NSW GOVERNMENT

Department of Primary Industries

DPI Research Impact Summary

Stronger Primary Industries

Job No 16340

NSW DPI Research impact

NSW DPI's research history extends for more than 100 years and our diverse, high impact research portfolio solves key issues that impede the growth of our primary industries. For example, our R&D programs have; underpinned the expansion of the NSW Oyster industry, now with a farm-gate value of $50 million; led National chickpea breeding research, with a net return to industry of over $100 million; and minimised major biological threats by developing advanced and rapid methods for detecting zoonotic agents of high consequence, including equine influenza which posed risk estimated at $500 million to the horse industry.

Our scientific capability, rigour and understanding of the unique constraints faced by Australia's primary industries are highly regarded, both nationally and internationally.

1. Ranking using Web of Science*

1.1 World-class research

NSW DPI has produced ~50 publications which rank in the **TOP 1%** of citations globally for the fields of Agricultural Science, Plant & Animal Science and Environment & Ecology, over the past **10 YEARS**

NSW DPI ranks **14th** amongst Government Organisations for Agricultural Science and Plant and Animal Science globally, ordered by total number of documents.

Agricultural Science*

Plant and Animal Science

Environment and Ecology

* Web of Science ranks publications in highly-regarded journals. It provides the most reliable and consistent metrics for determining global and Australian rankings. NSW DPI produces some applied products that are not evident in these metrics. ** NSW DPI produced 1038 papers in the field of Agricultural Science of which 11 were in the top 1% of citations globally. This places NSW DPI 170th out of 857 organisations that produced at least one paper in the top 1% in the previous 10 years.

1.2 Australian agency leader

NSW DPI ranks

7th

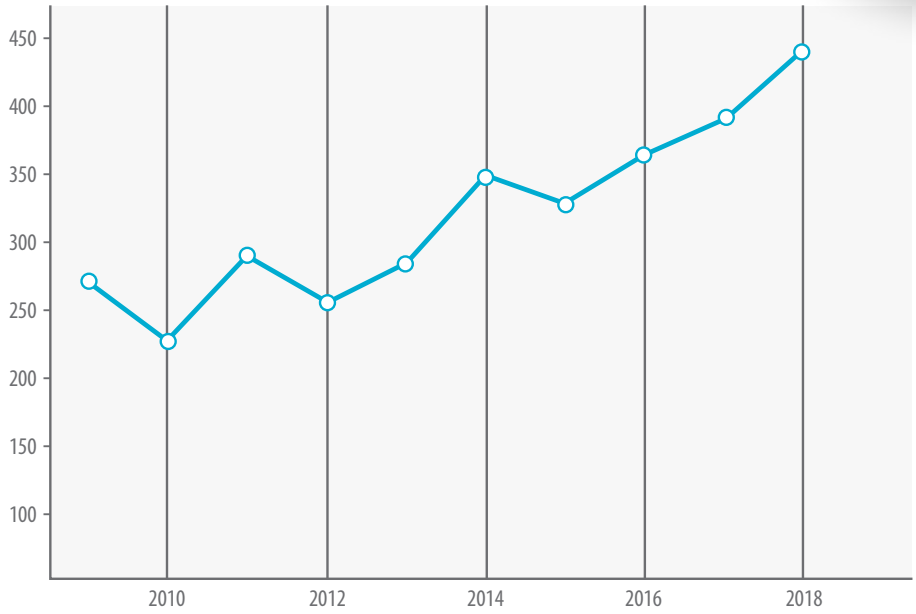
in the field of Agricultural Sciences for 2009-2019

NSW DPI is the highest ranked State government agency in the field of agricultural sciences in Australia.

NSW DPI is unusual in this top 10 cohort as we conduct both applied and cutting-edge research. We can also value add to our work via close linkages to extension (LLS and consultants), education (Tocal) and compliance functions.

Source: As defined by the Essential Science Indicators database, updated as of 11 July 2019, to cover a 10 year and 4 months period, 1 January 2009 – 30 April 2019. Some data are as defined by the InCites dataset updated 28 June 2019, including Web of Science content to 31 May, 2019.

Number of NSW DPI scientific publications produced annually



Source: Web of Science

1.3 Highly collaborative

NSW DPI collaborated with

762

organisations globally between 2014 and 2019

Some of our top global collaborators from 2014 to 2019 were:

- The Chinese Academy of Sciences
- The University of Auckland
- Fujian Agriculture and Forestry University
- The United States Department of Agriculture

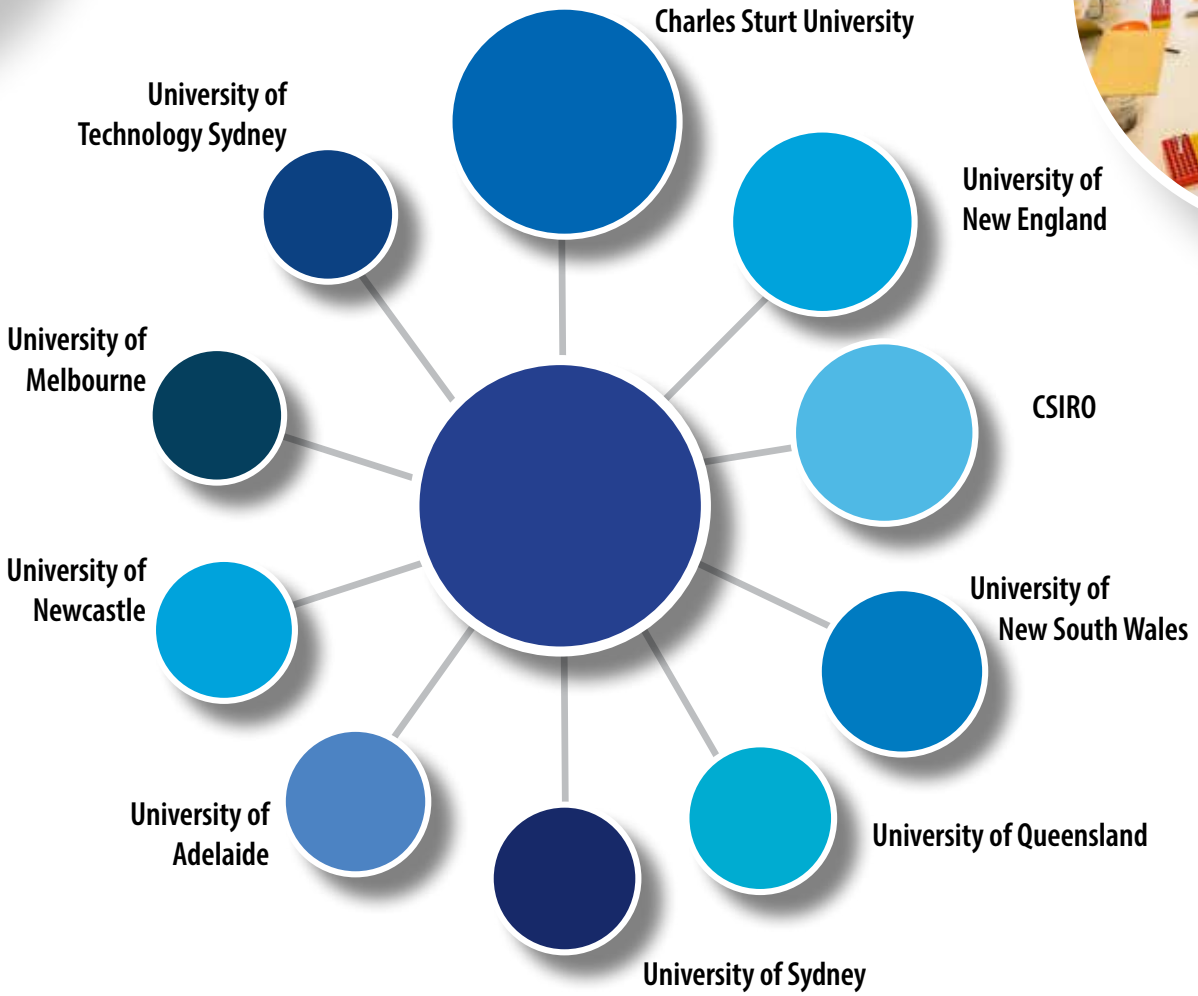
Each with more than 33 papers.

NSW DPI produced more than

100 peer reviewed papers between 2014 and 2019 with each of:

- Charles Sturt University
- The University of New England
- CSIRO
- The University of NSW
- The University of Queensland
- The University of Sydney
- The University of Adelaide

Number of publications produced by NSW DPI with our top 10 collaborating Australian institutions:



Source: Web of Science

CRC collaboration

NSW DPI has partnered in many Co-operative Research Centres (CRCs) and is currently involved in the CRC for High Performance Soils,Food Agility CRC; and is the research lead in the newly-announced CRC-P for Growing the Medicinal Cannabis Industry.

2. Individual excellence

2.1 Scientific standing

NSW DPI has
10 researchers with
>80 publications
in Web of Science and more
than 20 researchers with
>1000 citations
since 1980 and with a
NSW DPI affiliation.

As of July 2019:

- **30** Research Scientists
- **46** Senior Research Scientists
- **24** Principal Research Scientists
- **13** Senior Principal Research Scientists

With:

- **10** New Research Scientists; and
- **13** Progression applications pending

2.2 Examples of award winners

Premier's Prizes for Science and Engineering

- Innovation in Public Sector Science and Engineering Award:
  - Dr Wayne O'Connor 2017
  - Dr Lukas van Zwieten 2016
  - Dr Hutton Oddy 2015
- Plant and Animal Science Award - Dr Peter Kirkland 2008

International

- 2018 Vietnam Medal for Agriculture - Dr Wayne O'Connor 2018

Science and Innovation Awards 2019

- AgriFutures Australia Award - Ashlea Webster

Grains Research and Development Corporation

- Seed of Light 2019 Award - Loretta Serafin
- Recognising and Rewarding Excellence 2019 Award - Deb Slinger
- Emerging Leader 2019 Award - Dr Felicity Harris

Institute of Foresters Australia

- NW Jolly 2018 Award - Dr Christine Stone
- Australian Society of Fish Biology, 2019 Early Career Excellence Award – Dr David Harasti

Australian Association of Cotton Scientists Awards

- Early Career Scientist Encouragement 2019 Award - Dr Guna Nachimuthu

3. Impact beyond journal publications

3.1 Impact from electronic delivery and media

The NSW DPI website is a key hub for industry information and assistance and receives an average of

7.5 million

visits each year

NSW DPI has gained traction with communities, industries and people through digital platforms, including:

- NSW DPI website
- Facebook
- Instagram
- Twitter
- Workplace (internal platform)

Strong engagement levels across our social media accounts shows our ability to develop effective content and deliver it through a suite of modern communication platforms, to promote NSW DPI research and demonstrate industry leadership.

3.2 Industry impacts from research

Research conducted by NSW DPI creates substantial benefit to primary industry, with considerable 'return on investment'. Some examples are provided below.

3.2.1 Oysters

The NSW oyster industry has a farm-gate value of **$50m**

20% of Sydney rock oysters farmed in NSW are hatchery spat produced using techniques refined by NSW DPI

80% of the flat oysters produced in NSW are from spat produced by NSW DPI

100% of pearl oyster production in NSW since 2000 has originated from oysters bred in our hatchery

3.2.2. Murray Cod

The industry has established on the basis of research conducted for Golden Perch. This research, which commenced in 1986, encompassed both breeding techniques and hatchery technology, and supported development of manuals to support growers. Broader aquaculture research is also supporting social license to operate.

3.2.3 Synthetic biology

Synthetic biology is a multi-disciplinary technology that designs and engineers novel and existing biological systems to perform new functions in a modular, reliable and predictable way. It is transforming the pharmaceutical, fragrance and textiles industries. Benefits are expected across agriculture, medicine and environmental remediation and conservation.

The total market value of industries deploying synthetic biology is predicted to be **us $14bn by 2020**

NSW DPI, through its partnership with Macquarie University, is the only primary industries organisation directly involved in the global "Yeast 2.0" consortium, an exemplar project in synthetic biology that is constructing the world's first designer eurkaryotic organism. This This strategic co-investment will deliver outcomes to our stakeholders and build new capability and collaborations. .

3.2.4 Crop Breeding

NSW DPI makes significant investments in crop breeding, including leading the national chickpea anddurum wheat breeding programs.

NSW DPI investment in these two breeding programs from 2013-2019 have been shown to produce strongly positive returns for industry. Returns from a forecast to 2032:

	Chickpea breeding	Durum breeding
DPI investment	$4.7m	$5.9m
% of total investments nationally	23.8%	34.6%
$ received by NSW industry for every dollar invested	$7.7	$1.9
Net return to NSW industry	$24.2m	$4m
Net return to national industry	$100.6m	$11.4m

3.2.5 Forestry

In 2017-18 26,000 people were employed in forestry and related industries, 2,000 of whom were directly in commercial forestry.

The NSW DPI Forest Science team directly contributes to improving the viability of this industry through the following R&D activities:

- annual health surveys of the plantation estate managed by the NSW Forestry Corporation and targeted biosecurity monitoring for new exotic incursions
- fauna surveys in native forests subjected to selective harvesting, in particular koala activity
- the application of remote sensing technologies and
- the development of new markets for biomass.

An overview of industry trends, some of which have been driven by NSW DPI research (e.g. verticillium control in cotton and release of new lupin varieties) is available in the Performance, Data and Insights document.

The gross value of logs harvested is estimated to be

$470m

comprised of hardwood and softwood production; and excluding wood manufacturing

4. DPI's research capability

More than twenty key research institutes State-wide

A network of NATA accredited laboratories

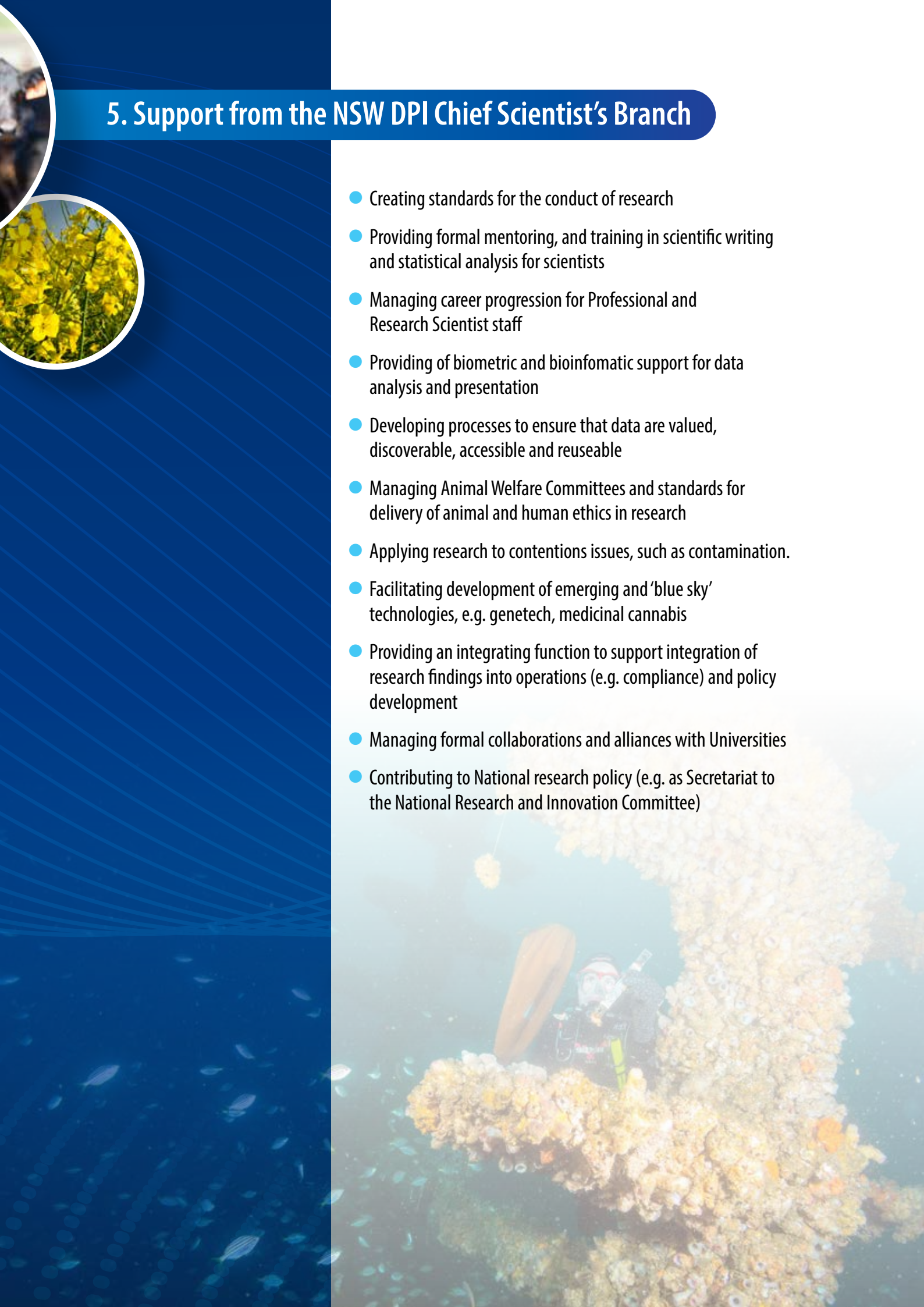
600+ scientific and technical staff

13,000 ha of trial sites

Portfolio of $100m per year of research and development projects

5. Support from the NSW DPI Chief Scientist's Branch

- Creating standards for the conduct of research
- Providing formal mentoring, and training in scientific writing and statistical analysis for scientists
- Managing career progression for Professional and Research Scientist staff
- Providing of biometric and bioinfomatic support for data analysis and presentation
- Developing processes to ensure that data are valued, discoverable, accessible and reuseable
- Managing Animal Welfare Committees and standards for delivery of animal and human ethics in research
- Applying research to contentions issues, such as contamination.
- Facilitating development of emerging and 'blue sky' technologies, e.g. genetech, medicinal cannabis
- Providing an integrating function to support integration of research findings into operations (e.g. compliance) and policy development
- Managing formal collaborations and alliances with Universities
- Contributing to National research policy (e.g. as Secretariat to the National Research and Innovation Committee)



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www.dpi.nsw.gov.au