerly Victorian Department of Jobs, Precincts and Regions), Victoria (no animal use in 2022)
 Victorian Wader Study Group Inc (VWSG), Victoria
 Western Sydney University, New South Wales
 Zoetis Australian Research and Manufacturing, New South Wales, (no animal use in 2022)

There were two AECs resident in Tasmania (NRE Tas and UTAS) in 2022. While the Australian Antarctic Division's AEC is also resident in Tasmania, the Division was not licensed in Tasmania during 2022 as it was not conducting animal research within the Tasmanian jurisdiction.

Of the 58 licensed institutions, 32 reported animal use in Tasmania in 2022. The active institutions comprised 16 Tasmanian resident and 16 head quartered interstate.

The number and variety of institutions conducting animal research in Tasmania fluctuates according to academic and commercial interests for the period. Licensed institutions include the CSIRO, environmental consultants, corporate farmers, individuals, or not-for-profit organisations as well as the conventional academic and government research entities.

The 16 Tasmanian resident institutions using animals in 2022 comprised 1 academic institution (UTAS), 1 government department (NRE Tas), 6 commercial entities and 8 not-for-profit organisations. Interstate institutions using animals comprised two Australian Government entities, 9 academic institutions, 3 commercial entities, and 2 not-for-profit organisation. There were no overseas institutions licensed in the state during 2022.

Table 1 lists the institutions that used animals and the categories and numbers of animals involved, including a comparison with 2021 data. Table 2.1 summarises animal categories used; Table 3 provides detail on the types of animals used by each institution, and Figure 1 provides a 5-year visual comparison.

In 2022, 114,401 animals or sightings of animals were reported within 201 projects (compared to 322,842 in 205 projects in 2021).

The major contributor to this decrease in animal use over 2021 figures, was a decrease in the numbers of birds (see sections 2.2 and 2.4) reported in camera trapping projects.

Changes in the number of individual projects provides a rough guide to the level of activity an institution is engaged in or the level of interest an animal category or purpose is attracting from one reporting period to the next. This report includes figures illustrating the relative level of activity over the past five years in terms of project number per categories of animals (Figure 2), purposes (Figure 4) and procedures (Figure 6). Care should be taken interpreting this data on an institutional basis as projects may be the result of a licensed institution contracting or otherwise collaborating with another licensee ('lead' institution) to provide the research service entirely or a proportion of projects. The data from collaborative projects is therefore reported by the 'lead' institution to avoid double counting and maintain commercial-in-confidence.

UTAS continued to be the most active institution in Tasmania during 2022, with 130 or 65% of all projects reported (Table 1), compared to 131 projects in 2021, using or sighting 83,787 animals. All animal categories except amphibians were represented in the UTAS report. The number of animals reported by UTAS in 2022 was decreased compared to the number of animals used or sighted in 2021 (285,163). The decrease was due mainly to decreased sightings recorded in wild bird observational projects.

The NRE Tas Environment, Heritage and Land Division and Biosecurity Tasmania reported animal use in 10 and 9 projects respectively identifying a total of 14,047 animals or 12.3% of all animals reported in 2022. In 2021, 16,545 animals were reported in 7 and 10 projects respectively. NRE Tas projects included a wide variety of subjects from the management of stranded cetaceans, Tasmanian devil and orange bellied parrot conservation to the development of salmonid fish vaccines and feral cat control strategies.

One of the environmental projects undertaken by NRE Tas in 2022 involved the use of drones to monitor wildlife on Macquarie Island. Procedures in this project involved observation and image capture via unmanned Aerial Vehicle (UAV), with no direct handling of animals. However, at the time of reporting, camera footage from this project had not yet been viewed or analysed, so relevant data was unavailable. Estimates based on past surveys were submitted, pending actual data. These estimates (< 7,700 native mammals and <1,000,250 wild birds) are noted in Table 2.4 but have not been included in the animal use totals.

Projects conducted by commercial entities involved aquatic animals in ecological surveys of waterways for various development or monitoring purposes, fauna and bird surveys for terrestrial development purposes and sheep and cattle in projects aimed at improving sheep and cattle health, welfare, and production.

In 2022, all not-for-profit organisations reporting animal use in 2022 were supervised by the NRE Tas AEC and accounted for 3,265 animals (compared to 4,933 animals in 2021) in 12 projects. Of these projects, 7 involved wild bird research and 5 involved native wildlife research.

Ten academic institutions were active in Tasmania during 2022. Apart from UTAS, academic institutions reported a total of 5,187 animals (compared with 3,197 were reported in 2021), with each institution having between 1 to 3 projects targeting a small range of animal categories, with aquatic animals, birds, domestic and native mammals featuring.

Of the 30 external licensees using the NRE Tas AEC in 2022, 17 reported animal use, totalling 6,574 animals in 23 projects. Commercial enterprises using the NRE AEC (Dairy Tas, Entura, Freshwater, Fonterra, Nick Mooney, Nature Advisory and North Barker) reported a total of 3,309 animals across 11 projects.

CSIRO undertook 4 projects in Tasmania in 2022 involving 4,336 animals (448 birds and 3888 fish). Australian Museum also undertook research in Tasmania involving the use of 25 amphibia.

2.2 Animal categories

Tables 1 and 2.1 summarise the number of animals and projects reported within animal categories for 2022. Table 3 provides detail on the types of animals within each category used by each institution. Figures 1 and 2 illustrate a rolling 5 year distribution of animals and projects respectively within animal categories.

Aquatic animals was the most commonly reported category with 52,362 animals in 2022, which is a slight decrease from the number (60,812) used in 2021. The number of projects using aquatic animals decreased from 51 in 2021 to 41 in 2022 but was still the third most active area of research for 2022 in project terms. The largest user of aquatic animals was UTAS with a total of 42,633 (compared to 51,672 in 2021), all of which were fish. No use of cephalopods was reported in 2022 (168 cephalopods were reported in 2021 by UTAS and in 2020 26,363 cephalopods were reported in a single project.) Aquatic research projects included a range of subjects including the development of fish vaccines, aquaculture production, feral fish species control strategies, conservation strategies for threatened marine species, impacts of climate change on marine species and ecological surveys. One project, using 5,540 zebra fish, is an example of the increasing use of 'laboratory' fish in the field of biomedical research. Currently crustaceans do not need to be reported. However, sometimes institutions may include crustaceans' numbers despite this not being a requirement. If reported, these animal numbers are usually included in this report for interest. In 2022 no use of crustaceans was reported (In 2021 UTAS reported crustacean use in 3 projects involving 446 animals)

Native mammals were the most active area of research for 2022 in terms of project numbers. There were 54 projects using native mammals, up from 44 in 2021, Native mammals were also the second most common category in terms of animal numbers, with 28,948 being reported. This is a large decrease from the 168,318 native mammals reported in 2021 when several UTAS projects reported large numbers of native mammal camera trap sightings. One project alone in 2021, using camera traps only, accounted for 134,000 native mammal sightings. In 2022 UTAS projects accounted for 18,115 native mammals reported. In addition to this, based on previous surveys, it is estimated that the NRE Tas project using drones on Macquarie island to monitor wildlife, may have captured images of up to 7,700 seals, though this data has not been confirmed and therefore is not included in the animal use totals above. As in previous years, camera trap sightings, observational studies and environmental surveys accounted for most of the native mammal animal use in 2022.

Birds accounted for 8,488 animals used in 2022. This also is a large decrease from the 52,806 reported in 2021. There was also small decrease in the number of projects using birds, from 54 in 2021 to 47 in 2022. Fluctuations in specific animal use and sightings from one year to the next is common in a research context, particularly in projects recording wild bird camera trap sightings. One UTAS project in 2021, using camera traps only, accounted for 34,000 bird sightings that year. It is estimated that the NRE Tas project using drones on Macquarie island to monitor wildlife, may have captured images of up to 1,000,250 wild birds, However this estimate is based on past surveys rather than current project data, so has not been included in the animal use totals above. In 2022 projects involving birds included conservation requirements and ecological studies of Tamarian threatened species, the impact of human activities on wild bird populations and mapping migration patterns.

Laboratory mammal use involved 8,644 mammals (all rodents) in biomedical research in 2022. This was a 41% decrease on 2021 figures when 14,686 laboratory mammals were reported. (but was similar to 7,258 reported in 2020). Some of these fluctuations in animal use numbers may occur due to colony establishment and maintenance, which varies from time to time. The number of animals maintained in breeding colonies fluctuates with specific project requirements and is therefore highly unpredictable. There were 34 projects using laboratory mammals in 2022, which is the same number of projects using laboratory mammals reported in 2021. Some 484 rats and mice were used for training and assessment of rodent experimental techniques.

Exotic feral mammal use involved 4,010 animals, which was less than that reported in 2021 (16,067). In 2021, 98% were camera trap sightings. Most projects in 2022 involved camera trap sightings or observation with minor interference procedures. The projects involved mainly cats, rabbits, hares, rats and mice.

Domestic mammal use in 2022 involved 10,066 head used in 17 projects, which is an increase on the number reported in 2021 (8,538 in 16 projects). The majority were reported in livestock management projects, aimed for instance, at grazing behaviour, improved animal welfare or breeding success of terrestrial livestock species.

Reptile use in 2022 involved 1,858 lizards and other reptile species, in 16 projects, up from 1,598 reptiles used in 13 projects in 2021. UTAS projects accounted for most (over 99%) of the reptiles reported in 2022. The remainder were reported as part of ecological surveys.

Amphibian use in 2022 involved 25 frogs in one project undertaken by The Australian Museum. Commercial organisations undertaking environmental and ecological surveys were the only users of amphibians in 2021, reporting 17 frogs across 2 projects. None were reported by commercial organisations in 2022.

2.3 Purposes

Table 2.2 summarises the research and teaching purposes for which animals were used during 2022. Figure 3 and 4 illustrates a rolling 5-year distribution of animals and projects respectively within purposes. Table 4 presents detail on the purposes and procedures applied to animal types within categories.

Environmental studies used 63,915 animals (or 56%) in 2022. This is a substantial decrease in the number of animals used or sighted for this purpose compared to that used or sighted in 2021 (224,807). However, the number of projects (68) increased compared to the 58 projects undertaken in 2021 for this purpose. Environmental projects involved large numbers of macropods, wild birds, fish, and possums, however, almost all animal categories and types were represented.

Understanding biology projects used 22,112 animals in 82 projects in 2022, compared to 40,784 animals and 79 projects in 2021. This is a decrease in animal use numbers and continues to reverse the upward trend that had been occurring in the 3 years prior to 2021. Fish (6,169), native mammals (7,266) and wild birds (2,088) featured, accounting for over 70% of animals reported in this type of project.

Management and production research accounted for 12,993 animals used in 16 projects, compared to 38,116 animals in 24 projects in 2021. The majority of animals used for this purpose were fish (5,991), cattle (3,969), followed by laboratory mice and rats (2,672 and 360 respectively), as part of rodent colony management, maintenance and breeding projects. Of the 21,748 fish recorded in this category in 2021, 16,510 were camera trap sightings in a single UTAS camera trap project (with the remainder mostly farmed salmonids), which accounts for the difference in animal use numbers in this category over the two year period.

Health and welfare studies reported a decreased level of animal use in 2022 (10,062 animals) when compared to that used in 2021 (15,771). The number of projects conducted for this purpose also decreased from 43 in 2021 to 33 in 2022. As has been the case for several years, the majority of projects and animals used in this area were livestock (5,049 in 2022 compared with 1,661 in 2021), fish (3,582 in 2022 compared with 12,011 in 2021), or laboratory mice and rats (901 in 2022 compared with 1,152 in 2021) aimed at improving salmonid, livestock or human health and welfare respectively.

Education projects reported for 2022, used slightly greater number of animals (5,420) to those reported in 2021 (4,951), and involved ten projects. 484 of animals used in this category were laboratory rodents used in the training of experimental techniques. Observational fauna surveys undertaken as part of a teaching program by UTAS accounted for majority of animal use (3,018) in this category. 481 fish, 304 birds and 864 domestic mammals were also used or sighted in educational projects.

2.4 Procedures

Table 2.3 summarises the procedures used on animals during 2022. Figures 5 and 6 illustrate rolling 5-year distributions of animals and projects respectively, according to various procedural categories. The procedures are listed below in descending order of animal use; procedures are listed in the tables in ascending order of welfare impact.

Observation with Minor Interference procedures were applied to 65,899 animals in 80 projects in 2022. This is an increase on 2021 figures of 44,975 animals in 78 projects. Birds (6,097), domestic mammals (9,358), native mammals (10,788) and aquatic animal (36,139) surveys were the main users of observational procedures in 2022.

Camera Traps Only sightings decreased markedly during 2022 with 19,628 sightings reported in 14 projects. This is compared to 221,177 sightings in 20 projects in 2021. The vast majority of sighting were recorded in environmental projects, with the remainder in management and production projects. Most sightings were of native mammals (16,501) followed exotic feral mammals (1,703) and by birds (1,236). No fish were recorded in camera trap projects in 2022

Animal Unconscious, No Recovery procedures were applied to 16,191 animals in 58 projects. While the number of projects using these procedures, is greater than that in 2021 (50 projects), the number of animals used in these projects was less than in 2021 (29,677). These procedures were applied mainly to fish (10,995) and laboratory mammals (5,070) as has been the case for several years. With regard to aquatic animals, these procedures were applied in wild fisheries, aquaculture disease management and production projects and a biomedical project involving zebrafish. The large representation of laboratory mammals is consistent with the invasive nature of some biomedical research where recovery is not in the interests of the animal.

Minor Conscious Procedures were applied to 11,343 animals across 62 projects in 2022, which was an increase in relation to the number of projects but a decrease in relation to the number of animals used compared to 2021 figures (20,375 animals used in 55 projects). These procedures were applied mainly to aquatic animals (4,440) laboratory mammals (3,188), native mammals (1,550), birds (1,141) and cattle and sheep (430). A number of the projects involving laboratory mammals in this category were addressing routine laboratory rodent colony maintenance. Minor conscious procedures were also applied in projects addressing, population monitoring (eg via bird banding and telemetry), domestic and wild animal disease and genetic surveillance, and habitat use.

Major Physiological Challenge was applied to 2,792 animals in 6 projects in 2022. This was a decrease in both project numbers and animal use numbers compared to the 5,974 animals used in 11 projects in 2021. As for previous years, the majority of projects using these procedures were concerned with farmed salmonid disease prevention, accounting for 2,632 animals reported. Laboratory rodents accounted for the remaining animals subjected to this procedure (51 mice and 109 rats).

Minor Operative Procedures With Recovery were applied to 1,201 animals. This is a decrease on 2021 figures (2,844 in 2021). There was a slight increase in the number of projects using this procedure, with 17 in 2022 (compared to 14 in 2021). These procedures are generally applied to a wide range of animals as they include anaesthesia with recovery – a common procedure for restraining wild mammals, fish, and birds. In 2022 81% of animals subjected to these procedures were fish species addressing specific disease issues.

Minor Physiological Challenge was applied to 108 animals across 3 projects in 2022. A cattle project accounted for 90 of animals reported in this category, with farmed fish accounting for 15 animals and laboratory mice accounting for a further 3 animals. These procedures were applied to 2,915 animals across 7 projects in 2021.

Major Surgery With Recovery procedures were applied to 58 animals in 2022 in 8 projects. (In 2021 these procedures were applied to 80 animals in 5 projects). These procedures were applied exclusively to mice involved in neuropathology research.

Death as the End Point procedures are rarely used in Tasmania. Only two projects, involving the eradication of feral cat species, had procedures where death was an end point or deliberate measure in Tasmania in 2022.

The relatively low impact procedures of *Camera traps only*, *Observation with Minor Interference*, *Minor Conscious Procedure*, and *Minor Physiological Challenge* were applied to 82.7% (or 96,978) animals and in 63.6% of projects in 2022.

3 Tables and figures All summarised data is displayed in this section.

Table 1 Summary of animal categories used by institutions in 2022

Institution	Project number	Amphibia	Aquatic animals	Birds	Domestic mammals	Exotic feral mammals	Lab mammals	Native mammals	Reptiles	Total
Australian Museum	1	25								25
ANU	2			286						286
Birdlife Tas	2			1547						1547
Bush Heritage Aust	1					39		177		216
Charles Sturt Uni	1			150						150
CSIRO	4		3888	448						4336
DairyTas	1				230					230
Dawbuts	3				290					290
Deakin Uni	2			1040						1040
DEP	1			81						81
Entura	1		1609							1609
Fonterra	1				920					920
Freshwater Bio	1		83							83
FoMI	1			1062						1062
GDH Tas	6			5				150		155
Gray, Paul	1							1		1
Macq Uni	2		15	5						20
Mooney, Nick	1			20						20
Murdoch Uni	3			1		7		291		299
NRE Tas	19		3885	151		268		9743		14047
NRM Nth	1			38						38
NRM Sth	1							0		0
Nature Advisory	3			182				155		337
North Barker	3							106	4	110
Tas Nature	1			56						56
TLC	2							114		114
UAdelaide	2				3025	6				3031
UNSW	1		249							249
USydney	1							96		96
UTAS	130		42633	3250	5601	3690	8644	18115	1854	83787
VWGS	1			150						150
WestSyd Uni	1			16						16
2023 Totals	201	25	52362	8488	10066	4010	8644	28948	1858	114401
2022 Totals	205	17	60812	52806	8538	16067	14686	168318	1598	322842

Table 2 Animal categories, purposes and procedures in 2022

Table 2.1 Animal categories used in 2022

Animal category	Animals per category	Projects per category *
Amphibia	25	2
Aquatic animals	52362	41
Birds	8488	47
Domestic mammals	10066	17
Exotic feral animals	4010	24
Lab mammals	8644	34
Native mammals	28948	54
Reptiles	1858	16
Total	114401	* 235

***A project may use multiple animal categories. See body of report Section 1.2.1**

Table 2.2 Research and teaching purposes used in 2022

Purpose	Animals per purpose	Projects per purpose *
Education	5420	10
Environmental study	63915	68
Health & welfare	10062	33
Management & production	12993	16
Understanding biology	22112	82
Total	114502*	209*

***A project may have multiple purposes. See body of report of report Section 1.2.1**

Table 2.3 Research and teaching procedures used in 2022

Procedure	Animals per procedure*	Projects per procedure*
Camera Traps only	19628	14
Observation with minor interference	65899	80
Minor conscious procedure	11343	62
Minor physiological challenge	108	3
Minor operative procedure with recovery	1201	17
Major physiological challenge	2792	6
Major surgery with recovery	58	8
Animal unconscious no recovery	16191	58
Death as end point	7	2
Total	117,227*	250*

*A project may use multiple procedures. See body of report section 1.2.1

Table 2.4 Estimate animal use numbers for Wildlife Monitoring Project, Macquarie Island #

Institution	Procedure	Purpose	Category	Type	No. Animals
NRE	Observation with minor interference	Environmental Study	Native Mammals	Seals	< 7,700
			Native Wild Birds	Birds	< 1,000,250

#The numbers above are estimates only based on previous surveys (actual data is still to be determined following footage analysis), so animal use numbers from this project were not included in the total animal use numbers for 2022, but are noted here, pending actual results.

Table 3 Summary of animal types used by institutions in 2022

Institution>	Aust Museum	ANU	Birdlife Tas	Bush heritage	Charles Sturt	CSIRO	DairyTas	Dawbuts	Deakin uni
Amphibia									
Amphibia	25								
Aquatic animals									
Cephalopods									
Crustaceans									
Fish						3888			
Other Aquatic Animals									
Birds									
Exotic wild									253
Native captive									
Native wild		286	1547		150	448			787
Other birds									
Poultry									
Domestic Mammals									
Cats									
Cattle							230	90	
Deer									
Dogs									
Goats									
Horses									
Pigs									
Sheep								200	
Exotic feral Mammals									
Cats				1					
Mice				38					
Other exotic feral mammals									
Pigs									
Rabbits									
Rats									
Laboratory mammals									
Mice									
Rats									
Native Mammals									
Cetaceans									
Echidna				3					
Macropods				91					
Native Rats and Mice									
Other Native Animals									
Platypus									
Possums and Gliders				11					
Quoll				2					
Tasmanian Devils				16					
Wombats				54					
Reptiles									
Lizards									
Total	25	286	1547	216	150	4336	230	290	1040

Table 3 Summary of animal types used by institutions in 2022

Institution>	DEP	Entura	Fonterra	Freshwater Bio	FoMI	GHD	Gray, P	Macq Uni	Mooney,
Amphibia									
Amphibia									
Aquatic animals									
Cephalopods									
Crustaceans									
Fish		1609		83				15	
Other Aquatic Animals									
Birds									
Exotic wild									
Native captive									
Native wild	81				1062	5		5	20
Other birds									
Poultry									
Domestic Mammals									
Cats									
Cattle			920						
Deer									
Dogs									
Goats									
Horses									
Pigs									
Sheep									
Exotic Feral Mammals									
Cats									
Mice									
Other exotic feral mammals									
Pigs									
Rabbits									
Rats									
Laboratory mammals									
Mice									
Rats									
Native Mammals									
Cetaceans									
Echidna									
Macropods						150			
Native Rats and Mice									
Other Native Animals							1		
Platypus									
Possums and Gliders									
Quoll									
Tasmanian Devils									
Wombats									
Reptiles									
Lizards									
Total	81	1609	920	83	1062	155	1	20	20

Table 3 Summary of animal types used by institutions in 2022

Institution>	Murdoch Uni	NRE Tas	NRM Nth	NRM Sth	Nature Advisory	North Barker	Tas Land Cons
Amphibia							
Amphibia							
Aquatic animals							
Cephalopods							
Crustaceans							
Fish		3885					
Other Aquatic Animals							
Birds							
Exotic wild							
Native captive							
Native wild	1	151	38		182		
Other birds							
Poultry							
Domestic Cats							
Cattle							
Deer							
Dogs							
Goats							
Horses							
Pigs							
Sheep							
Feral Cats	2	267					
Mice							
Other exotic feral mammals							
Pigs							
Rabbits							
Feral Rats	5	1					
Laboratory mammals							
Mice							
Rats							
Cetaceans		48					
Echidna		21					
Macropods	221	4146			155		
Native Rats and Mice							
Other Native Animals	35	2					
Platypus	28						
Possums and Gliders	7	5380		0			
Quoll		146					114
Tasmanian Devils						106	
Wombats							
Reptiles							
Lizards						4	
Total	299	14047	38	0	337	110	114

Table 3 Summary of animal types used by institutions in 2022 continued

Institution	Tas Nature	UAdelaide	UNSW	USyd	UTAS	VWGS	UWestSyd
Amphibia							
Amphibia							
Aquatic animals							
Cephalopods							
Crustaceans							
Fish			249		42633		
Other Aquatic Animals							
Birds							
Exotic wild					714		
Native captive							
Native wild	56				2535	150	16
Other birds					1		
Poultry							
Domestic mammals							
Cats							
Cattle		3025			5203		
Deer							
Dogs					6		
Goats							
Horses					2		
Pigs							
Sheep					390		
Exotic feral mammals							
Cats		6			529		
Mice					674		
Other exotic feral mammals					17		
Pigs							
Rabbits					266		
Rats					2204		
Laboratory mammals							
Mice					7802		
Rats					842		
Native mammals							
Cetaceans					36		
Echidna					129		
Macropods					8942		
Native Rats and Mice					163		
Other Native Animals					776		
Platypus					0		
Possums and Gliders					2612		
Quoll					756		
Tasmanian Devils				96	990		
Wombats					3711		
Reptiles							
Lizards					1854		
Total	56	3031	249	96	83787	150	16

Table 4 Purposes and procedures used for animal types in 2022

	Amphi- bians	Aquatic animals			
	Amphibians	Cephalo- pods	Crust- aceans	Fish	Other Aquatics
Purpose					
Education				481	
Environmental study				36139	
Health & welfare				3582	
Management & production				5991	
Understanding biology	25			6169	
Procedure					
Camera traps only					
Observation with minor interference				36134	5
Minor conscious procedure	25			4440	
Minor physiological challenge				15	
Minor operative procedure with recovery				970	
Major physiological challenge				2632	
Major surgery with recovery					
Animal unconscious no recovery				10995	
Death as End Point					

Table 4 Purposes and procedures used for animal types in 2022 continued

Purpose	Birds				
	Exotic wild	Native captive	Native wild	Other birds	
Education	2		302		
Environmental study	120		5593	1	
Health & welfare			482		
Management & production			1		
Understanding biology	592		1496		
Procedure					
Camera traps only	692		543	1	
Observation with minor interference	22		6075		
Minor conscious procedure			1141		
Minor physiological challenge					
Minor operative procedure with recovery			14		
Major physiological challenge					
Major surgery with recovery					
Animal unconscious no recovery					
Death as End Point					

Table 4 Purposes and procedures used for animal types in 2022 continued

	Domestic mammals								other
	Cats	Cattle	Deer	Dogs	Goats	Horses	Pigs	Sheep	
Purpose									
Education		630		4				230	
Environmental study		20		2		2		160	
Health & welfare		4849						200	
Management & production		3969							
Understanding biology									
Procedure									
Camera traps only		20		6		2		160	
Observation with minor interference		9128						230	
Minor conscious procedure		230						200	
Minor physiological challenge		90							
Minor operative procedure with recovery									
Major physiological challenge									
Major surgery with recovery									
Animal unconscious no recovery									
Death as End Point									

Table 4 Purposes and procedures used for animal types in 2022 continued

	Exotic feral mammals						Laboratory mammals		other
	Cats	Mice	Other exotic feral mammals	Pigs	Rabbits	Rats	Mice	Rats	
Purpose									
Education	7				233	29	469	15	
Environmental study	411	712	17		33	2181			
Health & welfare							626	275	
Management & production							2672	360	
Understanding biology	387						4035	192	
Procedure									
Camera traps only	663	707	17		266	50			
Observation with minor interference	101	5				2155			
Minor conscious procedure	21					5	2845	343	
Minor physiological challenge							3		
Minor operative procedure with recovery	1						141	24	
Major physiological challenge							51	109	
Major surgery with recovery							58		
Animal unconscious no recovery	12						4704	366	
Death as End Point	7								

Table 4 Purposes and procedures used for animal types in 2022 continued

	Native mammals					
	Cetaceans	Echidnas	Macropods	Native Rats and Mice	Other native mammals	Platypus
Purpose						
Education		8	1634	1	384	
Environmental study	1	98	8708	162	324	8
Health & welfare	48					
Management & production						
Understanding biology	35	47	3383		106	
Procedure						
Camera traps only		96	8401	21	397	
Observation with minor interference	36	57	5304	142	375	23
Minor conscious procedure	48				15	
Minor physiological challenge						
Minor operative procedure with recovery					27	5
Major physiological challenge						
Major surgery with recovery						
Animal unconscious no recovery						
Death as End Point						

Table 4 Purposes and procedures used for animal types in 2022 continued

	Native mammals continued				Reptiles
	Possums and gliders	Quolls	Tas Devils	Wombats	Lizards
Purpose					
Education	975		16		
Environmental study	6644	796	758	1021	4
Health & welfare					
Management & production					
Understanding biology	391	222	434	2744	1854
Procedure					
Camera traps only	6663	206	377	340	
Observation with minor interference	1261	156	25	3409	1256
Minor conscious procedure	49	636	786	16	543
Minor physiological challenge					
Minor operative procedure with recovery		11	8		
Major physiological challenge					
Major surgery with recovery					
Animal unconscious no recovery	37	9	12		56
Death as End Point					

Figure I Animal categories used between 2018 and 2022

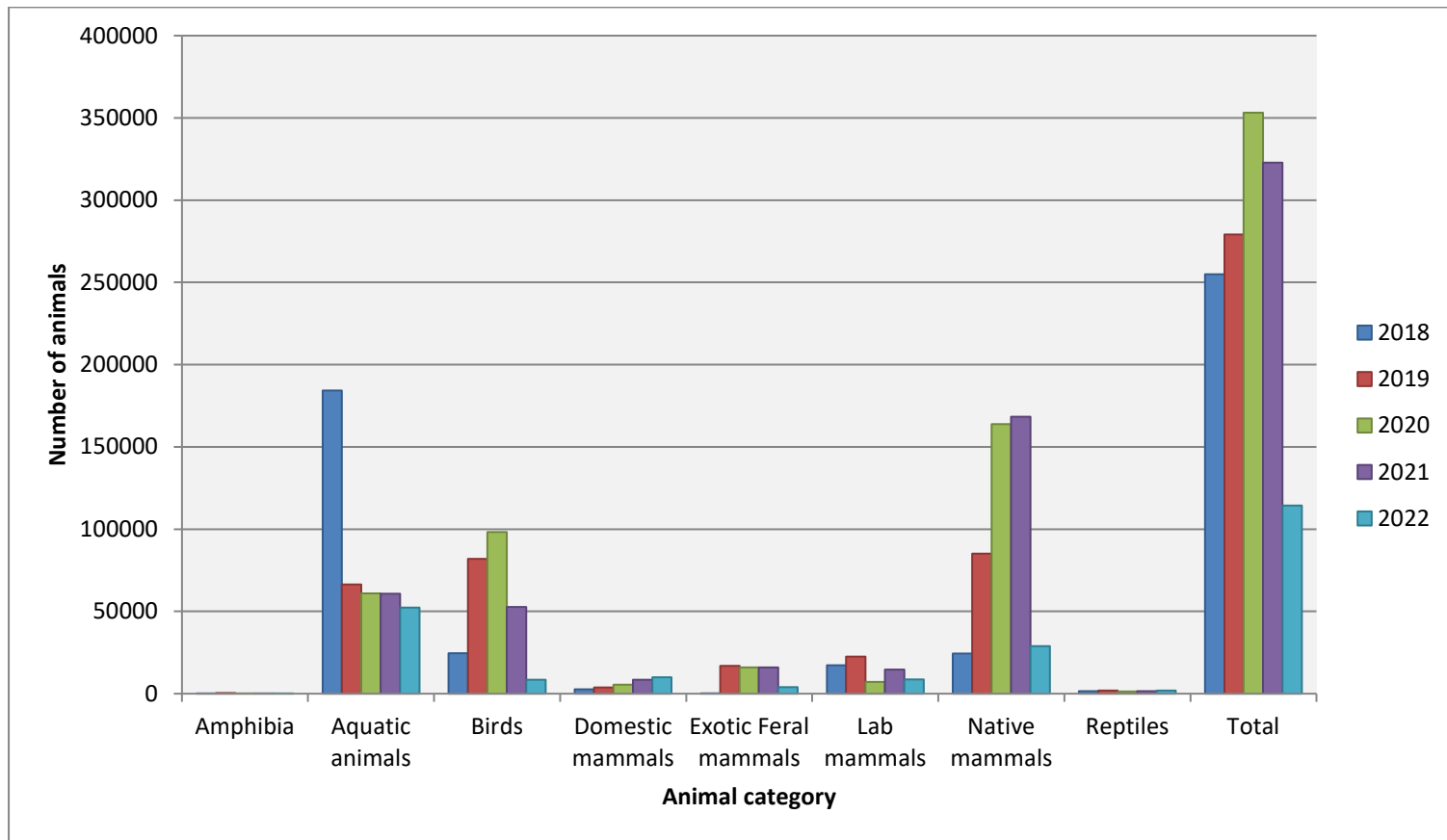


Figure 2 Projects per animal category between 2018 and 2022

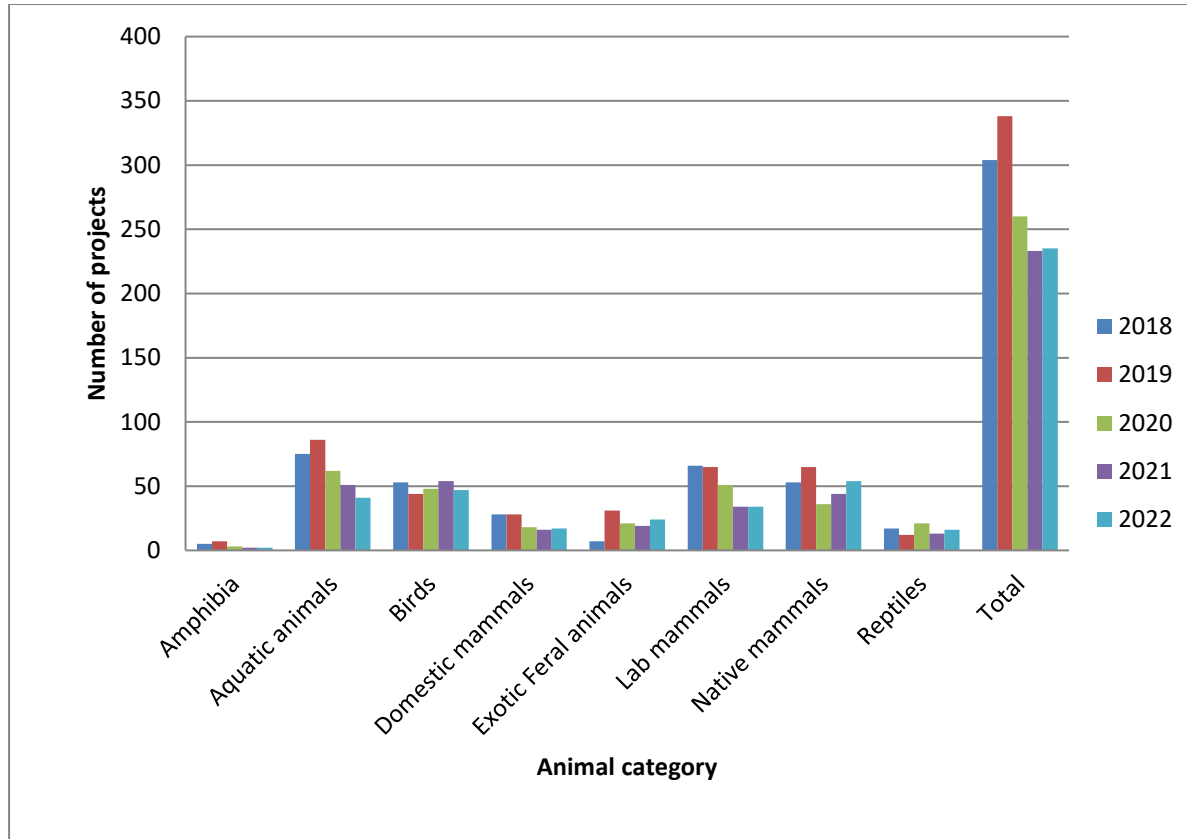


Figure 3 Purposes for which animals were used between 2018 and 2022

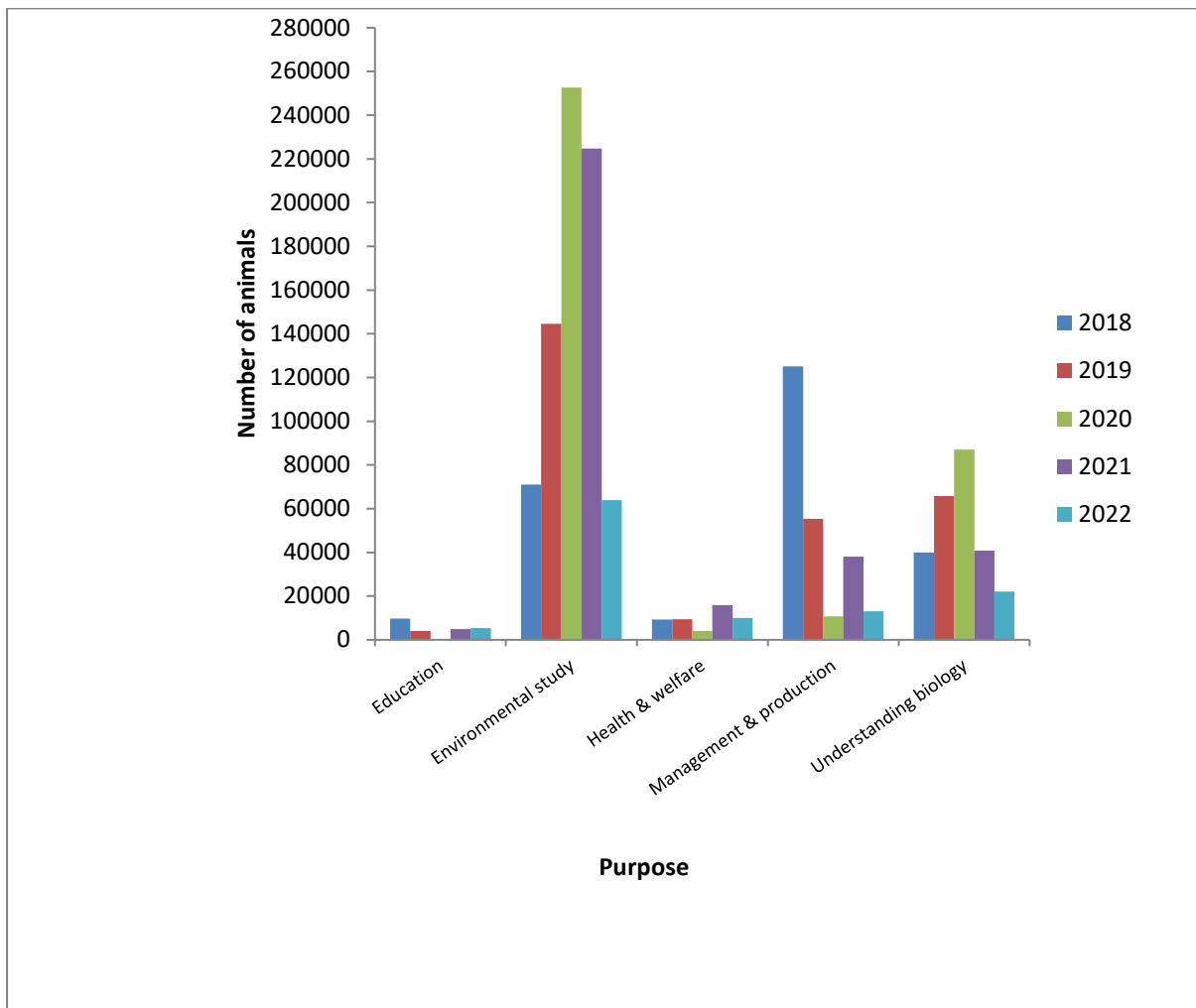


Figure 4 Projects per purposes between 2018 and 2022

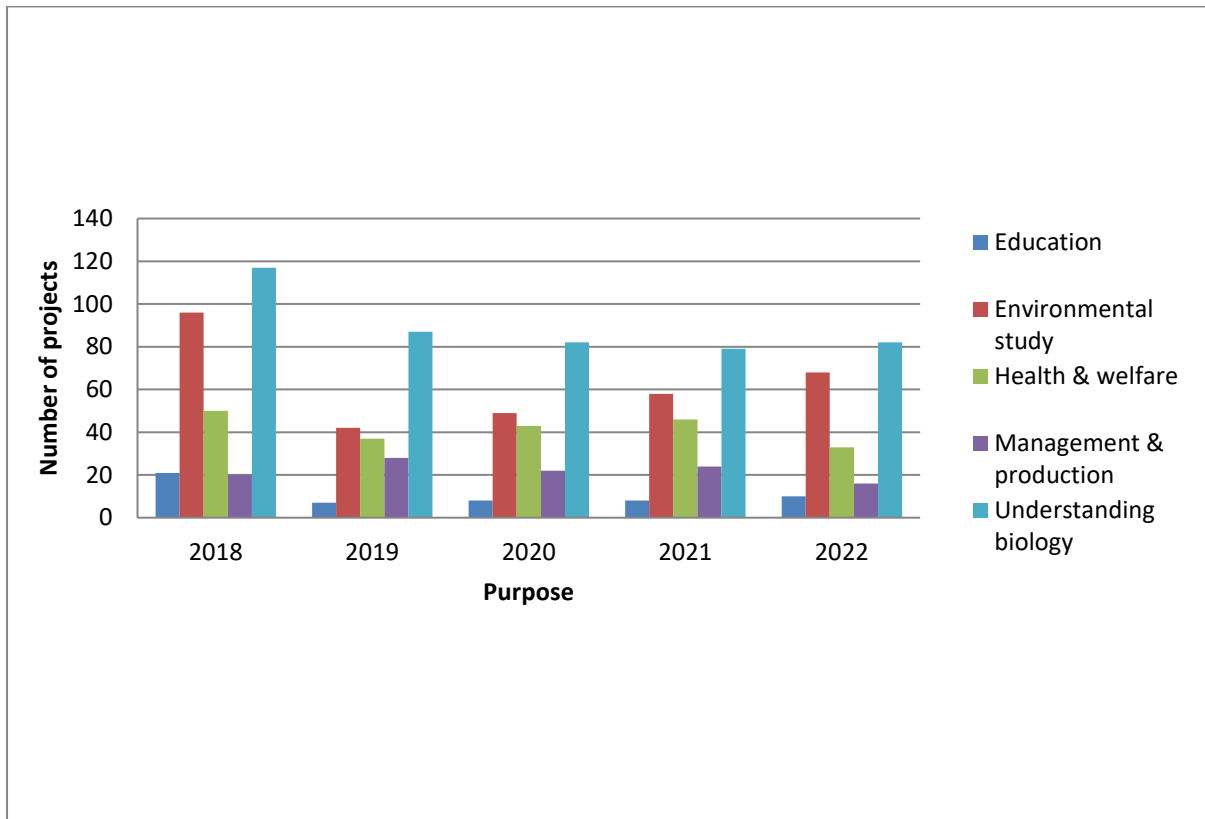


Figure 5 Procedures used between 2018 and 2022

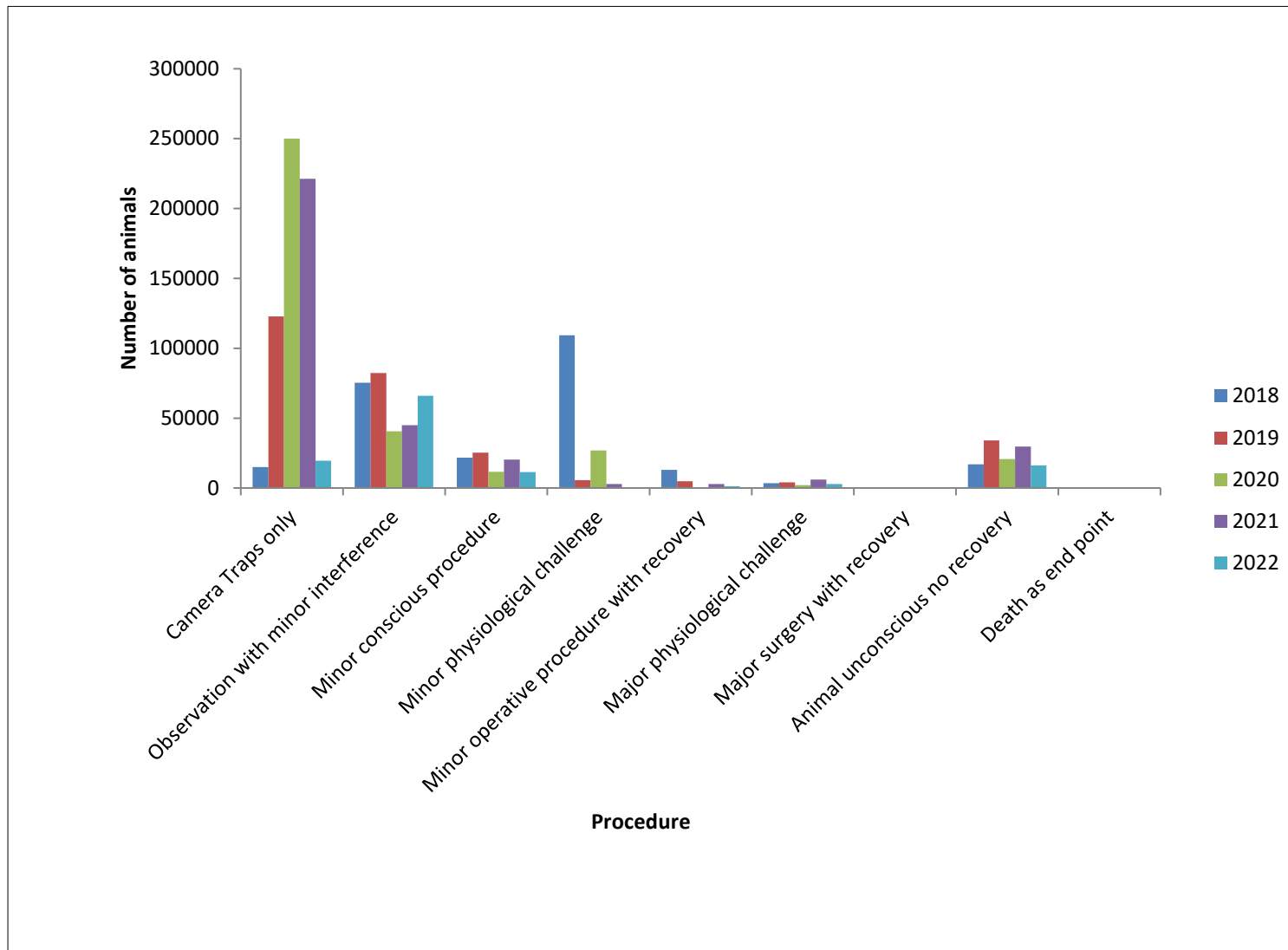
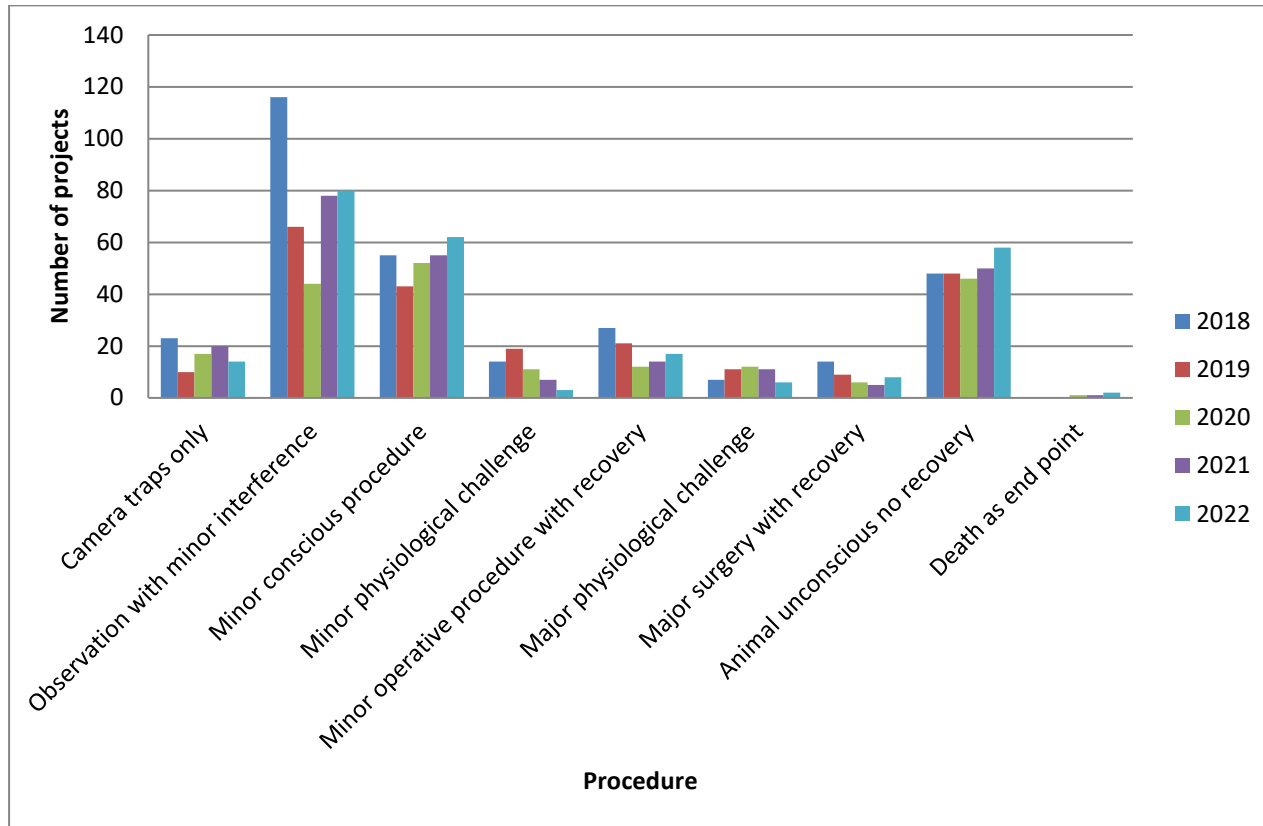


Figure 6 Projects per procedures used between 2018 and 2022



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ABBREVIATIONS

AEC	Animal Ethics Committee
ANU	Australian National University
Aust Ocean Biotech	Australian Ocean Biotechnology Pty Ltd
Birdlife.	Birdlife Tasmania
CRG	Code Reference Group (NHMRC)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Deakin	Deakin University, Victoria
DPIPWE	Department of Primary Industries, Parks, Water and Environment
Entura	Entura (Hydro Tasmania Group)
FoMI	Friends of Maatsuyker Island
Freshwater	Freshwater Biomonitoring
Gallagher	Gallagher eShepherd Pty Ltd
GHD	GHD Pty Ltd
Monash	Monash University
Murdoch	Murdoch University
NHMRC	National Health and Medical Research Council
North Barker	North Barker Ecosystem Services
NRE Tas	Department Natural Resources and Environment Tasmania
NRM Sth	Natural Resource Management – South
NSW DPI	New South Wales Department Primary Industry
STTAS	Sustainable Timber Tasmania
TLC	Tasmanian Land Conservancy
Treidlia	Treidlia Biovet Pty Ltd, New South Wales
UAdelaide	The University of Adelaide, South Australia
UNSW	The University of New South Wales
UQLD	The University of Queensland
USydney	University of Sydney, New South Wales
UTAS	University of Tasmania
Virbac	Virbac (Australia) Pty Ltd
Vic DJPR	Victorian Dept Jobs, Precinct and Regions
VWSG	Victorian Wader Study Group Inc
3Rs	Replacement, Reduction and Refinement

End