Trends in forest and sparse woody cover inside ERF HIR project areas relative to those in surrounding areas

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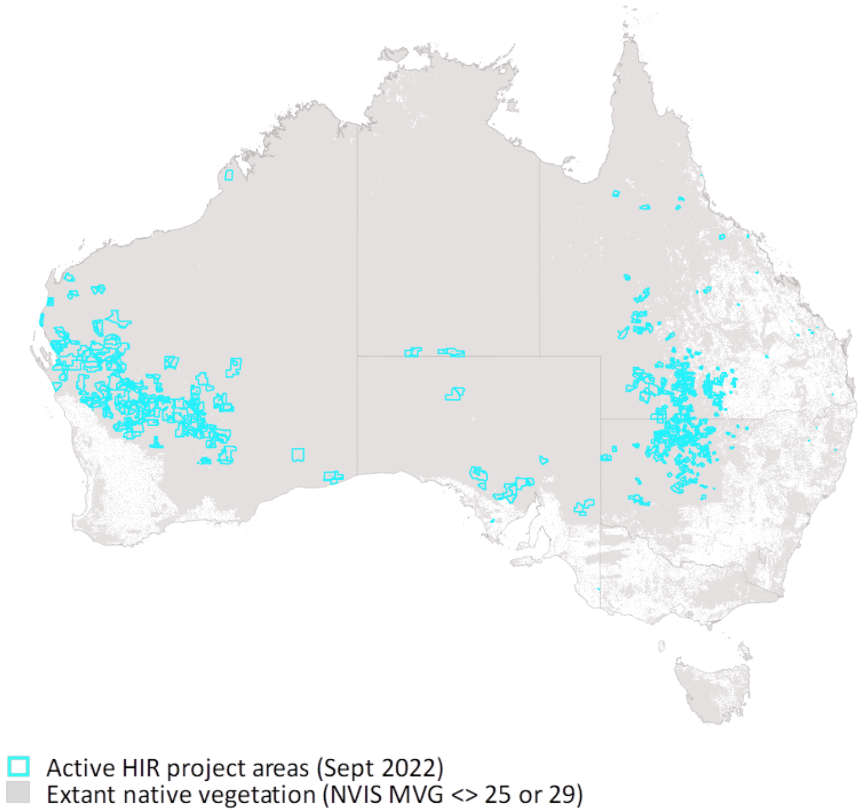
1. Introduction

The Emissions Reduction Fund's (ERF) Human-induced Regeneration (HIR) method provides landholders with Australian carbon credit units (ACCUs) for regenerating native forests by changing land management practices. When it was originally made, the method was intended to incentivise the regeneration of native forests by allowing juvenile trees and shrubs to regrow in areas that were previously cleared. Offset projects involving the regeneration of native forests that would not have regenerated in the absence of the project, such as in previously cleared areas, are both legitimate and desirable. However, the vast majority of HIR projects are not in areas that have previously been cleared. Almost all of the current HIR projects are located in semi-arid and arid areas (less than 350 mm average annual rainfall) that have never been comprehensively cleared (Figure 1), meaning most proponents are trying to regenerate native forests in remnant native vegetation solely by reducing grazing pressure from livestock and feral animals.

Figure 1. Location of registered HIR project areas (September 2022) and extant native vegetation



Source: Area-based Emissions Reduction Fund (ERF) projects, https://data.gov.au/dataset/ds-dga-4eac1209-869f-466f-b583-70ffded90a56/details (accessed 21/9/2022); National Vegetation Information System (NVIS) Version 6.0 - AUSTRALIA - Extant Vegetation. http://environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7Bab942d6d-9efd-4cf2-bec7-4c1521b83803%7D (accessed 21/9/2022).

The Australian National University (ANU) and University of New South Wales (UNSW) ERF research team has raised several concerns about the integrity of the HIR method and the projects that have been initiated under it in uncleared rangeland areas. These include the so-called 'additionality problem', or the risk that HIR projects are being credited for increases in tree and shrub cover that would have happened anyway because they are mainly a product of rainfall (i.e. increased in plant water availability) rather than the project activities. This risk relates to two issues:

a) the science on the impacts of grazing in uncleared rangeland areas in Australia suggest it has relatively limited impact on the extent of woody vegetation – variable rainfall (plant water availability) is the primary determinant of woody cover change; and

b) the HIR method has no processes for separating out the impacts of grazing management from the impacts of rainfall variability in any observed increases (or decreases) in woody cover.

Due to this, there is a significant risk HIR projects in uncleared rangeland areas are being, and will continue to be, credited for non-additional abatement.

Another way of framing the additionality problem is that it has arisen because the Clean Energy Regulator has failed to properly apply the method by allowed proponents to register projects over areas that do not meet the method's eligibility requirements. Specifically, the Regulator has not appropriately applied the method requirement that, for an area of land to be eligible for inclusion in an HIR project, it must be 'reasonable to expect that it would be necessary to undertake one or more HIR activities on the land in order for it to attain forest cover'. In other words, it must be reasonable to expect that the land would not regenerate if the project activities were not undertaken. This requirement was included in the method to mitigate the risk of ACCUs being issued for regeneration that would occur anyway, without the project activities. Consequently, if HIR areas are regenerating primarily due to rainfall rather than the project activities, they do not meet this eligibility requirement and should not have been included in the projects.

2. Purpose and method

To further explore the additionality problem and this compliance issue, we compared the trends in forest and sparse woody cover in HIR project areas to those in the lands around them (what we refer to as 'comparison areas'). The comparison areas comprised of either:

- 5 km buffer zones around the outside of the project areas, in regions where HIR projects are sparsely spread; or

- the surrounding local government areas (LGAs), in regions where HIR projects make up a substantial portion of the LGA.

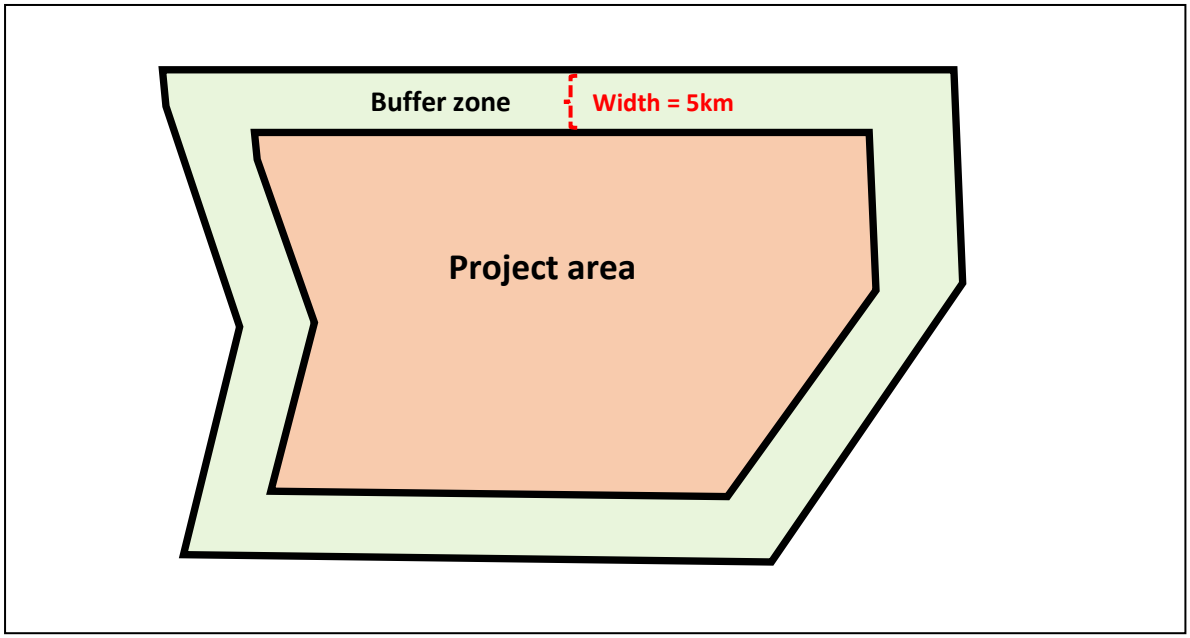
These areas are suitable for use as 'quasi controls' because they are likely to share similar characteristics and climate as the project areas but they are not subject to the HIR project activities that are supposed to be responsible for the regeneration (e.g. reducing stocking rates and increased efforts to control feral animals). Due to this, they provide an indication of what might reasonably been expected to happen without implementation of the project activities.

The analysis was undertaken using the National Forest and Sparse Woody Vegetation Data (Version 6.0 - 2021 Release).[1] This dataset uses Landsat imagery, composed of 25m x 25m pixels, to classify woody vegetation cover over the period 1988 to 2021. It places Australia's land areas into one of three categories: forest (areas with woody vegetation ≥2 metres tall that has canopy cover ≥20%); sparse woody (areas with woody vegetation with canopy cover between 5-19%); or non-woody (areas with canopy cover between 0-4%). These data are used to prepare Australia's National Inventory Report under the United Nations Framework Convention on Climate Change (UNFCCC) and by the Clean Energy Regulator to assess whether HIR projects have complied with ERF requirements (for the period 1988-2018).[2]

We confined the analysis to HIR projects registered prior to 1 January 2018. This ensured there were at least four years of data on forest and sparse woody trends after the registration of the projects. We identified 169 projects that met this criteria: 92 in New South Wales; 73 in Queensland; 2 in South Australia; and 2 in Western Australia.

The 5 km buffer zones were created around the perimeter of the HIR project area boundaries, as illustrated in Figure 2. The validity of the buffers as comparison areas (or quasi controls) hinges on the buffer zones sharing similar vegetation, soil and climatic conditions, and management histories, to the areas in the projects, but the project activities only being carried out within the project area.

Figure 2. Illustrative example of HIR project area and 5km buffer zone



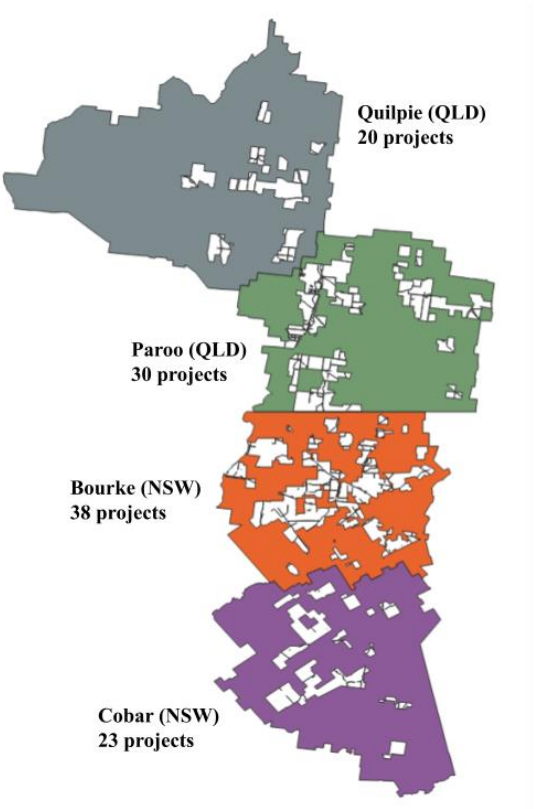
[1] Department of Climate Change, Energy, the Environment and Water (2022) National Forest and Sparse Woody Vegetation Data (Version 6.0 - 2021 Release). Available at: https://data.gov.au/data/dataset/national-forest-and-sparse-woody-vegetation-data-version-6-0-2021-release (14 October 2022).

[2] *Carbon Credits (Carbon Farming Initiative) Rule 2015*, s 9AA; Clean Energy Regulator (2019) Guidelines on stratification, evidence and records: For projects under the Human-Induced Regeneration of a Permanent Even-Aged Native Forest and Native Forest from Managed Regrowth methods. Commonwealth of Australia, Canberra; Beare, S., Chambers, R. (2021) *Human induced regeneration: A spatiotemporal study.* AnalytEcon Pty Ltd, Berry, NSW.

In instances where projects adjoin one another, the buffer zones will include part of the project area of the adjoining project. This renders the buffer areas invalid as quasi controls because they are likely to include areas where the project activities are being undertaken. This was a material issue in four LGAs—Bourke (NSW), Cobar (NSW), Quilpie (QLD) and Paroo (QLD)—where multiple projects adjoin, or are in close proximity to, one another.

For projects in these four LGAs, the entire surrounding LGA was used as the comparison area. The surrounding LGAs were defined for these purposes as the areas within the relevant LGA that do not form part of an ERF HIR project area, regardless of when the projects were registered. The HIR projects included in the sample cover between 17% and 26% of these four LGAs (Figure 3).

Figure 3. HIR project areas registered prior to 1 January 2018 in Bourke (NSW), Cobar (NSW), Quilpie (QLD) and Paroo (QLD) LGAs



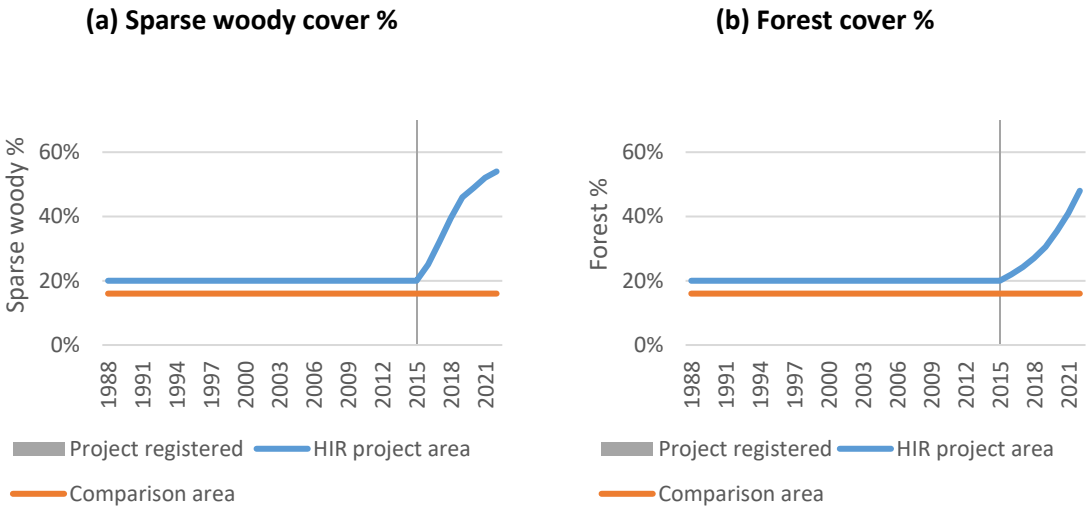
3. Expected impacts of project activities on forest and sparse woody cover

Given the logic of the HIR method, the pattern of sparse woody and forest cover in the project areas and comparison areas should look something like the hypothetical presented in Figure 4(a) and (b). In the period before the relevant HIR project is registered, sparse woody and forest cover should be relatively stable in both the project areas and comparison areas, reflecting the effects of grazing and other suppressors in preventing regeneration. Variability in the factors that drive forest regeneration and mortality (e.g. rainfall and clearing) mean there should be some inter-annual variation. However, the effects of the suppressors should ensure that sparse

woody and forest cover in the project areas and comparison areas are relatively stable and well correlated, unless there is material land clearing or reforestation plantings.

When the HIR project activities commence, and the suppressors are removed, sparse woody and forest cover in the project areas should increase, while cover should remain relatively stable in the comparison areas. This should result in a material divergence of the sparse woody and forest cover lines for project areas and the comparison areas, with sparse woody and forest cover increasing in the project areas as a consequence of removal of the suppressors. The pattern should also show evidence of a progression in the project areas, with sparse woody cover increasing more rapidly first, as the project activities move land areas from a non-woody state to a sparse woody state, and then these areas should transition through to forest cover.

Figure 4. Hypothetical pattern of sparse woody and forest cover in HIR project area and comparison areas



If the project activities were having the intended impacts on woody cover, there are three main reasons why the trends in the data may not match the idealised pattern in Figure 4.

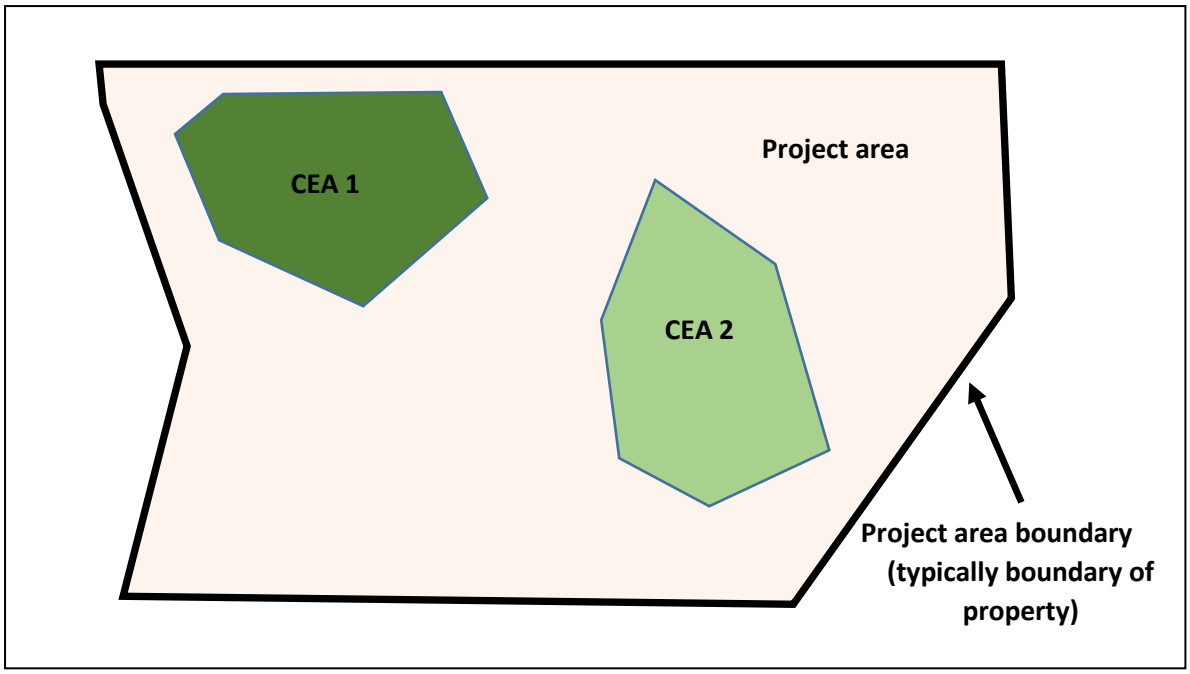
1. If the comparison areas are not representative of the land areas included in projects; for example, they were comprised of different vegetation types or had different climatic conditions.

2. If the carbon estimation areas (CEAs) – the areas where the forests are meant to be regenerating and that are credited (see illustrative example in Figure 5 below) – constituted only a small fraction of the project areas, it could result in the trends in woody cover across the project areas not reflecting the impacts of the project activities on woody cover in the CEAs. Based on the available data, this is not the case with most projects in either New South Wales or Queensland. Data released by the Clean Energy Regulator in August 2022 show that, as of 20 May 2022, on average, the CEAs of registered and reported HIR projects in New South Wales and Queensland constituted 34% and 37% respectively of the project areas. Given these proportions, if the project activities were having the intended impact on forest regeneration, commensurate with the rate at which they have been credited, sparse

woody and forest cover in the project areas should diverge significantly from the trends in the comparison areas, consistent with the ideal in Figure 4.

3. If the HIR project proponents have been clearing the parts of their properties that are not included in CEAs, the resultant reduction in woody cover due to clearing could mask increases being achieved by the project activities within the CEAs. This could occur if a significant barrier to land clearing in the relevant regions was the inability of landholders to access capital to fund property development and this barrier was alleviated by the revenue from the sale ACCUs (i.e. there was direct leakage). If direct leakage is occurring, arguably the outcome across the project area would be a better representation of the project's impact than considering the CEAs alone.

Figure 5. Illustrative example of HIR project area boundaries and CEAs



4. Results of analysis

Consistent with previous analyses done by the ANU-UNSW ERF research team, the trends in sparse woody and forest cover do not match, or even vaguely resemble, the ideal. Sparse woody and forest cover inside projects areas and in the comparison areas (buffers or surrounding LGAs) are well correlated both before and after the commencement of the projects. The most significant increases in woody cover within the project areas and comparison areas occurred prior to the registration of the first projects, and they correspond to the 2010-12 La Nina period that brought significant rains to the regions that contain most of the HIR projects in the sample. Generally, since the projects commenced, sparse woody and forest cover in HIR project areas has been relatively stable and, in some cases, even significantly declined. Most importantly, sparse woody and forest cover in HIR project areas has closely tracked the trends in the comparison areas since the projects were registered. These observations show that, in many instances, it is not reasonable to suggest that, where woody cover has increased, the increases would not have occurred without the projects. The other issue raised by these results is that forest cover does not necessarily persist in uncleared arid and semi-arid rangeland regions.

Table 1 shows the trends in sparse woody and forest cover inside projects areas and in the buffer zones for the 11 LGAs with more than two projects, other than Bourke, Cobar, Quilpie and Paroo. These 11 LGAs contain 45 projects from the sample (27% of the total). Across all of these LGAs, sparse woody and forest cover in the HIR project areas has closely tracked the trends in the buffer zones. At first glance, the trends in sparse woody cover in the two projects in Walgett (NSW) appear to be significantly different from those in the surrounding buffers over the period following the registration of the projects, which could be interpreted as supporting the hypothesis that the project activities have had a significant effect on cover. However, while sparse woody cover increased, there was an almost matching decline in forest cover, suggesting forest cover in the project areas transitioned to sparse woody cover, most likely due to the effects of the 2017-2019 drought. This conclusion is supported by the fact that the same patterns are evident in the buffer zones.

Tables 2 and 4 show the trends in sparse woody and forest cover inside projects areas and in the surrounding LGAs for Bourke and Cobar in New South Wales; and Quilpie and Paroo in Queensland. These LGAs account for 111 of the registered HIR projects that met the criteria for inclusion in the analysis (66% of the total). To place the results in context, Tables 3 and 5 compare the forest cover trends inside the analysed HIR project areas in these four LGAs to the cumulative ACCU issuances made to the corresponding HIR projects over the period 2015 to 2021.

A notable aspect from the analysis was that there was little difference between the results from the projects that were assessing using the 5 km buffer zones relative to those assessed using the surrounding LGAs. Both showed that the trends in sparse woody and forest cover inside the project areas closely tracked those in the relevant comparison areas.

5. Conclusion

The results demonstrate highly similar patterns in woody cover changes inside and outside HIR project areas, which suggest two possibilities:

- either the project activities (grazing management) are having limited additional impact on woody regeneration and woody cover; or
- there is considerable land clearing occurring within HIR project areas, which is neatly offsetting the increases in woody cover occurring within the CEAs.

The first of these aligns with the available scientific evidence on the impacts of grazing in uncleared rangelands areas in Australia and it provides the most compelling explanation of the results.

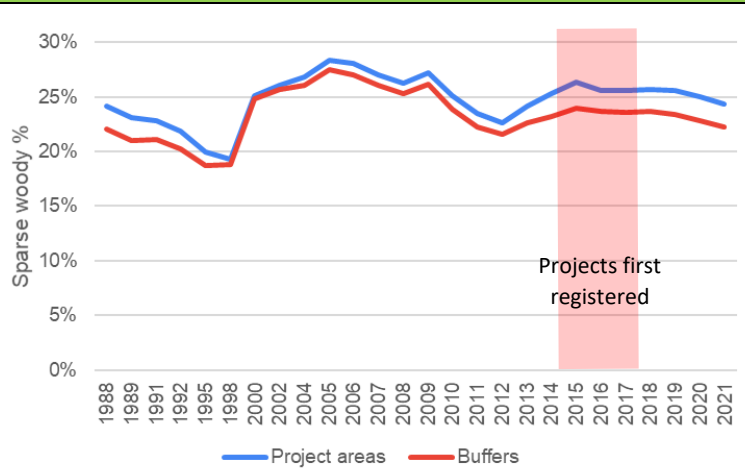
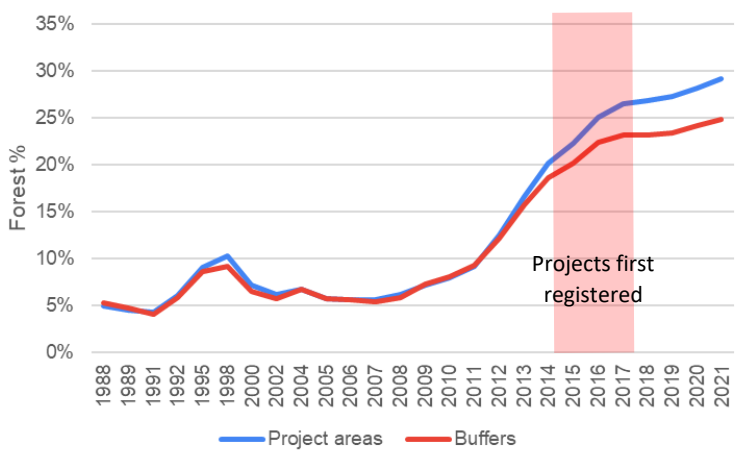
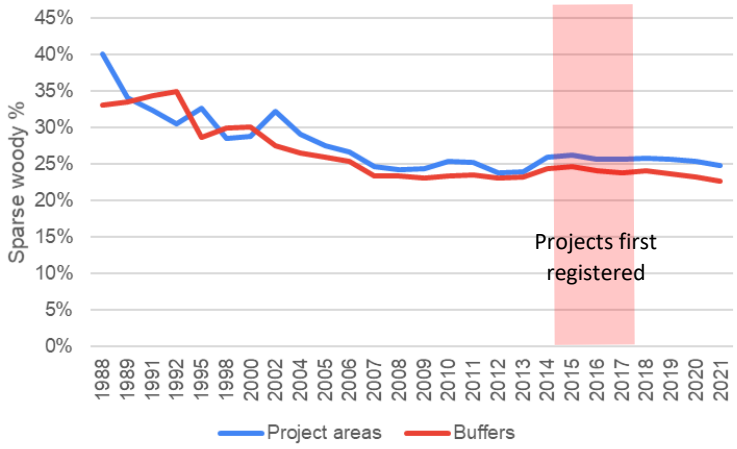
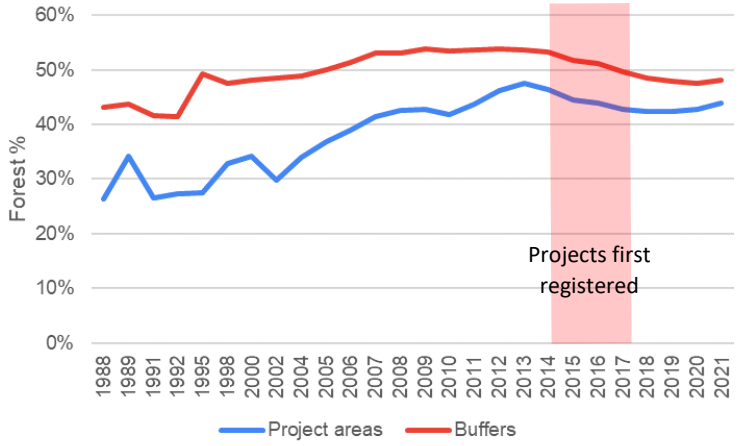
It is possible that the ACCUs issued to HIR proponents has triggered clearing within project areas. However, it is very unlikely to be at a scale that would be able to explain the trends in the data.

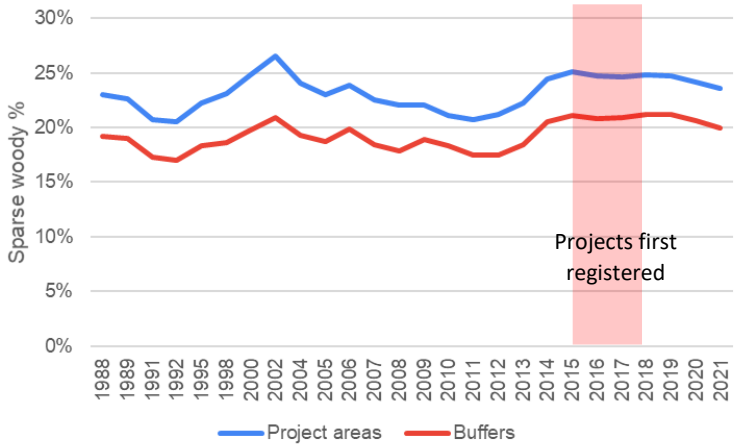
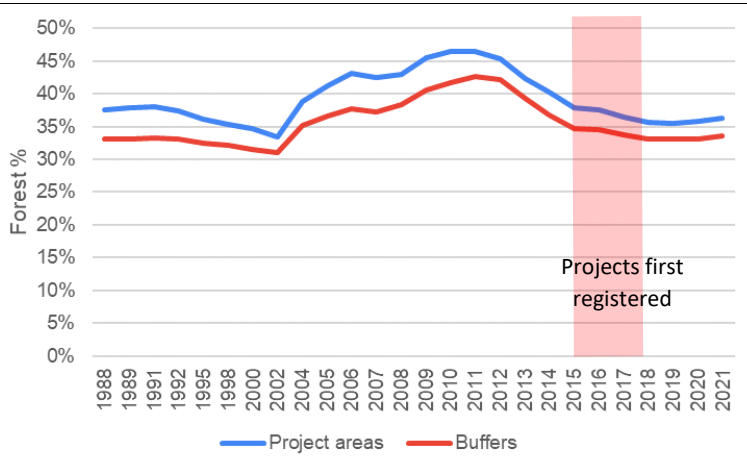
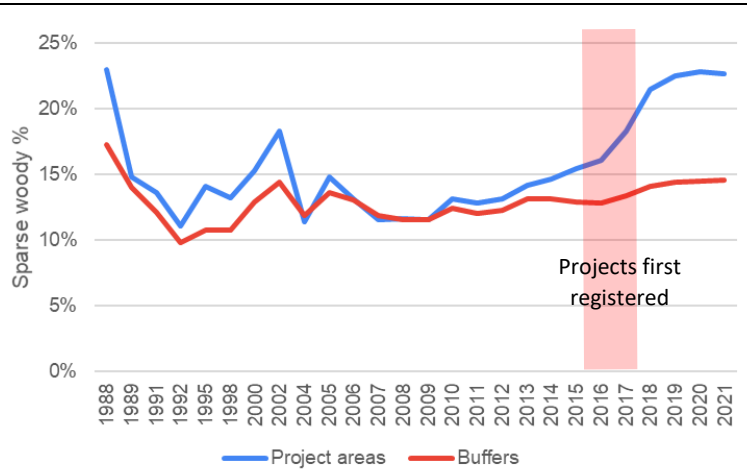
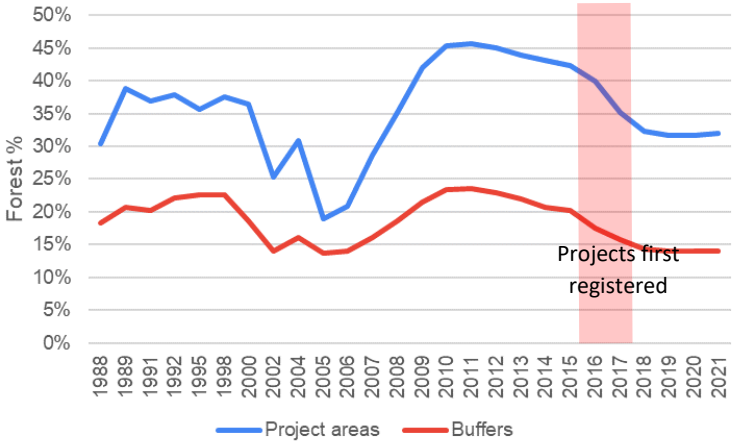
It could be argued that the regeneration in these areas through grazing control is very slow and that the results will not be evident until later in the project terms. This is unlikely. The projects in the sample have had between 4 and 8 years post-registration to demonstrate an effect on woody cover relative to the surrounding landscape. However, there is almost no evidence that the trends in woody cover inside the project areas are significantly different to the trends in the comparison areas. Further, if this explanation is accepted, the projects are still likely to be significantly over-credited over their 25-year crediting periods because the model that is used to

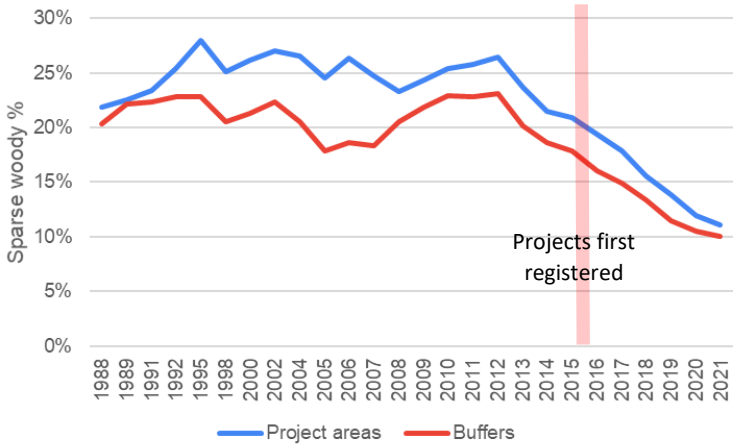
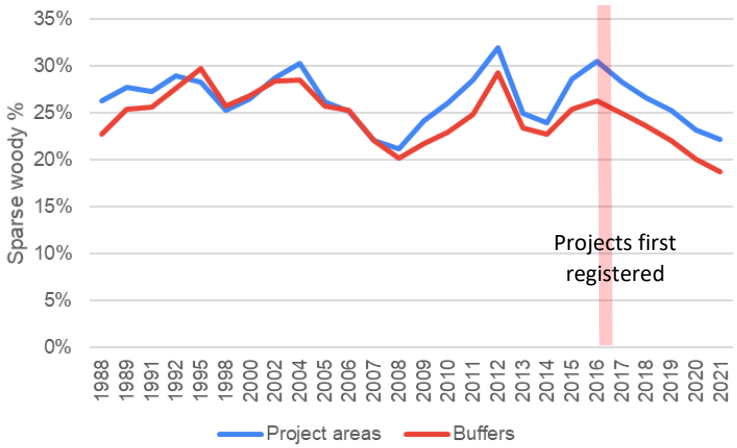
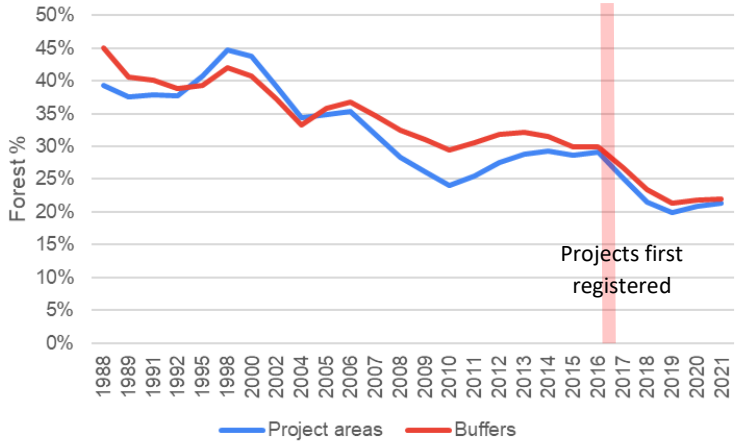
estimate tree growth, the Full Carbon Accounting Model, assumes forest regeneration is uniform and relatively rapid, with maximum growth rates achieved at between 10-12.5 years after the commencement of regeneration.

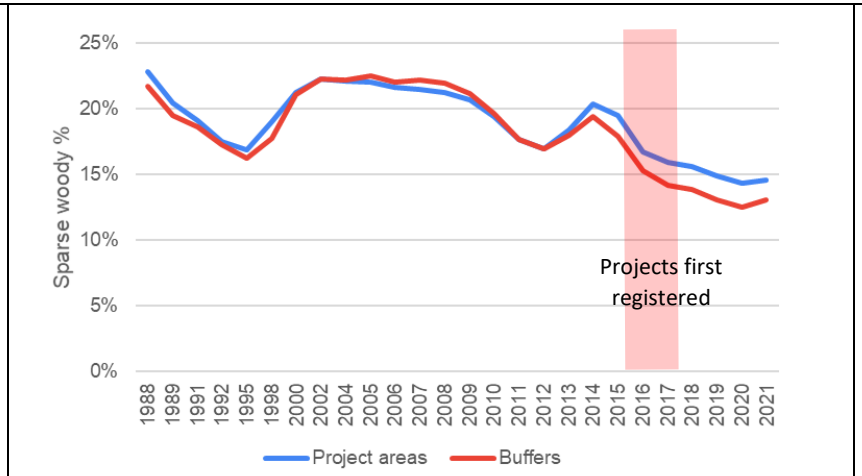
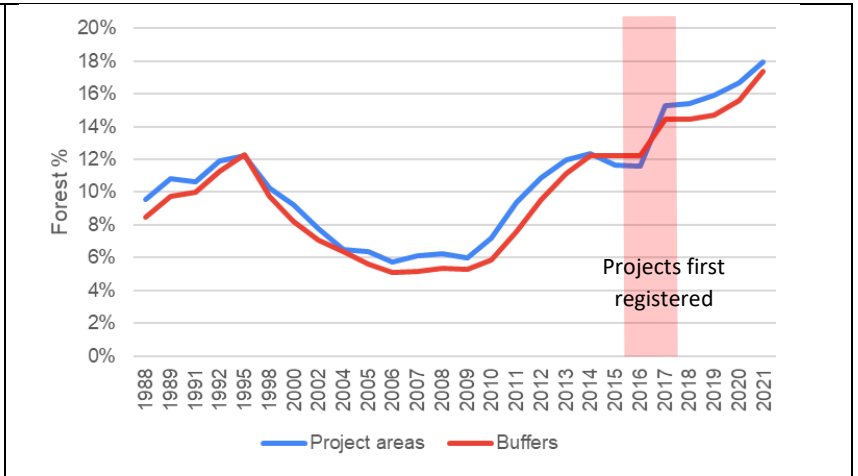
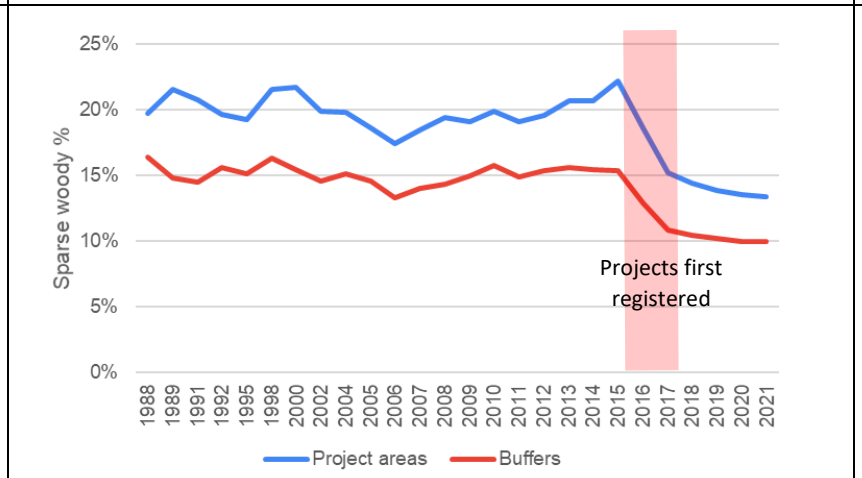
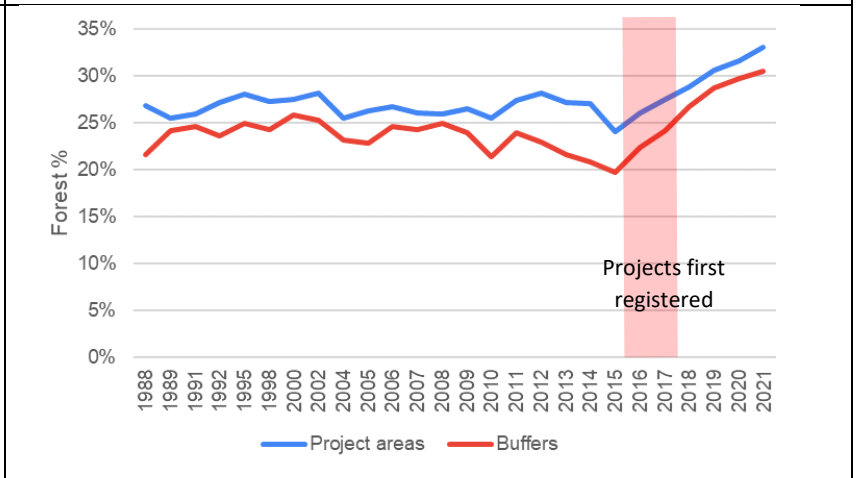
Given these results and the evidence from elsewhere, the critical policy questions are whether it can reasonably be said that it is conservative to assume that the project activities (mainly grazing control) are regenerating forests that would not otherwise regenerate, and are resulting in forest growth that is commensurate with the number of ACCUs that have been issued. Put another way, is there high confidence that the abatement that is being credited under the method is real (the increases in woody cover are commensurate with the number of credits that have been issued) and additional (the increases in woody cover that have occurred would not have happened without the project activities being undertaken)?

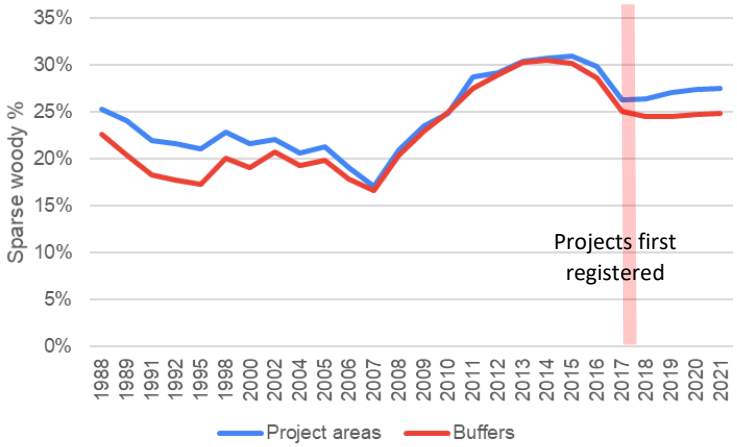
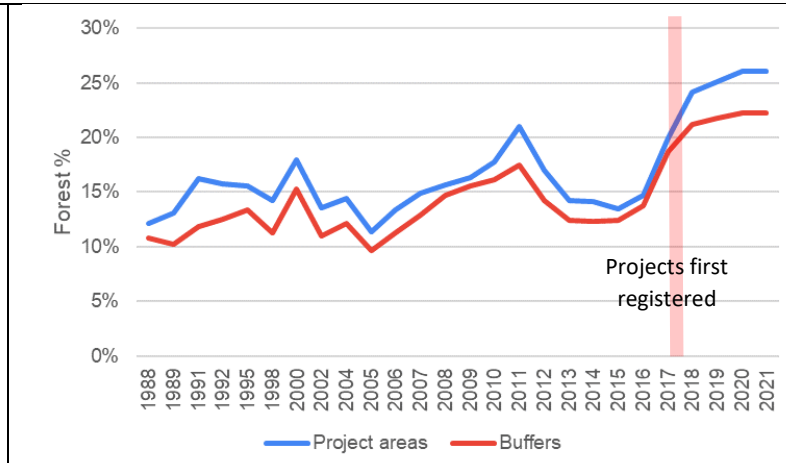
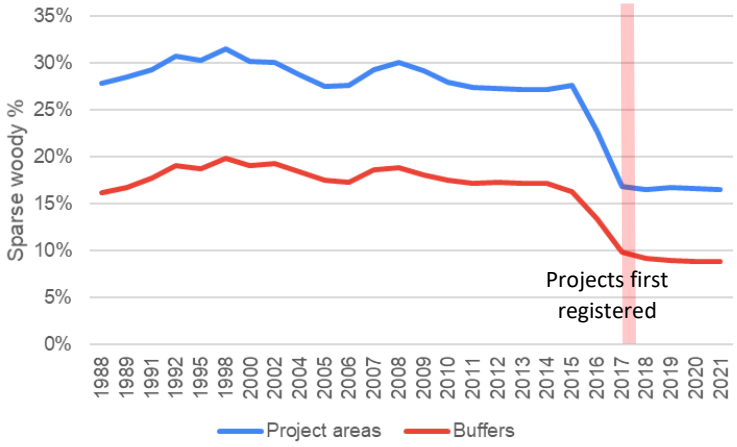
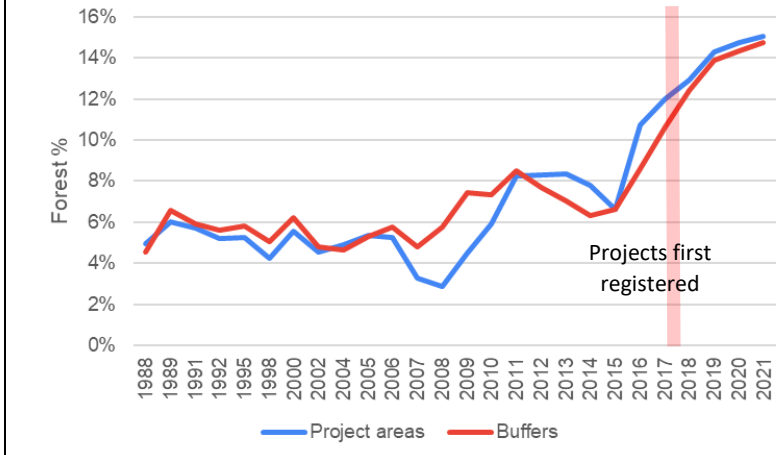
Table 1. Comparison of forest and sparse woody trends in HIR project areas and 5km buffer zones in 11 LGAs

	Sparse woody %	Forest cover %
Unincorporated NSW (n=15)		
Bogan (NSW) (n=2)		

Brewarrina (NSW) (n=7)		
Walgett (NSW) (n=2)		

Murweh (QLD) (n=4)		
Maranoa (QLD) (n=2)		

Bulloo (QLD) (n=6)		
Longreach (QLD) (n=3)		

Winton (QLD) (n=2)		
Barcoo (QLD) (n=2)		

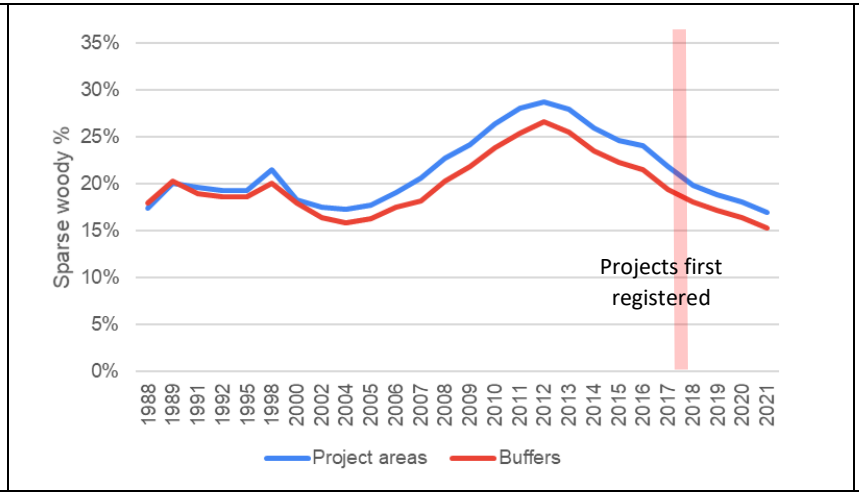
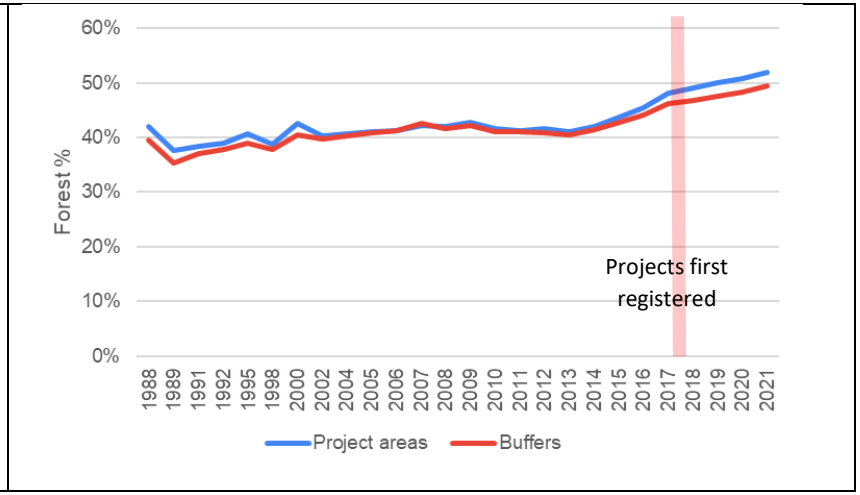
Yalgoo (WA) (n=2)	 Sparse woody % 35% 30% 25% 20% 15% 10% 5% 0% 1988 1989 1991 1992 1995 1998 2000 2002 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 Projects first registered Project areas Buffers	 Forest % 60% 50% 40% 30% 20% 10% 0% 1988 1989 1991 1992 1995 1998 2000 2002 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 Projects first registered Project areas Buffers

Table 2. Comparison of forest and sparse woody trends in HIR project areas and surrounding LGAs, Bourke and Cobar, New South Wales

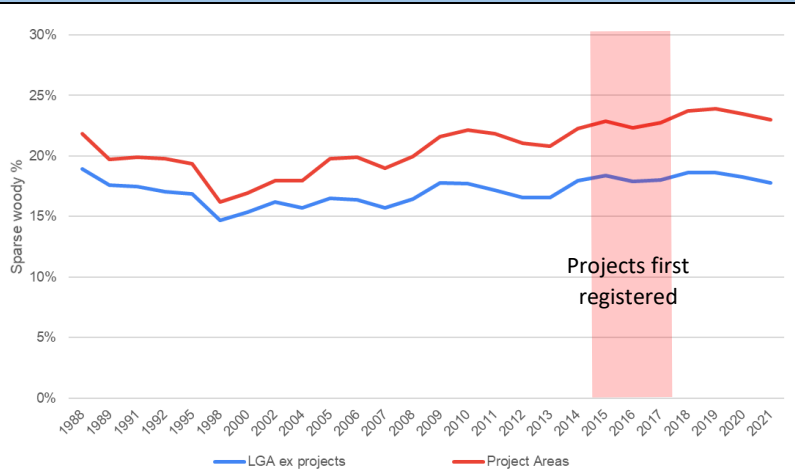
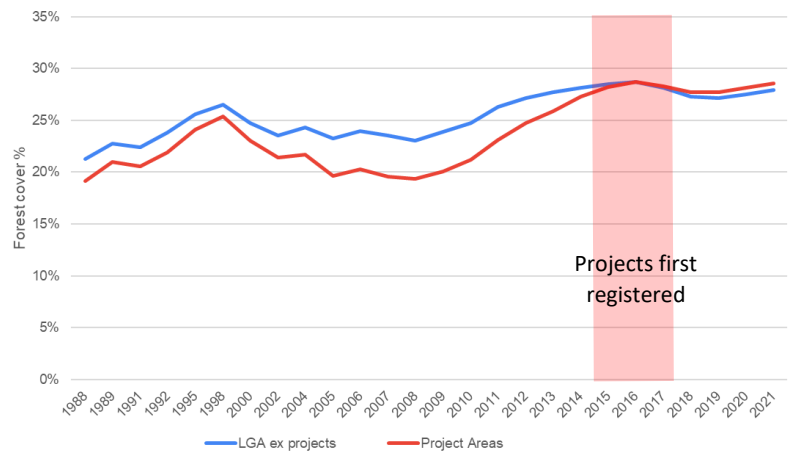
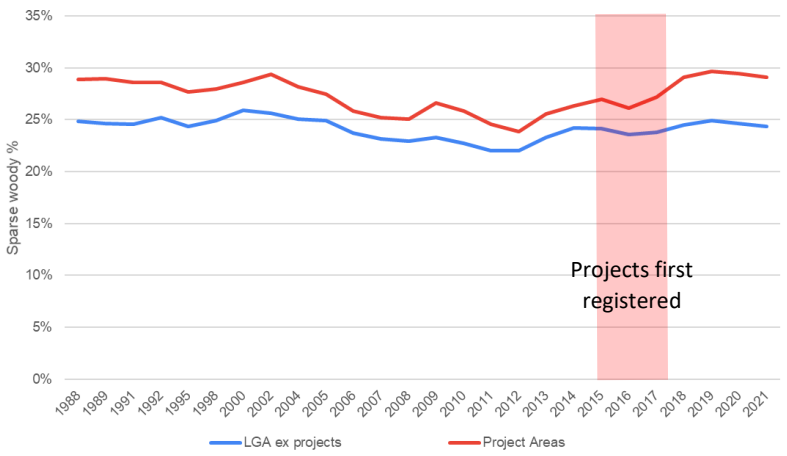
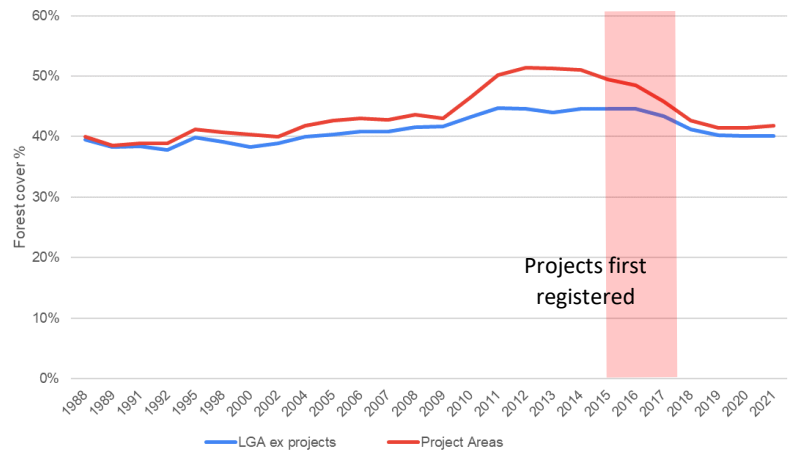
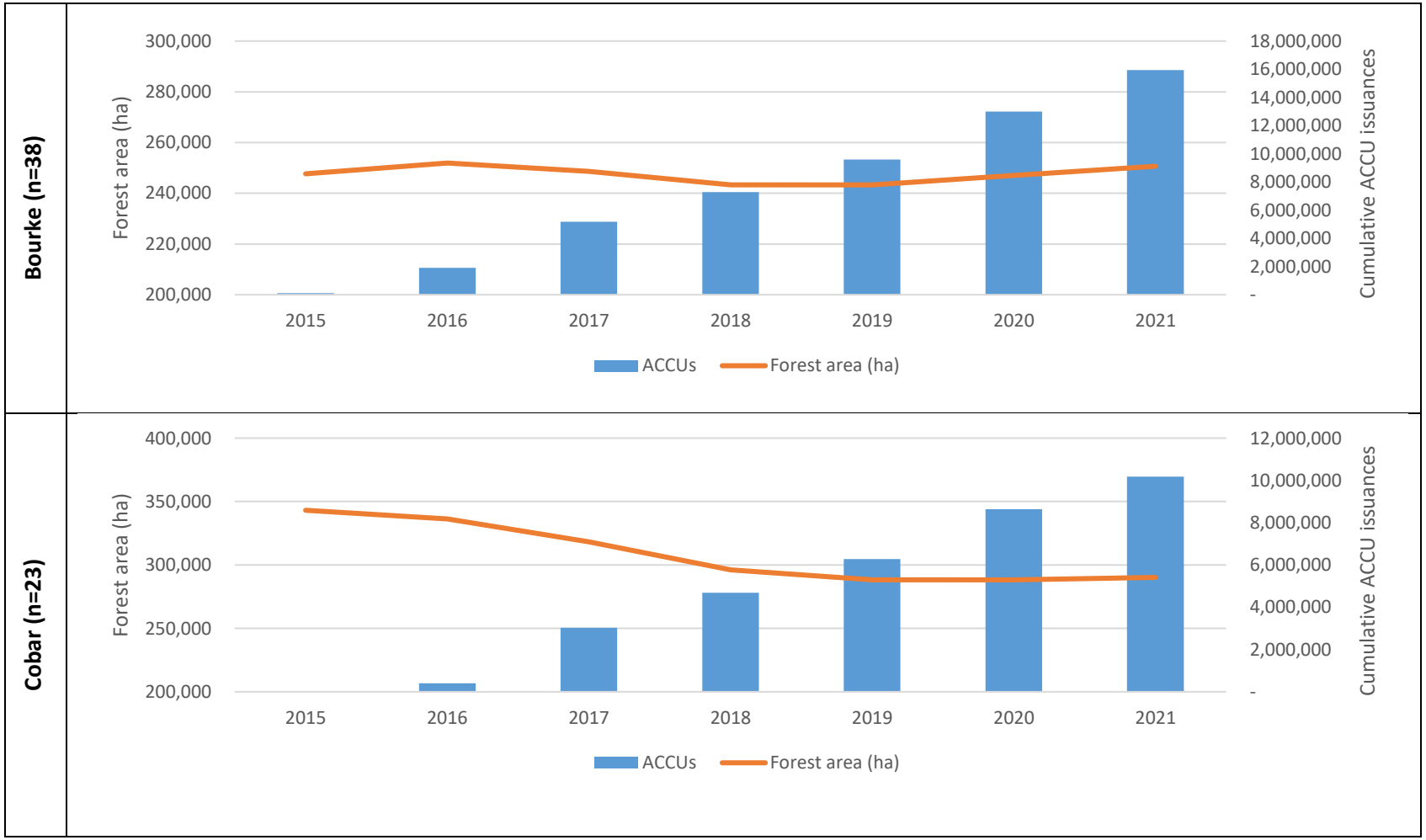
	Sparse woody %	Forest cover %
Bourke (n=38)		
Cobar (n=23)		

Table 3. Forest cover inside HIR project areas vs cumulative ACCU issuances, 2015 to 2021, Bourke and Cobar LGAs, New South Wales



Source: Clean Energy Regulator (2022), 'Emissions Reduction Fund project register', available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (7 October 2022).

Table 4. Comparison of forest and sparse woody trends in HIR project areas and surrounding LGAs, Quilpie and Paroo, Queensland

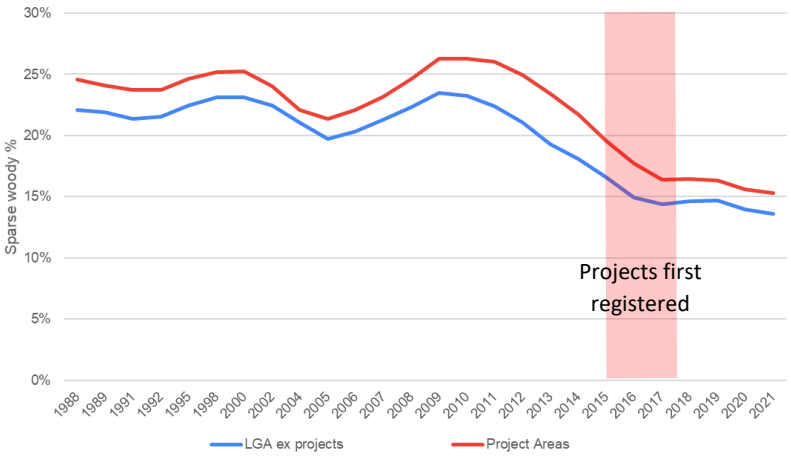
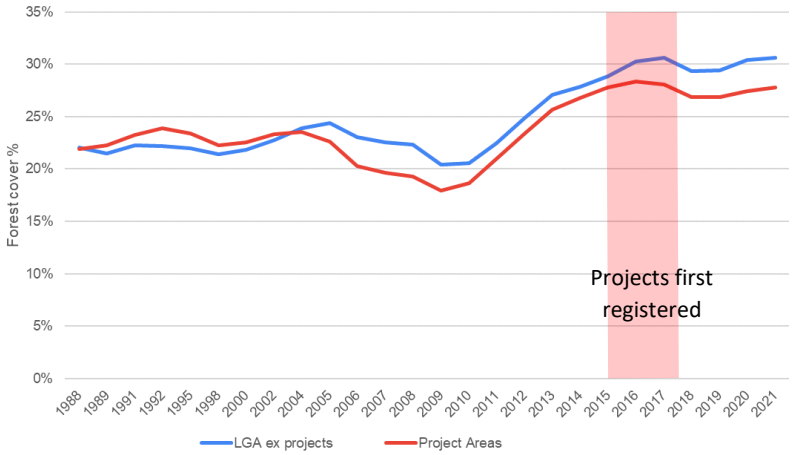
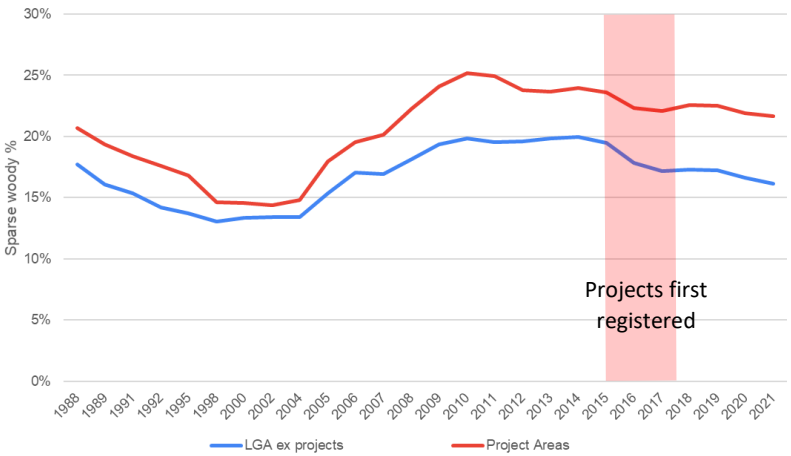
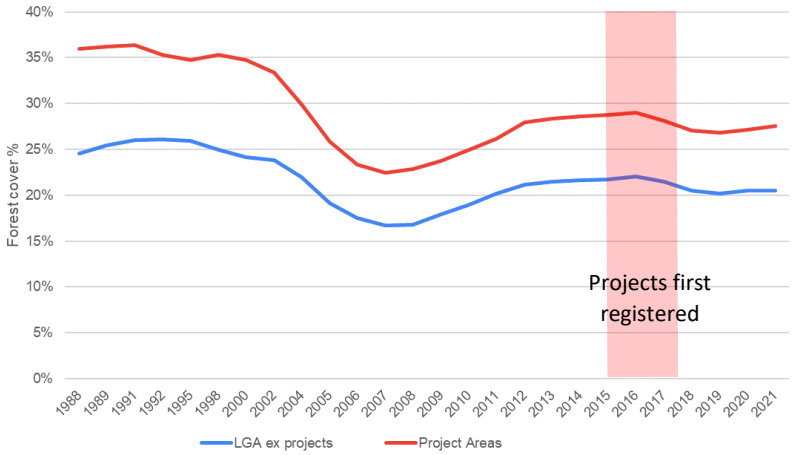
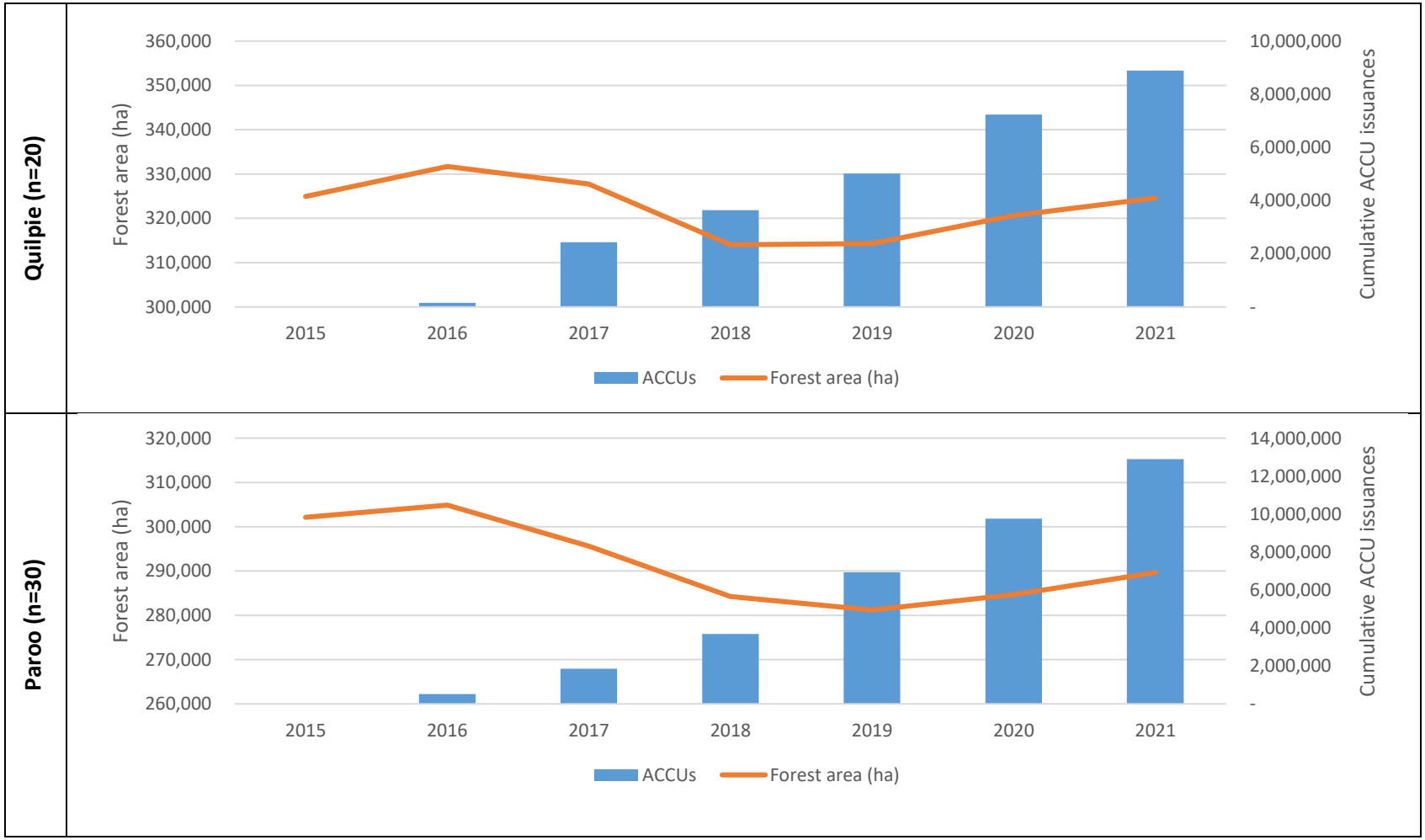
	Sparse woody %	Forest cover %
Quilpie (n=20)		
Paroo (n=30)		

Table 5. Forest cover inside HIR project areas vs cumulative ACCU issuances, 2015 to 2021, Quilpie and Paroo LGAs, Queensland



Source: Clean Energy Regulator (2022), 'Emissions Reduction Fund project register', available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (7 October 2022).