

## Enduring value for remote communities from mining: Synthesising production, employment, populations, and reform opportunities

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**Keywords:** benefits, mining, labour, mobility, population, remote, community

### Abstract

Enduring Community Value from Mining is an important outcome for mining in regional and remote locations around the world, an initiative lead by the national and global peak mining bodies. This article tracks the connections between mine production, employment and populations in very remote areas of the Northern Territory and South Australia. Mining is an important industry activity in these locations and the results suggest, in the main, these locations are highly dependent on mining for maintaining population levels through employment, not just in mining but in other industrial sectors that indirectly rely on mining. Leigh Creek has recently experienced declining coal production and so its population and workforce, while highly mobile, have been in decline. In contrast, until recently, production at Olympic Dam has been on the increase, with similarly highly mobile population and workforce that has experienced growth. While mining brings jobs during productive times, it can also bring dwindling populations through increased mobile work practices. These remote locations therefore face an uphill battle in ensuring enduring community value from mining. However, a range of policies can help ensure a better transfer of enduring value to remote mine dependent towns including being open to non-mine residents, unrestricted access in land and property markets, an ability of residents to have locally responsible and accountable local governments, and early and shared strategic planning by government, mining companies, and communities around how to manage the peaks and troughs of the various avenues for returns to community. Finally, while each case location is different in its own way, the most different is Yuendumu and it therefore requires careful consideration of how to deliver lasting benefit.

### Introduction

Resource abundance is often proposed as the beacon of hope for improving the conditions of less well-off communities (Dietsche, Stevens, Emsley, & Östensson, 2009; Daniels, 2012; Otto et al., 2006), however the evidence that it reaps benefits is less than favourable. (Freudenburg & Wilson, 2002; Humphreys, Sachs, & Stiglitz, 2007; Sachs & Warner, 2001; van der Ploeg & Venables, 2012). For developing economies the general evidence is mining has not helped communities. However, there are counter arguments which show 'rich countries' such as Canada, Norway and Germany have benefited from natural resource wealth due to well-designed public policy and strong institutions and institutional frameworks (Brunnschweiler, 2008; Brunnschweiler & Bulte, 2008; Davis & Tilton, 2005; Larsen, 2005). Although public policy analysts and prominent economists (Deloitte, 2010; Edwards, 2011; Taylor, Bradley, Dobbs, Thompson, & Clifton, 2012) argue that Australia has not been a victim of Dutch Disease or the

resource curse, the Australian experience has, in some remote areas, been little different to those of developing economies (Haslam McKenzie & Rowley, 2013; Pick, Dayaram, & Butler, 2010). By examining the labour stocks and flows of mine-affected communities in remote areas of South Australia (SA) and the Northern Territory (NT) over the mine lifecycle, this article identifies trends between resource development, employment and population levels in these remote locations. The overall intent of such an analysis of scale and outcomes is to identify, if possible, any underlying 'enduring community value' from mining (Davies, Maru, & May, 2012, p. vii) and whether this is case specific.

The geographical areas considered in this article are drawn from four locations in Australia, covering South Australia and the Northern Territory, for a variety of minerals and communities. The communities and mining operations all have the common characteristic of being termed 'remote' as classified by the Accessibility Remoteness Index of Australia (ARIA) (Australian Government Publishing Service, 2001). Remoteness adds to the difficulties faced by these communities accessing infrastructure and services, attracting and retaining people and consequently undertaking mining in these locations (Blackwell, Dollery & Grant, 2015). It also adds to the difficulty of ensuring mining delivers much needed stimuli to the remote economies of these communities given a disconnect through, for example, fly-in fly-out (FIFO) and drive-in drive-out (DIDO) operations and centralised purchasing, contributing to the 'fly-over effect' (Storey, 2001).

The remainder of the article is divided into five main sections, providing an outline of the methods and data used, analysing the evolution of production and the nature of employment resulting from this production, and the level of populations in these remote communities. The article ends with a synthesis discussion and suggestions for policy reform along with some concluding remarks.

## Methods and Data

The general approach taken in this article was to use secondary data to analyse the characteristics of the case study settlements and their associated mines. Three types of data were collected: 1) employment and population levels in these settlements, 2) mine production and employment, and 3) in some cases, indicators of mobility.

### *Employment*

Employment data were collected from the Australian Bureau of Statistics census for the years of 1996 to 2011. These data were collated and presented by industry type in percentage graphs for each of the towns associated with the case study mines. With a number of periods offering comparison, the flow of labour between industries could be identified along with a comparison over the same period of the ebb and flow of total employment.

In a number of cases, data were not available based on local government area across the census years considered. For example, much of remote NT was unincorporated into local government areas prior to 2008 (Blackwell, 2012). A similar situation exists for the South Australian cases study sites with the Outback Communities Authority acting as a *de facto* local government service provider on behalf of the state. Furthermore, the ABS has multiple data collection area definitions and these boundaries have changed overtime, particularly in the NT. For these reasons there are inconsistencies between data sources across the case study locations and census periods, but wherever possible consistent datasets are used in order to reduce any inherent bias. More details of data sources are provided in the notes and sources of tables and figures.

### *Mine Production and Employment*

The sources of data for mine production differ between mine locations and include State statistical collections or company reports. Employment data typically comes from company reports. These data have been collected, collated and are presented in time series graphs that provide a view of changes in production and employment over time for some locations. In some cases a breakdown of employment into Aboriginal and non-Aboriginal employment is undertaken to provide further distinction.

### *Mobility Indicators*

Three indicators were used to selectively identify the extent of mobility in particular local populations or employment. These measures are especially relevant in measuring the impacts of changes in work practices on where people live, particularly where these practices encourage people to leave remote Australia.

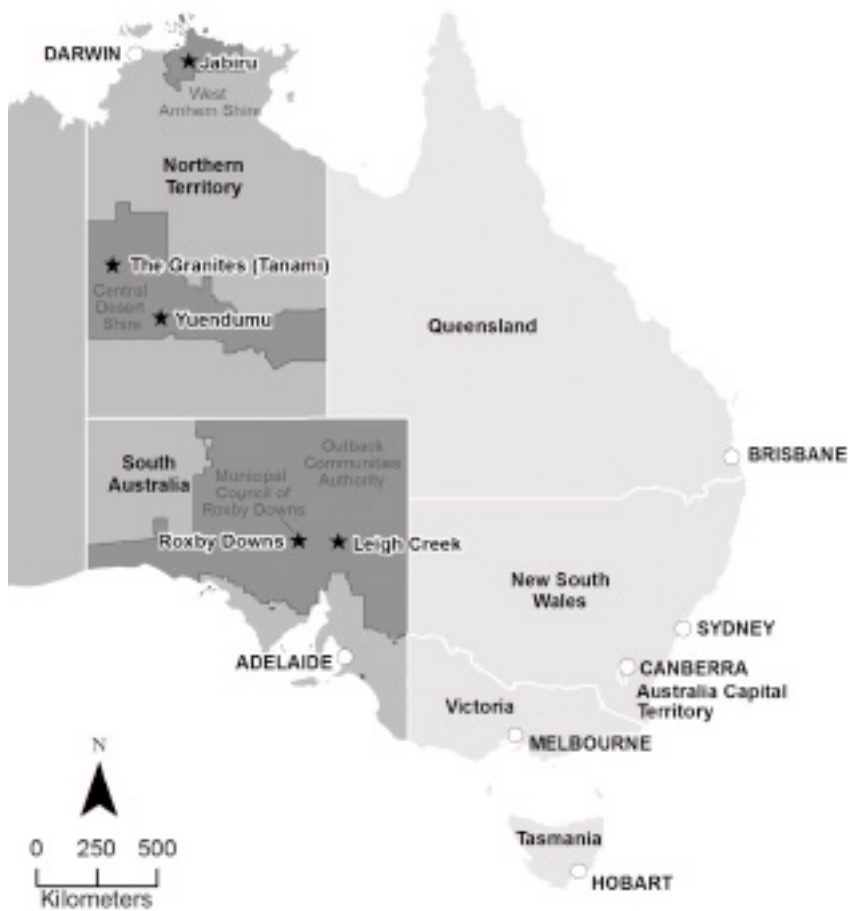
The first key indicator for mobility in employment is through a comparison between people's place of usual residence and their place of enumeration. This gives a guide, though not perfectly precise because of the existence of tourism, of the extent of people who are at a given location on census night because of work but live elsewhere, i.e. FIFO or DIDO workers. However, it does not capture the extent of people who FIFO or DIDO out of the given remote community for work (see Blackwell, Fischer, McFarlane and Dollery (2015) for more discussion).

The second is turnover of the population, where arrivals and departures of people are added together and divided by the population. This is useful in establishing the degree to which people stay in a location once they arrive and a range of reasons can exist for high or low turnover as discussed further in this article. The final mobility measure is migration, where we measure in, out and net migration rates.

### **The Mines, Associated Communities, Production, and Labour Stocks and Flows**

The mines and regions depicted in Figure 1, are:

1. the Granites gold and Ranger uranium mines in Central and Northern, Northern Territory. Granites is part of Central Desert shire and has aboriginal settlements to the south, Yuendumu, and north, Lajamanu and Kalkarindji, significant distances apart. In contrast, Jabiru supports the Ranger mine, is close by, and falls within the West Arnhem shire.
2. Leigh Creek and Roxby Downs in central South Australia support coal and copper, uranium, gold and silver at Olympic Dam respectively. These towns lie within a vast area of the state managed by the Outback Communities Authority, a defacto state government provider of local government services.

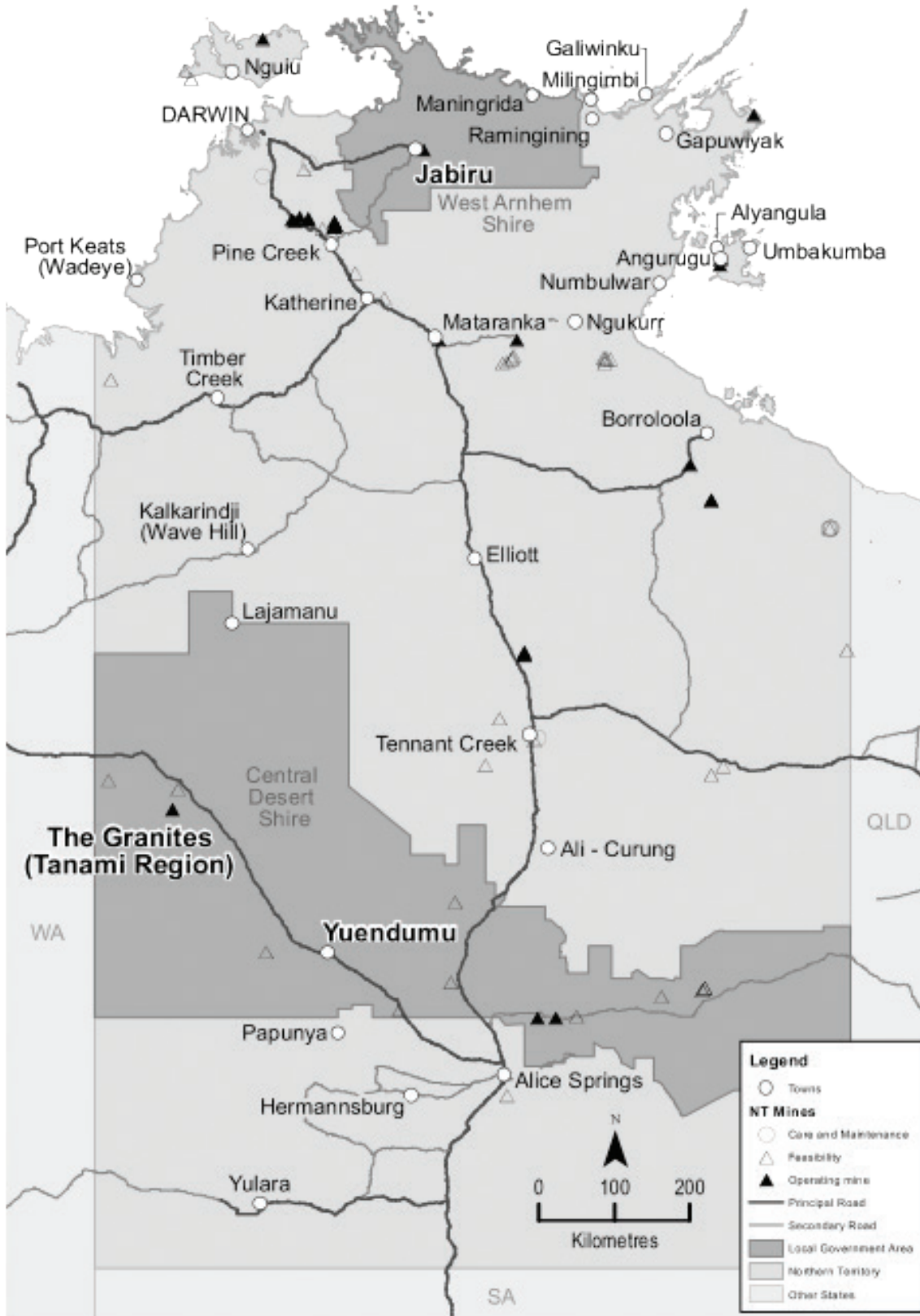
**Figure 1:** Case study locations

Source: Kate Rampellini ©, CRC for Remote Economic Participation, Curtin University, 2014

#### *Yuendumu and Jabiru, Central and Northern, Northern Territory*

The first case study from the Northern Territory includes the town of Yuendumu and associated Granites gold mine of Newmont based in the Tanami desert. The second case study is the town of Jabiru and associated Ranger uranium mine of Energy Resources Australia (ERA). These mines and towns are illustrated in Figure 2.

**Figure 2:** Location of Tanami and Ranger Mines and Associated Communities, Northern Territory



Source: Kate Rampellini ©, CRC for Remote Economic Participation, Curtin University, 2014

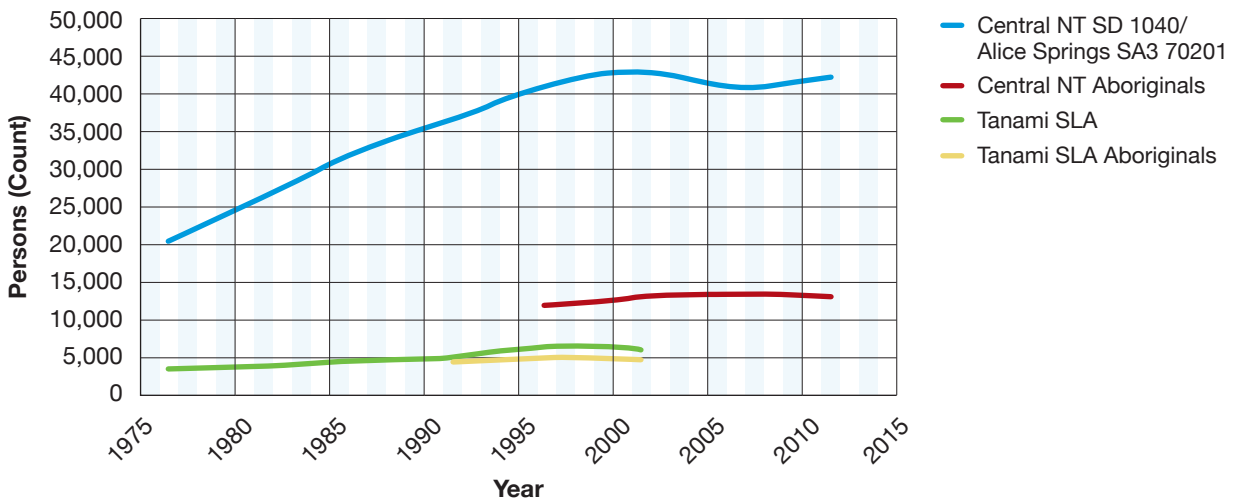
### Yuendumu and the Tanami Mine

The Newmont Tanami gold mine includes the mining operations of the Granites treatment plant, located about 550 kilometres along the Tanami Highway northwest of Alice Springs, and the Dead Bullock Soak mining operations, about 40 kilometres west of the Granites (Newmont Mining Corporation, 2012a). In 2011, the mine operations produced 221,000 ounces from an estimated 2.5 million ounces of gold reserves at year end (Newmont Mining Corporation, 2012a, p. 29) with the life of the mine estimated to extend to 2023.

Mining for gold in the Tanami desert began in the early 1900s (Newmont Mining Corporation, 2012b), with one of Australia's greatest modern day discoveries of gold occurring at Callie-Dead Bullock Soak in 1992 (Elias, 2007). Since then, a number of companies have owned the mining operation, including Normandy Mining that was subsequently taken over by the US company Newmont Asia Pacific in 2002.

The town of Yuendumu lies around 260 kilometres south of the Newmont Granites mine. Yuendumu was established as a ration and welfare services station in 1946 by the Native Affairs Branch of the Australian Government (Musharbash, 2010), rather than a mining support town as the other case studies considered in this article. The Baptist Church established a mission there in 1949 and by 1955 most of the local Warlpiri people had settled in town (Jordan, 1999). Today, the Warlpiri are the traditional freehold owners of the land mined by Newmont, and Yuendumu has the largest population of Warlpiri nearest the mine with 86 per cent Yapa (local Aboriginal) and 14 per cent Kardiya (non-Aboriginal) of a total population of 686 (Australian Bureau of Statistics, 2012c).

**Figure 3:** Populations of Central Northern Territory (NT) and Tanami Statistical Local Area (SLA)



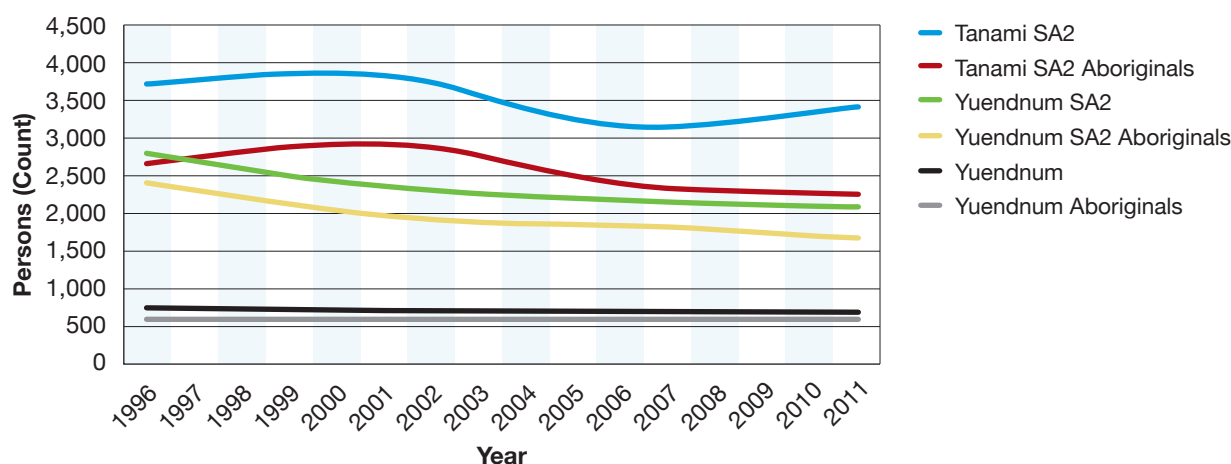
Source: Australian Bureau of Statistics, 1982a, 1987, 1993a, 2003, 2008d, 2013a.

Note: For 1976 and 1981, used sum of LGAs to give Central NT and Tanami SLA directly from source

Figure 3 shows the populations of Central Northern Territory (NT) while Figure 4 shows the populations of the Tanami and Yuendumu, with two different ABS statistical collections for the Tanami: 1) Statistical Local Area (SLA); and 2) Statistical Area 2 (SA2). Comparing both figures, as the focus of analysis moves from the regional to the local remote level (Figures 3 and 4), the proportion of Aboriginal people (Aboriginal and Torres Strait Islander people) in the population rises. Central NT has a lower proportion of Aboriginal people than the Tanami, and in turn the Tanami has a lower proportion than Yuendumu. Similarly while the populations of Central NT and the Tanami have increased, those of the Tanami SA2 and Yuendumu have generally been in decline.

Aboriginal people tend to have strong traditional ties to their local lands in contrast to people without such connections. People living remotely may also be isolated and disconnected from the broader economy, unable to move when local economic circumstances become less favourable. Combined, these factors suggest Aboriginal people may be more likely to live remotely, even when the general population is falling. Importantly, the falls in the local Yuendumu populations (SA2 and LGA) are likely to reflect a fall in economic activity and participation through employment as confirmed in Figure 5 by a fall in the total number of people employed).

**Figure 4:** Populations of Tanami and Yuendumu Statistical Area Level 2 (SA2)<sup>a</sup> and Yuendumu <sup>b</sup>

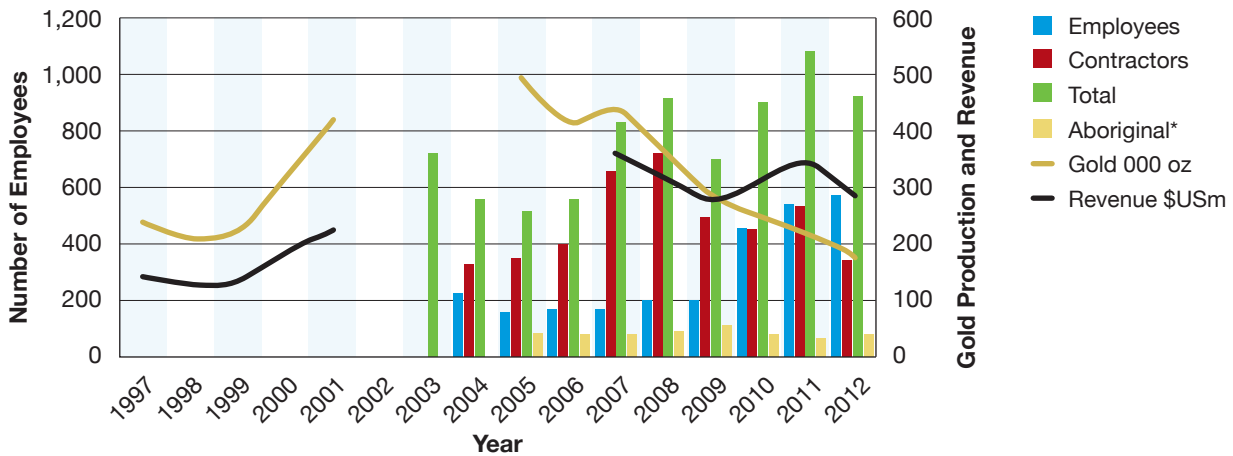


Source: Australian Bureau of Statistics, 2008h, 2008i, 2013g, 2013i.

Note:

- a. 1996 data not available for Tanami and Yuendumu SA2. 1996 Tanami SA2 data estimated by calibration with 1996-2006 Tanami SLA total population and 1996 Aboriginal proportion. 1996 Yuendumu SA2 estimated via power function (had highest  $R^2=0.98$ ) of total population and census years 2001-2011. Yuendumu SA2 Aboriginal population estimated from 1996 total population estimate imputed in log function (has highest  $R^2=0.97$ ) for total and aboriginal populations 2001-2011.
- b. 2011 data is not available for Yuendumu LGA (Local Government Area) because it was incorporated into Central Desert LGA in 2008, so data based on State Suburb Code (SSC) – the nearest measure to that of LGA – and is based on place of usual residence data which is higher and more conservative in this particular case than data based on place of enumeration.

Employment of local Yuendumu people has always been difficult for the mine, despite ongoing programs to boost employment of local Aboriginal people. Newmont (K. Eglinton, personal communication, 29 March 2012) points to at least five reasons: 1) the inhibitive distance that must be travelled to reach the mine (about 250kms of unsealed Tanami track); 2) the high turnover of Aboriginal staff and hence, the high cost of training and retention; 3) issues around ‘humbugging’ (as an aboriginal person, anything one earns or owns belongs to one’s extended family and must be shared with them); 4) poor health, literacy and numeracy status of Aboriginal work candidates; and 5) the lack of interest by Aboriginal people to work at the mine. The interaction of these factors is complex. For example, item 5 maybe because types of jobs have limited up skilling, transfer to other industries, and opportunities to develop other jobs or small businesses due to clan politics and small-isolated place distrust. In 2011, employment from Yuendumu Aboriginal people was around 2 out of a total of 90 employees (K. Eglinton, personal communication, 29 March 2012). Figure 5 provides a summary of the more recent levels of production and general Aboriginal employment at the mine.

**Figure 5: Newmont Tanami Revenue, Production and Employment**

Source: Newmont Asia Pacific, 2009, 2011, 2012, 2013; Newmont Mining Corporation, 2006, 2007; Normandy Mining Ltd, 1998, 1999, 2000, 2001, 2002.

Note: \* = employees and contractors.

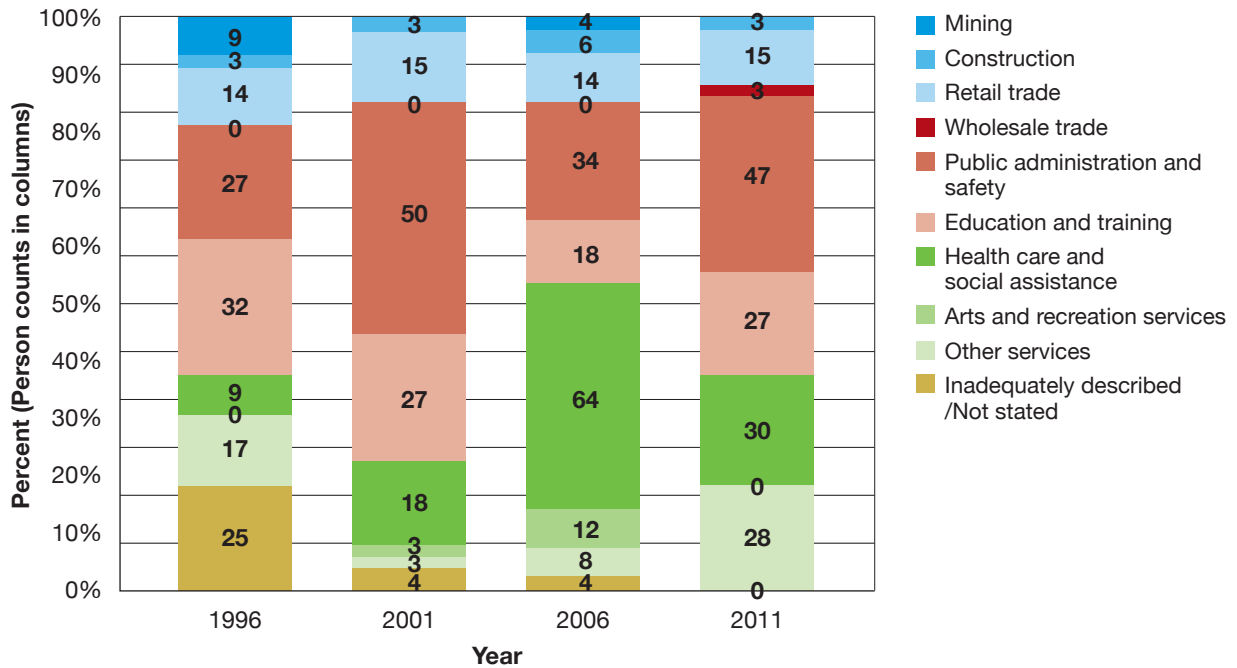
Revenues appear to drive employment given the co-oscillation of these two parameters from 2007 to 2012 in Figure 5. In the earlier years from 1998 to 2001, revenues oscillated with gold production but in more recent years these have diverged and this may be explained by strong growth in the gold price during the years 2008 to 2011, reaching and exceeding \$USD1600 per ounce in 2011 and 2012 (InfoMine, 2013; Newmont Asia Pacific, 2012). Despite the general fall in gold production since 2005, overall, total employment generally rose across the recent period. Contractors markedly increased in 2007 to 2008 then plateaued in 2009 to 2011 and dropped considerably in 2012, being substituted somewhat by an increase in employees. Aboriginal employment rose from 2007 to 2009 but then dropped from 2009 to 2011 and rose again in 2012.

Figure 6 shows the percentage of persons employed by industry and in Yuendumu from 2006 to 2011. During periods of lower employment, 2001 and 2011, more people were employed in public administration and safety, while during higher levels of employment in 1996 and 2006, there is a more even spread of employment across industries. Mining's direct contribution to employment was greatest in 1996 but in recent years contributed little. The reason for this cannot be determined definitively.

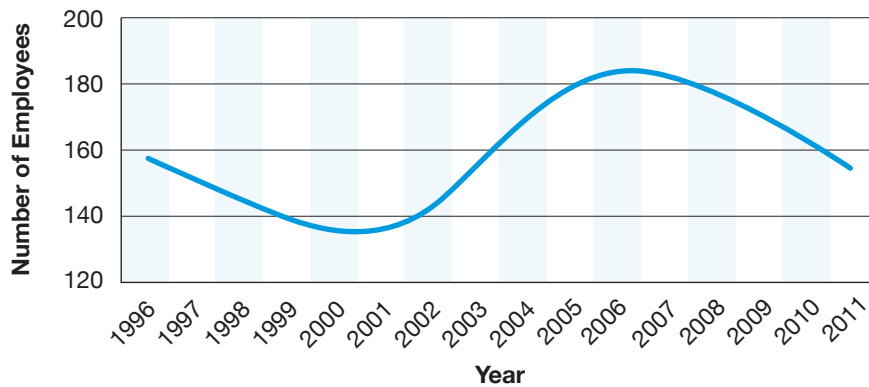


**Figure 6: Yuendumu Employment by Industry and Yuendumu Total Employment**

**A) Yuendumu Employment by Industry**



**B) Yuendumu Total Employment**



Source: Australian Bureau of Statistics, 2008i; 2012c.

Note: Yuendumu LGA was incorporated into Central Desert LGA in 2008 so there is no 2011 Yuendumu LGA data available. Instead we use Yuendumu SSC Based on Place of Enumeration data.

**Jabiru and the Ranger Mine**

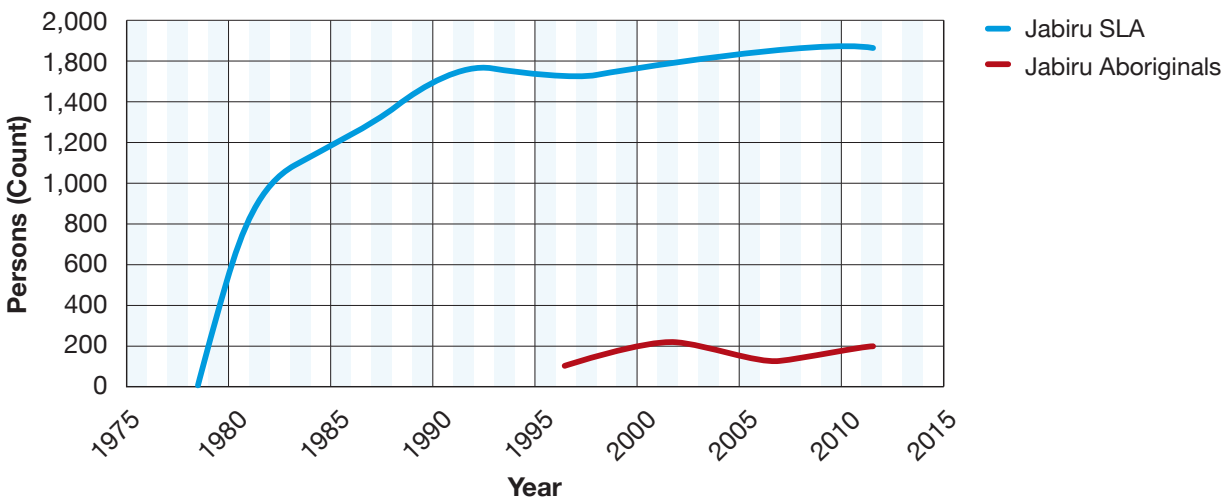
The Ranger uranium mine in the Northern Territory is owned by Energy Resources of Australia Limited and is 70 per cent owned by Rio Tinto (Energy Resources of Australia, 2013b). In 2011, it was reported that after three decades, the mine was one of three in the world to have produced in excess of 100,000 tonnes of uranium oxide (Energy Resources of Australia, 2012, p. 3).

Uranium was discovered at Ranger in 1969 and mining commenced in 1980, reaching full production by 1981. Due to a particularly wet season for tropical Australia in 2010/2011, mine production was lower than usual. Ranger 3 Deeps is one of the world’s most significant recent discoveries of uranium with estimated reserves of 34,000 tonnes of uranium oxide (Energy Resources of Australia, 2013c). Assuming recent environmental breaches can be overcome,

the life of the mine is expected to extend processing until 2021 with rehabilitation completed in 2026 (World Nuclear Association, 2013). However, the 2015 withdrawal of financial support by RioTinto for the 3 Deeps expansion will reduce future production from the mine.

The Ranger Project Area, Jabiluka lease, and the town of Jabiru are located on Aboriginal land of the Mirarr people. The Mirarr clan is small, consisting of 26 adult people who are explicitly opposed to uranium mining on their land (Gundjeihmi Aboriginal Corporation, 2012). As depicted in Figure 2, the town of Jabiru lies 260 kilometres east of Darwin with a State Statistical Suburb population of 1,128 in 2011, 19 per cent of whom were Aboriginal (Australian Bureau of Statistics, 2012a). The total and Aboriginal statistical local area populations of Jabiru are depicted in Figure 7. The population has steadily grown since the late 1970s, with a more recent plateau of the total population and oscillation of Aboriginal people. Relative to Yuendumu, the proportion of Aboriginal people is smaller.

**Figure 7:** Population of Jabiru Statistical Local Area (SLA)



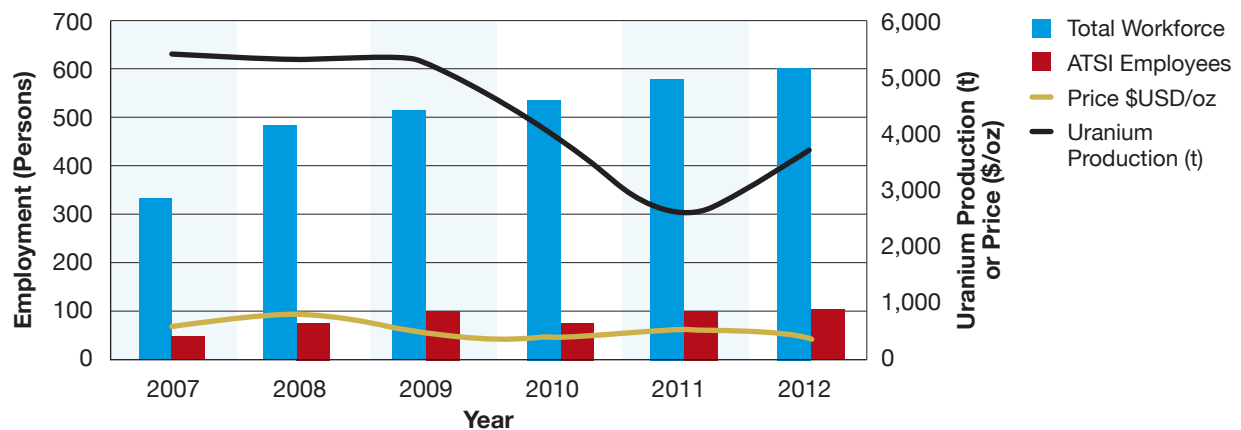
Source: Australian Bureau of Statistics, 1982a, 1993a, 2008e, 2012b

While Jabiru, and the Ranger mine and Jabiluka lease are surrounded by the Kakadu National Park, these mining areas had already been separated when the Park was established in 1981 (Lawrence, 2000). The town of Jabiru also lies within the Park, having been established in 1978 as the settlement for Jabiru East, eight kilometres from the mine (Spiers, 2000). ERA and the Commonwealth and Territory Governments committed funds to build the town (Knight, 2008) through the Jabiru Town Development Authority (JTDA) under Northern Territory legislation.

Jabiru is owned by the Commonwealth Director of National Parks (2007), who draws a head lease held by the JTDA which subleases it to private businesses, government agencies and ERA. Jabiru houses the head offices of the West Arnhem Shire, being formed as part of the local government amalgamations undertaken in 2008 (West Arnhem Shire, 2013). In addition to mining, other industries important to the town are tourism as well as Aboriginal arts and crafts, with the Kakadu National Park being a centrepiece for both (Director of National Parks, 2007).

Total employment at ERA has continued to grow over the period since 2007 as depicted in Figure 8. In contrast, Aboriginal employment has oscillated with an upward trend from 2007 to 2009 and 2010 to 2012, dipping in 2010. The percentage of Aboriginal employment at Ranger has been greater in recent years than that of Newmont's Tanami operation. One reason is Ranger is close to the well serviced town of Jabiru. This makes attracting Aboriginal employees locally and further afield easier compared to the very remote Tanami operation of Newmont.

**Figure 8: ERA (Ranger) Price, Production and Employment**



Source: *Energy Resources of Australia, 2012, 2013a.*

In addition, ERA point to a number of initiatives that highlight their good performance in Aboriginal employment (Energy Resources of Australia, 2013a). The first is having an Indigenous Employment Strategy (Energy Resources of Australia, 2013a) which includes a mentoring program, ‘flexible work arrangements, continued involvement in the Northern Territory Mine Training Programme, workplace literacy and numeracy training, and supporting students from local communities in work experience and school based apprenticeships’ (Energy Resources of Australia, 2013a, p. 38). Other initiatives include a cultural awareness program for all employees and an education partnership with the West Arnhem College involving the targeted recruitment of teachers and miners from Queensland, New South Wales, Victoria and South Australia (Energy Resources of Australia, 2013a).

Determining the number of people who work in mining in Jabiru and who also reside in Jabiru or the number of Jabiru workers in mining who do not reside in Jabiru cannot be definitely determined from the census data. What is known is the number of people working in mining in West Arnhem LGA in 2011 was 428 (Australian Bureau of Statistics, 2013h, based on place of work data). The number of people who worked in mining anywhere who resided in the LGA were 256 (Australian Bureau of Statistics, 2013h, based on place of usual residence data). There were 366 people who were surveyed in West Arnhem on census night (includes Australian visitors) and worked in mining (Australian Bureau of Statistics, 2013h, based on place of enumeration data). While there are expected to be residents who fly out of the region for mining work, given the relative magnitude of place of work data (428) to the usual place of residence data there are expected to be a considerable amount of people who FIFO into the region for mining work. The origin of these people is identified from the place of enumeration data on census night. Most people from outside the LGA were from outside the same statistical area level 2 (SA2) but residing in NT, followed by the same SA2 then NSW, Victoria and South Australia. A relatively small proportion was from Queensland.

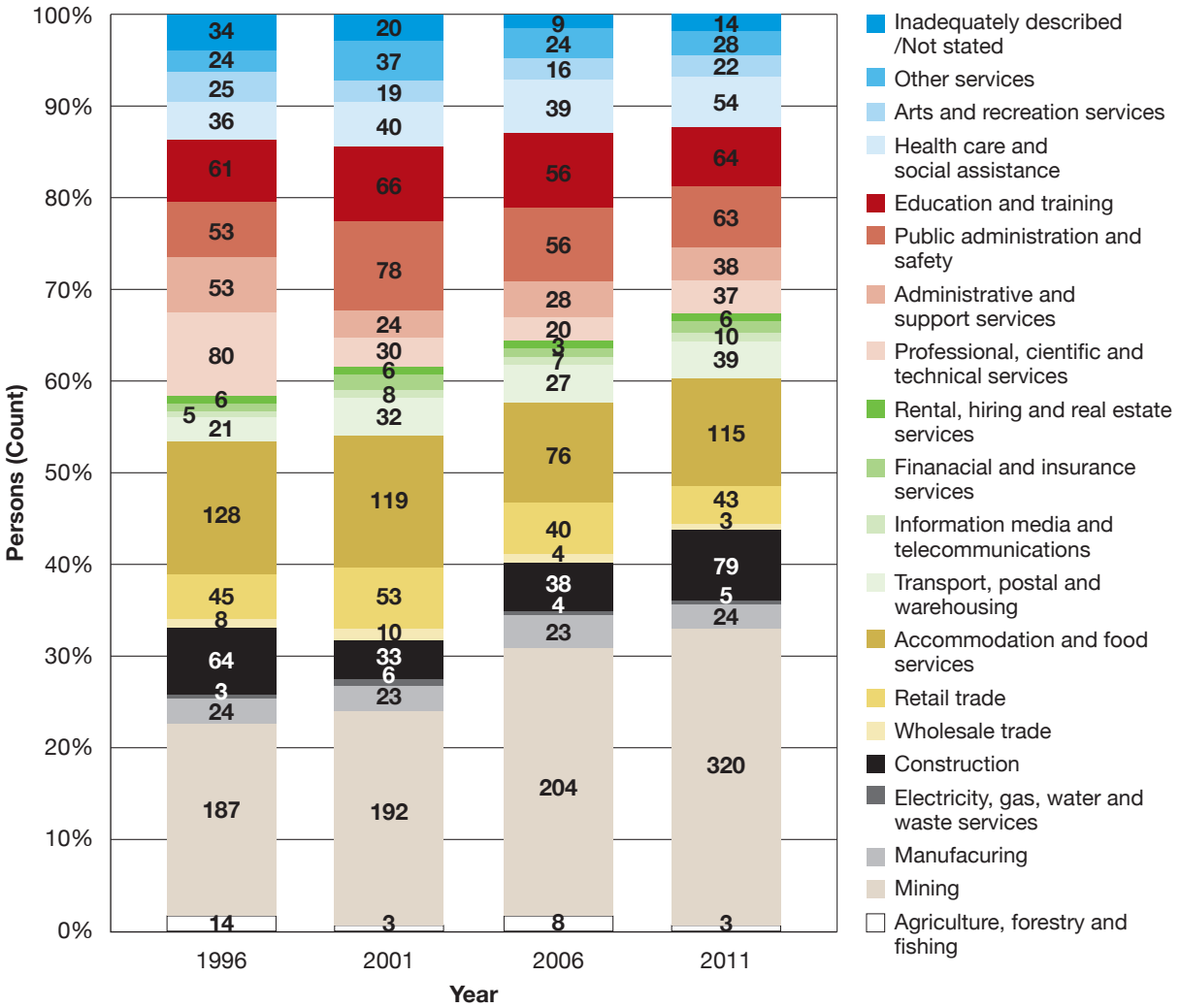
ERA’s financial management supports employment as shown through Figure 8. For example, there is a negative correlation between the ERA’s realised uranium price and production that helps to sustain revenues (prices are up while production is down or prices fall while production is up). Sustaining revenues, by altering production and use of stockpiles can also provide the ability to sustain employment during price fluctuations. Note that production was affected by an unusually wet 2010/2011 season, but with ERA drawing on stockpiles (Energy Resources of Australia, 2012) and with some price growth, total employment continued to rise as depicted in Figure 8.

Figure 9 provides the percentage and counts of persons employed by industry type and in total from 2006 to 2011 in Jabiru. Mining has taken an increasing share of employment across

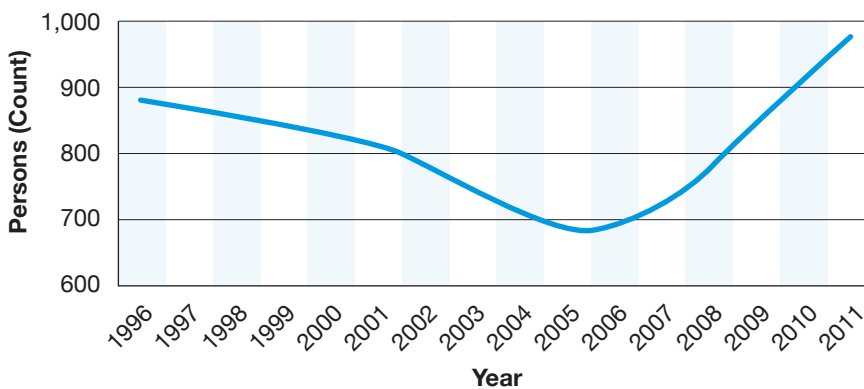
the period in contrast to Yuendumu. Furthermore, there are more types of industry supporting employment, reflecting a more diversified economy. An additional contrast is ‘public sector and support services’ appear to be a smaller percentage of total employment in Jabiru than in Yuendumu. This latter contrast again reflects a more diversified economy and greater opportunity for employment and economic participation through less relative, economic reliance on government expenditure, given its relative closeness to Darwin.

**Figure 9: Jabiru Employment by Industry and Jabiru Total Employment**

**A) Jabiru Employment by Industry**



**B) Jabiru Total Employment**

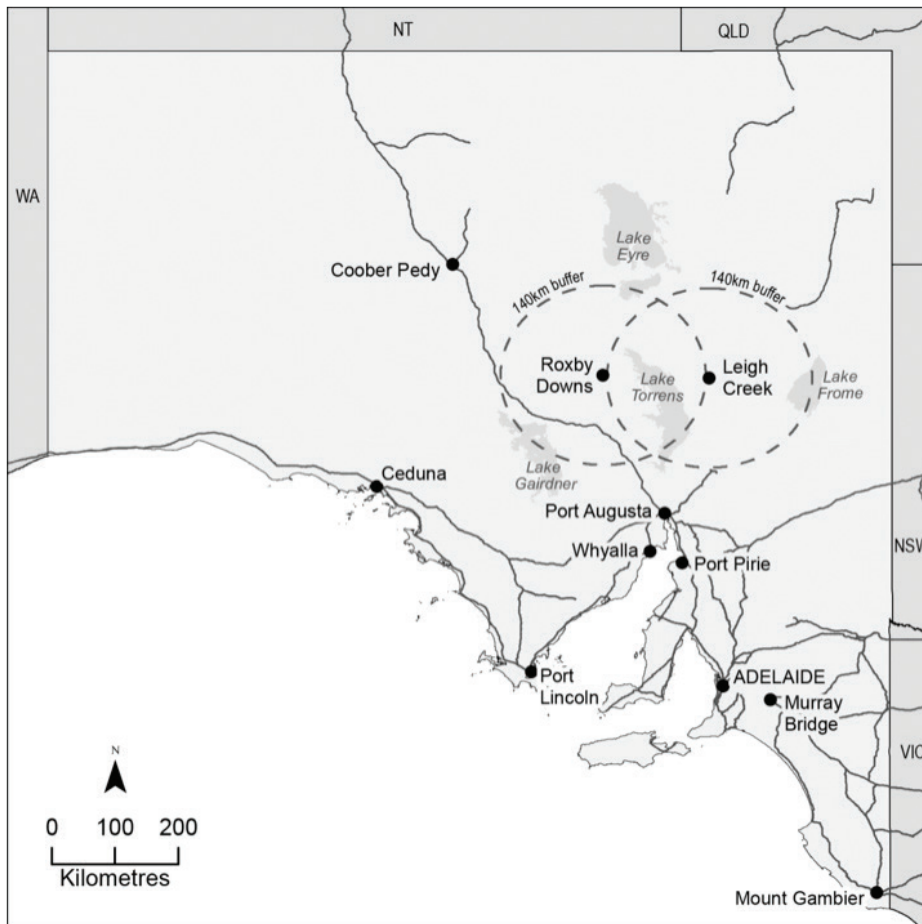


Source: Australian Bureau of Statistics, 2008e, 2012b.

### *Leigh Creek and Roxby Downs, South Australia*

Leigh Creek and Roxby Downs are located in the mid North and East of central South Australia. Leigh Creek is located on the western edge of the Northern Flinders Ranges and Roxby Downs is approximately 144 kilometres due west of Leigh Creek. As shown in Figure 10, the Lake Torrens basin is between the two communities and prevents direct access between the two locations. Both communities are remote, located approximately 560 kilometres north of Adelaide, the capital city of South Australia.

**Figure 10:** Location of Roxby Downs and Leigh Creek, South Australia



Source: Kate Rampellini ©, CRC for Remote Economic Participation, Curtin University, 2015

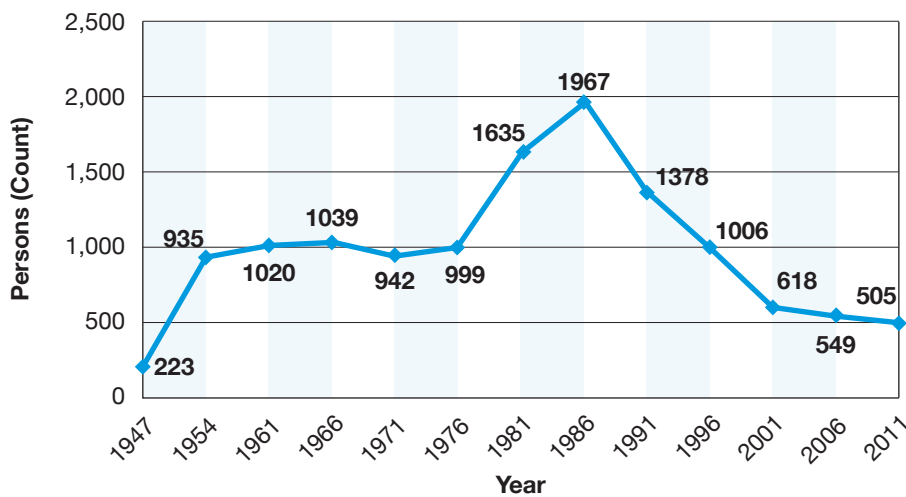
### *Leigh Creek*

In 1942 the South Australian Government developed the Leigh Creek coal field to supply coal for power generation, with the township established in the same year. Leigh Creek was designed as a model mining community for miners and their families, and also a service centre for the other communities within the remote region (Klaassen, 1997). The township is a 'closed community' to those who work a minimum of 20 hours per week in the mine and associated town services or private business (Matulick, 2011). The South Australian Government owns the town and associated infrastructure while private businesses lease premises in the town to provide services to the community. Currently, the mine and the town are leased to Alinta Energy with expiry in June 2018 but the mine is due to close on 17 November 2016 (Australian Broadcasting Corporation, 2015a).

In 1976, the Electricity Trust of South Australia (ETSA) decided the community needed to be relocated south of the original town site to allow for the expansion of the coalfield. This site was selected due to topography and it having no identified mineral deposits. Following relocation, the South Australian Government wished to develop the new town as an open community to act as a service centre for the Northern Flinders Ranges; the proposal was within the then preferred principles for planning a mine related community (State Records of South Australia, 1978c). Despite the significant benefits of an open town<sup>1</sup> policy, there was strong resistance from the existing community members and unions wishing to preserve the extant composition of Leigh Creek, objecting to the provision of Aboriginal and welfare housing in town (State Records of South Australia, 1977, 1978b). With Leigh Creek responsible for generating around a third of the State's electricity during the late 1970s, the government preferred to abandon its proposal to avoid industrial unrest and associated power 'blackouts' (State Records of South Australia, 1977, 1978a, 1978c). Despite opportunities to remove residency restrictions and make housing available for general lease or purchase during ETSA's privatisation in 1999, the town remained closed.

Figure 11 shows the population of Leigh Creek peaked at 1,967 residents in 1986 (Australian Bureau of Statistics, 1988) with a subsequent continued decline due to diminishing coal reserves (Figure 12), increased technological efficiencies, and long distance commuting by employees (Figure 13). As evidence of the latter, the percentage of residents remaining at the same address as five years ago across the census periods between 1996, 2001, 2006 and 2011 increased but at a higher rate to, and remained significantly lower than, that of South Australia (Calculated from Australian Bureau of Statistics, 2002b, 2008f; Australian Bureau of Statistics, 2013e).

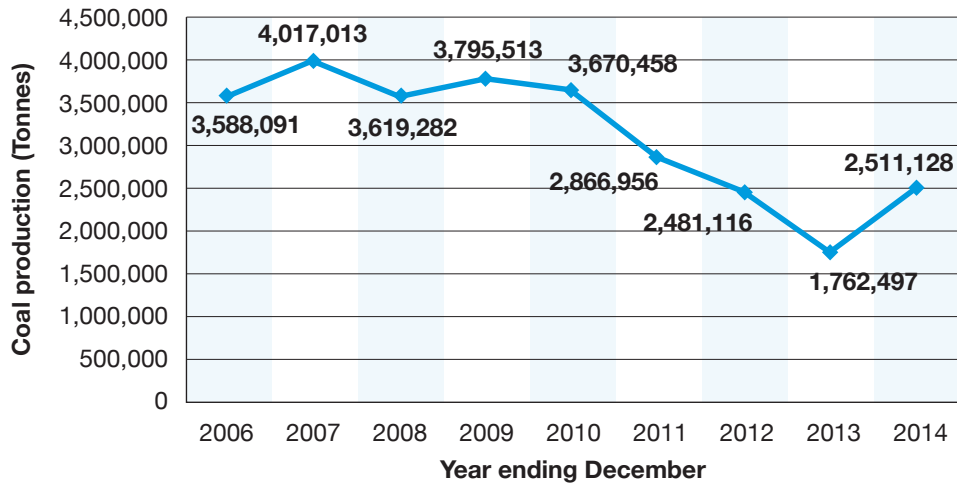
**Figure 11: Leigh Creek Population**



Source: Australian Bureau of Statistics, 1982b, 1988, 1993b, 1998, 2002b, 2008f, 2013e; Commonwealth Bureau of Census and Statistics, 1949, 1955, 1963, 1970, 1973.

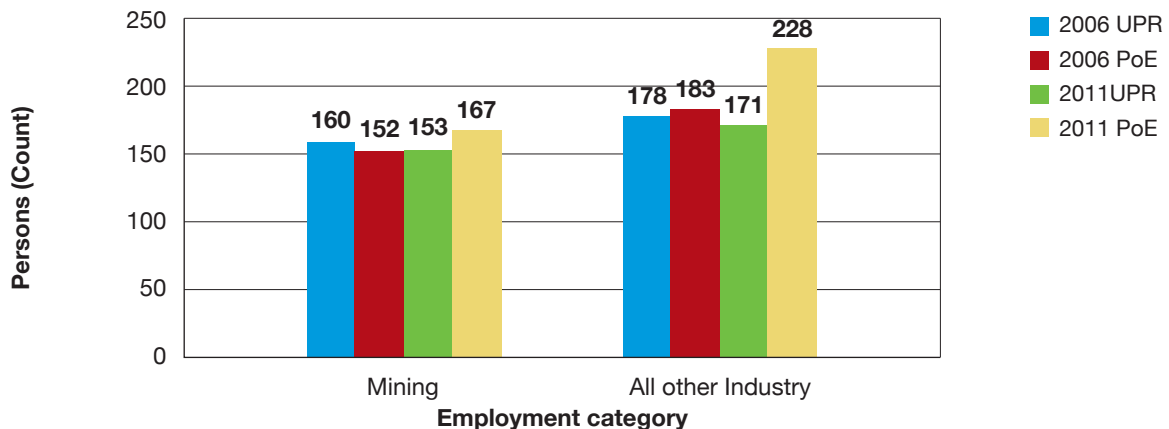
1. Benefits include the potential for tourism and other private development with diversification of job opportunities, a possible reduction in duplication of services, a more efficient use of housing and town facilities, and the importance of developing a service centre in the region.

**Figure 12: Leigh Creek Coal Production**



Source: Brice, 2011; Lavingdale, 2007, 2008, 2009, 2010, 2012, 2013, 2014, 2015.

**Figure 13: Leigh Creek Employment by Usual Place of Residence and Place of Enumeration**

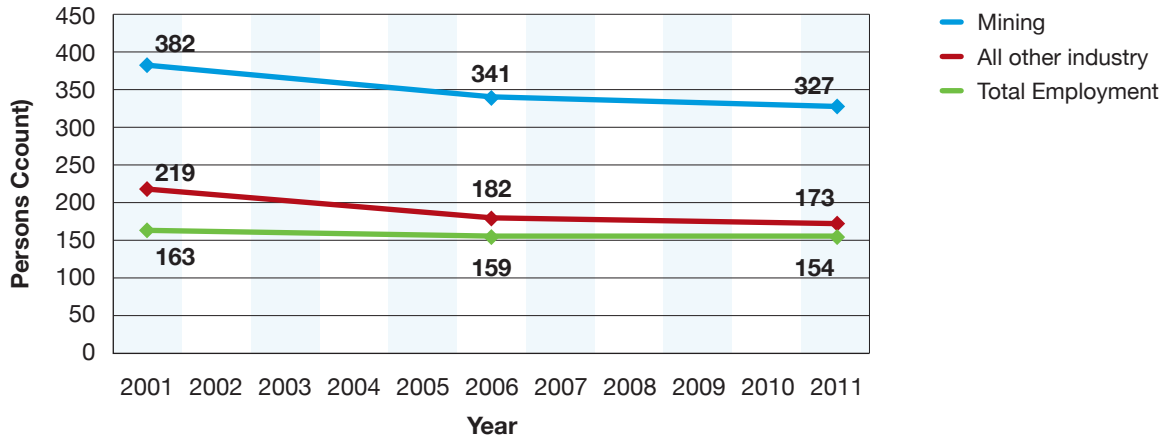


Source: Australian Bureau of Statistics, 2008a, 2013b.

Figure 14 presents employment in Leigh Creek from 2001 to 2011 using 2006 census data corrected for the anomaly of mine workers being recorded as working in the electricity industry. Following ETSA’s privatisation in 1999, the figure shows the decrease in employed persons outside of mining in Leigh Creek since 2001, highlighting the importance of mining to employment in other sectors.

Figure 15 highlights the changes in employment by industry since 2001, with an overall decline in total employment across the period. There was a decrease in employment in mining and utilities’ combined. Also, there is a decrease in retail trade and education employment, coinciding with the decrease in Leigh Creek’s population. Behind these decreases is a contraction of coal production (see Figure 12). The further falls in coal production in recent years can be explained by the curtailment of the operation of Leigh Creek supplied power stations to the peak summer period, October to March (Alinta Energy, 2012) resulting in increased productivity and profitability at the mine (P. Kelly, personal communication, 18 September 2013).

**Figure 14: Leigh Creek Mining, Other and Total Employment by Usual Place of Residence**

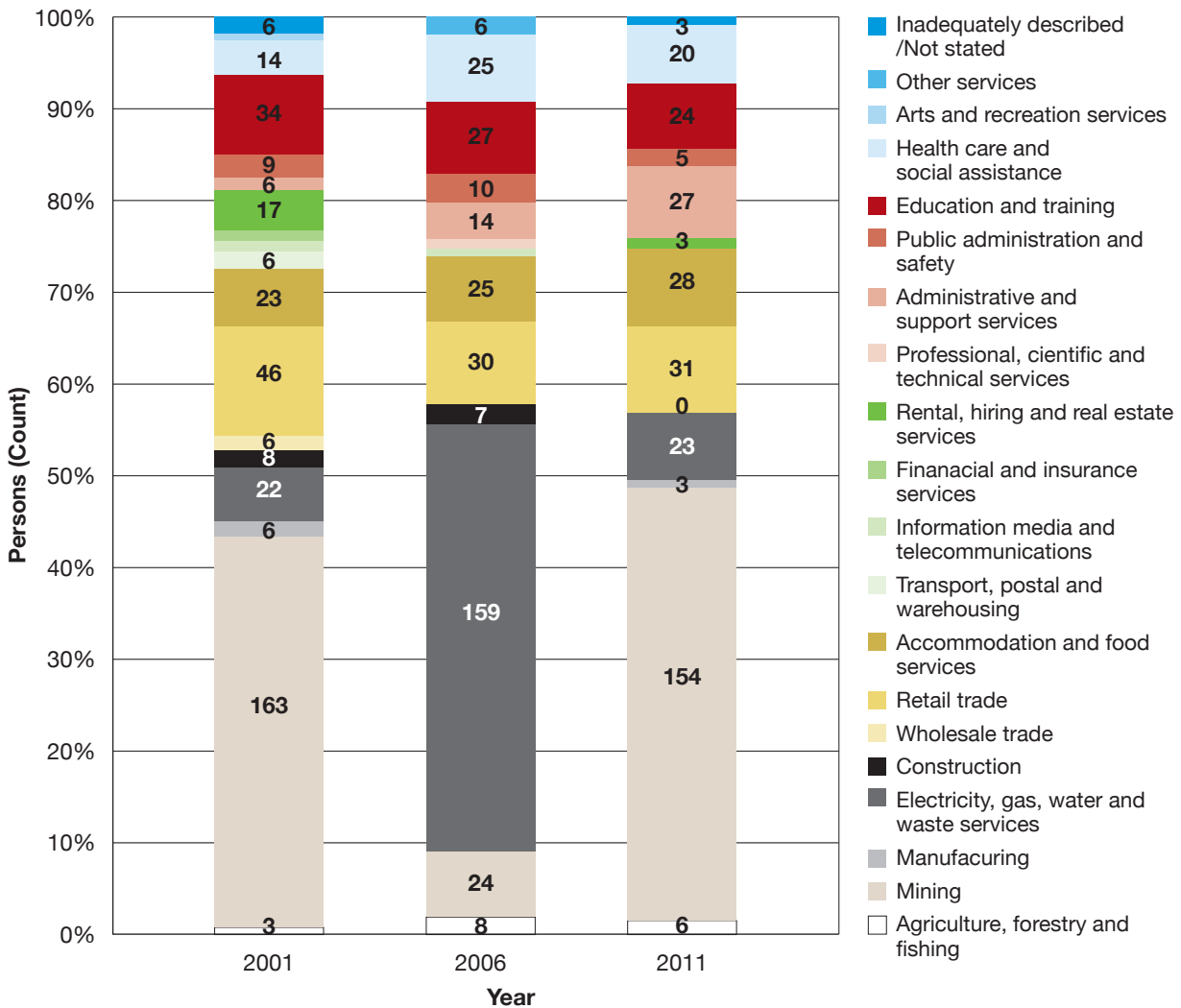


Sources: Australian Bureau of Statistics, 2002b, 2008f, 2013e.

Note: The 2006 data are estimated to correct for mining employees recorded as electricity industry employees.

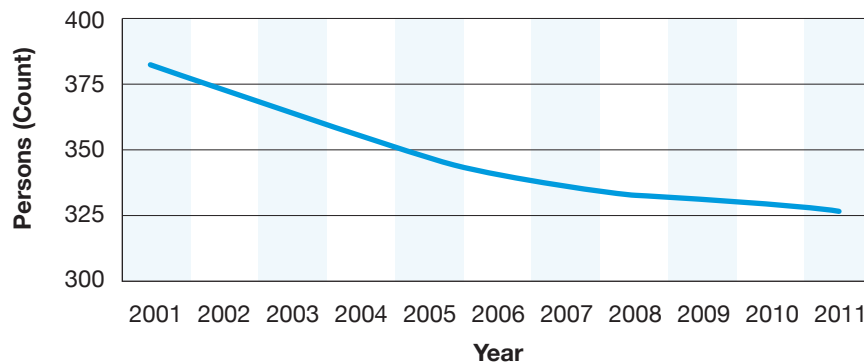
**Figure 15: Leigh Creek Industry Employment and Leigh Creek Total Employment**

**A) Leigh Creek Industry Employment**





**B) Leigh Creek Total Employment**



Source: Australian Bureau of Statistics, 2002b, 2008f, 2013e.

Note: Place of Enumeration used for 2001 Industry of Employment data, Place of Usual Residence used in 2006 & 2011. No data are available for 1996.

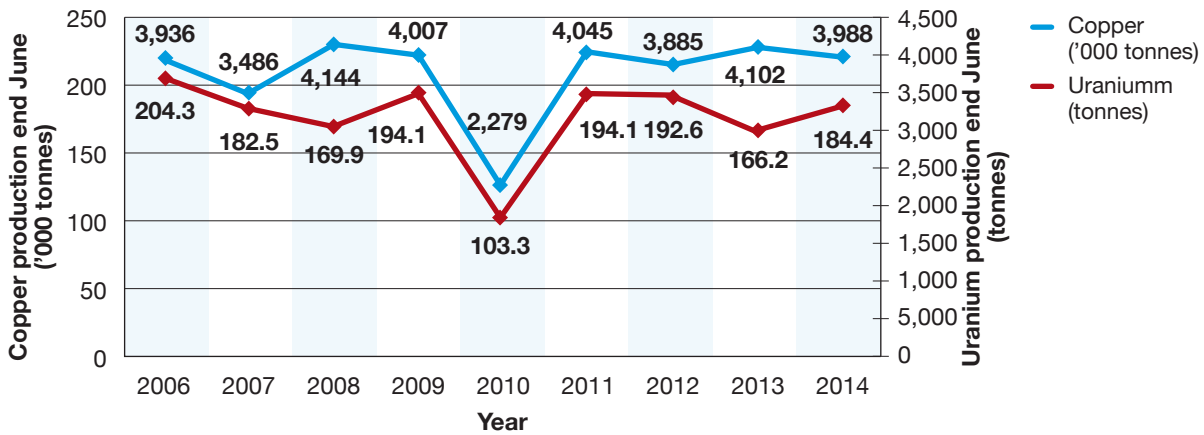
However, this improved efficiency has not been achieved without a social cost. As part of the efficiency initiatives, Alinta Energy changed work cycles in 2012 from four days on four days off, to seven days on seven days off. By 2015, 30 per cent of the Leigh Creek labour force utilised DIDO and almost five per cent utilised FIFO (R. Stack, personal communication, 20 April 2015), no doubt contributing to further declines in the local population. Analysis of the 2001, 2006, 2011 census data showed a decrease in school attendance (calculated from Australian Bureau of Statistics, 2002b, 2008f; 2013e), corroborating evidence of losses in population and social fabric.

Figure 13 lends further evidence in support of greater DIDO and FIFO utilisation in Leigh Creek, given a declining local population (counts for usual place of residence=UPR) but increasing Place of Enumeration counts (PoE) on census night. The Light Copper mine located between Leigh Creek and Copley operated on a DIDO basis in 2011 which potentially explains the increase (Phoenix Copper Limited, 2014). However, the relatively larger increase in the 'All other industry' category for enumeration counts in 2011 may be explained by the rare flooding of Lake Eyre, which increased the number of visitors to the area. This may also explain part of mining's enumeration increase.

**Roxby Downs**

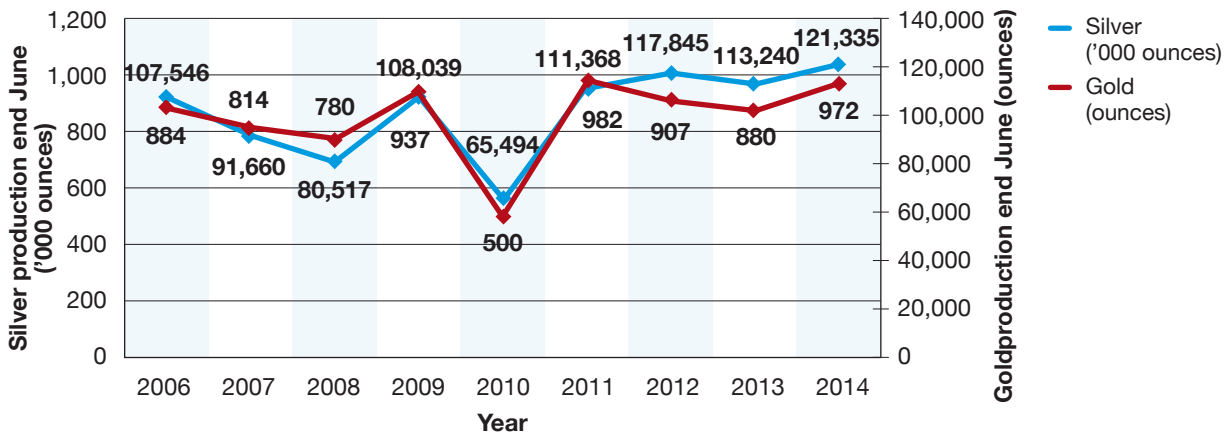
Western Mining Corporation was granted an exploration license over part of Roxby Downs Pastoral Station in May 1975 and the first exploration hole was drilled in June 1975 in the area of a stock watering point called Olympic Dam (Johns, 2010). In May 1986, Western Mining Corporation and their partners notified the South Australian Government of their intent to proceed with the Olympic Dam project (Johns, 2010). BHP Billiton acquired the Olympic Dam mine in June 2005 from Western Mining Corporation (Department for Manufacturing, 2012) and continues to produce copper, uranium, gold and silver as depicted in Figures 16 and 17. The main ore haulage shaft was damaged in October 2009 (BHP Billiton, 2009b, 2010a) resulting in the sharp decline in production for all minerals in 2010.

**Figure 16: Olympic Dam Copper and Uranium Production**



Source: BHP Billiton, 2006, 2007, 2008, 2009a, 2010b, 2011, 2012, 2013, 2014.

**Figure 17: Olympic Dam Silver and Gold Production**

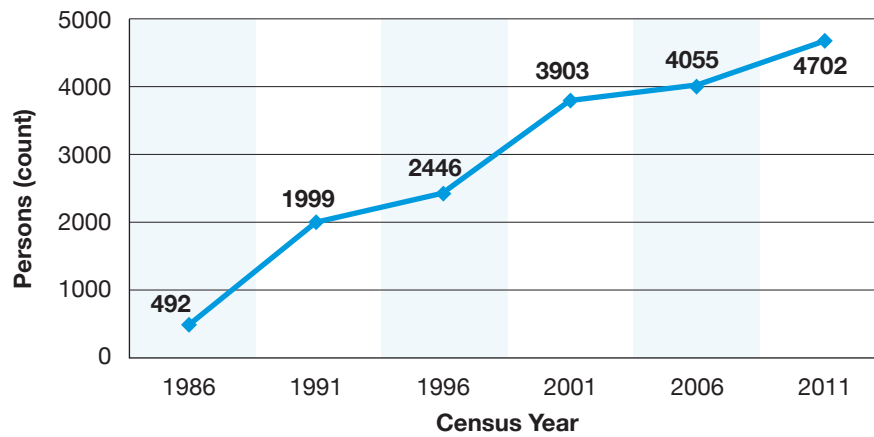


Source: BHP Billiton, 2006, 2007, 2008, 2009a, 2010b, 2011, 2012, 2013, 2014.

Roxby Downs was established in 1987 to provide accommodation and support services to the Olympic Dam mine workforce (*Roxby Downs (Indenture Ratification) Act 1982*). Unlike Leigh Creek, Roxby Downs was established as an ‘open community’ and is designated as a Local Government Area, though similar to Leigh Creek does have representation from state government. Also, unlike Leigh Creek, the population of Roxby Downs as depicted in Figure 18 did not recoil because of the reduced production in 2010 or other periods. This is because production of at least one mineral has continued to increase year on year (Figures 16 and 17), presenting a growing portfolio of mineral development to support population growth.

The connection of course between mining production and town population is through employment as depicted in Figure 19 that highlights mining as the major industry for all employees in Roxby Downs. Figure 20 highlights the changes in employment by industry since 1996 with a steady incline in mining’s employment (Figure 20.A) and total employment (Figure 20.B). Other larger employer industries include administration and support, accommodation and food services, and construction, industries that help service the mining sector.

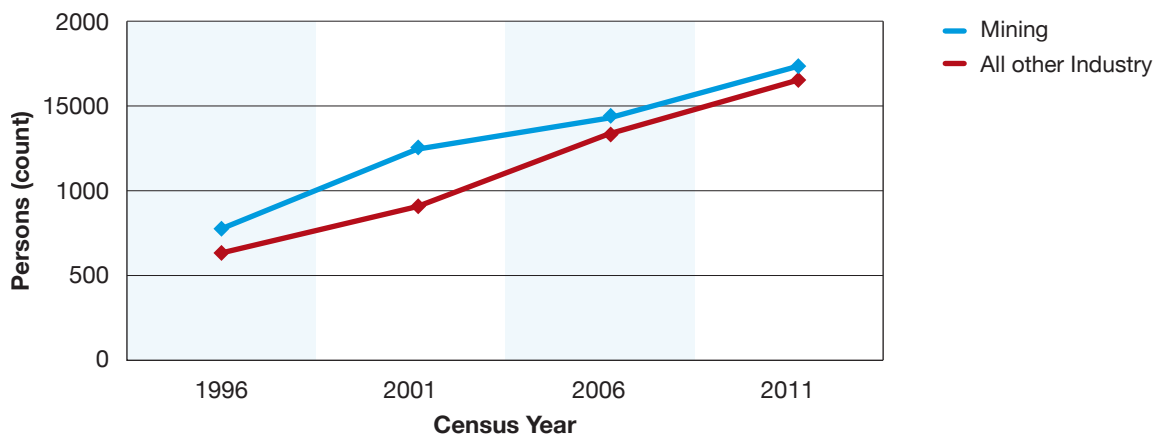
**Figure 18: Roxby Downs' Population**



Source: Australian Bureau of Statistics, 1988, 2002c, 2008g, 2013f.

Note: The locality was called Olympic Dam in the 1986 census.

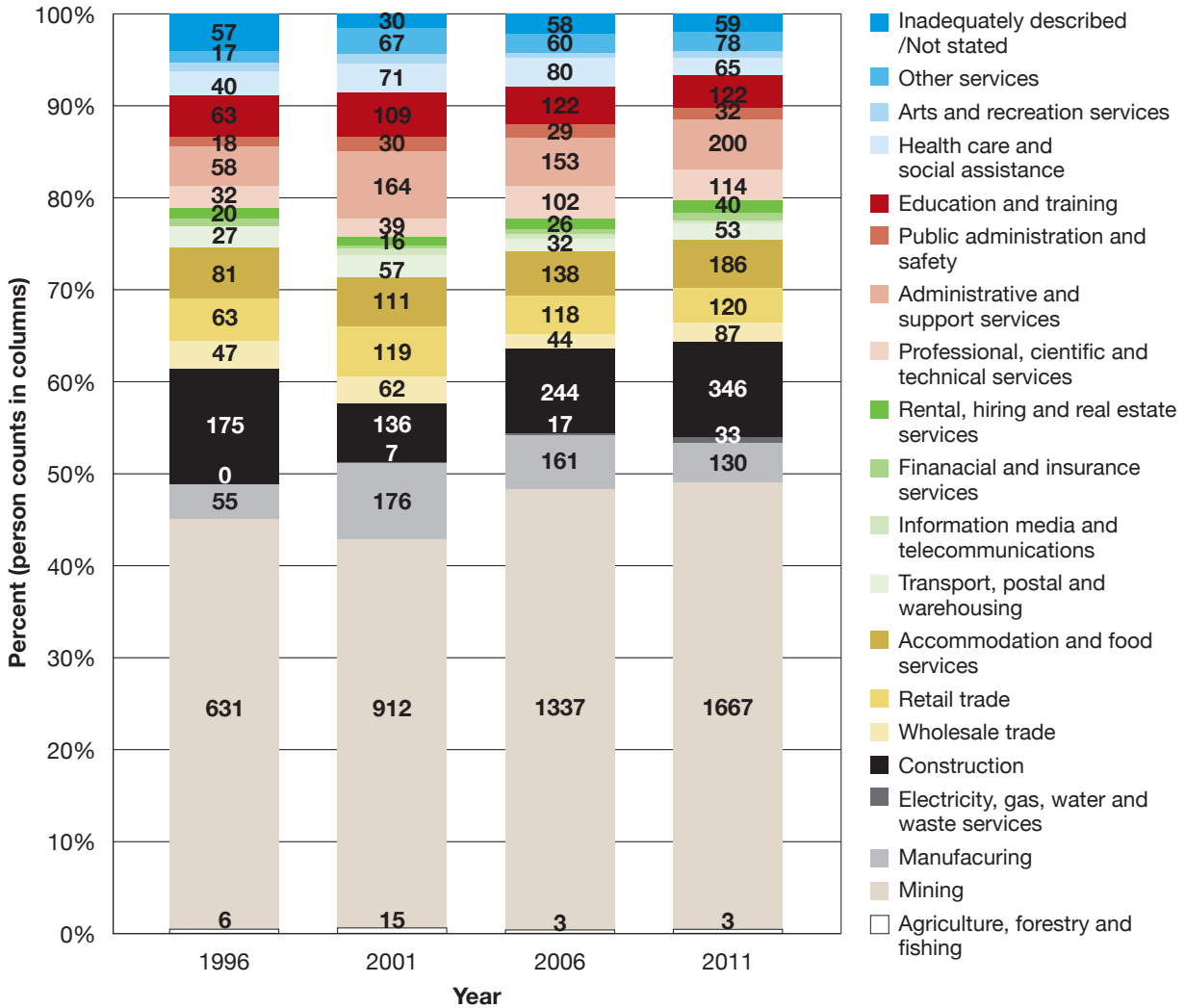
**Figure 19: Roxby Downs Mining and Other Employment**



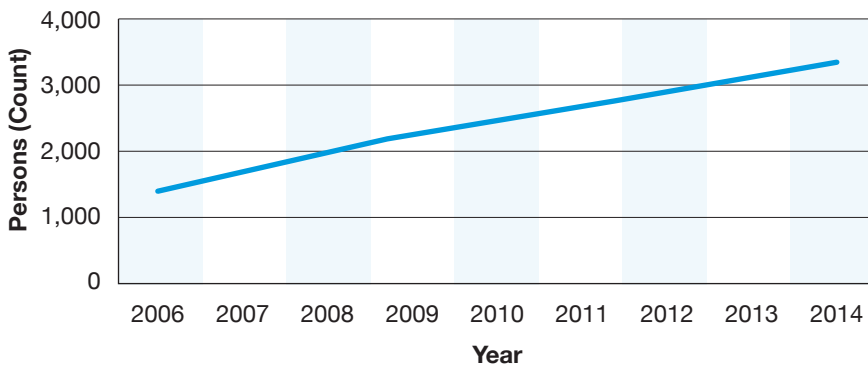
Source: Australian Bureau of Statistics, 2008b, 2013c.

**Figure 20: Roxby Downs Employment by Industry by Place of Enumeration and Roxby Downs Total Employment**

**A) Roxby Downs Employment by Industry by Place of Enumeration**



**B) Roxby Downs Total Employment**

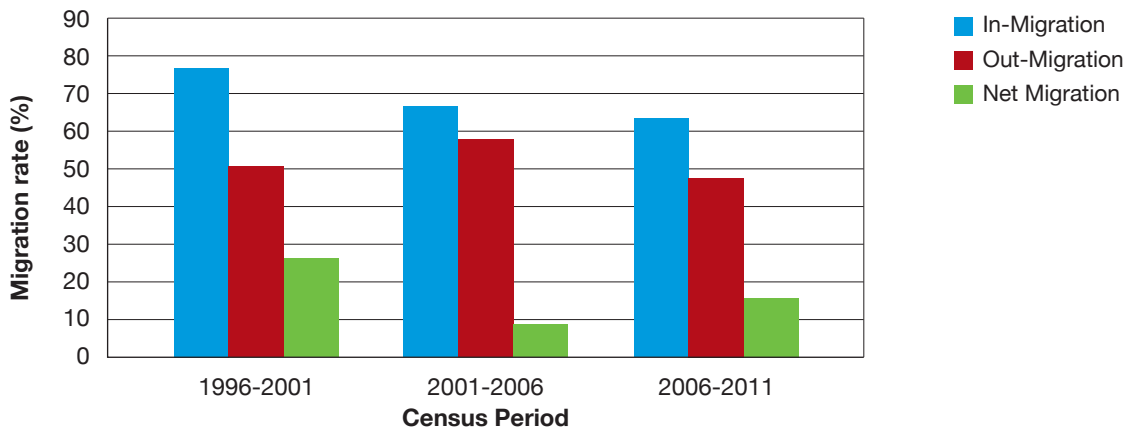


Source: Australian Bureau of Statistics, 2008g, 2013f.

Roxby Downs has a highly mobile labour force and population. Population turnover, migration rates, and place of residence and enumeration provide insights to this mobile labour force and impermanent population. Between 2001 and 2006 Roxby Downs had the seventh largest turnover of population in Australia, with 122 per cent of the population arriving or leaving across the period (Australian Bureau of Statistics, 2013j) with an increase to 124 per cent between 2006 and 2011 (Australian Bureau of Statistics, 2013k).

Figure 21 reveals Roxby Downs has experienced relatively high in- and out- migration rates since the mid-1990s, indicating equally high levels of population turnover. The net migration rates were also highly varied. For comparison, rates of in-migration for high amenity areas of the State (e.g. Victor Harbor) partially exceeded 40, while out-migration rates above 30 are rare (Argent, Tonts, Jones, & Holmes, 2010). Interviews conducted with Roxby Downs residents found that (i) many people move to Roxby Downs with five year career plans; (ii) mining company career development plans involve staff moving residence in Australia and overseas; (iii) and people reside in Roxby Downs whilst their children are young then change to a FIFO basis when the children are of high school age.

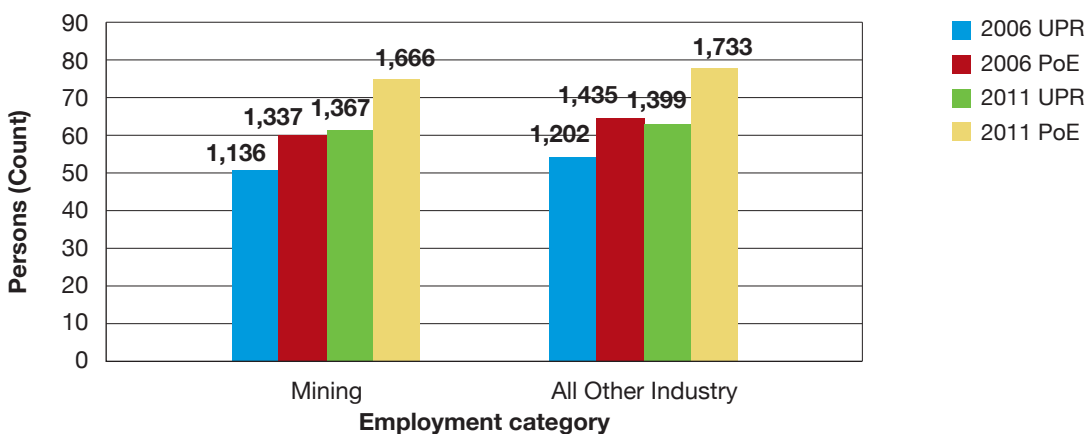
**Figure 21: Roxby Downs Migration Rates**



Source: Australian Bureau of Statistics, 1993b, 1998, 2002a, 2008c, 2013d.

Figure 22 highlights the difference between usual place of residence and place of enumeration for mining and all other industry combined. The high number of people in Roxby on the night of the census compared to the number of residents suggests FIFO/DIDO is utilised by mining and other industries supporting Roxby Downs and the Olympic Dam mine.

**Figure 22. Roxby Downs Employment by Usual Place Residence (UPR) and Place of Enumeration (PoE)**



Source: Australian Bureau of Statistics, 2008c, 2013d.

BHP Billiton recently announced it will not proceed with a planned open cut expansion of Olympic Dam resulting in expected staffing cuts (Australian Broadcasting Corporation, 2015b). This coincides with an increase in the number of vacant properties for sale and rent, and the closing of retail outlets (McGuire, 2014a, 2014b; RPData, 2014). Again, while mine production and town population has been on an upward trend since 2005, post 2011 the population is expected to decline given the curtailment of resource development.

### Synthesis Discussion, Policy Implications, and Conclusion

It has been well documented that the benefits from the recent decade-long resources boom have been broadly distributed across the nation (Minifie, 2013; Sheehan & Gregory, 2013). However, importantly for remote Australia, the wealth generated from mining is not distributed evenly back to or within the regions where mining occurs (Haslam-McKenzie, Rolfe, Hoath, Buckley & Greer, 2013; Hoath & Pavez, 2013; Johnson, 2009). This fact is corroborated by the variation in demographic and employment characteristics of the remote mining case study locations considered in this article as synthesised in Table 1.

**Table 1:** Demographic and employment characteristics of case study locations, 2011

Location	Roxby Downs	Jabiru	Yuendumu	Leigh Creek
Population	4702	1851	687	505
Aboriginal peoples	87	219	587	15
Aboriginal percentage	2%	12%	85%	3%
Total employment	3398	978	150	200
Employment percentage	72%	53%	22%	40%
Mining employment	1667	320	0	136
Mining/total employment percentage	49%	33%	0%	68%
Mining town service centre	Yes	Yes	No	Yes

While Roxby Downs has the largest population, the percentage of Aboriginal people in the population is small, like in Leigh Creek, mining is the predominant employer and more so in Leigh Creek, while overall employment of the population is high and even higher in Leigh Creek. In contrast, Jabiru has just under half the population of Roxby Downs, a higher Aboriginal percentage than Roxby Downs and Leigh Creek, but is able to maintain total employment at a reasonable percentage, with mining contributing moderately to that employment. Jabiru, therefore may provide some inklings for success. While Yuendumu and Leigh Creek have the smallest populations of the case study locations, they offer contrasts in Aboriginal representation (Yuendumu 85%; Leigh Creek 3%) and employment, with Leigh Creek having around twice as many people employed compared to Yuendumu and with mining employing almost 70 per cent of the population in contrast to Yuendumu's zero per cent. These contrasting comparisons, suggest a strong negative correlation between Aboriginal representation and employment, and moderate correlation between Aboriginal representation, and the dependency a town has on mining to support jobs. Jabiru appears to be the outlier, having a reasonable Aboriginal representation in the population and moderate levels of employment, particularly Aboriginal employment through mining.

From the employment data, we found similar results for Leigh Creek to that of the Northern Territory case locations where employment is more diversified with higher population levels in 2001 versus 2006 and 2011. In 2006, there was a significant fall in mining employment, with education and training taking up considerable slack within the employment market, but other sectors suffered also with many no longer employing anyone. In 2011, mining employment increased again, but it appears Leigh Creek was less resilient to the shock of 2006, with fewer industries employing and lower levels of employment across all sectors in 2011 compared to 2001, with the exception of 'administration and support' sector.

Furthermore, unlike Yuendumu but like Jabiru and Leigh Creek, a large proportion of Roxby Downs' employment results from mining activity. In contrast, while Leigh Creek is dominated by mining employment, without this employment its population was found to be highly susceptible to shocks. The recent announcement by Alinta Energy which closed the mine in late 2015, provides an excellent example of such a shock. Again, Yuendumu contrasts all three other locations, by having a small proportion of mining employment and a highly undiversified economy with reduced capacity for economic participation through employment.

There were some important distinguishing features found for Yuendumu relative to the other case study locations. Mining employment is minimal in Yuendumu and therefore the population of Yuendumu has not necessarily oscillated with mine production or employment through the mine. Yuendumu however does benefit through royalty streams from the mine indirectly helping provide much needed funds to provide essential social and community services. This points to the need to consider the array of streams through which benefits from mining can be delivered and delivered in a sustaining way. Also, Jabiru and Roxby Downs have more diversified employment opportunities than experienced in Leigh Creek and especially in Yuendumu. *Ceteris parabis*, these latter two towns are therefore more dependent on oscillations in the returns provided by mining to the local economy.

This article has provided evidence that the scale and pace of mining developments and long distance commuting to remote mine sites has changed the nature of benefits between the mines and their associated remote communities, none more so than through long distance commuting and mine shift work practices. There is, therefore, a pressing need for more strategic approaches by governments and companies to generate benefits both short and longer term for local remote communities. A range of possible strategies are available to decision makers.

Firstly, a shared engagement approach could be used to ensure community buy-in to expected long-term benefits. Secondly, timely and coordinated planning is an essential precursor to providing local job opportunities or otherwise at various phases of the mine's lifecycle. No such planning took place in Leigh Creek and there is no future vision of Roxby Downs without mining as examples. A comprehensive management plan cognisant of the potential environmental, social and economic impacts and benefits of the mining workforce could be developed at the outset of mine planning with key community and government leaders. Only relatively new mines are implementing such practices, whereas the mines in these case locations are well established in their lifecycles. Management plans should therefore be required retrospectively and be iterative.

Mining is also not the only responsible partner in delivering enduring community value from mining. Governments, communities and remote people are also responsible, governments even more so where institutions commonly available in the city are not available in the bush. The contrasting case studies above, particularly through Leigh Creek's closed town approach and unincorporated local government nature, and lack of free access to land and property title, are examples of where even the best intended remote economic development efforts can prove futile in the face of poorly designed institutions (Blackwell, Dollery & Grant, 2015;

Blackwell, 2012). Therefore, sometimes the avenues for delivering lasting benefits lie within community will to have free and open representation, garner support from outside regions and people, and gain access to the standard institutions that the rest of society enjoys (Blackwell, Dollery & Grant, 2015). Being open to non-mine residents, unrestricted access in local land and property markets, an ability of residents to have locally responsible and accountable local government, and early strategic planning by government, mining companies, and communities around how to manage the peaks and troughs of returns to community, offer key institutional reforms for such cases.

Not many things are certain for remote mining and associated communities, however, mine production, employment opportunities and resultant population are inevitably connected. Long distance commuting and modern mine work practices have the capacity to disconnect communities from remote economic development opportunities, which during boom times can be detrimental but during contractions can offer a cloaked benefit (Blackwell, Fischer, McFarlane & Dollery, 2015). Furthermore, as we have seen in the evidence from Yuendumu, mine employment is not necessarily an attractive occupation for all Aboriginal people and other avenues for delivering benefits are necessary in such cases. Similarly, whether communities wish to engage and are able to engage is an important consideration in delivering lasting benefits. While we have not been able to determine definitely whether specific factors deliver enduring value, we have outlined some of the contrasting characteristics of the case locations and how this has manifested in terms of employment.

Finally, non-employment avenues are particularly relevant for remote communities, where economies tend to be less diversified, communities are more significantly distant from associated mines, and communities are less resilient to shocks such as falls in commodity prices or the closure of a mine. In such cases, royalty payments, infrastructure provision, local economic contracting and spending, and regional partnerships are critical to the ongoing development of remote communities (see Blackwell, Dollery & Grant, 2015 for further discussion) and these also must be considered early in the planning process.

### **Acknowledgements**

The work reported in this publication was supported by funding from the Australian Government Cooperative Research Centres Program through the Cooperative Research Centre for Remote Economic Participation (CRC-REP). The views expressed herein do not necessarily represent the views of the CRC REP or Ninti One Limited or its participants. Errors or omissions remain with the author. We also wish to acknowledge Ninti One for providing the resources to fund this Special Issue as well as the Northern Institute, at Charles Darwin University for providing the opportunity for publication. The authors are grateful to Kate Rampellini for the preparation of the maps.



## References

- Alinta Energy. (2012). *Alinta Energy clarifies market reports*. Retrieved from <http://alintaenergy.com.au/Everything-Alinta-Energy/News/Alinta-Energy-clarifies-market-reports>.
- Argent, N., Tonts, M., Jones, R., & Holmes, J. (2010). Amenity-Led Migration in Rural Australia: A New Driver of Local Demographic and Environmental Change? In G.W. Luck, R. Black, & D. Race (Eds.), *Demographic Change in Australia's Rural Landscapes* (Volume 12, pp. 23-44). Netherlands: Springer.
- Australian Broadcasting Corporation. (2015a). Alinta's Leigh Creek coal mine to close next month, Port Augusta power station next March. *ABC*. Retrieved from <http://www.abc.net.au/news/2015-10-07/alinta-leigh-creek-coal-mine-to-close-next-month/6833402>.
- Australian Broadcasting Corporation. (2015b). BHP announces about 380 job losses as Olympic Dam operations are reviewed in South Australia. *ABC*. Retrieved from <http://www.abc.net.au/news/2015-08-09/bhp-announces-380-job-losses-at-olympic-dam/6684060>.
- Australian Bureau of Statistics. (1982a). 2103.0 - Census of Population and Housing, 30 June 1981. *Persons and Dwellings in Local Government areas and Urban Centres, Northern Territory*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2103.01981?OpenDocument>.
- Australian Bureau of Statistics. (1982b). 2103.0 - *Census of Population and Housing, 30 June 1981. Persons and Dwellings in Local Government areas and Urban Centres, South Australia*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2103.01981?OpenDocument>.
- Australian Bureau of Statistics. (1987). 2102.0 - *Census 86 - Age and Sex of Persons in Statistical Local Areas and Statistical Divisions, Northern Territory*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2102.01986?OpenDocument>.
- Australian Bureau of Statistics. (1988). 2102.0 - *Census 86 - Persons and Dwellings in Legal Local Government Areas, Statistical Local Areas and Urban Centres/(Rural) Localities, South Australia*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2102.01986?OpenDocument>.
- Australian Bureau of Statistics. (1993a). 2101.0 - *Census counts for Small Areas: Northern Territory, 1991 Census of Population and Housing*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2101.01991?OpenDocument>.
- Australian Bureau of Statistics. (1993b). 2101.0 - *Census counts for Small Areas: South Australia, 1991 Census of Population and Housing*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2101.01991?OpenDocument>.
- Australian Bureau of Statistics. (1998). 2016.4 - *Census of Population and Housing: Selected Characteristics for Urban Centres And Localities, South Australia, 1996*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2016.41996?OpenDocument>.
- Australian Bureau of Statistics. (2001). *Australian Standard Geographical Classification*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1216.02001?OpenDocument>.
- Australian Bureau of Statistics. (2002a). *2001 Census Community Profiles: Roxby Downs SA (LGA), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2002b). *2001 Census Community Profiles: Leigh Creek SA (L) (UC/L), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2002c). *2001 Census Community Profiles: Roxby Downs SA (M) (SLA)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.

- Australian Bureau of Statistics. (2003). *2001 Census Community Profiles: Tanami NT (SLA), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008a). *2006 Census Community Profiles: Leigh Creek SA (L), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008b). *2006 Census Community Profiles: Roxby Downs SA (SLA), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008c). *2006 Census Community Profiles: Roxby Downs SA (LGA), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008d). *2006 Census Community Profiles: Central NT (SSD), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008e). *2006 Census Community Profiles: Jabiru NT (T) (SLA), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008f). *2006 Census Community Profiles: Leigh Creek (SSC)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008g). *2006 Census Community Profiles: Roxby Downs (M) (Statistical Local Area)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008h). *2006 Census Community Profiles: Tanami NT (SLA Place of Enumeration Profile)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2008i). *2006 Census Community Profiles: Yuendumu (LGA), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2012a). *2011 Census Community Profiles: Jabiru NT (SSC), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2012b). *2011 Census Community Profiles: West Arnhem (S) – Jabiru, Place of Enumeration Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2012c). *2011 Census Community Profiles: Yuendumu (SSC), Place of Enumeration Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013a). *2011 Census Community Profiles: Alice Springs (T), Place of Enumeration Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013b). *2011 Census Community Profiles: Leigh Creek SA (GL), Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.

- Australian Bureau of Statistics. (2013c). *2011 Census Community Profiles: Roxby Downs (LGA), Time Series Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013d). *2011 Census Community Profiles: Roxby Downs SA (GL) -Basic Community Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013e). *2011 Census Community Profiles: Leigh Creek (SSC)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013f). *2011 Census Community Profiles: Roxby Downs (SLA)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013g). *2011 Census Community Profiles: Tanami (SA2), Time Series Profile, Place of Enumeration Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013h). *2011 Census Community Profiles: West Arnhem (S) (LGA)*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013i). *2011 Census Community Profiles: Yuendumu - Anmatjere (SA2), Time Series Profile, Place of Enumeration Profile*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>.
- Australian Bureau of Statistics. (2013j). *Perspectives on Regional Australia: Population Growth and Turnover in Local Government Areas (LGAs), 2001 to 2006*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1380.0.55.0072001%20to%202006?OpenDocument>.
- Australian Bureau of Statistics. (2013k). *Perspectives on Regional Australia: Population Growth and Turnover in Local Government Areas (LGAs), 2006-2011*. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1380.0.55.0072006-2011>.
- BHP Billiton. (2006). *BHP Billiton Production Report for the Quarter Ended 30 June 2006*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-quarter-ended-30-june-2006>.
- BHP Billiton. (2007). *BHP Billiton Production Report for the Year Ended 30 June 2007*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-year-ended-30-june-2007>.
- BHP Billiton. (2008). *BHP Billiton Production Report for the Year Ended 30 June 2008*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-year-ended-30-june-2008>.
- BHP Billiton. (2009a). *BHP Billiton Production Report for the Year Ended 30 June 2009*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-year-ended-30-june-2009>.
- BHP Billiton. (2009b). *Olympic Dam Recovery Process*. Retrieved from <http://www.bhpbilliton.com/investors/news/Olympic%20Dam%20Recovery%20Progress>.
- BHP Billiton. (2010a). *BHP Billiton Production Report for the Quarter Ended 30 September 2010*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-quarter-ended-30-september-2010>.
- BHP Billiton. (2010b). *BHP Billiton Production Report for the Year Ended 30 June 2010*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-year-ended-30-june-2010>.

- BHP Billiton. (2011). *BHP Billiton Production Report for the Year Ended 30 June 2011*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-has-released-its-production-and-exploration--development-reports-for-the-year-ended-30-june-2011>.
- BHP Billiton. (2012). *BHP Billiton Production Report for the Year Ended 30 June 2012*. Retrieved from <http://www.bhpbilliton.com/investors/news/bhp-billiton-production-report-for-the-year-ended-30-june-2012>.
- BHP Billiton. (2013). *BHP Billiton results for the year ended 30 June 2013*. Retrieved from <http://www.bhpbilliton.com/investors/reports/bhp-billiton-results-for-the-year-ended-30-june-2013>.
- BHP Billiton. (2014). *BHP Billiton results for the year ended 30 June 2014*. Retrieved from <http://www.bhpbilliton.com/investors/reports/bhp-billiton-results-for-the-year-ended-30-june-2014>.
- Blackwell, B.D. (2012). Local and regional government in remote and unincorporated Australia: Sui Generis? *Public Policy*, 7(1), 23-46.
- Blackwell, B.D., Dollery, B., & Grant, B.J. (2015). Institutional vehicles for place-shaping in remote Australia. *Space and Polity*, 19(2), 150-169. doi:10.1080/13562576.2015.1014227.
- Blackwell, B.D., Fischer, A., McFarlane, J., & Dollery, B. (2015). Mining and other industry contributions to employment leakage in Australia's Northern Territory. *Journal of Developing Areas*, 49(6), 263-278.
- Brice, R. (2011). *South Australian mineral resource production statistic for the six months ended 31st December 2010*. (2011/00008). Adelaide, SA: Department of Primary Industries and Resources.
- Brunnschweiler, C. (2008). Curse the blessings? Natural resource abundance, institutions and economic growth. *World Development*, 36(3), 399-419.
- Brunnschweiler, C., & Bulte, E. (2008). The resource curse revisited and revised: A tale of paradoxes and red herrings. *Journal of Environmental Economics and Management*, 55, 248-264.
- Commonwealth Bureau of Census and Statistics. (1949). *Volume III - Part VIII Population and Dwellings in Localities*. Canberra, ACT: Commonwealth Bureau of Census and Statistics.
- Commonwealth Bureau of Census and Statistics. (1955). *Part V - Population and Occupied Dwellings in Localities South Australia*. Canberra, ACT: Commonwealth Bureau of Census and Statistics.
- Commonwealth Bureau of Census and Statistics. (1963). *Volume IV - Part V South Australia Population and Dwellings in Localities*. Canberra, ACT: Commonwealth Bureau of Census and Statistics.
- Commonwealth Bureau of Census and Statistics. (1970). *Volume 5 - Part 4 Populations and Dwellings in Localities South Australia*. Canberra, ACT: Commonwealth Bureau of Census and Statistics.
- Commonwealth Bureau of Census and Statistics. (1973). *Bulletin 6 - Population And Dwellings In Local Government Areas - Part 4 South Australia*. Canberra, ACT: Commonwealth Bureau of Census and Statistics.
- Daniels, P. (2012). *Fiscal Regimes for Extractive Industries: Design and Implementation*. Report for the International Monetary Fund. Retrieved from <http://inec.usip.org/resource/fiscal-regimes-extractive-industries-design-and-implementation>.
- Davies, J., Maru, Y., & May, T. (2012). *Enduring community value from mining: conceptual framework*. CRC-REP Working Paper CW007. Alice Springs, NT: Ninti One Ltd.
- Davis, G., & Tilton, J. (2005). The resource curse. *Natural Resources Forum*, 29(3), 233-242.
- Deloitte. (2010). *Clouds in the silver lining? The two speed economy and Dutch disease*. Sydney, NSW: Minerals Council of Australia.

- Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE). (2012). *Olympic Dam*. Adelaide, SA: Government of South Australia.
- Dietsche, E., Stevens, P., Emsley, I., & Östensson, O. (2009). *The Challenge of Mineral Wealth: Using Resource Endowments to Foster Sustainable Development. Mineral Taxation Regimes, A Review of Issues and Challenges in Their Design and Application: Analysis and Observations*. International Council on Mining and Metals (ICMM) Report 2009.
- Director of National Parks. (2007). *Kakadu National Park Management Plan 2007-2014*. Canberra, ACT: Director of National Parks.
- Edwards, J. (2011). *Quiet boom: How the long economic upswing is changing Australia and its place in the world*. Sydney, NSW: Lowy Institute for International Policy. Retrieved from <http://www.loyyinstitute.org/publications/quiet-boom>.
- Elias, D. (2007). The Measure of Dreams. In J. F. Weiner & K. Glaskin (Eds.), *Customary Land Tenure and Registration in Australia and Papua New Guinea: Anthropological Perspectives* (pp. 223-246). Canberra: ANU E-press.
- Energy Resources of Australia. (2012). *2011 Annual Report*. Retrieved from <http://www.energyres.com.au/library/44.asp>.
- Energy Resources of Australia. (2013a). *2012 Annual Report*. Retrieved from <http://www.energyres.com.au/library/44.asp>.
- Energy Resources of Australia. (2013b). *Business Overview*. Retrieved from [http://www.energyres.com.au/whoweare/179\\_business\\_overview.asp](http://www.energyres.com.au/whoweare/179_business_overview.asp).
- Energy Resources of Australia. (2013c). *Projects*. Retrieved from <http://www.energyres.com.au/whatwedo/2324.asp>.
- Freudenburg, W., & Wilson, L. (2002). Mining the data: Analyzing the economic implications of mining for nonmetropolitan regions. *Sociological Inquiry*, 72(4), 549-575.
- Gundjeihmi Aboriginal Corporation. (2012). *The Mirarr Gundjeihmi clan*. Retrieved from <http://www.mirarr.net>.
- Haslam McKenzie, F., & Rowley, S. (2013). Housing market failure in a booming economy. *Housing Studies*, 28(3), 373-388.
- Haslam-McKenzie, F., Rolfe, J., Hoath, A., Buckley, A., & Greer, L. (2013). *Regions in Transition: Uneasy Transitions to a Diversified Economy involving Agriculture and Mining*. Final Report prepared for CSIRO Minerals Down Under Flagship, Mineral Futures Collaboration Cluster.
- Hoath, A., & Pavez, L. (2013). *Survey report: Intersection of mining and agriculture, Boddington radius - Land use, workforce and expenditure patterns*. Perth, WA: Curtin University.
- Humphreys, M., Sachs, J., & Stiglitz, J. (2007). Future directions for the management of natural resources. In M. Humphreys, J. Sachs, & J. Stiglitz (Eds.), *Escaping the Resource Curse* (pp. 322-336). New York, NY: Columbia University Press.
- InfoMine. (2013). *Five Year Gold Prices and Price Charts*. Retrieved from <http://www.infomine.com/investment/metal-prices/gold/5-year/>.
- Johns, K. (2010). *A mirage in the desert ? The discovery, evaluation and development of the Olympic Dam ore body at Roxby Downs, South Australia, 1975-1988*. Adelaide, SA: O'Neil Historical & Editorial Services.
- Johnson, P. (2009). *Fly-In Fly-Out and Regional Impact Assessments*. Final Report Prepared for Regional Development Council.

- Jordan, I. (1999). *Baptists in Australia: Ministry Among Indigenous People. Brief History of Baptist Ministry to Indigenous People of Central Australia*. Retrieved from <http://www.bwa-baptist-heritage.org/bap-ab.htm>.
- Klaassen, N. (1997). *Leigh Creek an oasis in the desert*. Eden Hill, SA: Flinders Ranges Research.
- Knight, D.R. (2008). *Jabiru Town Development Amendment Bill 2008: Northern Territory Second Reading Speeches*. Retrieved from [http://www.austlii.edu.au/au/legis/nt/bill\\_srs/jtdab2008354/srs.html](http://www.austlii.edu.au/au/legis/nt/bill_srs/jtdab2008354/srs.html).
- Larsen, E. (2005). Are rich countries immune to the resource curse? Evidence from Norway's management of its oil riches. *Resources Policy*, 30, 75-86.
- Lavingdale, M. (2007). *Resources production for the six month ended December 2006*. Report Book 2007/1. Adelaide, SA: Department Primary Industries and Resource.
- Lavingdale, M. (2008). *Resources production for the six month ended December 2007*. Report Book 2008/5. Adelaide, SA: Department of Primary Industries and Resources.
- Lavingdale, M. (2009). *Resources production for the six months ended December 2008*. Report Book 2009/9. Adelaide, SA: Department of Primary Industries and Resources.
- Lavingdale, M. (2010). *South Australian mineral resource production statistic for the six months ended 31st December 2009*. Report Book 2010/00009. Adelaide, SA: Department of Primary Industries and Resources.
- Lavingdale, M. (2012). *South Australian mineral resource production statistic for the six months ended 31st December 2011*. Report Book 2012/00011. Adelaide, SA: Department for Manufacturing, Innovation, Trade, Resources and Energy.
- Lavingdale, M. (2013). *South Australian mineral resource production statistics for the six months ended 31st December 2012*. Report Book 2013/00002. Adelaide, SA: Department for Manufacturing, Innovation, Trade, Resources and Energy.
- Lavingdale, M. (2014). *South Australian mineral resource production statistics for the six months ended 31st December 2013*. Report Book 2014/00012. Adelaide, SA: Department for State Development.
- Lavingdale, M. (2015). *South Australian mineral resource production statistics for the six months ended 31st December 2014*. Report Book 2015/00020. Adelaide, SA: Department for State Development.
- Lawrence, D. (2000). *Kakadu: the Making of a National Park*. Melbourne: University of Melbourne Press.
- Matulick, L. (2011). *Leigh Creek Visitor Information Outlet - Town history*.
- McGuire, J. (2014a, Tuesday November 11). *Another local store closes*. Roxby Downs Sun.
- McGuire, J. (2014b). *Business closure causes concern*. Roxby Downs Sun.
- Minifie, J. (2013). *The mining boom: Impacts and prospects*. Grattan Institute Report No. 2013-9. Grattan Institute.
- Musharbash, Y. (2010). *Yuendumu Everyday: Contemporary Life in Remote Aboriginal Australia*. Canberra: Aboriginal Studies Press.
- Newmont Asia Pacific. (2009). *Beyond the Mine 2008 - sustainability report for Australia and New Zealand*. Subiaco, WA: Newmont Mining Corporation
- Newmont Asia Pacific. (2011). *Beyond the Mine Sustainability Report 2010*. Newmont Mining Corporation
- Newmont Asia Pacific. (2012). *Beyond the Mine Sustainability Report 2011*. Newmont Mining Corporation

- Newmont Asia Pacific. (2013). *Beyond the Mine Sustainability Report 2012*. Newmont Mining Corporation
- Newmont Mining Corporation. (2006). *Now and Beyond - 2005 Sustainability Report: Tanami Australia*. Newmont Mining Corporation.
- Newmont Mining Corporation. (2007). *Beyond the Mine 2006 - The Journey Towards Sustainability, Tanami Site Summary*. Newmont Mining Corporation.
- Newmont Mining Corporation. (2012a). *The Next 90: 2011 Annual Report and Form 10-K*. Newmont Mining Corporation.
- Newmont Mining Corporation. (2012b). *Tanami, Northern Territory*. Retrieved from <http://www.newmont.com/asia-pacific/apac-tanami>.
- Normandy Mining Ltd. (1998). *Annual Shareholder Report 1997*. Adelaide, South Australia Normandy Mining Limited.
- Normandy Mining Ltd. (1999). *Annual Shareholder Report 1998*. Adelaide, South Australia Normandy Mining Limited.
- Normandy Mining Ltd. (2000). *Annual Shareholder Report 1999*. Adelaide, South Australia Normandy Mining Limited.
- Normandy Mining Ltd. (2001). *Annual Shareholder Report 2000*. Adelaide, South Australia Normandy Mining Limited.
- Normandy Mining Ltd. (2002). *Annual Shareholder Report 2001*. Adelaide, South Australia Normandy Mining Limited.
- Otto, J., Andrews, C., Cawood, F., Doggett, M., Guj, P., Stermole, F., Stermole, J., & Tilton, J. (2006). *Mining Royalties: A Global Study of Their Impact on Investors, Government and Civil Society*. Washington D.C.: The World Bank.
- Phoenix Copper Limited. (2014). *Phoenix Copper Mining*. Retrieved from <http://www.phoenixcopper.com.au/mining/>.
- Pick, D., Dayaram, K., & Butler, B. (2010). Regional development and global capitalism: The case of the Pilbara, Western Australia. *Society and Business Review*, 5(1), 99-110.
- RPData. (2014). Roxby Downs SA 5725 Suburb Profile & Suburb Statistics. Retrieved from [http://www.myrp.com.au/stats/sa/roxby\\_downs/5725](http://www.myrp.com.au/stats/sa/roxby_downs/5725).
- Sachs, J.D., & Warner, A.M. (2001). The curse of natural resources. *European Economic Review*, 45(4-6), 827-838. doi: 10.1016/S0014-2921(01)00125-8.
- Sheehan, P., & Gregory, R. G. (2013). The Resources Boom and Economic Policy in the Long Run. *Australian Economic Review*, 46(2), 121-139. doi:10.1111/j.1467-8462.2013.12023.x
- Spiers, A.G. (2000). Paper 6: history of land use and resultant environmental change in the Alligator Rivers region. In I. Eliot, M. Saynor, M. Eliot, & C. M. Finlayson (Eds.), *Assessment and monitoring of coastal change in the Alligator Rivers Region, Northern Australia, Supervising Scientist Report 157* (pp. 91-107). Darwin: Supervising Scientist.
- State Records of South Australia. (1977). *Leigh Creek Township (new) Correspondence Liaison Internal The Electricity Trust of South Australia*. Letter to General Manager from Manager Administration, 28 July 1977. GRS 2701/1/d 10/75 - 2/84 N167-N171, N167.
- State Records of South Australia. (1978a). *HURA 297/77 relocation of the Leigh Creek township*. Memo to Acting Director General Premiers Department from Director General Planning, 14 September 1978. GRS 468/1/ 1971 - 1982.

- State Records of South Australia. (1978b). *HURA 297/77 relocation of the Leigh Creek township*. Memo to Minister of Planning from the Chairman, Leigh Creek fact finding committee, 22 August 1978. GRS 468/1/ 1971 – 1982.
- State Records of South Australia. (1978c). *Leigh Creek Township (new) Correspondence Liaison Internal The Electricity Trust of South Australia*. Letter from Minister for Planning to the Premier, 3 May 1978. GRS 2701/1/d 10/75 - 2/84 N167-N171, N167.
- Storey, K. (2001). Fly-in/Fly-out and Fly-over: Mining and regional development in Western Australia. *Australian Geographer*, 32(2), 133-148. doi:10.1080/00049180120066616.
- Taylor, C., Bradley, C., Dobbs, R., Thompson, F., & Clifton, D. (2012). *Beyond the boom: Australia's productivity imperative*. McKinsey Global Institute Report.
- van der Ploeg, F., & Venables, A. J. (2012). Natural Resource Wealth: The Challenge of Managing a Windfall. *Annual Review of Economics*, 4(1), 315-337. doi: 10.1146/annurev-economics-080511-111003.
- West Arnhem Shire Council. (2013). *2013-14 Shire Plan and Budget*. West Arnhem Shire.
- World Nuclear Association. (2013). *Australia's Uranium Mines*. Retrieved from <http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Appendices/Australia-s-Uranium-Mines/>.