

CHAPTER 9

STEM PATHWAYS: AGRICULTURAL SCIENCES

WHAT ARE AGRICULTURAL SCIENCES?

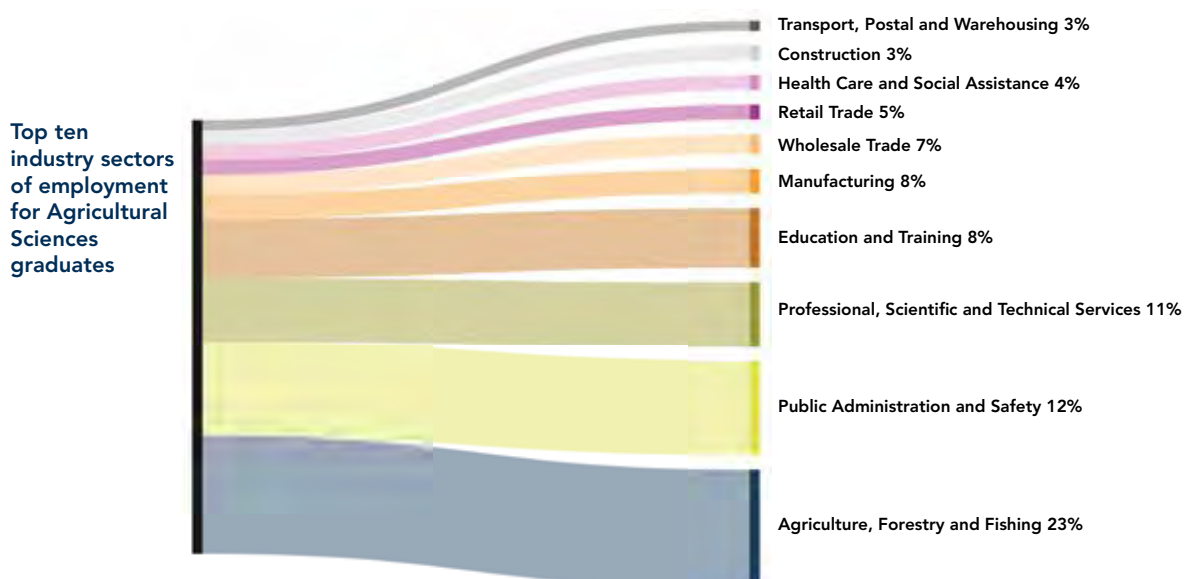
This report combines the ASCED fields of Agriculture and Horticulture and Viticulture into Agricultural Sciences for this chapter. The main purpose of studying and working in Agriculture is to understand and apply knowledge of livestock reproduction, the production of primary plant and animal products, and the theory and practice of farming. The main purpose of studying and working in Horticulture and Viticulture is to understand and apply knowledge of the factors affecting plant propagation, growth and physiology. Both Agriculture and Horticulture and Viticulture also involve utilising current technology, principles and practices (ABS, 2001). The fields of Fisheries Studies and Forestry Studies have been examined separately.

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STEM PATHWAYS: AGRICULTURAL SCIENCES

KEY FACTS

- 1** In 2011, there were 24 410 Agricultural Sciences graduates, two-thirds of whom were male (combining the sub-classifications of Agriculture; and Horticulture and Viticulture).
- 2** The female workforce was younger than the male workforce: less than one third of females were aged 45 or over (29 per cent), compared to 47 per cent of males.
- 3** 79 per cent worked in the private sector—varying from 83 per cent of bachelors to 47 per cent of doctorates.
- 4** The top two industries of employment were Agriculture, Forestry and Fishing (23 per cent), and Public Administration and Safety (12 per cent).
- 5** Graduates most commonly worked as Professionals (31 per cent) and Managers (31 per cent); and 11 per cent were Technicians and Trades Workers.
- 6** At a more detailed level, the most common occupations were as Agricultural and Forestry Scientists (11 per cent) and Livestock Farmers (6 per cent).
- 7** For those with doctorates, the most common occupation were as Agricultural and Forestry Scientists (25 per cent), and University lecturers and tutors (11 per cent).
- 8** The proportion of graduates earning over \$104 000 per year more than doubles from 11 per cent at bachelor level of qualification to 24 per cent at doctorate level of qualification.



HOW MANY AGRICULTURAL SCIENCES GRADUATES ARE THERE IN AUSTRALIA?

In 2011, there were 24 410 Agricultural Science graduates (combining the sub classifications of Agriculture; and Horticulture and Viticulture) in Australia. Of these, 84 per cent held a degree in Agriculture and the remaining 16 per cent in Horticulture and Viticulture.

Twenty-one per cent of graduates (5038) were either not in the labour force or were unemployed (approximately 18 and 2 per cent, respectively).

There were 1694 graduates (7 per cent of the total cohort) in Agricultural Science who held a doctoral degree: 3 per cent of Horticulture and Viticulture graduates and 8 per cent of Agriculture graduates. Comparatively, 8 per cent of STEM graduates and 3 per cent of Non-STEM graduates held a doctoral degree.

Approximately two thirds of all graduates in Agricultural Science were male, which increased to 74 per cent of graduates with doctoral level qualifications.

HOW OLD IS THE AGRICULTURAL SCIENCES GRADUATE WORKFORCE?

The female Agricultural Sciences graduate workforce is younger than the male workforce, and has a similar

age distribution to the Non-STEM graduate workforce (Figure 9.1). Less than one third of females were aged 45 or over (29 per cent), compared to 47 per cent of males.

WHERE DO AGRICULTURAL SCIENCES GRADUATES WORK?

The private sector employed 79 per cent of all Agricultural Sciences graduates; however the proportion varied depending on level of qualification as follows:

- ▶ Bachelor level: 83 per cent
- ▶ Postgraduate level: 59 per cent
 - Masters: 69 per cent
 - Doctorate: 47 per cent

INDUSTRY SECTORS OF EMPLOYMENT

Industries are classified in four levels (ABS, 2006a):

- ▶ Divisions (the broadest level)
- ▶ Subdivisions
- ▶ Groups
- ▶ Classes (the finest level)

See Appendix B for a detailed list.

Figure 9.1: Age distribution of employed Agricultural Sciences graduates at bachelor level and above, by field and gender

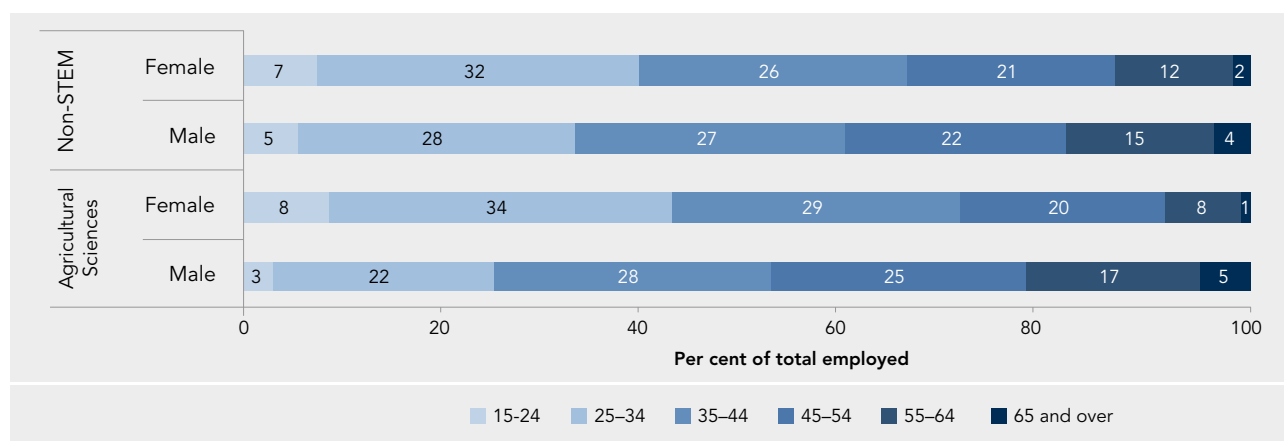


Figure 9.2: Top ten industry divisions of employment for Agricultural Sciences graduates with qualifications at bachelor level and above, by gender

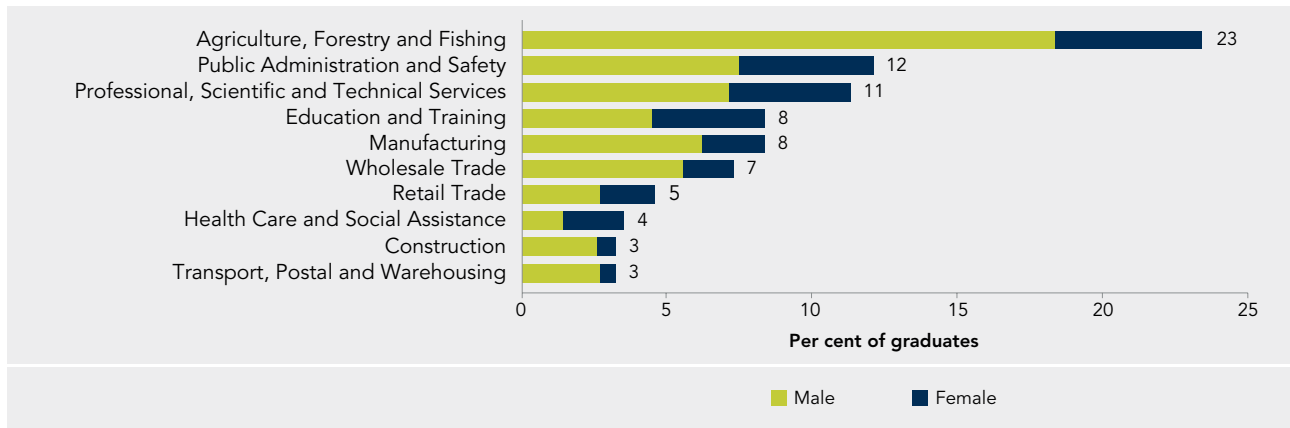
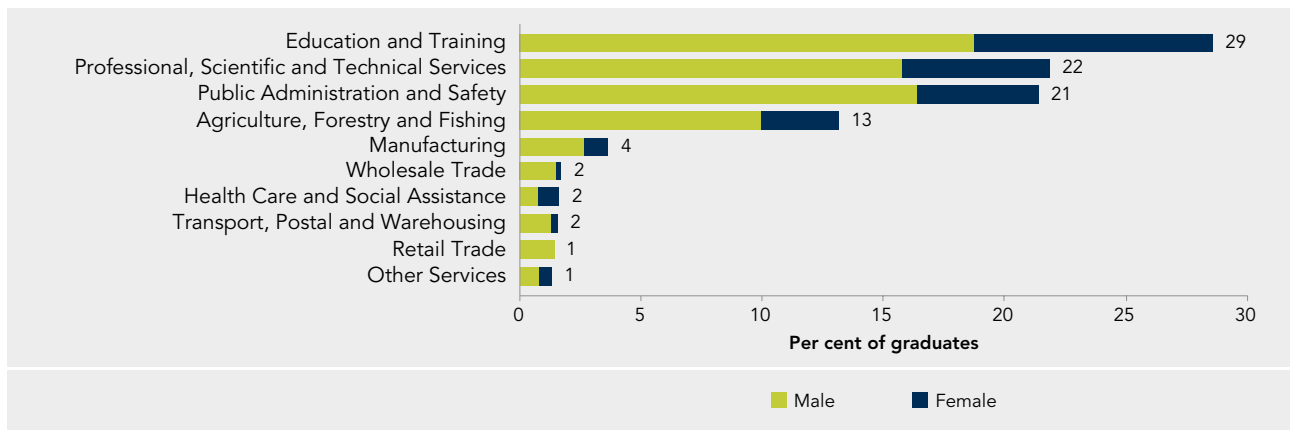


Figure 9.3: Top ten industry divisions of employment for Agricultural Sciences doctoral graduates, by gender



The top industries of employment for Agricultural Science graduates were Agriculture, Forestry and Fishing and Public Administration and Safety (23 and 12 per cent of graduates, respectively) (Figure 9.2).

For individuals with a doctoral degree, Education and Training, and Professional, Scientific and Technical Services were the top destinations, with 29 and 22 per cent of graduates, respectively. The top four industries employed 85 per cent of all doctoral graduates (Figure 9.3).

At a finer level of detail, the industry classes that employed the most graduates were State Government Administration, Science Research Services, and Higher Education (7, 4 and 4 per cent, respectively) (Figure 9.4). Several specialised agriculture industries also appear in the top ten industries of employment suggesting that the degree serves a strong basis for specialised expertise.

The top three industry subgroups employed more than half of all Agricultural Sciences doctorates (Figure 9.5). One quarter of these were employed in Higher Education industry. The second highest industry of employment was Scientific Research Services, followed by State Government Administration (16 and 15 per cent, respectively).

Figure 9.4: Top ten industry classes of employment for Agricultural Sciences graduates with qualifications at bachelor level and above, by gender

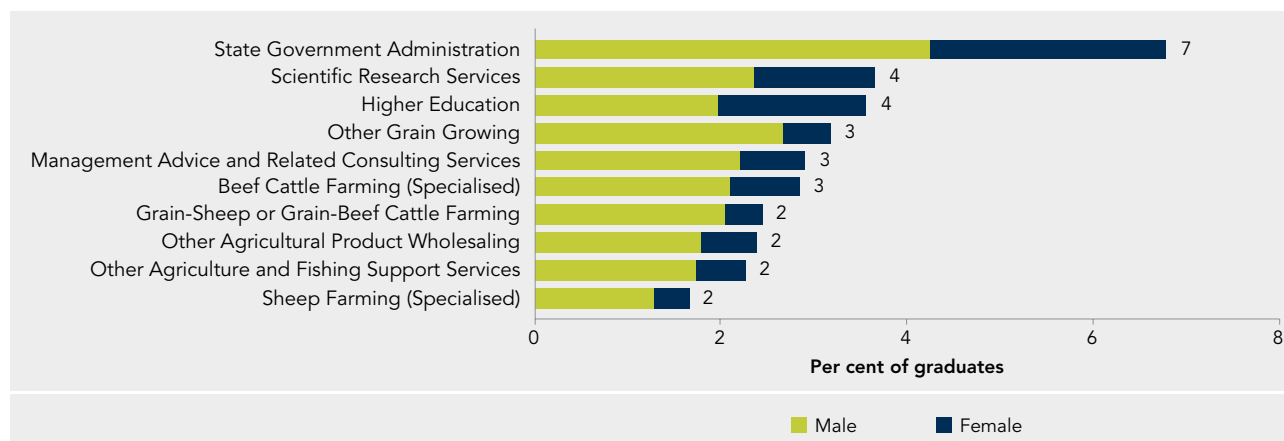
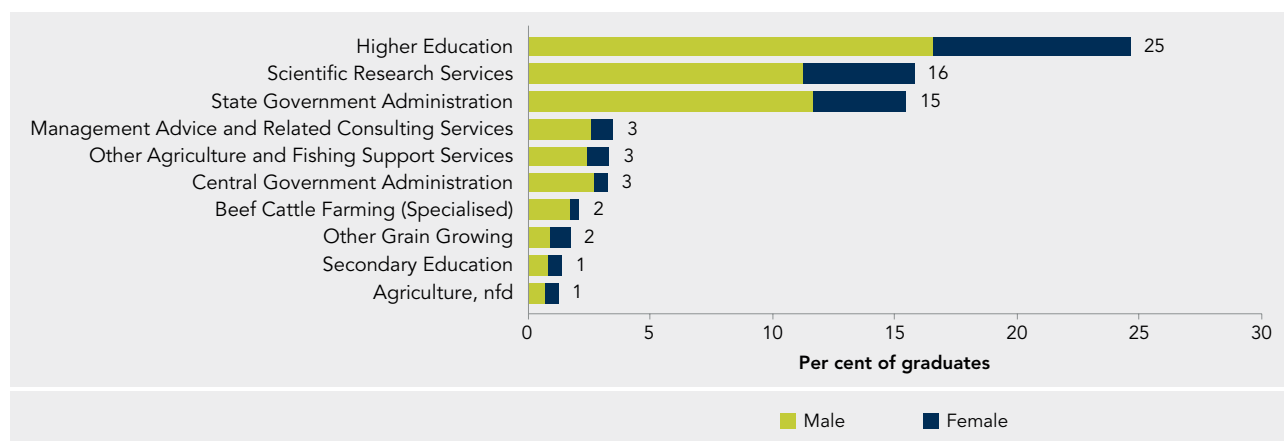


Figure 9.5: Top ten industry classes of employment for Agricultural Sciences doctoral graduates, by gender



WHAT ARE THE OCCUPATIONS OF AGRICULTURAL SCIENCE GRADUATES?

Approximately 62 per cent of all graduates were employed as Professionals or Managers (31 per cent each)(data not shown) Among the Professionals, the most common sub-groups of occupation were:

- ▶ Design, Engineering, Science and Transport Professionals (54 per cent)
- ▶ Business, Human Resource and Marketing Professionals (20 per cent), and
- ▶ Education Professionals (14 per cent).

Among the Managers, the most common sub-groups of occupation were:

- ▶ Farmers and Farm Managers (50 per cent)
- ▶ Specialist Managers (12 per cent), and
- ▶ Hospitality, Retail and Service Managers (12 per cent).

Occupations are classified in five levels (ABS, 2013):

- ▶ Major group (broadest level)
- ▶ Sub-major group
- ▶ Minor group
- ▶ Unit group
- ▶ Occupation (most detailed level)

See Appendix C for a detailed list.

Figure 9.6: Top ten unit group level occupations of Agricultural Sciences graduates with qualifications at bachelor level and above, by gender

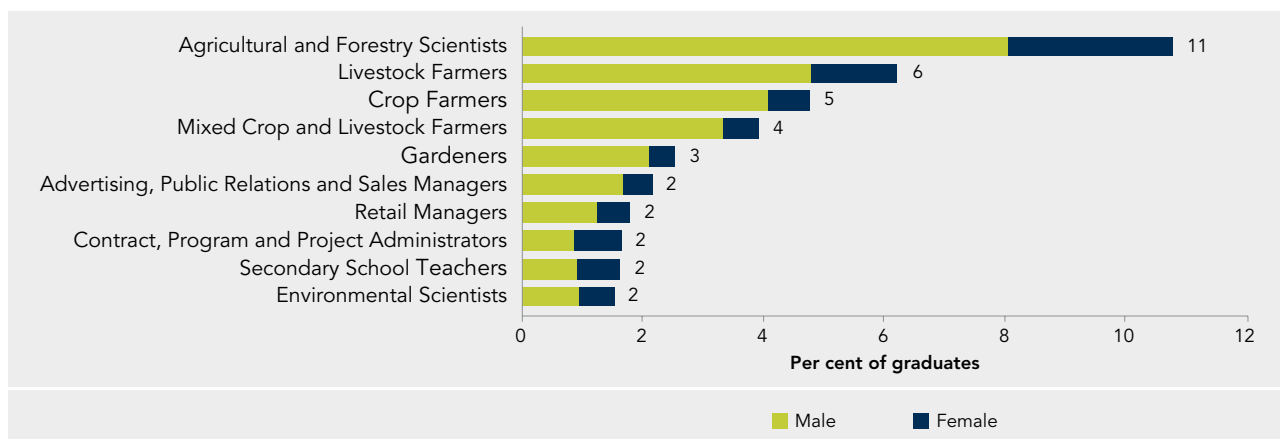
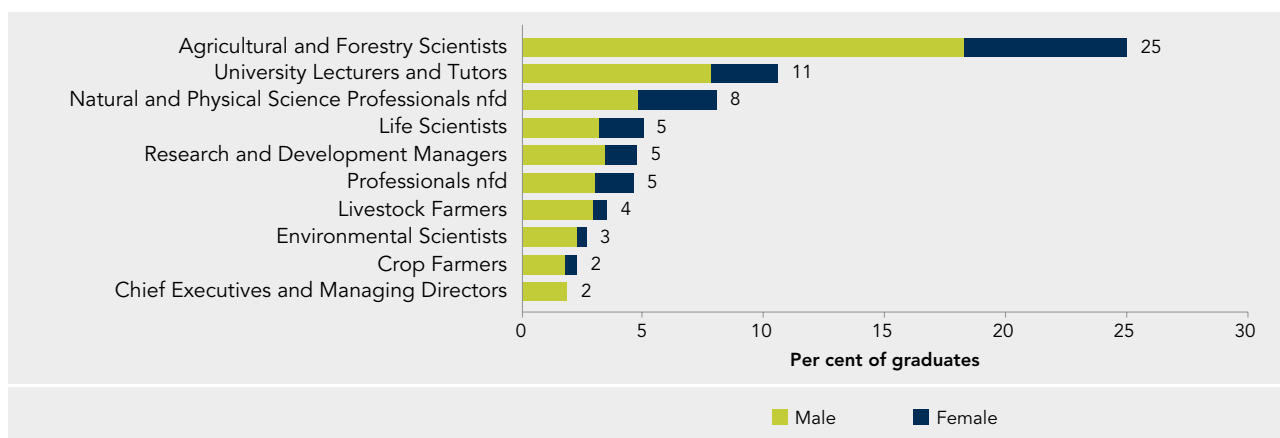


Figure 9.7: Top ten unit group level occupations of Agricultural Sciences doctoral graduates, by gender



At the more detailed unit group level, Agricultural and Forestry Scientists and Livestock Farmers were the most common occupations (11 and 6 per cent, respectively) (Figure 9.6).

The majority of the graduates in the most common occupations were male, in line with the fact that approximately two thirds of all Agricultural Science graduates were male. The difference was least skewed for Contract, Program and Project administrators, which has an equal male to female ratio.

ARE THE DESTINATIONS FOR AGRICULTURAL SCIENCE DOCTORATE HOLDERS DIFFERENT FROM BACHELOR DEGREE HOLDERS?

Almost 68 per cent of Agricultural Science doctorate holders were employed as Professionals and 21 per cent as Managers. Overall, the private sector employed 46 per cent of all Agricultural Science doctorate holders. However, among the doctorate holders employed as Professionals, only 36 per cent were employed by the private sector.

At the unit level of occupation, one quarter of doctorate holders worked as Agricultural and Forestry Scientists. The next most common occupation was University Lecturers and Tutors, and Natural and Physical Science Professionals with 11 and 8 per cent of graduates, respectively (Figure 9.7). There was a higher proportion of male doctorate holders compared to females in all occupation sub-groups, and none of the Chief Executives and Managing Directors were female.

Figure 9.8: Personal annual income of graduates, by field and level of qualification

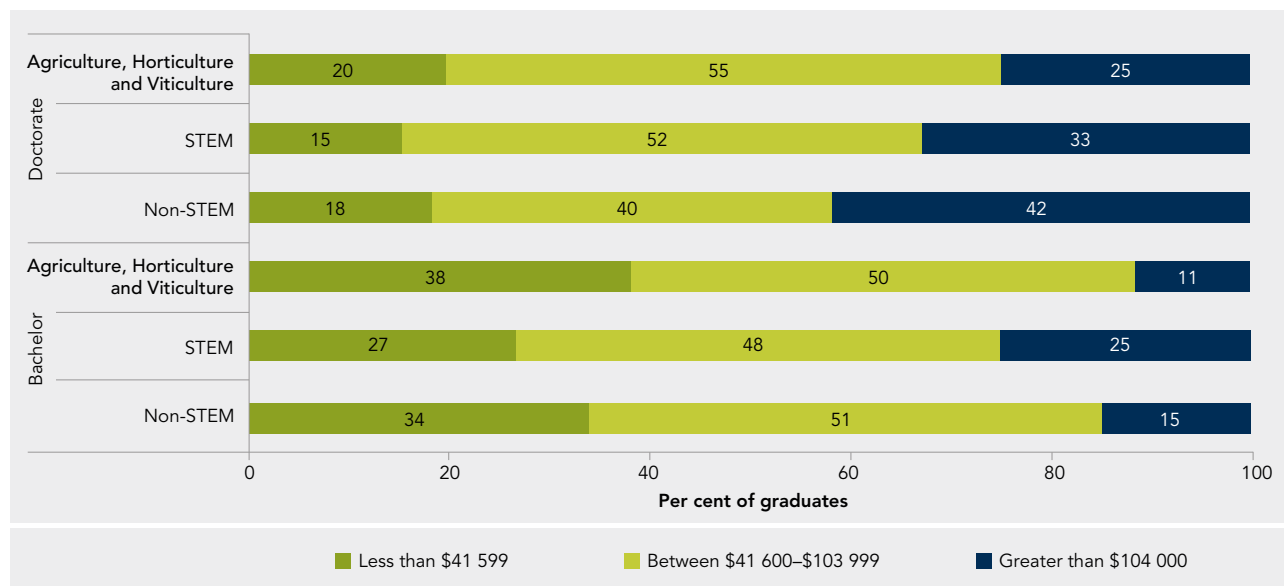
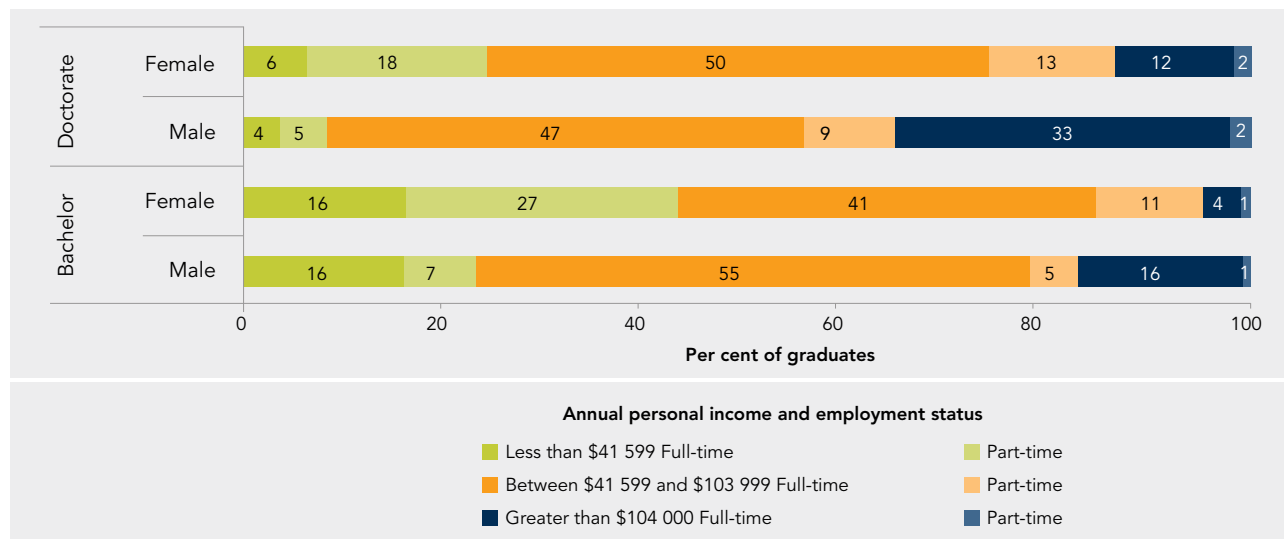


Figure 9.9: Personal annual income of Agricultural Sciences graduates working full-time and part-time, by gender and level of qualification



ARE AGRICULTURAL SCIENCES GRADUATES HIGH EARNERS?

Agricultural Sciences graduates generally had lower incomes compared to Non-STEM graduates (Figure 9.8). Eleven per cent of bachelors and 25 per cent of doctorates had an income in the highest bracket (more than \$104 000), less than both the total STEM and Non-STEM cohorts.

There were twice as many females with a personal income in the lowest bracket (less than \$41 599) compared to males with a bachelor degree, and four times as many females were employed part-time compared to males (at both bachelor and doctoral qualified levels) (Figure 9.9).

At the bachelor level, 3.5 times more males had an income in the highest bracket compared to females. Among doctoral qualified individuals, this gender difference was 2.5 times. This gender difference in income is present across

Figure 9.10: Percentage of bachelor level graduates earning greater than \$104 000 annually, by field, gender and age group

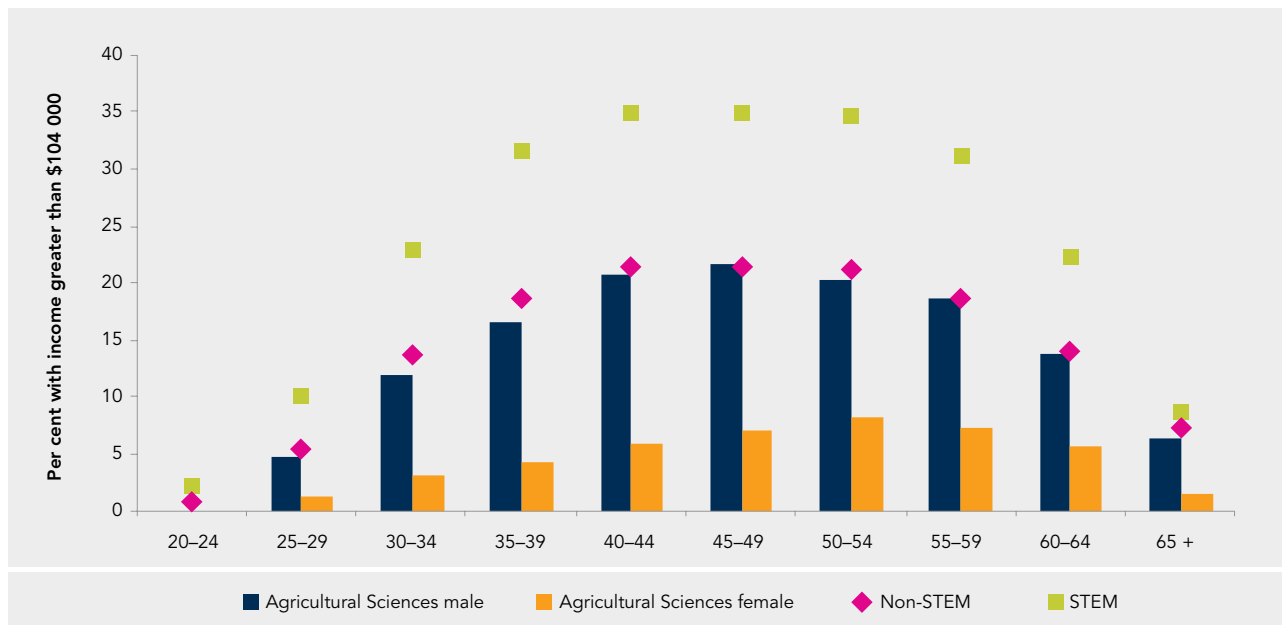
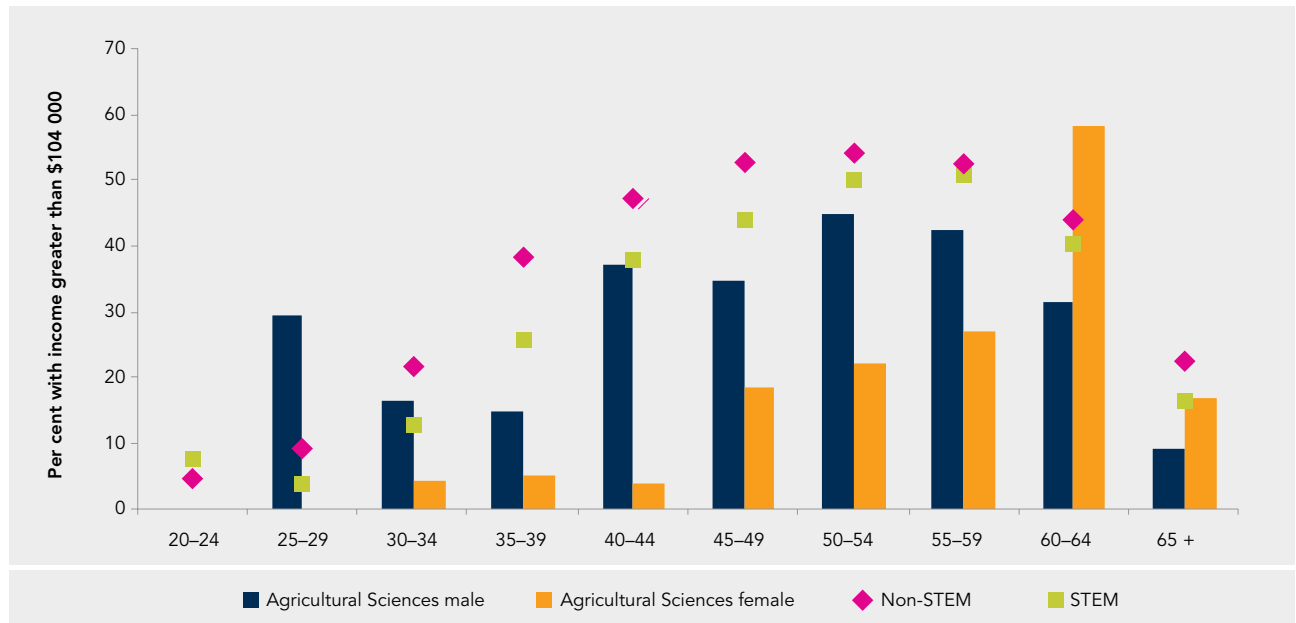


Figure 9.11: Percentage of doctoral level graduates earning greater than \$104 000 annually, by field, gender and age group



all age groups for bachelor graduates—reaching a maximum between the ages of 25 to 34 and again at 65 and over, where four times as many males had an income in the highest bracket compared to females (Figure 9.10).

Compared to the total STEM cohort, fewer Agricultural Sciences bachelor graduates had an income in the highest bracket for both males and females and across all age groups (Figure 9.10). At the doctorate level, the differences were not as consistent across age groups and gender (Figure 9.11). Until the 30 to 34 year age group, no female Agricultural Sciences doctorate graduates reached the highest income bracket; and there were considerably higher proportions of males in this bracket between the ages of 30 and 54, peaking at 45 per cent between the ages of 50 to 54. Above the age of 60 there was a higher proportion of females in the highest bracket; however only 30 females in total were in this cohort.

STEM PATHWAYS: FISHERIES STUDIES

There were 1287 Fisheries Studies graduates (bachelor and above) in Australia in 2011. Fifteen per cent of graduates (195) were not in the labour force or were unemployed. The majority of graduates were male (77 per cent).

Almost half of all Fisheries Studies graduates were employed in the five most common industries at the sub-division level (49 per cent) (Figure 9.12); while the top five sub-major occupations also employed 49 per cent of all graduates (Figure 9.13).



Figure 9.12: Most common industry sub-division of employment for Fisheries Studies graduates at bachelor level and above, by gender

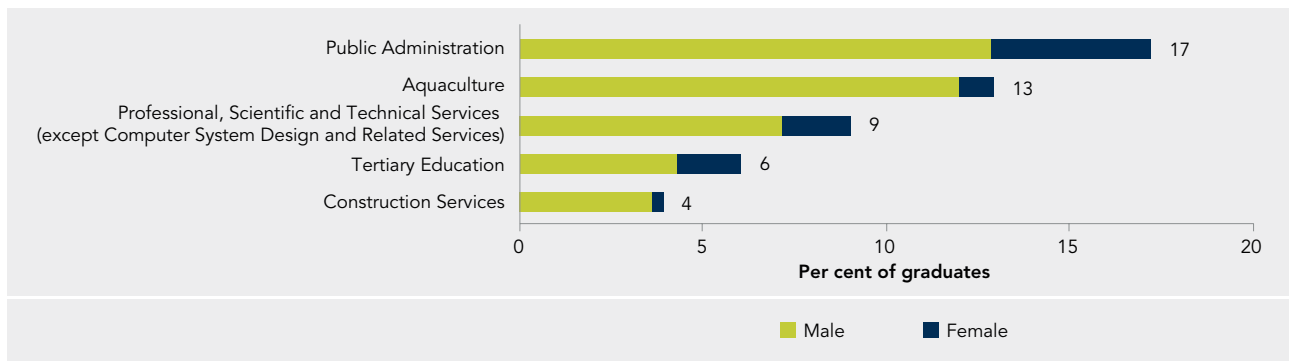
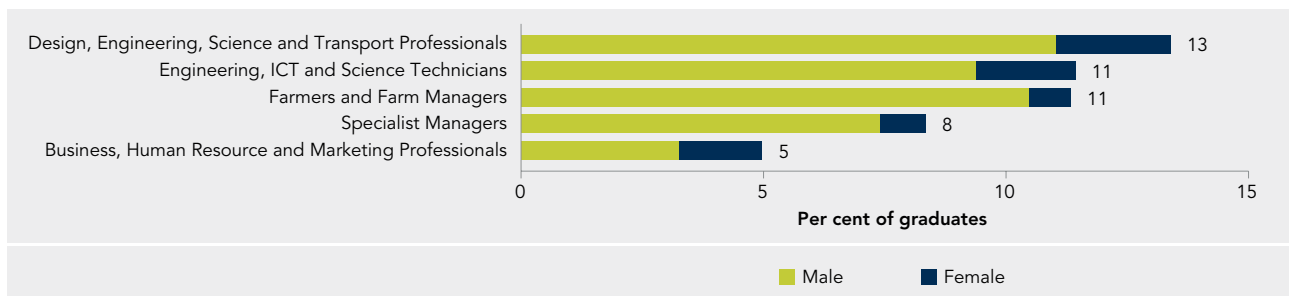


Figure 9.13: Most common sub-major occupations of Fisheries Studies graduates at bachelor level and above, by gender



STEM PATHWAYS: FORESTRY STUDIES

In 2011, there were 2342 graduates in Forestry Studies (bachelor and above) in Australia. Over one quarter of graduates were not in the labour force or unemployed (650, 28 per cent). Of those graduates in the labour force, the majority were male (81 per cent).

The top 5 industries of occupation (2-digit level) employed approximately 60 per cent of all graduates (Figure 9.14).

The five most common sub-major occupations covered 62 per cent of all graduates, with just over one third employed as Design, Engineering, Science and Transport Professionals (Figure 9.15).



Figure 9.14: Most common industry sub-division of employment for Forestry Studies graduates at bachelor level and above, by gender

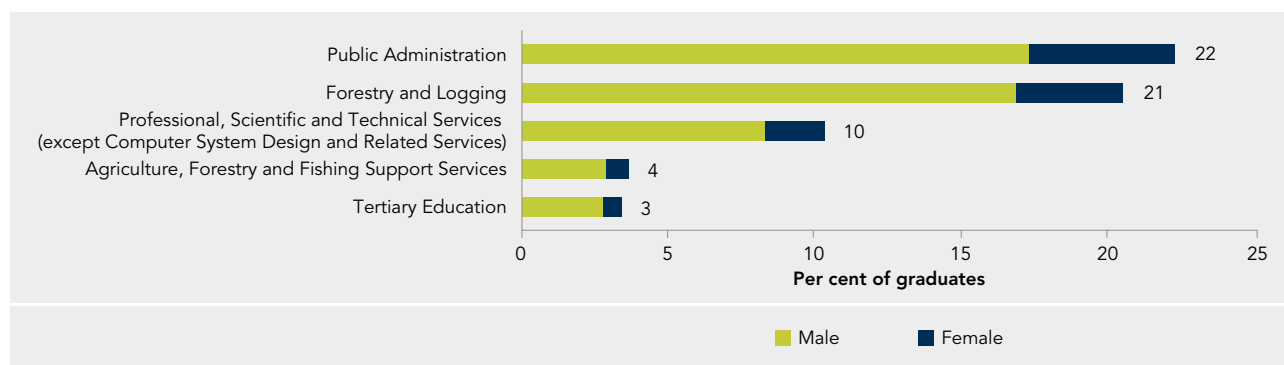


Figure 9.15: Most common sub-major occupations of Forestry Studies graduates at bachelor level and above, by gender

