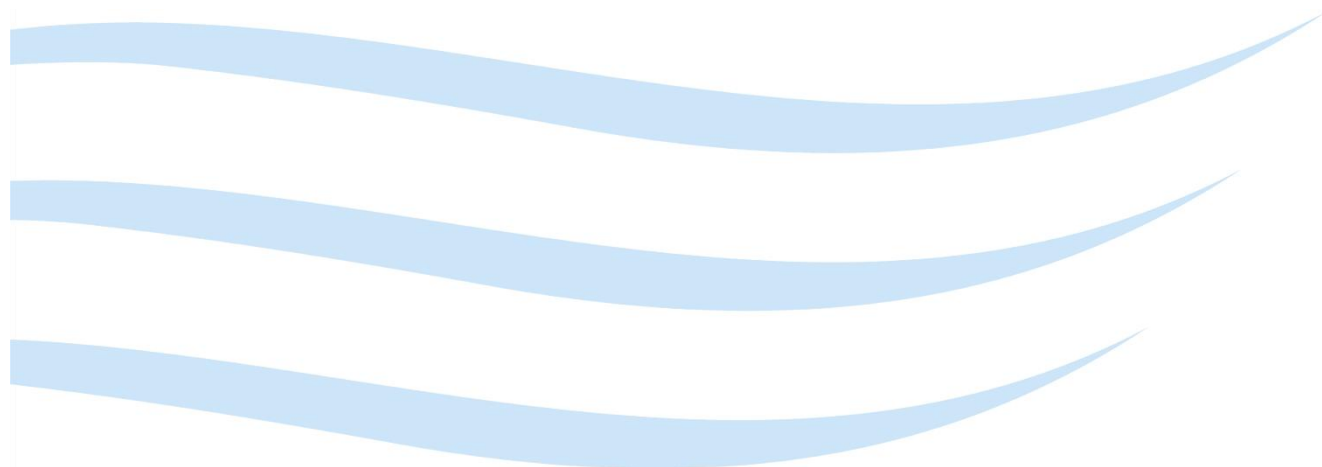


Animal Research Statistics Tasmania

Annual Report

Number 24 (2019)

September 2020



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 2019 to 31 December 2019.

Animal Research Statistics Tasmania Annual Report Number 24 (2019)

Animal Biosecurity and Welfare Branch

Biosecurity Tasmania

Department of Primary Industries, Parks, Water and Environment

GPO Box 44 Hobart 7001

Published September 2019

© Copyright State of Tasmania 2020

Summary	2
I Introduction	3
1.1 Regulation of animal research in Tasmania	3
1.2 Annual reporting in Tasmania	4
1.2.1 Explanation of the reporting format.....	5
1.2.2 Application of categories.....	5
2 Animal research activities for 2019.....	8
2.1 Institutions	8
2.2 Animal categories.....	10
2.3 Purposes	11
2.4 Procedures.....	12
3 Tables and figures	14
Table 1 Summary of animal categories used by institutions in 2019	14
Table 2 Animal categories, purposes and procedures in 2019	15
2.1 Animal categories used in 2019.....	15
2.2 Research and teaching purposes used in 2019.....	15
2.3 Research and teaching procedures used in 2019	16
Table 3 Summary of animal types used by institutions in 2019	17
Table 4 Purposes and procedures used for animal types in 2019.....	20
Figure 1 Animal categories used between 2015 and 2019.....	26
Figure 2 Projects per animal category between 2015 and 2019.....	27
Figure 3 Purposes for which animals were used between 2015 and 2019	28
Figure 4 Projects per purposes between 2015 and 2019.....	29
Figure 5 Procedures used between 2015 and 2019.....	30
Figure 6 Projects per procedures used between 2015 and 2019.....	31
ABBREVIATIONS.....	33

Summary

This report details animal use for research and teaching purposes in Tasmania from 1st January to 31st December 2019. 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 42 licensed institutions required to report, 21 used animals during the reporting period comprising 9 Tasmanian resident institutions and 12 institutions head quartered interstate. In addition to the Department of Primary Industries, Parks, Water and Environment (DPIPWE), there were 9 academic, 4 not-for-profit institutions and 7 commercial entities including the Commonwealth Scientific and Industrial Research Organisation (CSIRO) reporting animal use in 2019.

There were 2 animal ethics committees (AECs) resident in Tasmania supervising projects within the Tasmanian jurisdiction during 2019 – the DPIPWE AEC and the University of Tasmania's (UTAS) AEC.

The DPIPWE AEC provided project assessment and monitoring services to 20 external licensed institutions during 2019. Ten of these external institutions reported animal use in 16 projects. The DPIPWE AEC also supervised 18 internal departmental projects that reported animal use during the reporting period.

A total of 197 individual projects were reported in 2019, which is a small decrease of 8.8% on the previous year. Of these, 87 were projects involved in understanding biology and 42 were environmental studies. In 2019, a total of 279,178 animals or sightings of animals were reported, recording a 9.5% increase from the 255,015 reported in 2018. All animal categories experienced an increase in animal use, except aquatic animals where a 64% reduction was reported.

UTAS continued to be the most active research institution using animals for scientific purposes in Tasmania, reporting data from 139 projects representing 70% of all projects reported. The number of animals reported by UTAS increased from 116,906 (or 46% of the annual total) in 2018 to 238,787 or 85.5% of all animal use in 2019. 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 used in 2019 accounting for 30.5% (or 85,113) animals in 65 projects. Camera trap sighting accounted for 73,454 or 86.3% of native mammal use. A similar number of birds were also reported (81,916 (or 29.3%) in 44 projects; mainly in observational studies including one involving 20,000 free-range laying hens. Consistent with this, most animals were used in environmental studies.

The 64% decline in aquatic animal use was unusual, however interest in the area continues to be very active as represented by an increase in the number of projects from 75 in 2018 to 86 in 2019.

Laboratory rodent use increased by 31.5% during 2019 with 22,616 (or 8.1% of the total) being reported. The majority of these animals were involved in colony establishment or maintenance which fluctuates from time. The other major contributor to overall numbers was the exotic feral animal category representing 6.1% or 16,980 animals of which 99% were camera trap sightings. Relatively small numbers of domestic mammals, reptiles and amphibians were reported in 2019, as in 2018.

Relatively low impact procedures were applied to 84% of animals and were utilised in 70% of projects in 2019. No animals were subjected to procedures where death was an end point or deliberate measure in Tasmania in 2019.

I Introduction

This report details animal use for research and teaching purposes in Tasmania from 1st January to 31st December 2019. 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. 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 2019, 20 external institutions were approved to use the DPIPW's AEC services for project assessment and monitoring; of these institutions, 10 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, DPIPW 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.

While it is unlikely a project has multiple purposes, 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. An example appears in this report (see Section 2.1, Gray, Paul).

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 2019

2.1 Institutions

There were 42 licensed institutions required to report animal use during 2019. They are listed below.

Australian National University (ANU), Australian Capital Territory

Biosis Pty Ltd, Victoria (no animal use in 2019)

Birdlife Tasmania (Birdlife), Tasmania

Bonorong Wildlife Sanctuary, Tasmania (no animal use in 2019)

Brett Lane and Associates, Victoria (no animal use in 2019)

Central Queensland University, Queensland (no animal use in 2019)

Charles Sturt University, New South Wales (no animal use in 2019)

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

Elanco, New South Wales (no animal use in 2019)

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

Federation University, Victoria (no animal use in 2019)

Freshwater Biomonitoring (Freshwater), Tasmania

Friends of Maatsuyker Island (FoMI), Tasmania

GHD Pty Ltd (GHD), New South Wales

Gray, Paul, (Independent researcher), Tasmania (no animal use in 2019 apart from recording bat echolocation calls)

Huon Aquaculture Co Pty Ltd, Tasmania (no animal use in 2019)

James Cook University, Queensland (no animal use in 2019)

Jurox Pty Ltd, New South Wales (no animal use in 2019)

Macquarie University, New South Wales (no animal use in 2019)

Monash University (Monash), Victoria

Murdoch University (Murdoch), Western Australia

Natural Resource Management – South (NRM Sth), Tasmania
North Barker Ecosystem Services (North Barker), Tasmania
Robertson, Dr Bruce Ingram, (Independent researcher), Victoria (no animal use in 2019)
Scibus, New South Wales (no animal use in 2019)
Sustainable Timber Tasmania (STTAS), Tasmania
Tasmanian Irrigation Pty Ltd, Tasmania (no animal use in 2019)
TasNature (Peter Tonelli), Tasmania (no animal use in 2019)
Tassal Operations Pty Ltd (Tassal), Tasmania (no animal use in 2019)
Troidlia Biovet Pty Ltd (Troidlia), New South Wales
University of Adelaide (UAdelaide), South Australia
University of New England, New South Wales (no animal use in 2019)
University of New South Wales (UNSW), New South Wales
University of Queensland (UQLD), Queensland
University of the Sunshine Coast, Queensland (no animal use in 2019)
University of Sydney (USydney), New South Wales
University of Tasmania (UTAS), Tasmania
University of Technology Sydney, New South Wales (no animal use in 2019)
Victorian Wader Study Group Inc (VWSG), Victoria
Virbac (Australia) Pty Ltd, Victoria (no animal use in 2019)

There were two AECs resident in Tasmania (DPIPWE and UTAS) in 2019. While the Australian Antarctic Division's AEC is also resident in Tasmania, the Division was not licensed in Tasmania during 2019 as it was not conducting animal research within the Tasmanian jurisdiction.

Of the 42 licensed institutions, 21 reported animal use in Tasmania in 2019. This was 5 less than in 2018 and within the usual range for the previous seven years (18-26). The active institutions comprised 9 Tasmanian resident and 12 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 9 Tasmanian resident institutions using animals in 2019 comprised 1 academic institution (UTAS), 1 government department (DPIPWE), 4 commercial entities (not including CSIRO projects approved by the DPIPWE AEC) and 3 not-for-profit organisations. Interstate institutions using animals comprised 8 academic institutions, 3 commercial entities (including CSIRO), and 1 not-for-profit organisations. There were no overseas institutions licensed in the state during 2019.

Table 1 lists the institutions that used animals and the categories and numbers of animals involved, including a comparison with 2018 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 2019, 279,178 animals or sightings of animals were reported within 197 projects (compared to 255,015 in 216 projects in 2018).

This represents an increase of 9.5% in animal use over 2018 figures. The major contributors to the change were increases in the numbers of birds, exotic feral animals and native mammals (see sections 2.2 and 2.4) reported.

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 139 or 70% of all projects reported (Table 1) using 238,787 or 85% of animals reported. All animal categories except amphibians were represented in the UTAS report. The number of animals reported by UTAS was over twice the number of animals used in 2018 (116,906 or 46%). 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 7 and 11 projects respectively identifying a total of 7,006 animals or 2.51% of all animals reported in 2019. There was a substantial increase in the number of animals reported by DPIPWE divisions on 2018 figures, attributed to a significantly higher number of fish being used in farmed fish projects. DPIPWE projects included a wide variety of subjects from shy albatross, 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. However, CSIRO also reported an observational project involving 20,000 free-range layer hens which increased their animal use by more than 7-fold on 2018 figures.

In 2019, all not-for-profit organisations reporting animal use in 2018 (Birdlife, FoMI, NRM Sth and VWSG) were supervised by the DPIPWE AEC and accounted for 4,526 animals in 8 projects. Of these projects, 7 involved wild bird research, while the remaining project reported the use of a small number of domestic mammals in livestock health monitoring workshops for smallholders.

Nine academic institutions were active in Tasmania during 2019. Apart from UTAS, academic institutions reported a total of 3,587 animals, with each institution having between 1 to 4 projects targeting a small range of animal categories, with aquatic animals, birds, domestic and native mammals featuring.

Of the 20 external licensees using the DPIPWE AEC in 2019, 10 reported animal use totalling 9,577 animals in 16 projects. Commercial enterprises (other than CSIRO) using the DPIPWE AEC (Entura, Freshwater, North Barker, STT and Treidlia) reported a total of 2,858 animals across 5 projects.

CSIRO uses both the DPIPWE AEC and its own interstate AECs. For simplicity, the tables in this report present combined figures for CSIRO. However, 3 projects were conducted by CSIRO under DPIPWE AEC supervision, using 2,193 animals. There were 4 interstate monitored CSIRO projects reporting a total of 20,188 animals.

2.2 Animal categories

Tables 1 and 2.1 summarise the number of animals and projects reported within animal categories for 2019; 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 85,113 (or 30.5%) being reported. This is over 3 times that reported in 2018 (24,327). There were 65 projects using native mammals, up from 53 in 2018. UTAS projects accounted for 82,894 native mammals of which Camera trap sightings accounted for 41,725 in 1 project alone.

Birds was the second most common category reported with 81,916 (or 29.3%). Like native mammals, this is over 3 times the number reported for 2018 (24,531). However, there was a decline in the number of projects using birds from 53 in 2018 to 44 in 2019. Two UTAS projects totalling 41,809 wild bird

observations, and the already mentioned CSIRO poultry project using 20,000 hens contributed the majority of bird use. The remainder of bird use were population surveys of wild birds.

Aquatic animals accounted for 66,456 animals (or only 23.8%) used in 2019 – a 64% decline from 2018 (184,369 or 72.3%). The number of projects utilising aquatic animals increased from 75 in 2018 to 86 in 2019 and was the most active area of research for 2019 in project terms. The largest user of aquatic animals was UTAS with a total of 55,484, of which 54,840 were fish. A single reef biodiversity project reported 15,000 fish. Another project utilising 7,867 zebra fish in a biomedical project, is an example of the increasing use of 'laboratory' fish in this field of research.

A small number of cephalopods are reported annually. In 2019, 366 were reported in 4 projects. Crustaceans do not need to be reported, however 186 animals in 3 projects were reported in 2019.

Laboratory mammal use involved 22,616 (or 8.1%) mammals (all rodents) in biomedical research in 2019. This was a 31.5% increase on 2018 figures, continuing an increasing trend over the past 3 years from a relatively low base in 2017. There were 65 projects using laboratory mammals (or 30.6% of all projects), similar to 2018 (66 projects), reflecting continued interest in the area (Figure 2) in Tasmania. The number of animals used in establishing and maintaining breeding colonies (16,767) was significantly higher than in 2018 (3,026) and includes re-establishment of some colonies as well as established strain maintenance. The number of animals maintained in breeding colonies fluctuates with specific project requirements and is therefore highly unpredictable. Some 356 rats and mice were used in assessing procedural competencies – a mandatory component of both the approved Code and, depending on the procedure, the *Veterinary Surgeons Regulations 2012*.

Exotic feral mammal use increased dramatically in 2019 with 16,980 (or 6.1%) animals reported compared to 321 or 0.13% reported in 2018. Of these, 99% were camera trap sightings. The projects involved mainly cats, rats and mice.

Domestic mammal use remained comparatively low in 2019 with 3,853 head (or 1.4%) used in 28 projects, although this was a 42% increase on 2018 figures (2,707 or 1.1%). The vast majority were again reported by UTAS in observational livestock management projects, aimed, for instance, at grazing behaviour or breeding success of terrestrial livestock species.

Reptile use in 2019 involved 1,863 lizards in 12 projects, up from 1,282 in 2018. UTAS projects accounted for the entire number reported.

Amphibian use in 2019 involved 381 frogs and tadpoles across 4 projects. Deakin (112) and Monash (252) Universities were the major users of amphibians. Two projects were ecological surveys, the other projects involved developing forestry practices that support threatened frog populations or understanding the developmental biology of tadpoles.

2.3 Purposes

Table 2.2 summarises the research and teaching purposes for which animals were used during 2019. 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 144,477 animals (or 42%) in 2019. This represents over twice the number of animals used for this purpose in 2018 (71,054 or 27.9%). However the number of projects declined, from 96 in 2018 to 42 in 2019. Environmental projects involved large numbers of macropods, wild birds, fish and possums in particular, however, almost all animal categories (except reptiles) and types were represented.

Understanding biology projects used 65,868 animals in 87 projects in 2019, compared to 39,883 animals and 117 projects in 2018. This is another upward trend for the past 3 years. Wild birds (30,547) and fish (23,698) featured, accounting for over 82% of animals reported in this type of project.

Management and production research accounted for 55,311 animals used in 28 projects, compared to 125,061 animals in 20 projects in 2018. The majority of animals used for this purpose were farmed salmonids (23,698), followed by poultry (20,000), and laboratory mammals (15,472) involved in colony maintenance.

Health and welfare studies reported a similar level of animal use in 2019 (9,442 animals) to that used in 2018 (9,318). However, the number of projects conducted for this purpose declined from 50 to 37 in 2019. As has been the case for several years, the vast majority of projects and animals used in this area were fish (6,692) and laboratory mice and rats aimed at improving salmonid or human health and welfare respectively.

Education projects reported for 2019, used less than half the number of animals (4,080) than reported in 2018 (9,699). Only 7 educational projects used animals of which 3,572 were fish collected from vessels and shore-based sampling and 326 were laboratory rodents used in training techniques training.

2.4 Procedures

Table 2.3 summarises the procedures used on animals during 2019. 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 2019 with 122,724 sightings reported in 10 projects. This is compared to 15,018 sightings in 23 projects in 2018. The vast majority of sighting were recorded in environmental projects (7 projects reporting 100,458 sightings) with the remainder in management and production projects (3 projects reporting 22,266 sightings). The vast majority of sightings were of native mammals (73,454) followed by birds (30,873) and exotic feral mammals (16,820).

Observation with Minor Interference procedures were applied to 82,283 animals in 66 projects in 2019. This an increase on 2018 figures of 75,420 animals. However, the number of projects using this procedure in 2019 (66) was significantly less than that reported in 2018 (116 projects). As for previous years, bird (49,545), aquatic animal (17,846) and native mammal (10,724) surveys were the main users of observational procedures in 2019.

Animal Unconscious, No Recovery procedures were applied to 34,088 animals (or 13.4%) – over twice as many as in 2018 (16,985 or 6.7%). The procedures were used in the same number of projects (48). These procedures were applied mainly to fish (31,846 or 93%) and laboratory mammals (2,172 or 6.3%) as has been the case for several years. With regard to aquatic animals, these procedures were applied in wild fisheries and aquaculture educational projects utilising shore-based sampling and commercial vessels and techniques. 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 25,324 (or 9.9%) animals across 43 projects in 2019, which was an increase on 2018 figures (21,745 or 8.5%). These procedures were applied mainly to laboratory mammals (19,167), and aquatic animals (3,228). 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 5,586 animals (or 2.2%) across 19 projects in 2019. Farmed fish projects accounted for 88% of the animals subjected to this procedure. This represents a dramatic reduction in the use of this procedure during the year compared to 2018 (109,188 animals or 42.8% in 14 projects).

Minor Operative Procedures With Recovery were applied to 4,828 (or 1.9%) animals in 2019; a substantial decrease on 2018 figures (12,974 animals or 5.1%). There was also decrease in the number of projects utilising this procedure, with 21 in 2019 compared to 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 2019 over 90% of animals subjected to these procedures were Atlantic salmon addressing specific disease issues.

Major Physiological Challenge was applied to 4,024 animals (1.6%) in 11 projects in 2019. This was a small increase on 2018 figures of 3,359 animals in 7 projects. As for previous years the vast majority of projects (7) using these procedures were concerned with farmed salmonid disease prevention, accounting for 3,728 animals reported. Laboratory rodents accounted for the remaining animals subjected to this procedure (171 mice and 125 rats).

Major Surgery With Recovery procedures were applied to 321 animals in 2019 in 9 projects. This is very similar to 2018 figures (326 animals in 14 projects). These procedures were applied exclusively to mice involved in neuropathology research

Death as the End Point procedures were not utilised during 2019. These procedures are rarely used in Tasmania.

The relatively low impact procedures of *Camera traps only*, *Observation with Minor Interference*, *Minor Conscious Procedures* and *Minor Physiological Challenge* were applied to 84.5% (or 235,917) animals and in 70% of projects in 2019.

3 Tables and figures

All summarised data is displayed in this section.

Table 1 Summary of animal categories used by institutions in 2019

Institution	Project number	Amphibia	Aquatic animals	Birds	Domestic mammals	Exotic feral mammals	Lab mammals	Native mammals	Reptiles	Total	% of all animals
ANU	4			232				80		312	0.11
Birdlife	4			3194						3194	1.14
CSIRO	7		2381	20000						22381	8.02
Deakin	4	112	934	233						1279	0.46
DPIPWE	18		4497	340	5	476		1688		7006	2.51
Entura	1		2719							2719	0.97
FoMI	1			893						893	0.32
Freshwater	1		57							57	0.02
GHD	3	5	20	8						33	0.01
Monash	1	252								252	0.09
Murdoch	1		8					21		29	0.01
North Barker	1	12								12	0.00
NRM Sth	1				52					52	0.00
STTAS	1			12						12	0.00
Treidlia	1				58					58	0.02
UAdelaide	1				570					570	0.20
UNSW	1		356							356	0.13
UQLD	1			27						27	0.01
USydney	4				332			430		762	0.27
UTAS	139		55484	56590	2836	16504	22616	82894	1863	238787	85.53
VWVG	2			387						387	0.14
Total	197	381	66456	81916	3853	16980	22616	85113	1863	279178	100.00
% of categories	N/A	0.14	23.80	29.34	1.38	6.08	8.10	30.49	0.67	100.00	
2018 numbers	216	89	184369	24531	2707	321	17204	24327	1467	255015	
% Change	-8.8	328.1	-64.0	233.9	42.3	5189.7	31.5	249.9	27.0	9.5	

Table 2 Animal categories, purposes and procedures in 2019**2.1 Animal categories used in 2019**

Animal category	Animals per category	Projects per category	% Animals	% Projects (n= 197*)
Amphibia	381	4	0.14%	3.55%
Aquatic animals	66456	86	23.80%	43.65%
Birds	81916	44	29.34%	22.34%
Domestic mammals	3853	28	1.38%	14.21%
Exotic feral animals	16980	31	6.08%	15.74%
Lab mammals	22616	65	8.10%	32.99%
Native mammals	85113	65	30.49%	32.99%
Reptiles	1863	12	0.67%	6.09%
Total	279178	334*	100.00%	

*A project may use multiple animal categories.

2.2 Research and teaching purposes used in 2019

Purpose	Animals per purpose	Projects per purpose	% Animals	% Projects (n= 197*)
Education	4080	7	1.46%	3.55%
Environmental study	144477	42	51.75%	21.32%
Health & welfare	9442	37	3.38%	18.78%
Management & production	55311	28	19.81%	14.21%
Understanding biology	65868	87	23.59%	44.16%
Total	279178	201*	100.00%	

*A project may use multiple purposes.

2.3 Research and teaching procedures used in 2019

Procedure	Animals per procedure	Projects per procedure	% Animals	% Projects (n= 197*)
Camera Traps only	122724	10	43.96%	5.08%
Observation with minor interference	82283	66	32.27%	33.50%
Minor conscious procedure	25324	43	9.93%	21.83%
Minor physiological challenge	5586	19	2.19%	9.64%
Minor operative procedure with recovery	4828	21	1.89%	10.66%
Major physiological challenge	4024	11	1.58%	5.58%
Major surgery with recovery	321	9	0.13%	4.57%
Animal unconscious no recovery	34088	48	13.37%	24.37%
Death as end point	0	0	0.00%	0.00%
Total	279178	227*	109.48%	

*Projects may use several procedures except for 'Camera traps only'.

Table 3 Summary of animal types used by institutions in 2019

Institution>	ANU	Birdlife	CSIRO	Deakin	DPIPWE	Entura
Amphibia						
Amphibia				112		
Aquatic animals						
Cephalopods						
Crustaceans						
Fish			2381	934	4497	2719
Other Aquatic Animals						
Birds						
Exotic wild						
Native captive					39	
Native wild	232	3194		233	301	
Other birds						
Poultry			20000			
Domestic mammals						
Cats						
Cattle						
Deer						
Dogs					5	
Goats						
Horses						
Pigs						
Sheep						
Exotic feral mammals						
Cats					155	
Mice					153	
Other exotic feral mammals						
Pigs						
Rabbits					153	
Rats					15	
Laboratory mammals						
Mice						
Rats						
Native mammals						
Cetaceans					2	
Echidna						
Macropods					552	
Native Rats and Mice	3					
Other Native Animals	1					
Platypus						
Possums and Gliders	10				552	
Quoll	64				552	
Tasmanian Devils	2				30	
Wombats						
Reptiles						
Lizards						
Total	312	3194	22381	1279	7006	2719

Table 3 Summary of animal types used by institutions in 2019 continued

Institution>	FoMI	Fresh-water	GHD	Monash	Murdoch	North Barker	NRM South	STTAS
Amphibia								
Amphibia			5	252		12		
Aquatic animals								
Cephalopods								
Crustaceans			20					
Fish		57			8			
Other Aquatic Animals								
Birds								
Exotic wild								
Native captive								
Native wild	893		8					12
Other birds								
Poultry								
Domestic mammals								
Cats								
Cattle								
Deer								
Dogs								
Goats								
Horses								
Pigs							4	
Sheep							48	
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								
Platypus					21			
Possums and Gliders								
Quoll								
Tasmanian Devils								
Wombats								
Reptiles								
Lizards								
Total	893	57	33	252	29	12	52	12

Table 3 Summary of animal types used by institutions in 2019 continued

Institution>	Treidlia	UNSW	UAdelaide	UQLD	USydney	UTAS	VWSG
Amphibia							
Amphibia							
Aquatic animals							
Cephalopods						366	
Crustaceans						166	
Fish		356				54840	
Other Aquatic Animals						112	
Birds							
Exotic wild						660	
Native captive							
Native wild				27		53022	387
Other birds						2908	
Poultry							
Domestic mammals							
Cats					32		
Cattle			570			1715	
Deer						135	
Dogs						449	
Goats						1	
Horses						58	
Pigs							
Sheep	58				300	478	
Exotic feral mammals							
Cats						8920	
Mice						3115	
Other exotic feral mammals						973	
Pigs						1	
Rabbits						737	
Rats						2758	
Laboratory mammals							
Mice						20909	
Rats						1707	
Native mammals							
Cetaceans						4660	
Echidna						679	
Macropods						41712	
Native Rats and Mice						324	
Other Native Animals						2537	
Platypus							
Possoms and Gliders						17600	
Quoll					40	1928	
Tasmanian Devils					390	8580	
Wombats						4874	
Reptiles							
Lizards						1863	
Total	58	356	570	27	762	238787	387

Table 4 Purposes and procedures used for animal types in 2019

	Amphibians	Aquatic animals			
	Amphibians	Cephalopods	Crustaceans	Fish	Other Aquatics
Purpose					
Education		9	1	3572	56
Environmental study	129	51	20	20103	3
Health & welfare				6692	
Management & production		1	165	11727	1
Understanding biology	252	305		23698	52
Procedure					
Camera traps only				552	
Observation with minor interference	67	109	185	17548	4
Minor conscious procedure	224			3228	
Minor physiological challenge	90			4917	
Minor operative procedure with recovery				4339	
Major physiological challenge				3728	
Major surgery with recovery					
Animal unconscious no recovery		257	1	31480	108
Death as End Point					

Table 4 Purposes and procedures used for animal types in 2019 continued

Purpose	Birds				
	Exotic wild	Native captive	Native wild	Other birds	Poultry
Education					
Environmental study	660		25467	2908	
Health & welfare			113		
Management & production			2182		20000
Understanding biology		39	30547		
Procedure					
Camera traps only	161		7804	2908	20000
Observation with minor interference	499		49046		
Minor conscious procedure		9	1459		
Minor physiological challenge					
Minor operative procedure with recovery		30			
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 2019 continued

	Domestic mammals							
	Cats	Cattle	Deer	Dogs	Goats	Horses	Pigs	Sheep
Purpose								
Education								60
Environmental study		53	135	449	1	50		332
Health & welfare	32	58				5		358
Management & production		2174		5			4	134
Understanding biology						3		
Procedure								
Camera traps only		53	135	454	1	50		332
Observation with minor interference		2132						146
Minor conscious procedure	32					5	4	406
Minor physiological challenge		100				3		
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 2019 continued

	Exotic feral mammals						Laboratory mammals	
	Cats	Mice	Other exotic feral mammals	Pigs	Rabbits	Rats	Mice	Rats
Purpose								
Education						8	326	30
Environmental study	8900	3115	973	1	737	2750		
Health & welfare							1961	190
Management & production	153	153			153	15	15472	1295
Understanding biology	22						3150	192
Procedure								
Camera traps only	9038	3268	873	1	890	2750		
Observation with minor interference	22		100			8	73	
Minor conscious procedure							17818	1349
Minor physiological challenge							264	
Minor operative procedure with recovery	15						246	77
Major physiological challenge							171	125
Major surgery with recovery							321	
Animal unconscious no recovery						15	2016	156
Death as End Point								

Table 4 Purposes and procedures used for animal types in 2019 continued

	Native mammals					
	Cetaceans	Echidnas	Macropods	Native Rats and Mice	Other native mammals	Platypus
Purpose						
Education			1	7		
Environmental study		679	41671	320	2538	21
Health & welfare						
Management & production			552			
Understanding biology	4662		40			
Procedure						
Camera traps only		664	37503	317	1737	
Observation with minor interference	4662	15	4761	7	800	
Minor conscious procedure						
Minor physiological challenge						
Minor operative procedure with recovery				3	1	21
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 2019 continued

	Native mammals continued				Reptiles
	Possums and gliders	Quolls	Tas Devils	Wombats	Lizards
Purpose					
Education	10				
Environmental study	17580	1732	8228	4871	
Health & welfare			30	3	
Management & production	552	573			
Understanding biology	20	279	744		1863
Procedure					
Camera traps only	18102	2201	8060	4870	
Observation with minor interference	50	199	229	1	1620
Minor conscious procedure	10	120	660		
Minor physiological challenge		21		3	188
Minor operative procedure with recovery		43	53		
Major physiological challenge					
Major surgery with recovery					
Animal unconscious no recovery					55
Death as End Point					

Figure I Animal categories used between 2015 and 2019

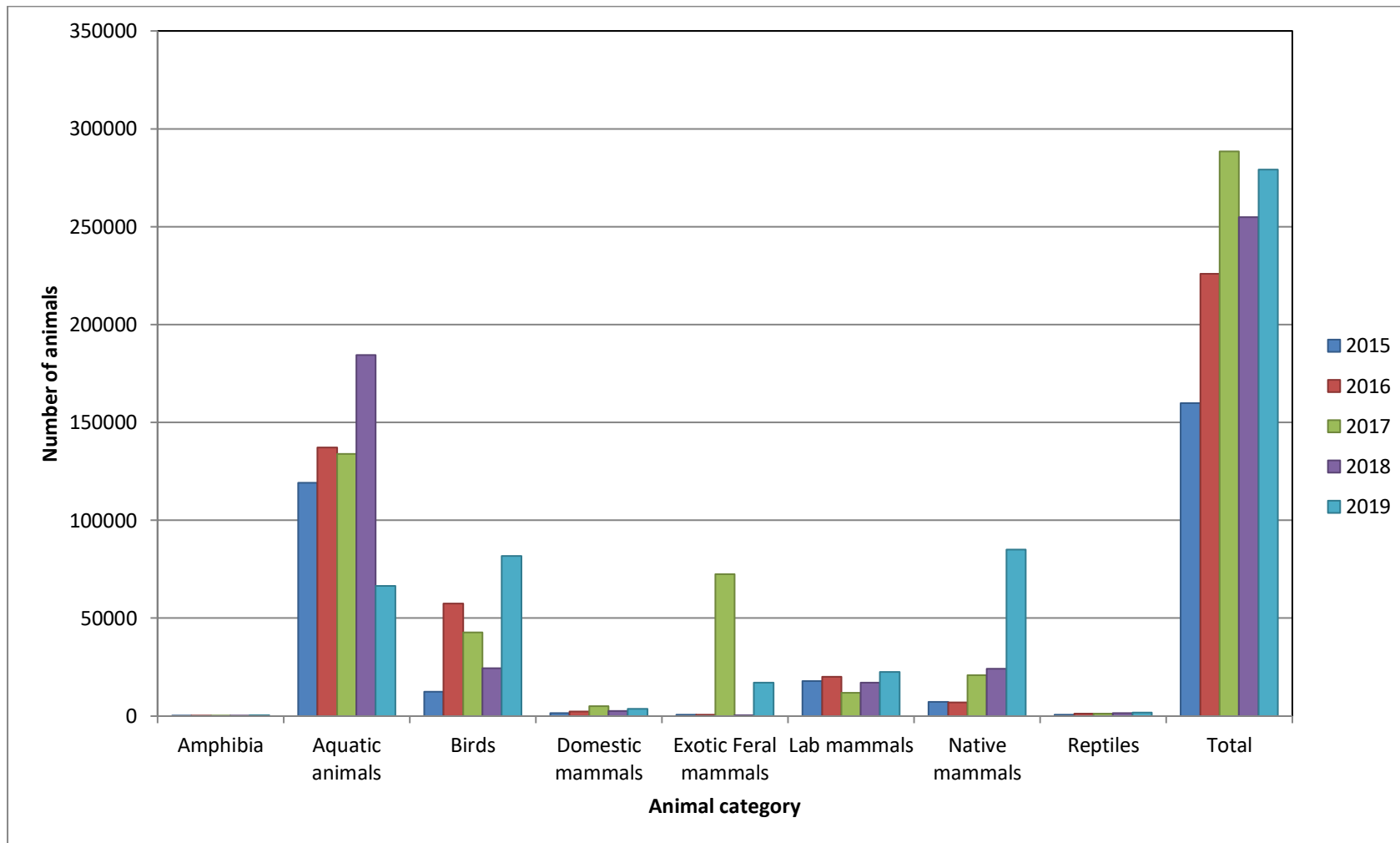


Figure 2 Projects per animal category between 2015 and 2019

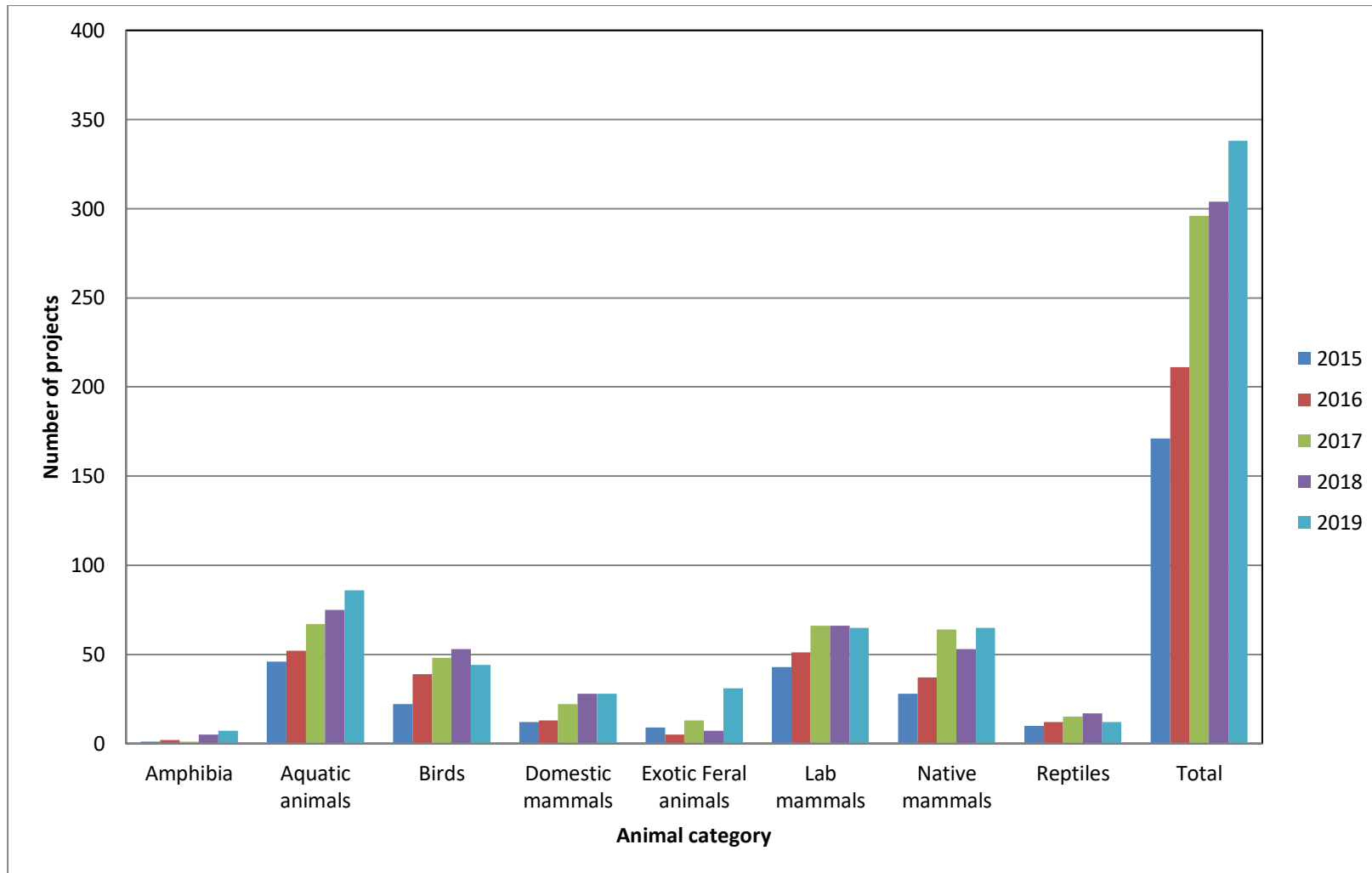


Figure 3 Purposes for which animals were used between 2015 and 2019

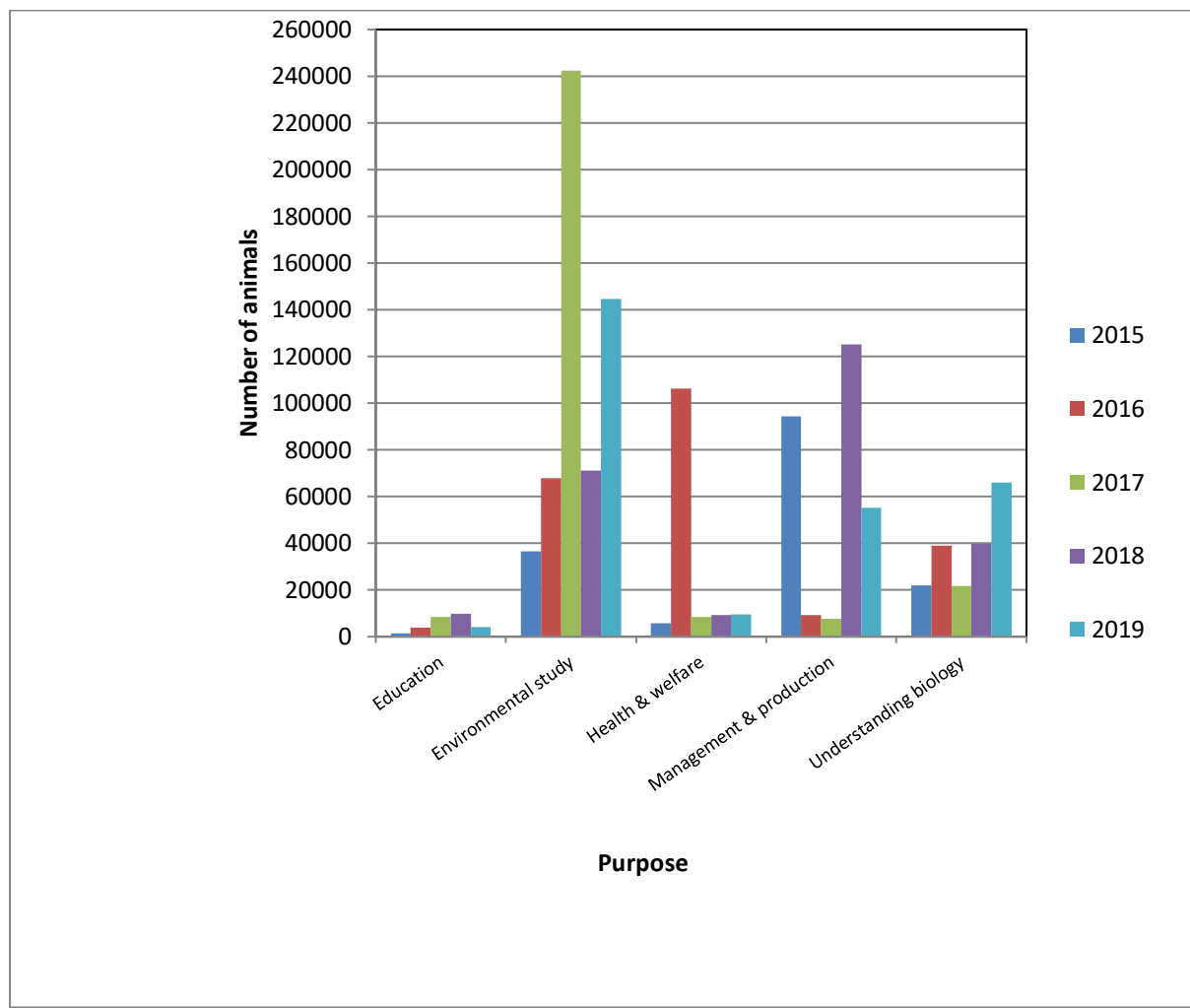


Figure 4 Projects per purposes between 2015 and 2019

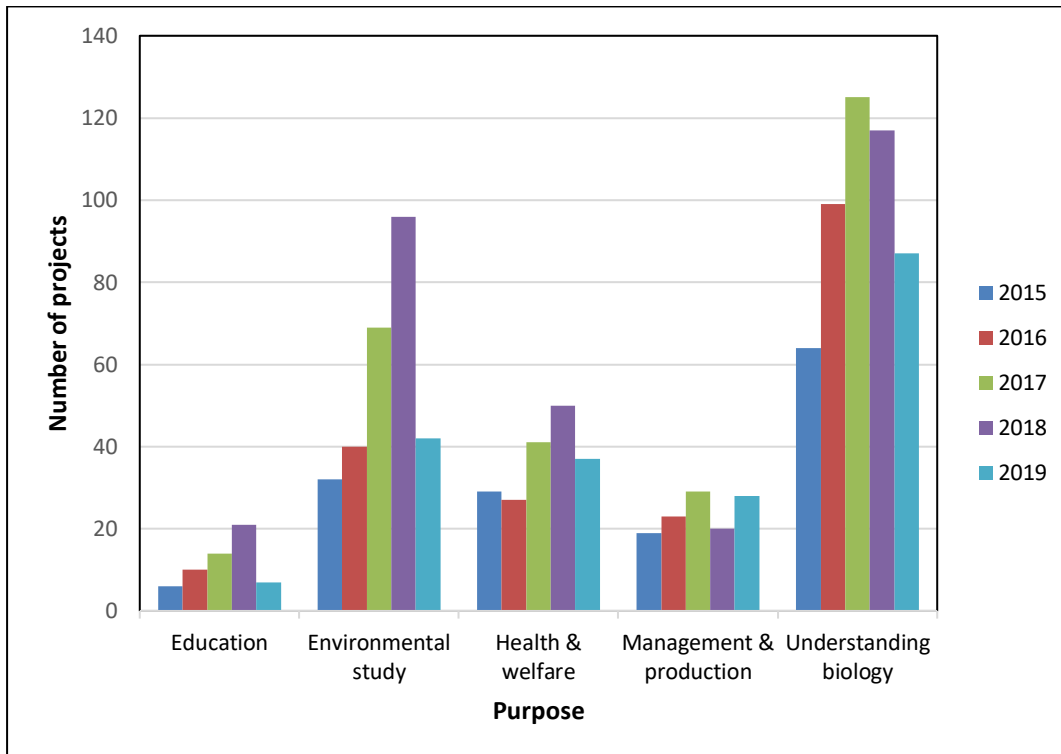


Figure 5 Procedures used between 2015 and 2019

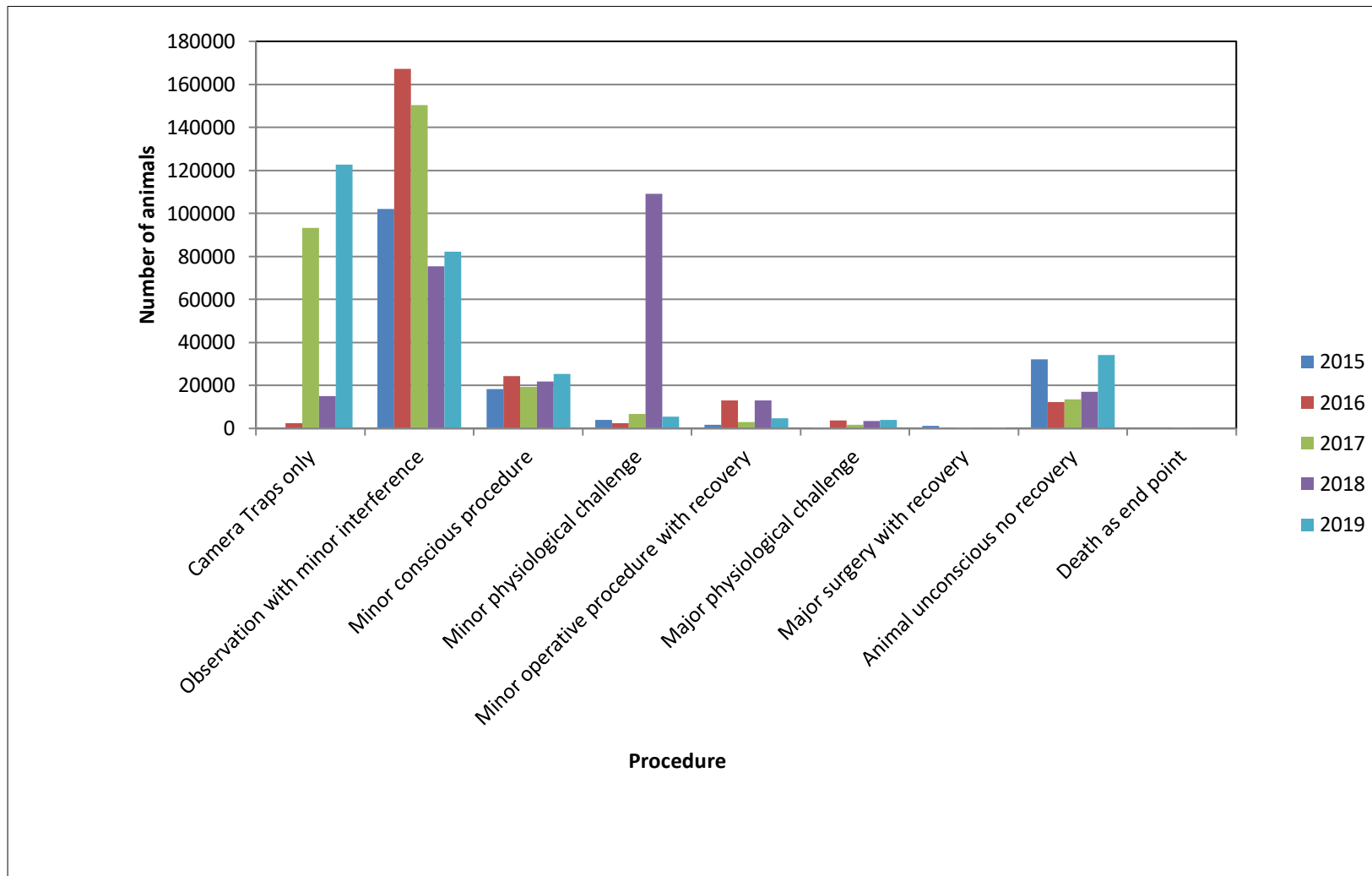
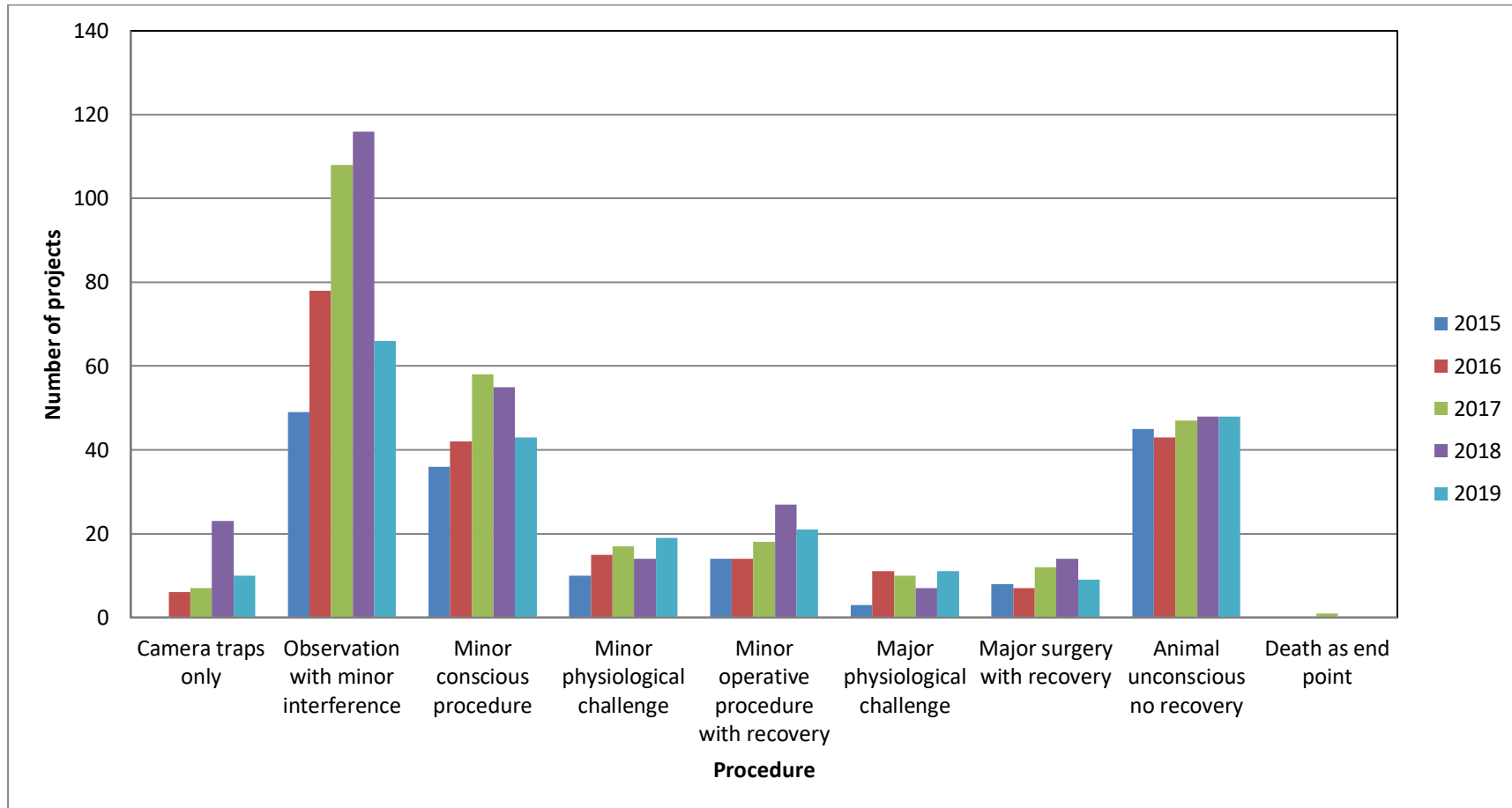


Figure 6 Projects per procedures used between 2015 and 2019



Left intentionally blank

ABBREVIATIONS

AEC	Animal Ethics Committee
ANU	Australian National University
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
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
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