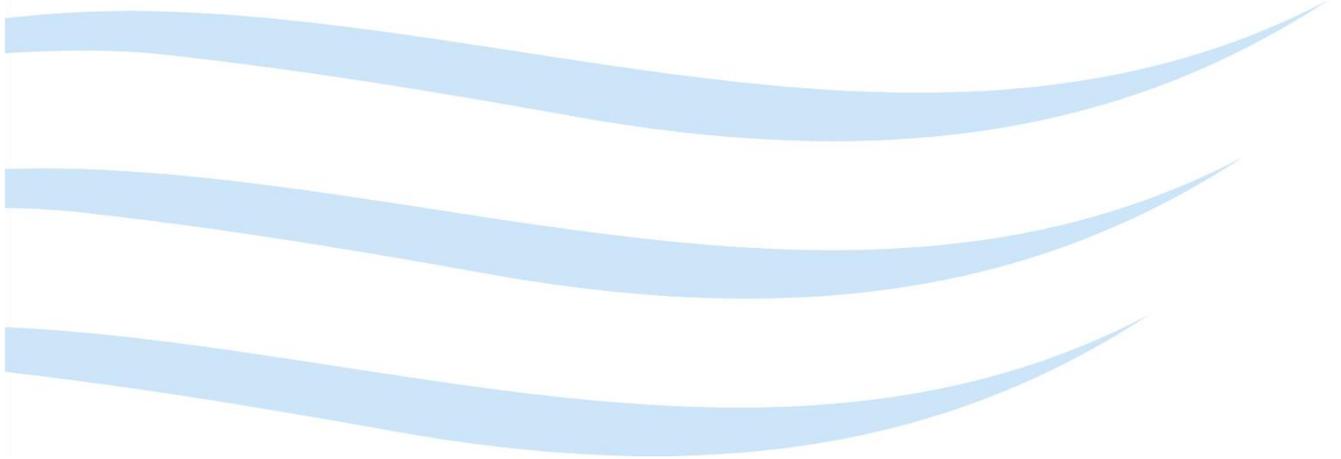


Animal Research Statistics Tasmania

Annual Report

Number 25 (2020)

September 2021



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 2020 to 31 December 2020.

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Summary

This report details animal use for research and teaching purposes in Tasmania from 1st January to 31st December 2020. 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 45 licensed institutions required to report, 29 used animals during the reporting period comprising 15 Tasmanian resident institutions and 14 institutions head quartered interstate. In addition to the Department of Primary Industries, Parks, Water and Environment (DPIPWE), there was one government department, 9 academic, 8 not-for-profit institutions and 10 commercial entities including the Commonwealth Scientific and Industrial Research Organisation (CSIRO) reporting animal use in 2020.

There were 2 animal ethics committees (AECs) resident in Tasmania supervising projects within the Tasmanian jurisdiction during 2020 – the DPIPWE AEC and the University of Tasmania's (UTAS) AEC.

The DPIPWE AEC provided project assessment and monitoring services to 21 external licensed institutions during 2020. 16 of these external institutions reported animal use in 20 projects. The DPIPWE AEC also supervised 19 internal departmental projects that reported animal use during the reporting period.

A total of 194 individual projects were reported in 2020, which is a small decrease on the previous year when 197 projects were reported. Of these, 82 were projects involved in understanding biology and 49 were environmental studies. The remaining projects were undertaken for the purposes of education, health and welfare and/or management and production. In 2020, a total of 353,177 animals or sightings of animals were reported, recording an increase from the 279,178 reported in 2019. The animal categories accounting for the majority of this increase were birds and native mammals.

UTAS continued to be the most active research institution using animals for scientific purposes in Tasmania, reporting data from 121 projects representing 62% of all projects reported. The number of animals reported by UTAS increased from 238,787 in 2019 to 338,937 in 2020. Several wild bird and native mammal observational projects 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.

Native mammals were the most numerous category recorded in 2020 accounting for 163,775 animals in 36 projects. Camera trap sighting accounted for 153,208 (93.5%) of native mammal use. Birds were the next most common animal category reported (98,220) in 48 projects, mainly in observational studies. Consistent with this, most animals were in environmental studies.

Laboratory rodent use decreased during 2020, with 7,258 being reported. This is a significant decrease to the 22,616 reported in 2019. In 2019 the majority of these animals were involved in colony establishment or maintenance which fluctuates from time to time. The other major contributor to overall numbers was the exotic feral animal category representing 15,952 animals, of which most were camera trap sightings. Relatively small numbers of domestic mammals, reptiles and amphibians were reported in 2020, as occurred in 2019.

Relatively low impact procedures were applied to 93.2% of animals and were utilised in 67.7% of projects in 2020. Only one project in Tasmania in 2020, involving the eradication of feral fish 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 1st January to 31st December 2020. 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 1st 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 2020, 21 external institutions were approved to use the DPIPWE's AEC services for project assessment and monitoring: of these institutions, 16 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 the 30th 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 Natural and Cultural Heritage Division, DPIPWE and the 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 utilising 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 DPIPWE web site once they have been tabled in Parliament (<https://dpiipwe.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*) 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 2020

2.1 Institutions

There were 45 licensed institutions required to report animal use during 2020. They are listed below.

Australian Museum, New South Wales (no animal use in 2020)
Australian National University (ANU), Australian Capital Territory
Bayview Bush Babies Inc (no animal use in 2020)
Biosis Pty Ltd, Victoria (no animal use in 2020)
Birdlife Tasmania (Birdlife), Tasmania
Nature Advisory P/L, Victoria (no animal use in 2020)
Central Queensland University, Queensland (no animal use in 2020)
Charles Sturt University, New South Wales
Commonwealth Scientific and Industrial Research Organisation, (CSIRO) - Tasmanian projects only
Deakin University (Deakin), Victoria
Department of Primary Industries, Parks, Water and Environment (DPIPWE, includes the Inland Fisheries Service), Tasmania
Derwent Estuary Program (DEP), Tasmania (no animal use in 2020)
Elanco, New South Wales (no animal use in 2020)
Entura (Hydro Tasmania Group), (Entura), Tasmania
Freshwater Biomonitoring (Freshwater), Tasmania
Friends of Maatsuyker Island (FoMI), Tasmania
GHD Pty Ltd (GHD), New South Wales
Gray, Paul, (Independent researcher), Tasmania
Huon Aquaculture Co Pty Ltd, Tasmania (no animal use in 2020)
James Cook University, Queensland (no animal use in 2020)
Jacobs Group, Victoria
Jurox Pty Ltd, New South Wales (no animal use in 2020)
Macquarie University, New South Wales (no animal use in 2020)
Monash University (Monash), Victoria (no animal use in 2020)
Mooney Nick Independent researcher, Tasmania
Murdoch University (Murdoch), Western Australia

Natural Resource Management – South (NRM Sth), Tasmania
New South Wales Department of Primary Industries , New South Wales
North Barker Ecosystem Services (North Barker), Tasmania
Robertson, Dr Bruce Ingram, (Independent researcher), Victoria
Scibus, New South Wales (no animal use in 2020)
Sustainable Timber Tasmania (STTAS), Tasmania
Tasmanian Irrigation Pty Ltd, Tasmania
TasNature (Peter Tonelli), Tasmania (no animal use in 2020)
Tassal Operations Pty Ltd (Tassal), Tasmania
Tasmanian Land Conservancy, Tasmania
Troidlia Biovet Pty Ltd (Troidlia), New South Wales
University of Adelaide (UAdelaide), South Australia
University of New England, New South Wales
University of New South Wales (UNSW), New South Wales
University of Queensland (UQLD), Queensland (no animal use in 2020)
University of Sydney (USydney), New South Wales
University of Tasmania (UTAS), Tasmania
University of Technology Sydney, New South Wales (no animal use in 2020)
Victorian Wader Study Group Inc (VWSG), Victoria (no animal use in 2020)

There were two AECs resident in Tasmania (DPIPWE and UTAS) in 2020. While the Australian Antarctic Division's AEC is also resident in Tasmania, the Division was not licensed in Tasmania during 2020 as it was not conducting animal research within the Tasmanian jurisdiction.

Of the 45 licensed institutions, 29 reported animal use in Tasmania in 2020. The active institutions comprised 15 Tasmanian resident and 14 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 15 Tasmanian resident institutions using animals in 2020 comprised 1 academic institution (UTAS), 1 government department (DPIPWE), 6 commercial entities and 7 not-for-profit organisations. Interstate institutions using animals comprised 8 academic institutions, 1 government department, 3 commercial entities (including CSIRO), and 1 not-for-profit organisations. There were no overseas institutions licensed in the state during 2020.

Table 1 lists the institutions that used animals and the categories and numbers of animals involved, including a comparison with 2019 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 2020, 353,177 animals or sightings of animals were reported within 194 projects (compared to 279,178 in 197 projects in 2019).

The major contributors to this increase in animal use over 2019 figures, were increases in the numbers of birds, exotic feral animals and native mammals (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 2019, with 121 or 62% of all projects reported (Table 1), using or sighting 338,937 animals. All animal categories except amphibians were represented in the UTAS report. The number of animals reported by UTAS in 2020 was increased compared to the number of animals used or sighted in 2019 (238,787). The increase was due mainly to several wild bird and native mammal observational projects.

The DPIPWE Divisions of Natural and Cultural Heritage and Biosecurity Tasmania reported animal use in 9 and 10 projects respectively identifying a total of 2,503 animals or 0.71% of all animals reported in 2020. There was a substantial decrease in the number of animals reported by DPIPWE divisions on 2019 figures, attributed to a significantly lower number of fish being used in farmed fish projects. DPIPWE projects included a wide variety of subjects from shy albatross, pilot whale, Tasmanian devil and orange bellied parrot conservation to the development of fish vaccines and feral cat control strategies.

Most projects conducted by commercial entities involved aquatic animals in ecological surveys of waterways for various development or monitoring purposes.

In 2020, all not-for-profit organisations reporting animal use in 2020 were supervised by the DPIPWE AEC and accounted for 3,610 animals in 9 projects. Of these projects, 7 involved wild bird research and 2 involved native wildlife research.

Nine academic institutions were active in Tasmania during 2020. Apart from UTAS, academic institutions reported a total of 3,695 animals (c.f. 3,587 were reported in 2019), with each institution having between 1 to 11 projects targeting a small range of animal categories, with aquatic animals, birds, domestic and native mammals featuring.

Of the 21 external licensees using the DPIPWE AEC in 2020, 16 reported animal use totalling 7,878 animals in 20 projects. Commercial enterprises (other than CSIRO) using the DPIPWE AEC (Entura, Freshwater, Jacobs Group, North Barker, STT, Tas irrigation, Tassal and Treidlia) reported a total of 4,692 animals across 12 projects.

CSIRO formally used both the DPIPWE AEC and its own interstate AECs. CSIRO has now moved to using their own interstate AECs for all new projects. Projects conducted by CSIRO under DPIPWE AEC supervision have now been completed with no animal use reported for these projects in 2020. There were 2 interstate monitored CSIRO projects reporting a total of 109 animals in 2020.

2.2 Animal categories

Tables 1 and 2.1 summarise the number of animals and projects reported within animal categories for 2020. 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.

Native mammals was the most commonly reported category with 163,775 being reported. This is almost twice that reported in 2019 (85,113 native mammals). There were 36 projects using native mammals, down from 65 in 2019. UTAS projects accounted for 163,387 native mammals of which most were camera trap sightings. One project alone, using camera traps only, accounted for 128,930 native mammal sightings.

Birds was the second most common category with 98,220 animals reported. This is an increase over the number reported for 2019 (81,916). There was also an increase in the number of projects using birds, from 44 in 2019 to 48 in 2020. Four UTAS projects, totalling 58,291 wild bird observations, contributed the majority of bird use. The remainder of bird use were mostly population surveys of wild birds.

Aquatic animals accounted for 60,954 animals in 2020, a decrease from 66,456 used in 2019. The number of projects utilising aquatic animals decreased from 86 in 2019 to 62 in 2020 but was still the most active area of research for 2020 in project terms. The largest user of aquatic animals was UTAS with a total of 52,445, of which 26,082 were fish and 26,363 were cephalopods. The cephalopods were reported in a single project in 2020. (c.f. 2019, where 366 cephalopods were reported in 4 projects.) Two biomedical projects utilising 9,565 zebra fish, are examples of the increasing use of 'laboratory' fish in this field of research. 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. However, in 2020 there were no crustaceans reported.

Laboratory mammal use involved 7,258 mammals (all rodents) in biomedical research in 2020. This was a 68% decrease on 2019 figures when 22,616 laboratory mammals were reported. In 2019 the majority of these animals were involved in colony establishment or maintenance which fluctuates from time to time. (c.f. 11, 846 reported in 2017 and 17,204 reported in 2018). There were 51 projects using laboratory mammals in 2020, a decrease from the 65 projects in 2019. The number of animals maintained in breeding colonies fluctuates with specific project requirements and is therefore highly unpredictable. Some 353 rats and mice were used for training and assessment of rodent experimental techniques.

Exotic feral mammal use involved 15,940 animals which was similar to that reported in 2019 (16,980). Of these, 99% were camera trap sightings. The projects involved mainly cats, rabbits, rats and mice.

Domestic mammal use remained comparatively low in 2020 with 5,516 head used in 18 projects, which is an increase on the number reported in 2019 (3,853 in 28 projects). The vast majority were reported by UTAS and University of Adelaide in observational livestock management projects, aimed for instance, at grazing behaviour or breeding success of terrestrial livestock species.

Reptile use in 2020 involved 1,324 lizards in 21 projects, down from 1,863 reptiles used in 12 projects in 2019. UTAS projects accounted for the entire number reported in 2020.

Amphibian use in 2020 involved 178 frogs and tadpoles across 3 projects. Commercial organisations undertaking environmental and ecological surveys (GDH, Tas Irrigation and North Barker) accounted for all the users of amphibians in 2020. (c.f. 2019 where 381 frogs and tadpoles were used across 4 projects, two of which were ecological surveys).

2.3 Purposes

Table 2.2 summarises the research and teaching purposes for which animals were used during 2020. 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 252,606 animals (or 71%) in 2020. This represents a 75% increase in the number of animals used or sighted for this purpose compared to that used or sighted in 2019 (144,477). However, the number of projects (49) was only a small increase compared to the 42 projects undertaken in 2019 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 86,054 animals in 82 projects in 2020, compared to 65,868 animals and 87 projects in 2019. This is another upward trend for the past 3 years. Wild birds (36,377) and fish (11,835) featured, accounting for over 55% of animals reported in this type of project.

Management and production research accounted for 10,770 animals used in 22 projects, compared to 55,311 animals in 28 projects in 2019. The majority of animals used for this purpose were fish (8,823, mostly farmed salmonids), followed by cattle (1,710).

Health and welfare studies reported a decreased level of animal use in 2020 (4,098 animals) to that used in 2019 (9,442). However, the number of projects conducted for this purpose increased from 37 in 2019 to 43 in 2020. As has been the case for several years, the vast majority of projects and animals used in this area were fish (2,357) and laboratory mice and rats (1,603) aimed at improving salmonid or human health and welfare respectively.

Education projects reported for 2020, used significantly less animals (459) than reported in 2019 (4,080). Eight educational projects used animals of which 353 were laboratory rodents used in the training of experimental techniques.

2.4 Procedures

Table 2.3 summarises the procedures used on animals during 2020. 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.

Camera Traps Only use again increased dramatically during 2020 with 250,116 sightings reported in 17 projects. This is compared to 122,724 sightings in 10 projects in 2019. The vast majority of sightings were recorded in environmental projects, with the remainder in management and production projects. The vast majority of sightings were of native mammals (153,208) followed by birds (77,386) and exotic feral mammals (16,083).

Observation with Minor Interference procedures were applied to 40,631 animals in 44 projects in 2020. This is a decrease on 2019 figures of 82,283 animals in 66 projects. Bird (30,035) and aquatic animal (7,881) surveys were the main users of observational procedures in 2020. Camera traps were used for most native mammal surveys in 2020, so observation with minor interference procedures were applied less frequently in projects involving native mammals compared to 2019.

Animal Unconscious, No Recovery procedures were applied to 20,737 animals in 46 projects. While the number of projects using these procedures, is similar to that in 2019 (48 projects), the number of animals used in these projects was significantly less than in 2019 (34,088). These procedures were applied mainly to fish (18,935) and laboratory mammals (1,786) as has been the case for several years. With regard to aquatic animals, these procedures were applied in wild fisheries and aquaculture disease management and production projects. 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 11,514 animals across 52 projects in 2020, which was an increase in relation to the number of projects but a decrease in relation to the number of animals used compared to 2019 figures (25,324 animals used in 43 projects). These procedures were applied mainly to laboratory mammals (3,885), and aquatic animals (4,510). Minor conscious procedures were also applied in projects addressing routine laboratory rodent colony maintenance, population monitoring (eg via bird banding and telemetry), domestic and wild animal disease and genetic surveillance, and habitat use.

Minor Physiological Challenge was applied to 26,963 animals across 11 projects in 2020. These procedures were applied to 5,586 animals across 19 projects in 2019 and 109,188 animals in 14 projects in 2018. A single project addressing the impact of seismic surveys on marine species, which involved 26,363 cephalopods accounted for most of the animal use in this category in 2020. Farmed fish projects accounted for a further 483 animals.

Major Physiological Challenge was applied to 2,142 animals in 12 projects in 2020. This was a slight increase in project numbers but a decrease in animal use numbers compared to the 4,024 animals used in 11 projects in 2019. As for previous years, the majority of projects (9) using these procedures were concerned with farmed salmonid disease prevention, accounting for 2013 animals reported. Laboratory rodents accounted for the remaining animals subjected to this procedure (62 mice and 67 rats).

Minor Operative Procedures With Recovery were applied to 563 animals. This is a substantial decrease on 2019 and 2018 figures (4,828 in 2019 and 12,974 in 2018). There was also decrease in the number of projects utilising this procedure, with 12 in 2020 (compared to 21 in 2019 and 27 in 2018). 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. Despite this, however, in 2020 over 70% of animals subjected to these procedures were Atlantic salmon addressing specific disease issues.

Major Surgery With Recovery procedures were applied to 473 animals in 2020 in 6 projects. (In 2019 these procedures were applied to 321 animals in 9 projects). These procedures were applied exclusively to mice involved in neuropathology research.

Death as the End Point procedures are rarely used in Tasmania. Only one project, involving the eradication of feral fish species, had procedures where death was an end point or deliberate measure in Tasmania in 2020.

The relatively low impact procedures of *Camera traps only*, *Observation with Minor Interference*, *Minor Conscious Procedures* and *Minor Physiological Challenge* were applied to 93.2% (or 329,224) animals and in 67.7% of projects in 2020.

3 Tables and figures

All summarised data is displayed in this section.

Table I Summary of animal categories used by institutions in 2020

Institution	Project number	Amphibia	Aquatic animals	Birds	Domestic mammals	Exotic feral mammals	Lab mammals	Native mammals	Reptiles	Total	Comment
ANU	6			99				41		140	
Birdlife	1			1984						1984	
Charles Sturt Uni	2										Passive bird acoustic and camera monitoring only: no animal handling
CSIRO	3		109							109	
Deakin	1		454							454	
DPIPWE	19		2420	36	14	9		24		2503	
Entura	2		4104							4104	
FoMI	1			887						887	
Freshwater Bio	1		320							320	
GHD	4	52						3		55	
Gray, Paul	1							44		44	
Jacobs group	1									0	Camera monitoring – no animal handling
Mooney, Nick	1			8						8	
Murdoch Uni	2		1			2		8		11	
North Barker	1	2								2	
NRM Sth	1			177						177	
NSW DPI	1									0	Passive camera monitoring only- no animal handling
Robertson, Bruce	1			20						20	

STTAS	2			12					12		
Tassal	1						12		12		
Tas Irrigation	1	124							124		
Tas Land Conservancy	1			11			55		66		
Tas Nature	1								0		
Treidlia	3				118				118		
UAdelaide	1				1674				1674		
UNE	2				101	1		16	118		
UNSW	1		1101						1101		
USydney	11				12			185	197		
UTAS	121		52445	94986	3597	15940	7258	163387	1324	338937	
2020 Totals	194	178	60954	98220	5516	15952	7258	163775	1324	353177	
% of categories	N/A	0.05	17.298	27.795	1.567	4.514	2.0545	46.342	0.380	100	
2019 Totals	197	381	66456	81916	3853	16980	22616	85113	1863	279178	

Animal categories, purposes and procedures in 2020

Table 2.1 Animal categories used in 2020

Animal category	Animals per category	Projects per category *
Amphibia	178	3
Aquatic animals	60954	62
Birds	98220	48
Domestic mammals	5516	18
Exotic feral animals	15952	21
Lab mammals	7258	51
Native mammals	163775	36
Reptiles	1324	21
Total	353177	260*

***A project may use multiple animal categories.**

Table 2.2 Research and teaching purposes used in 2020

Purpose	Animals per purpose	Projects per purpose *
Education	459	8
Environmental study	252606	49
Health & welfare	4098	43
Management & production	10770	22
Understanding biology	86054	82
Total	353987*	204*

***A project may have multiple purposes.**

Table 2.3 Research and teaching procedures used in 2020

Procedure	Animals per procedure*	Projects per procedure*
Camera Traps only	250116	17
Observation with minor interference	40631	44
Minor conscious procedure	11514	52
Minor physiological challenge	26963	11
Minor operative procedure with recovery	563	12
Major physiological challenge	2142	12
Major surgery with recovery	473	6
Animal unconscious no recovery	20737	46
Death as end point	102	1
Total	353241*	201*

***A project may use multiple procedures**

Table 3 Summary of animal types used by institutions in 2020

Institution>	ANU	Birdlife	Charles Sturt	CSIRO	Deakin	DPIPWE
Amphibia						
Amphibia						
Aquatic animals						
Cephalopods						
Crustaceans						
Fish				109	454	2420
Other Aquatic Animals						
Birds						
Exotic wild						
Native captive						
Native wild	73	1984				36
Other birds	26					
Poultry						
Domestic Mammals						
Cats						
Cattle						
Deer						
Dogs						
Goats						
Horses						
Pigs						
Sheep						14
Exotic feral Mammals						
Cats						
Mice						
Other exotic feral mammals						
Pigs						
Rabbits						
Rats						9
Laboratory mammals						
Mice						
Rats						
Native Mammals						
Cetaceans						24
Echidna						
Macropods						
Native Rats and Mice						
Other Native Animals						
Platypus						
Possums and Gliders						
Quoll	41					
Tasmanian Devils						
Wombats						
Reptiles						
Lizards						
Total	140	1984	0	109	454	2503

Table 3 Summary of animal types used by institutions in 2020

Institution>	Entura	Freshwater	FoMI	GDH	Paul Gray	Jacobs Group
Amphibia						
Amphibia				52		
Aquatic animals						
Cephalopods						
Crustaceans						
Fish	4104	305				
Other Aquatic Animals		15				
Birds						
Exotic wild						
Native captive						
Native wild			887			
Other birds						
Poultry						
Domestic Mammals						
Cats						
Cattle						
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						
Native Rats and Mice						
Other Native Animals					44	
Platypus						
Possums and Gliders						
Quoll				1		
Tasmanian Devils				2		
Wombats						
Reptiles						
Lizards						
Total	4104	320	887	55	44	0

Table 3 Summary of animal types used by institutions in 2020

Institution>	Nick Mooney	Murdoch Uni	NRM Sth	NSW DPI	North barker	Bruce Robertson,
Amphibia						
Amphibia					2	
Aquatic animals						
Cephalopods						
Crustaceans						
Fish						
Other Aquatic Animals		1				
Birds						
Exotic wild						
Native captive	8					
Native wild			177			20
Other birds						
Poultry						
Domestic Mammals						
Cats						
Cattle						
Deer						
Dogs						
Goats						
Horses						
Pigs						
Sheep						
Exotic Feral mammals						
Cats						
Mice						
Other exotic feral mammals						
Pigs						
Rabbits						
Rats		2				
Laboratory mammals						
Mice						
Rats						
Native Mammals						
Cetaceans						
Echidna						
Macropods						
Native Rats and Mice						
Other Native Animals		2				
Platypus		6				
Possums and Gliders						
Quoll						
Tasmanian Devils						
Wombats						
Reptiles						
Lizards						
Total	8	11	177	0	2	20

Table 3 Summary of animal types used by institutions in 2020 continued

Institution	STTAS	Tas Irrigati	Tas Nature	Tassal	Tas Land Cons	Tredlia	UAdelaide	UNE
Amphibia								
Amphibia		124						
Aquatic animals								
Cephalopods								
Crustaceans								
Fish								
Other Aquatic Animals								
Birds								
Exotic wild								
Native captive								
Native wild	12				11			
Other birds								
Poultry								
Domestic mammals								
Cats								
Cattle							1674	101
Deer								
Dogs								
Goats								
Horses								
Pigs								
Sheep						118		
Exotic feral mammals								
Cats								1
Mice								
Other exotic feral mammals								
Pigs								
Rabbits								
Rats								
Laboratory mammals								
Mice								
Rats								
Native mammals								
Cetaceans								
Echidna								
Macropods								8
Native Rats and Mice								
Other Native Animals				12				
Platypus								
Possums and Gliders					9			8
Quoll					20			
Tasmanian Devils					26			
Wombats								
Reptiles								
Lizards								
Total	12	124	0	12	66	118	1674	118

Table 3 Summary of animal types used by institutions in 2020 continued

Institution	UNSW	USyd	UTAS
Amphibia			
Amphibia			
Aquatic animals			
Cephalopods			26363
Crustaceans			
Fish	1101		26082
Other Aquatic Animals			
Birds			
Exotic wild			5323
Native captive			
Native wild			89205
Other birds			458
Domestic mammals			
Cats		12	6
Cattle			693
Deer			
Dogs			19
Goats			
Horses			4
Pigs			
Sheep			2875
Exotic feral mammals			
Cats			13915
Mice			
Other exotic feral mammals			1599
Pigs			
Rabbits			426
Rats			
Laboratory mammals			
Mice			5498
Rats			1760
Native mammals			
Cetaceans			
Echidna			1935
Macropods			97923
Native Rats and Mice			716
Other Native Animals			65
Platypus			
Possums and Gliders			32661
Quoll			3672
Tasmanian Devils		185	14112
Wombats			12303
Reptiles			
Lizards			1324
Total	1101	197	338937

Table 4 Purposes and procedures used for animal types in 2020

	Amphibians	Aquatic animals			
	Amphibians	Cephalopods	Crustaceans	Fish	Other Aquatics
Purpose					
Education					
Environmental study	54			11561	15
Health & welfare				2357	
Management & production				8823	
Understanding biology	124	26363		11835	
Procedure					
Camera traps only					
Observation with minor interference	52			7881	
Minor conscious procedure	126			4495	15
Minor physiological challenge		26363		483	
Minor operative procedure with recovery				403	
Major physiological challenge				2013	
Major surgery with recovery					
Animal unconscious no recovery				18935	
Death as End Point				102	

Table 4 Purposes and procedures used for animal types in 2020 continued

Purpose	Birds				
	Exotic wild	Native captive	Native wild	Other birds	
Education					
Environmental study	5323		66472	458	
Health & welfare			8		
Management & production			12		
Understanding biology		79	36377		
Procedure					
Camera traps only	4608		72320	458	
Observation with minor interference	715		29320		
Minor conscious procedure		79	620		
Minor physiological challenge					
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 2020 continued

	Domestic mammals							
	Cats	Cattle	Deer	Dogs	Goats	Horses	Pigs	Sheep
Purpose								
Education	10							14
Environmental study	6	657		19		4		3205
Health & welfare								118
Management & production		1710						219
Understanding biology								
Procedure								
Camera traps only		657		19		4		2456
Observation with minor interference	6	1710						219
Minor conscious procedure	22	101						318
Minor physiological challenge								
Minor operative procedure with recovery								
Major physiological challenge								
Major surgery with recovery								
Animal unconscious no recovery								14
Death as End Point								

Table 4 Purposes and procedures used for animal types in 2020 continued

	Exotic feral mammals						Laboratory mammals	
	Cats	Mice	Other exotic feral mammals	Pigs	Rabbits	Rats	Mice	Rats
Purpose								
Education							335	18
Environmental study	11557	120	1599		189	172		
Health & welfare							1189	414
Management & production								
Understanding biology	2359					701	3854	95
Procedure								
Camera traps only	13882	120	1299		426	356		
Observation with minor interference						7		
Minor conscious procedure	23						3424	461
Minor physiological challenge							111	
Minor operative procedure with recovery	8						31	
Major physiological challenge							62	67
Major surgery with recovery							473	
Animal unconscious no recovery							1277	509
Death as End Point								

Table 4 Purposes and procedures used for animal types in 2020 continued

	Native mammals					
	Cetaceans	Echidnas	Macropods	Native Rats and Mice	Other native mammals	Platypus
Purpose						
Education			40			
Environmental study		1935	95815	716	105	6
Health & welfare					12	
Management & production					6	
Understanding biology	24		2076		44	
Procedure						
Camera traps only		1934	97912	716	65	
Observation with minor interference	24	1	11		47	
Minor conscious procedure			8		12	
Minor physiological challenge					6	
Minor operative procedure with recovery					37	6
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 2020 continued

	Native mammals continued				Reptiles
	Possums and gliders	Quolls	Tas Devils	Wombats	Lizards
Purpose					
Education	20		1	1	
Environmental study	23487	3323	13503	12302	3
Health & welfare					
Management & production					
Understanding biology	453	349			1321
Procedure					
Camera traps only	23659	3317	13503	12302	3
Observation with minor interference	1	12			625
Minor conscious procedure	44	343	735	35	653
Minor physiological challenge					
Minor operative procedure with recovery		20	58		
Major physiological challenge					
Major surgery with recovery					
Animal unconscious no recovery			1	1	
Death as End Point					

Figure I Animal categories used between 2016 and 2020

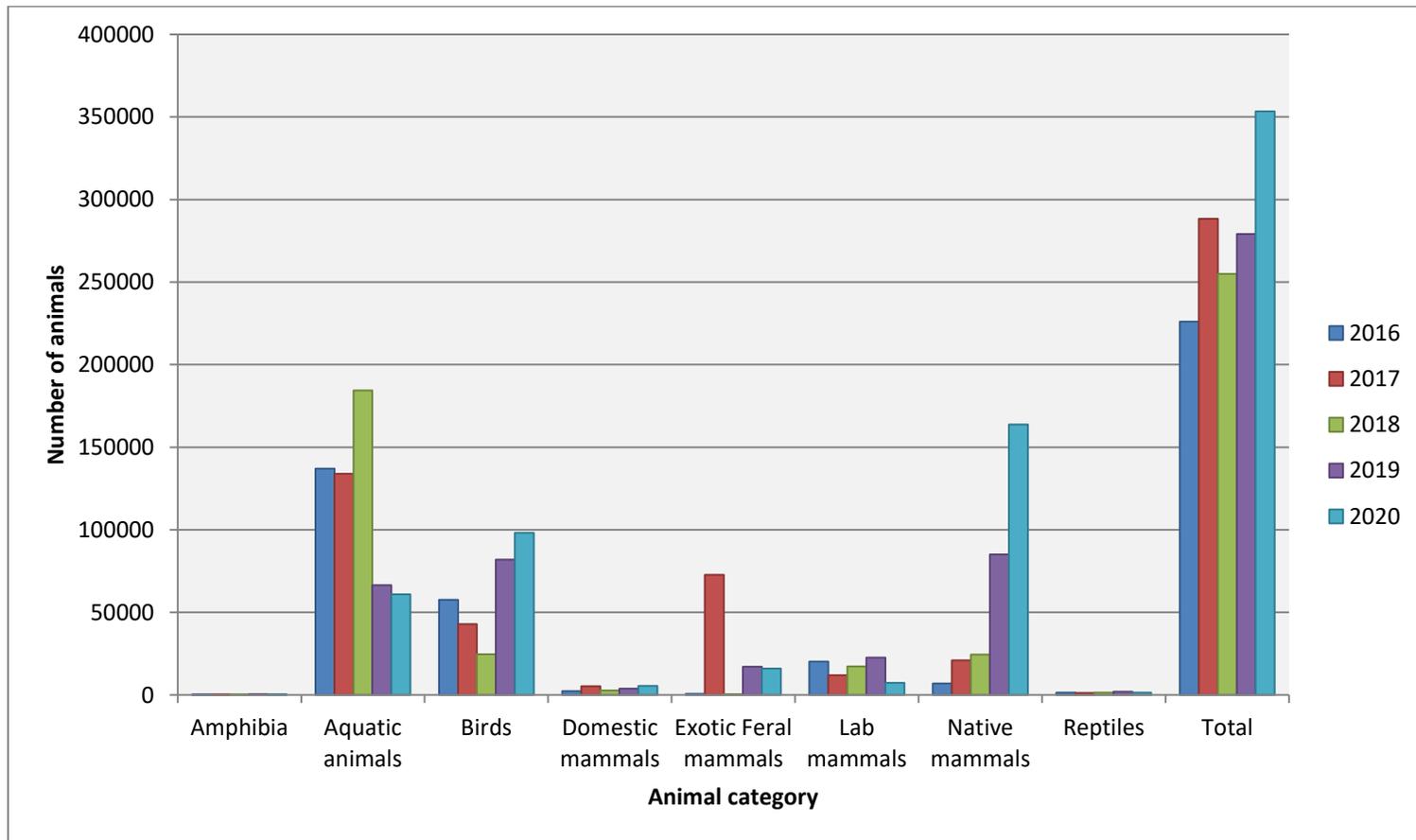


Figure 2 Projects per animal category between 2016 and 2020

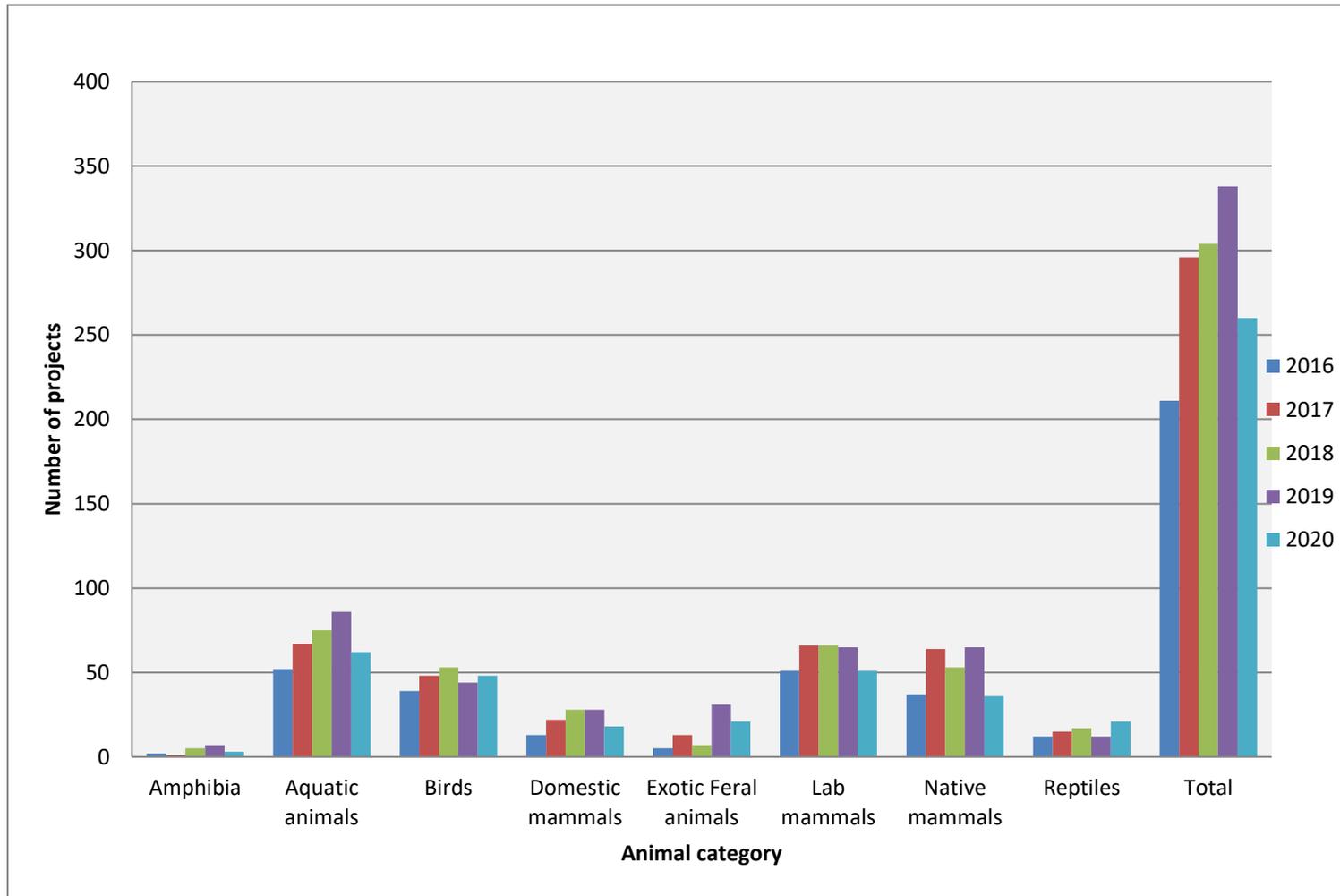


Figure 3 Purposes for which animals were used between 2016 and 2020

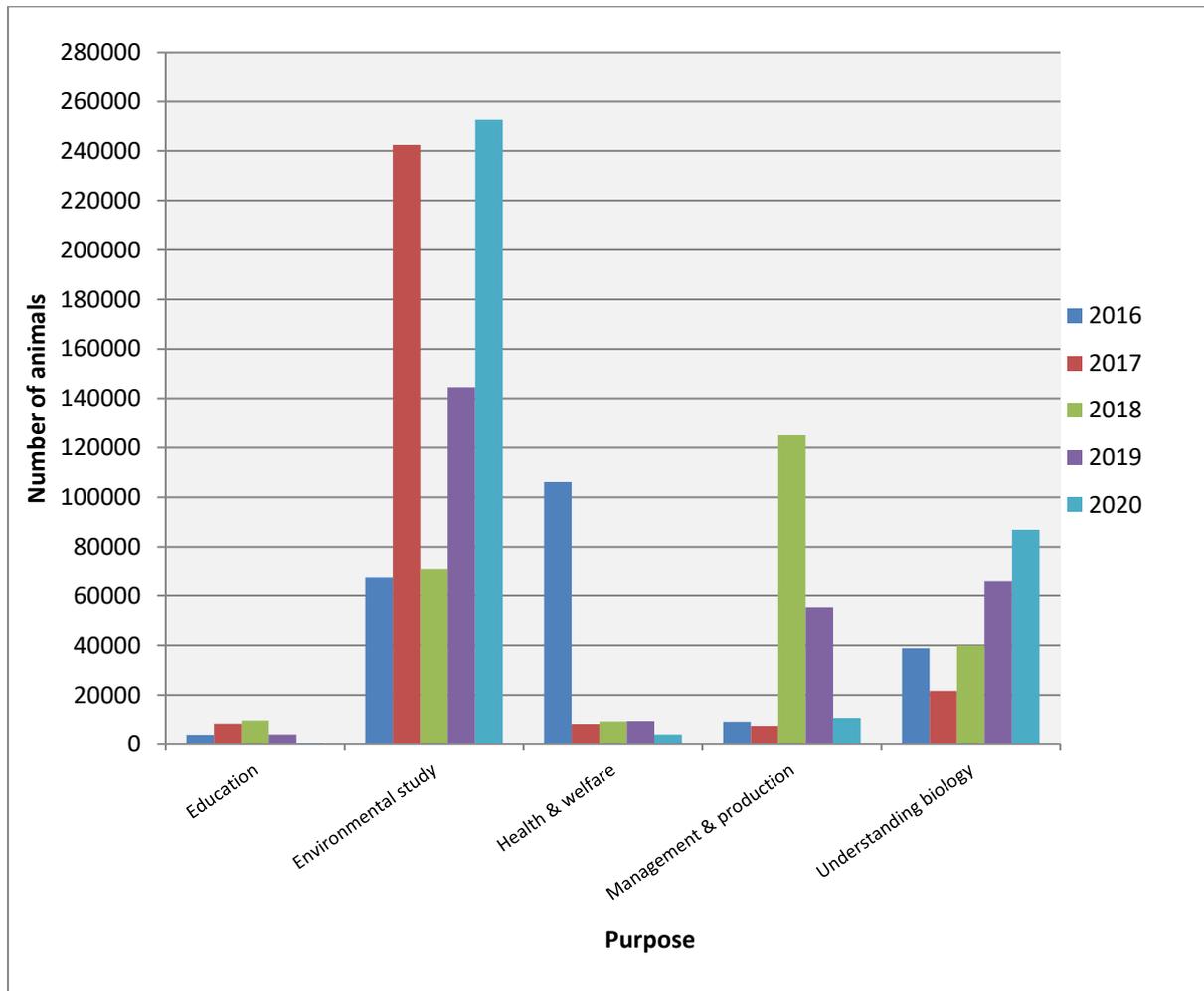


Figure 4 Projects per purposes between 2016 and 2020

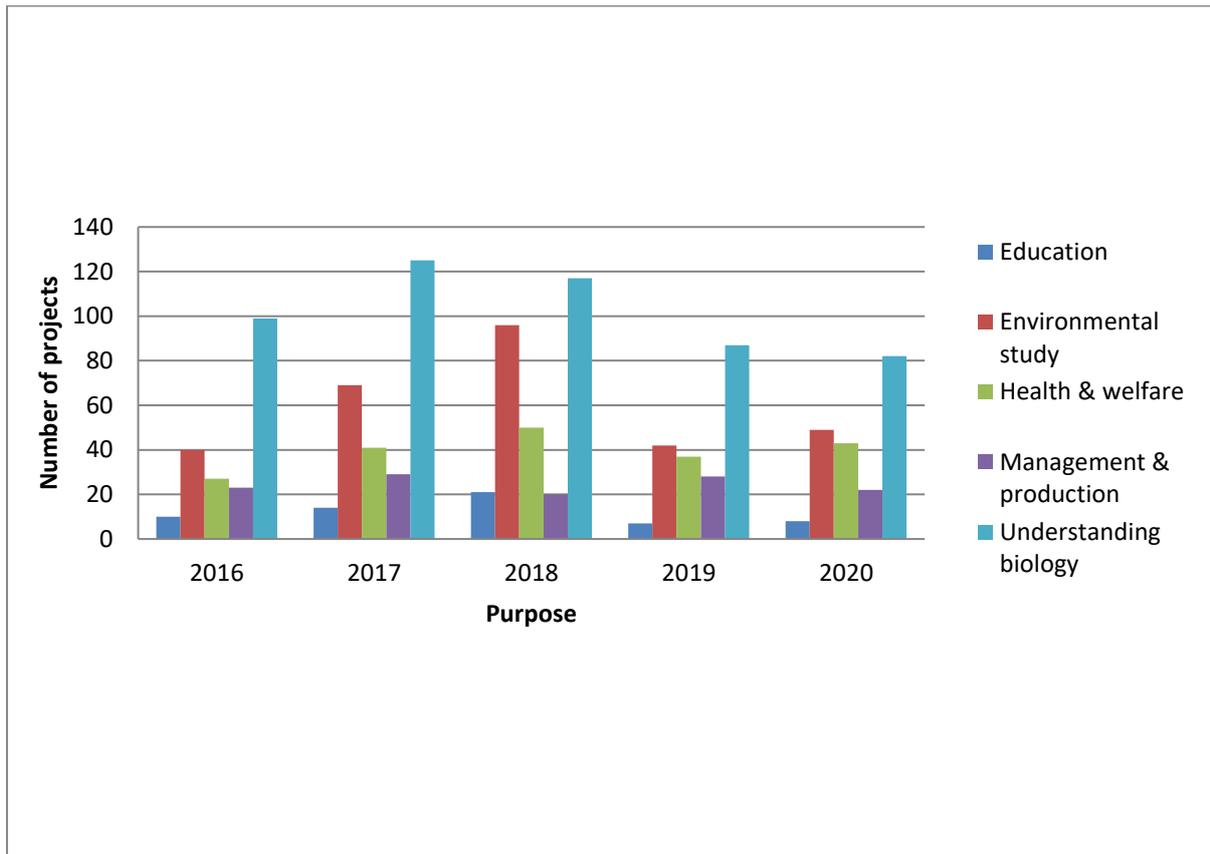


Figure 5 Procedures used between 2016 and 2020

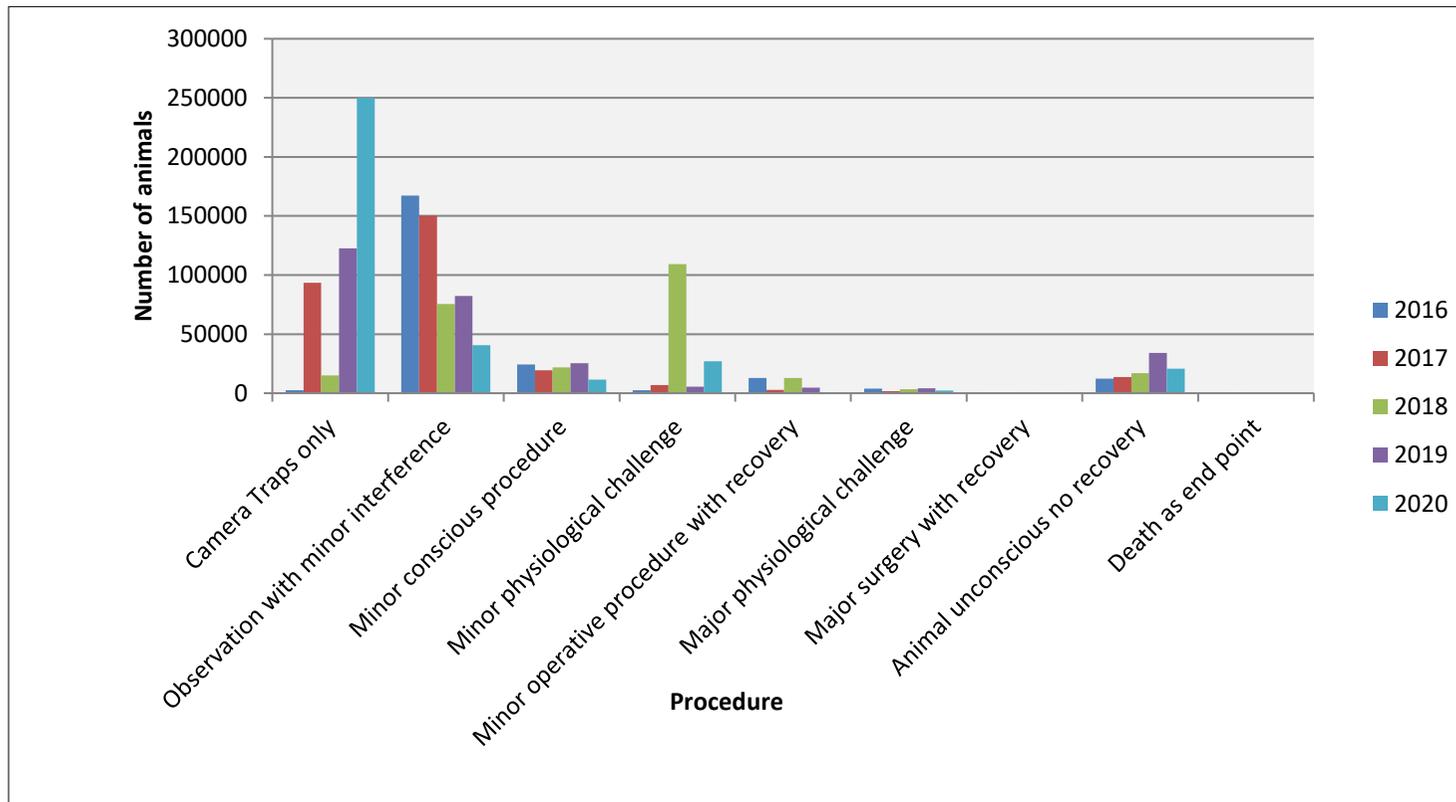
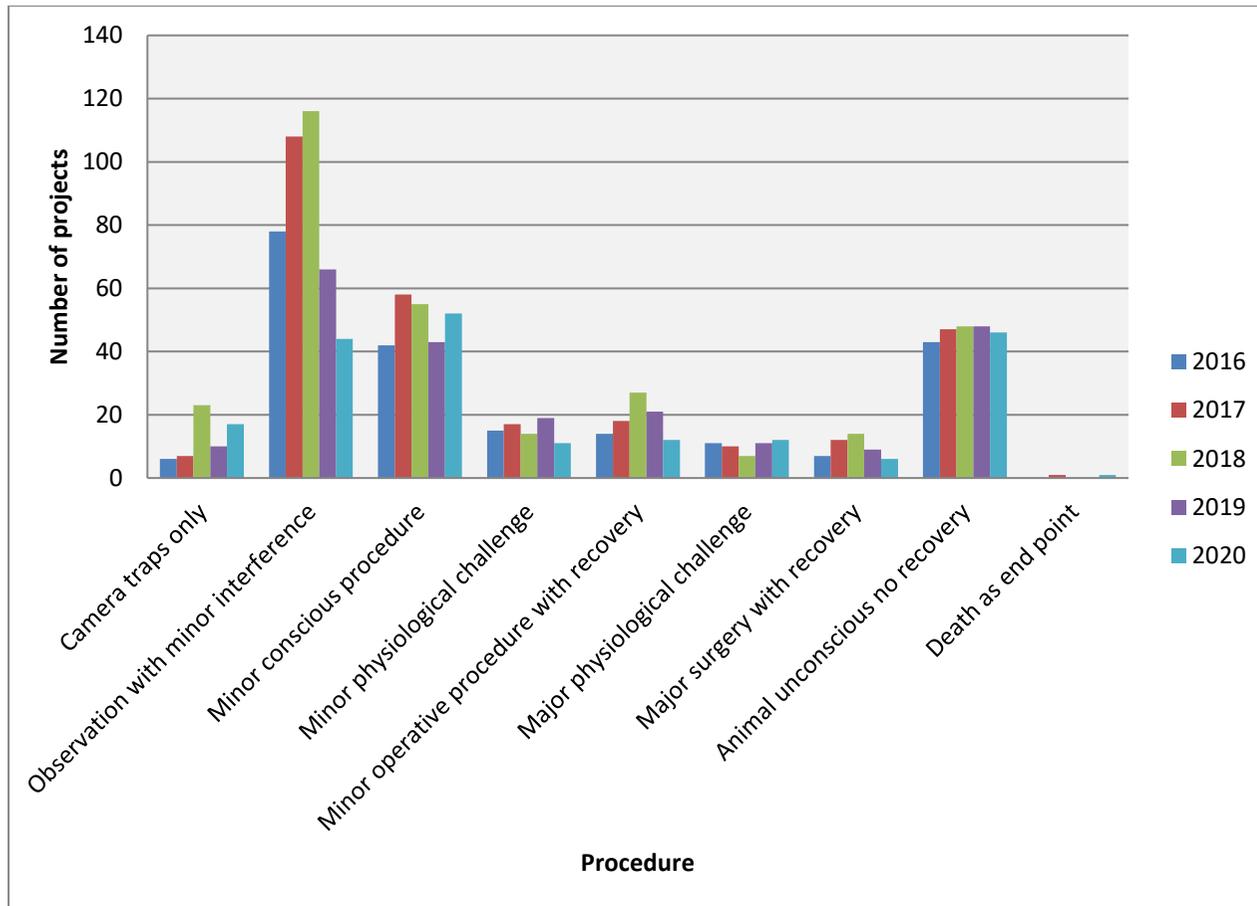


Figure 6 Projects per procedures used between 2016 and 2020



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ABBREVIATIONS

AEC	Animal Ethics Committee
ANU	Australian National University
Birdlife	Birdlife Tasmania
c.f.	Compared with
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
Monash	Monash University
Murdoch	Murdoch University
NHMRC	National Health and Medical Research Council
North Barker	North Barker Ecosystem Services
NRM Sth	Natural Resource Management – South
NSW DPI	New South Wales Department Primary Industry
STTAS	Sustainable Timber Tasmania
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
VWSG	Victorian Wader Study Group Inc
3Rs	Replacement, Reduction and Refinement

End