Gateway Regeneration Checks for Human Induced Regeneration projects

ANUE Project #1-1035 (Phase 2)

C.L. Brack. 6 December 2023

1. Context

Sequestering carbon in trees and forests is a significant tool for keeping atmospheric levels of carbon dioxide within the thresholds required to avoid dangerous climate change. Under the Australian Carbon Credit Unit (ACCU) Scheme (formerly known as the Emissions Reduction Fund), the Australian Government offers landholders, communities and businesses the opportunity to run projects in Australia that avoid the release of greenhouse gas emissions or remove and sequester carbon from the atmosphere. The ACCU Scheme is legislated under the *Carbon Credits (Carbon Farming Initiative) Act 2011* and is administered by the Clean Energy Regulator (CER).

One method under the ACCU Scheme is the Human-Induced Regeneration (HIR) method, which aims to improve the forest cover on degraded and deforested land. In essence, HIR projects identify land which, although having forest potential, has no current forest cover and can be regenerated back to forest cover through undertaking an approved activity or activities. Successful HIR projects are awarded Australian carbon credit units (ACCUs) for each tonne of carbon dioxide equivalent sequestered by regenerating vegetation.

Potential HIR projects must fulfill a number of criteria before they can be implemented. There must be evidence that a forest could be regrown after approved intervention – such evidence would include the presence of woody plant species in the area that can achieve a minimum of 2 m height and 20% canopy cover (at maturity); at least some seed source (say 2% tree canopy cover); and site quality modelling or mapping that supports the potential for adequate growth of trees. The project must also exclude areas over 0.20 ha of existing forest cover at project commencement and during the project's baseline period as these may not be counted in the allocation of ACCU's (no additionality) and would also compete against any regeneration which would significantly slow growth and sequestration potential. Areas that meet these criteria are defined as Carbon Estimation Areas (CEA).

Potential HIR projects tend to cover large areas – thousands to tens of thousands of hectares – and remotely sensed data (satellite and airborne) is expected to be used to support stratification into pre-existing forest, non-forest and potentially regenerating forest / CEA. Proponents are expected to include field data collection to train classification of remotely sensed data and map accuracy assessments in these initial stratifications. Given the range of remotely sensed data available, and the rapid changes in technology, the HIR program has developed a list of approved data that proponents can use to map their project areas and identify regeneration. These data include the National Forest Inventory (NFI) maps although higher precision data is expected to be used. NFI mapping to determine all areas of pre-existing forest to be excluded may require additional supporting evidence. The list is updated as required. Proponents are "*expected to select techniques that best increase certainty in their situation for assessing pre-existing forest cover, the forest potential and its subsequent regeneration toward forest cover (collectively forest regeneration) and attainment of forest cover.*" The CER has not, to date, defined approved practices and some proponents or their agents are regularly introducing more advanced and precise methods.

Gateway Regeneration checks

Regeneration on HIR projects is anticipated to be slow and patchy, although forest cover (20% canopy cover of trees exceeding 2 m height over 90% of the area) is expected to be attained by the end of the project's crediting period for each CEA. Additional gateway requirements, including 5-yearly regeneration checks and a final forest cover assessment date, were introduced in 2019 to build confidence that HIR projects are on track to meet the final forest classification and justify the allocation of ACCUs.

Regeneration gateway checks must occur about every 5 years after project initiation (or when requested by CER) until at least 90% of the CEA is forested. To help reduce the impact of patchy (heterogeneous) regeneration, areas can be analysed in different spatial scales: up to 100 ha contiguous blocks for CEA's over five years since commencement; and 10 ha contiguous blocks for stands over 10 years. Areas identified as no longer on track will be stratified out, or modelled as having a "growth pause" to reflect the carbon stock attained at the time.

While *in situ* field inspections are required for initial stratification, they are not mandatory for regeneration checks. Where field inspections are undertaken for regeneration checks, they must provide evidence that there are sufficient regenerating trees (trees ha^{-1}) that the expected mature canopy cover will exceed 20% of 2 m tall trees. An independent audit is required to provide "reasonable assurance" at the time of initial stratification / project commencement and the regeneration gateway. The proponent's offsets and auditor's reports submitted as part of the Gateway checks are reviewed by CER and proponents may be required to provide additional evidence as necessary.

Regeneration checks must demonstrate woody cover increase of 5%; sufficient trees ha^{-1} that their mature canopy will provide a total of 20% canopy cover; or 7.5% or 10% canopy cover at five or ten years respectively. Although change detection analysis (to demonstrate 5% growth) is preferred, the checks can use remote sensing images (to demonstrate canopy cover at a given time) or other approaches for flexibility.

There has been recent public discussion about the veracity of HIR projects and whether they were on track to deliver the carbon sequestration goals anticipated. This discussion included concerns that proponents were being credited for pre-existing forest, there was no net growth caused by the proponents or that any change in vegetation was just due to the weather. Subsequently, a requirement for an additional, independent review of the Gateway checks was created to "*provide additional information and assurance to satisfy the CER that the forest potential and forest cover attainment requirements under the HIR method have been met for all the CEAs in accordance with sections 9AA and 70(3A) of the CFI Rule and the HIR Guidelines*"

This report is the first in a proposed series that reviews the process and outcomes of the HIR Regeneration checks. It summarises the regeneration check processes and compares the HIR conclusion with independent data for a representative sample of projects.

2. Review Approach

Twenty-five (25) projects where CEA had passed regeneration checks were selected for review. These projects were stratified to cover a range of project commencement dates; location; and agents working on behalf of the proponents.

The following documents and data were provided for the selected projects:

- Geospatial data (SHP) for each project with most up to date CEAs and exclusions identified.

CER converted other spatial file format into SHP as necessary;

- CER assessment of the regeneration checks. These checks usually included maps of AUSCOVER Persistent Green (PG) and estimates of annual National Forest and Sparse Woody Vegetation (NFSW) and any follow up actions;

- Offset reports submitted by proponents, including initial report, subsequent reports where restratification has been required, and where regeneration checks have occured;

- Reasonable assurance audit reports (produced by an independent auditor). Initial audits include (in most cases) a physical inspection of the Project area to inspect/verify cadastral, CEA and exclusion boundaries; verification of stratification and regeneration techniques; quality assurance of data collection and storage; verification of *Reforestation Modelling Tool* (RMT) or *Full Carbon Accounting Model* (FullCAM) inputs and execution; and verification of historical suppression activities and management actions to relieve suppression. Independent auditors are selected only from a list of approved companies.

General information about woody vegetation around each project area was extracted from *Tree Change* (ANU Centre for Water and Landscape Dynamics – https://www.wenfo.org/tree/). This spatial model estimates woody vegetation cover and vegetation height (e.g. Figure 1 and Figure 2). This general vegetation information puts each project in the context of the surrounding land as well as ensuring that the vegetation *in situ* can achieve the minimum 2 m height required. Note the vegetation canopy dynamics represented in the graph on the bottom right of Figure 1. There is a trend of a tree canopy cover high around 2000 before dropping to close to 0% by the time the millennium drought breaks in about 2010. After that drought breaks, there is a flush of growth before the next drought causes a significant drop, again close to 0%, before recovering after about 2019.

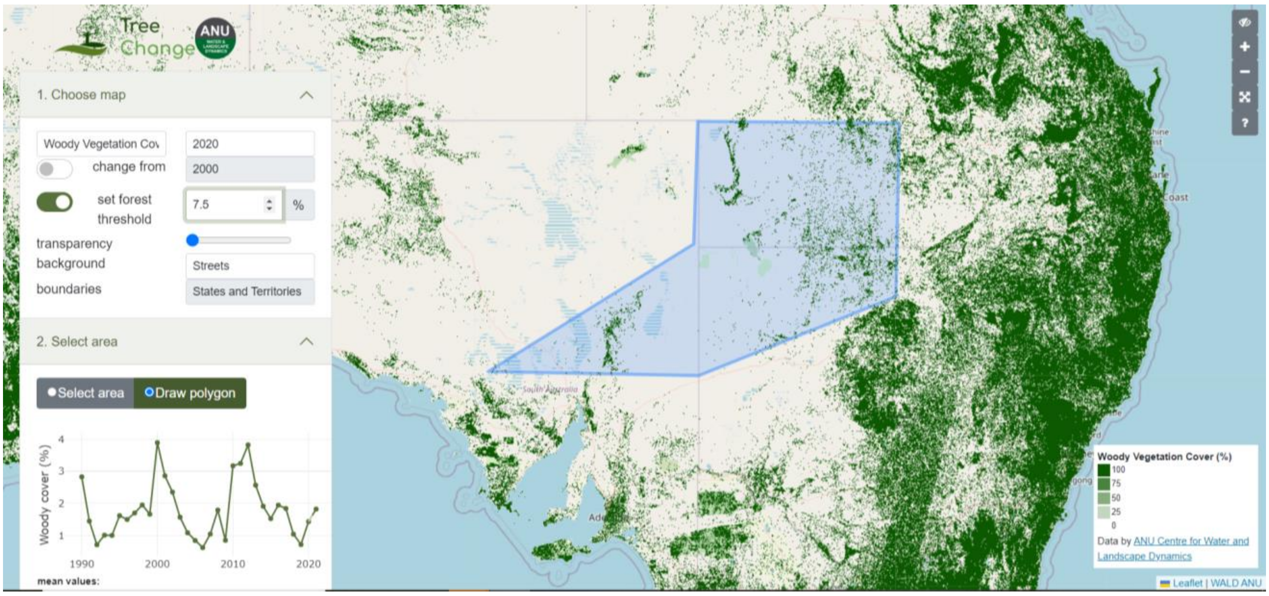

Figure 1: Map with modelled areas of more than 7.5% woody vegetation cover. Selected shape contains the 25 projects (CEAs a very small percentage of total area) Embedded graph estimates the overall average woody vegetation cover per year. NB: Legend colours overriden when Set threshold selected – highlights only include cells > 7.5% canopy cover

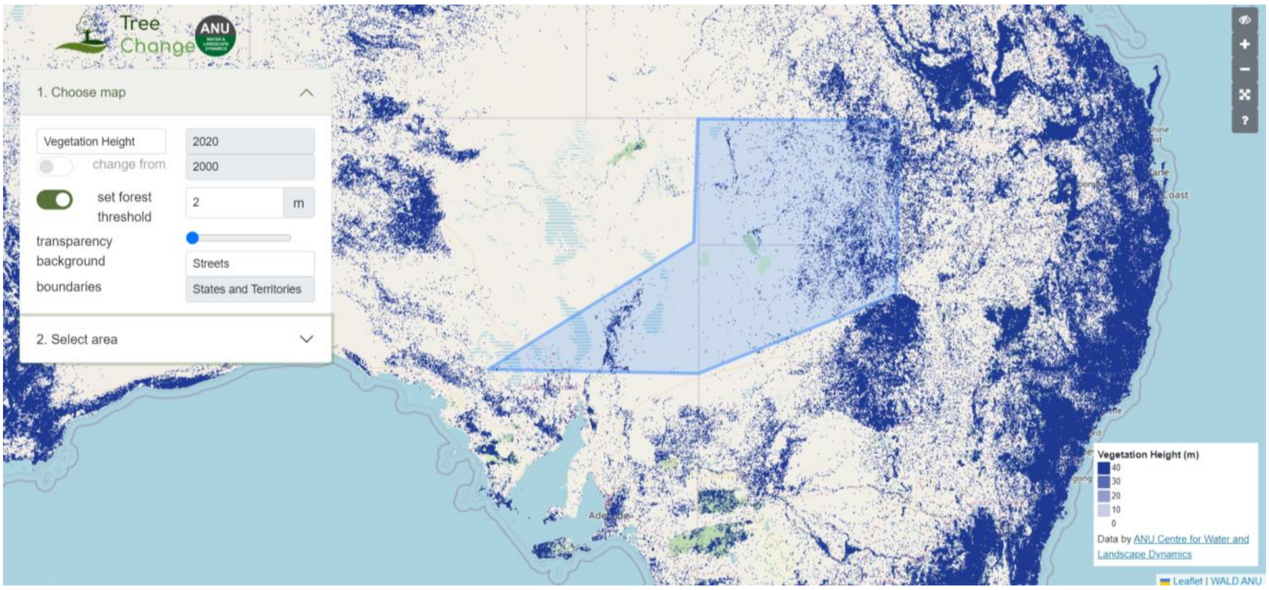

Figure 2: Map with modelled areas containing woody vegetation cover more than 2 m height. Selected shape contains the 25 projects (CEAs a very small percentage of total area) NB: Legend colours overridden when Set threshold selected – highlights only include cells > 2 m height.

Approximately twenty-five (20 - 30) sample locations were identified for each project and examined using satellite imagery and annual time series of tree cover as estimated by Australia's Environment Explorer (AEX). AEX integrates a number of spatial and temporal datasets, including remotely sensed data, into a unified national database of weather, bushfires, water availability, vegetation and production/use. The data is freely available and ongoing maintenance and updating is carried out by the *Terrestrial Ecosystem Research Network* (TERN) (https://www.wenfo.org/aex) (e.g., Figure 3.). Sample locations were checked against the proponents mapping classification (i.e., CEA, forest, non-project) and whether there was evidence of fire/major disturbance or growth since project commencement. Cells identified by the proponent as within the CEA were classified as "correctly classified" when AEX estimated there were periods before project commencement when tree cover was greater than 1 - 2% (otherwise should have been non-regeneration) and there were no periods before project commencement when the tree cover was greater than 20% (could have been baseline forest if within more than 0.20 ha contiguous area).

Critically in this context, the AEX calibration/model fit included a substantial number of sites with very small woody cover as well as woody cover represented by forests (Figure 4). The woody cover models were fitted and verified from a very large set of data that covered all of Australia, including sites near to many HIR projects. The Root Mean Square Error (RMSE) for woody cover fraction predictions was only 0.072 and the R^2 was 94%. There was no bias observed in the predictions of woody cover with the exception of some closed forests (Figure 5). The slight bias in the closed forest is irrelevant to regeneration checks.

Although the woody cover fraction models are unbiased at fractions below about 0.80 (80%), there are still variations for individual predictions around mean estimates. An unbiased model with RSME = 0.072 means that when AEE predicts woody cover of 0.2 (20%), approximately 2/3 of all individual areas will have a woody cover of 0.13 – 0.27 with the average being 0.20.

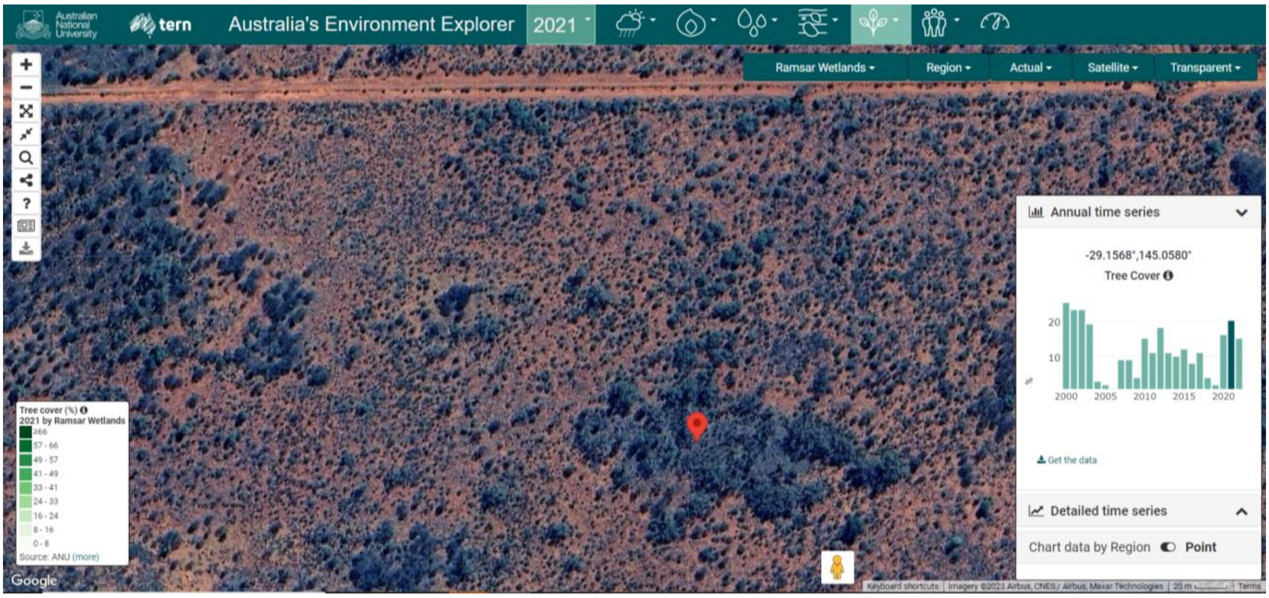

Figure 3: Image from AEX showing the remote sensing imagery for an ad hoc point and the estimated tree cover [25 x 25 m cell] per year. Technically this location shifted from being classified as a forest level of canopy (20% canopy cover of trees > 2 m) in the early 2000's to sparse woody / woodlands. After 2019, the canopy appears to be quickly returning to forest. NB: this point was not included in any sample Project and is provided only as an example

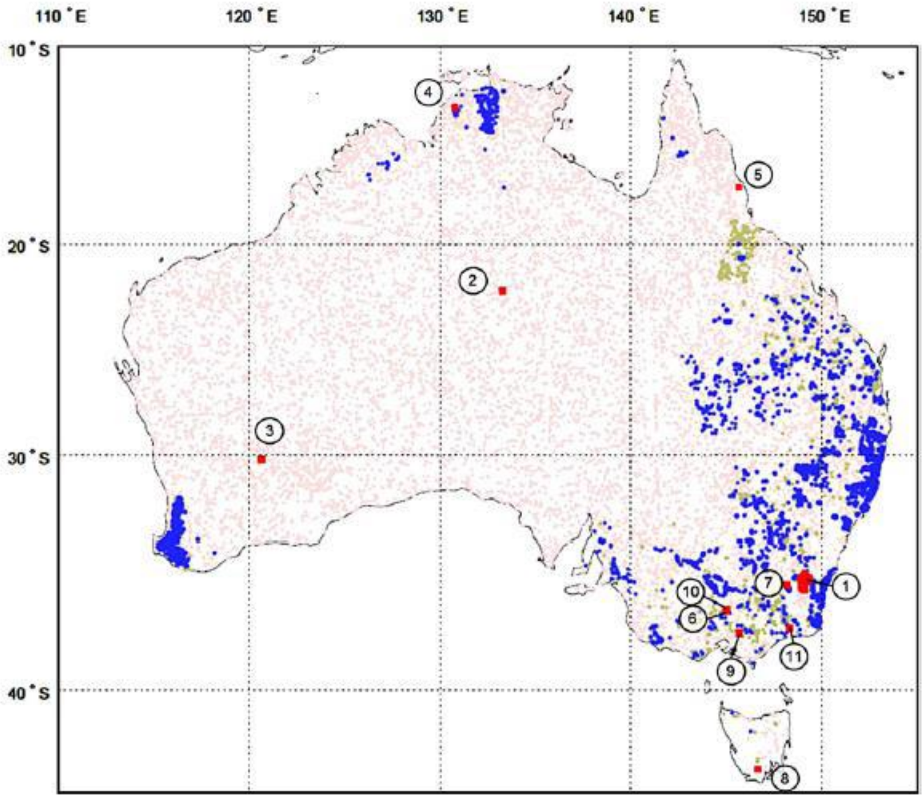

Figure 4: Map from Liao et al (2020)[1] identifying the validation sites (dots) for AEE predictions of woody cover. See the paper for details at numbered sites

[1] Liao, Z., VanDijk, A.I.J.M., He, B., Larraondo, P.R and Scarth, P.F. (2020) Woody vegetation cover, height and biomass at 25-m resolution derived from multiple site, airborne and satellite observations. Int J Appl Earth Obs Geoinformation 93: 102209

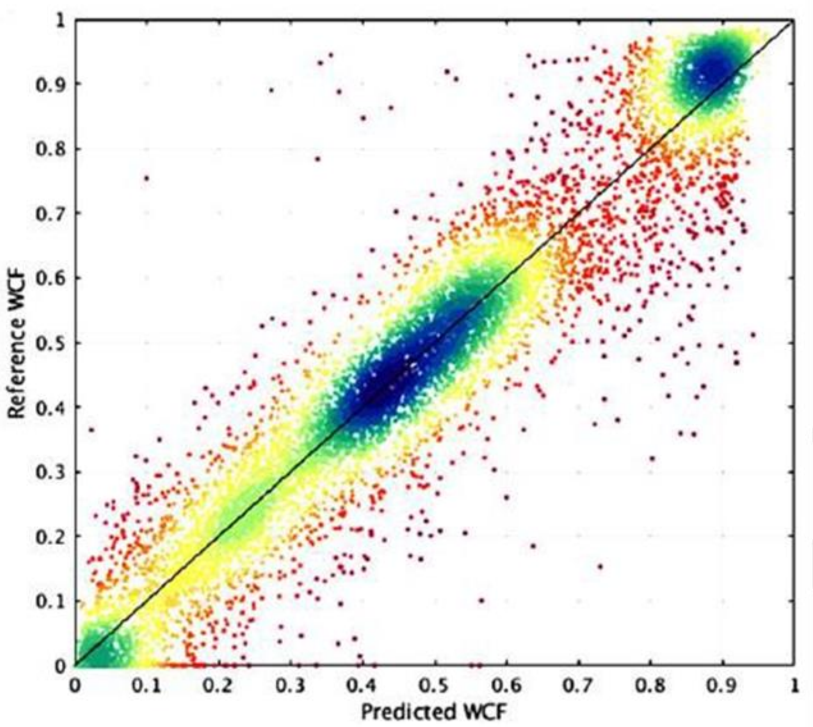

Figure 5: Scatter plot of predicted versus reference woody cover fraction from Liao et al (2020)

3. Results

3.1. General

Projects varied from a few thousand hectare to over 150,000 ha total area, with CEA within these projects ranging from about 10% - 80% of the total project area. Overall, the sampled projects covered a wide range of bioregions - about seven IBRA (*Interim Biogeographic Regionalisation for Australia*) regions – including Brigalow belts, Darling riverine plains and Mulga.

About 600 points were examined using remote sensing imagery and AEX predictive models of which about 475 were classified by proponents as CEA.

3.2. Management activities

Independent auditors / CER affirm they sighted evidence of management activities required to relieve regeneration suppression being carried out. This evidence includes invoices for fencing to limit/control domestic and feral animals, supplementary feeding and watering (to reduce grazing effects); bills of sale for feral animals trapped and disposed; livestock trading statements; fire hazard reduction actions; etc.

Where proponents did not remove all stock, they claim that the level of stocking had been reduced to “safe levels” or that supplementary feeding (e.g., hay) and movement of stock between areas had been provided. As evidence, auditors / CER were provided with photographs of areas grazed without damage and/or invoices for purchase of hay / feed. Safe levels of stocking were informed by peer reviewed studies in a number of cases and compared with actual stocking. If actual stocking was higher than the safe levels, auditors / CER documented proponent’s actions that were undertaken to relieve any regeneration suppression.

I am confident that proponents carried out the required management activities.

3.3. Stratification

Stratification is a dynamic process and areas can move into and out of CEA as further information becomes available. Stratification is required at project commencement and the process is independently audited to ensure approved methods are applied. A variety of techniques can be used, including supervised or unsupervised classifications of Landsat, Sentinel, SPOT and other remotely sensed imagery. Historic details, including NCAS, can also be used in conjunction with other tools. As well as confirming the appropriate use of classification tools, the independent auditors usually include *in situ* inspections and provide detailed reports on strata and other boundaries.

CER use estimates of annual NFSW and other sources to confirm that baseline forests have been reasonably excluded. As projects develop, and especially related to feedback from CER on the 5-year gateway checks, the stratification boundaries can be changed to exclude areas that appear not to be regenerating. New CEA can be defined if there is evidence that areas previously classified as non-regenerating are regenerating. Documentation is required to justify both these changes.

Only the most current stratification details were provided for this review. Of the total sample points observed, 85% (82% - 88% at p=0.05) had proponent classifications that agreed with the classification resulting from AEX modelling.

Eighty-one percent (70% - 88% at p=0.5) of the sampled cells that proponents classified as Forest contained more than about 20% tree canopy cover in the years before project commencement. Most of these forests lost significant tree canopy cover during the 2012-2019 droughts. Most projects were more than 90% correct with only two consistently identifying areas as forests despite low canopy cover. Incorrectly classifying these areas as forest has no impact on carbon credit units as these areas are excluded.

Eighty-five percent (81% - 88% at p=0.05) of the sampled cells that proponents classified as part of the CEA contained at least 1-2% tree canopy cover in the years before projects commenced without approaching the level of cover associated with baseline forest. A couple of projects had less than 70% of CEA cells agreeing with AEX due to including cells with only 0-1% before (and during) the project, but these Projects had already been identified by CER and subjected to *in situ* and other analyses.

The overall agreement of the stratification and the AEX predictions is well within the limitations of available remote sensing.

I am confident that the independent audits and CER reviews have ensured proponents have used appropriate stratification tools. An 85% accuracy for identification of CEA is acceptable good practice.

3.4. Regeneration checks

Regeneration checks were introduced in 2019 to build confidence that HIR projects are on track to meet the final forest classification and justify the allocation of ACCUs. These gateway checks occur about every 5 years[2] after project initiation (or when requested by CER) until at least 90% of each CEA within the project area is forested.

Regeneration checks must demonstrate woody cover increase of 5%; sufficient trees ha^{-1} that their mature canopy will provide a total of 20% canopy cover; or 7.5% or 10% canopy cover after five or

[2] Taking into consideration eligible growth disruption periods if necessary.

ten years respectively. Although change detection analysis is preferred, regeneration checks can use remote sensing images or other approaches for flexibility. Remote sensing – especially Landsat 7, Sentinel and SPOT – was the preferred method for most of the projects in this review. Some agents used quite advanced *in situ* field methods, including unmanned aerial vehicles (UAVs) to generate three-dimensional models of forest stands to train supervised remote sensing classification algorithms. Others used high resolution photographs to train the supervised classification while one proponent used a stratified sample of transects. Independent auditors and CER confirmed the images and approaches were reasonable and conformed to the regulations. In a few circumstances where the images were not current, a reasonable decision was made that no adverse bias would result.

To help reduce the impact of patchy (heterogeneous) regeneration, areas are analysed in different spatial scales: up to 100 ha contiguous blocks for CEA's over five years since commencement; and 10 ha contiguous blocks for stands over 10 years. Portions of CEAs identified as no longer on track must be stratified out (see 3.3 above) or assigned a growth pause.

After confirming appropriate methods have been used for the regeneration check, CER compared the proponent's maps of regeneration with maps of AUSCOVER Persistent Green (PG) and estimates of annual National Forest and Sparse Woody Vegetation (NFSW). PG cells within 100 ha blocks were overlaid with the CEA to estimate average canopy cover at the 100-ha scale. The regeneration check was generally approved by CER when all blocks exceeded 7.5% – minor exceptions around the boundaries are ignored.

Detailed remote sensing, including *ESRI World Imagery Wayback*[3], were explored by CER for areas that appear to contain less than the threshold canopy cover or where there are substantial differences between PG and NFSW estimates of cover. Proponents are asked to justify any below canopy cover threshold 100 ha areas or otherwise take action. Actions taken by the proponents include collecting *in situ* evidence (plot data or geo-referenced photographs) to demonstrate there are sufficient trees (able to achieve 2 m in height) to reach 20% canopy cover at maturity. If there is still insufficient evidence to pass the threshold, proponents can reclassify areas as "non-regenerating" and exclude them from the CEA, or if they believe these areas still have forest potential, they could apply a growth pause to the modelling.

PG is a reliable and efficacious tool for separating forest (20% canopy cover) from other woody lands, but Gill et al (2017)[4] warn that "*as a general rule [use] care when foliage projection cover is in the range of 0.03 – 0.17 [or 3% - 17% cover]*". Gill et al (2015)[5] concluded that estimates of *Landsat Persistent Green Vegetation Fraction were often higher than LiDAR estimates at lower cover levels.* They interpreted this bias as resulting from persistent green vegetation cover due to herbaceous and woody understory (less than 0.5 m) being included in the Landsat Persistent Green Vegetation Fraction but not in the more accurate LiDAR-based woody foliage. It may be reasonable to assume then that the use of Persistent Green may be a "one way test" – if Persistent Green indicates the canopy cover is less than 7.5% then there is a strong chance that it is less than 7.5%, but the reverse relationship is not as likely. The use of Persistent Green by CER to identify areas that fail the

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[3] https://livingatlas.arcgis.com/wayback/

[4] Tony Gill, Kasper Johansen, Stuart Phinn, Rebecca Trevithick, Peter Scarth and John Armston (2017) A method for mapping Australian woody vegetation cover by linking continental-scale field data and long-term Landsat time series, International Journal of Remote Sensing, 38:3, 679-705, DOI: 10.1080/01431161.2016.1266112

[5] Gill, T., Johansen, K., Scarth, P., Armston, J., Trevithick, R., Flood, N. (2015). Persistent Green Vegetation Fraction. In A. Held, S. Phinn, M. Soto-Berelov, & S. Jones (Eds.), AusCover Good Practice Guidelines: A technical handbook supporting calibration and validation activities of remotely sensed data product (pp. 134-154). Version 1.1. TERN AusCover, ISBN 978-0-646-94137-0.

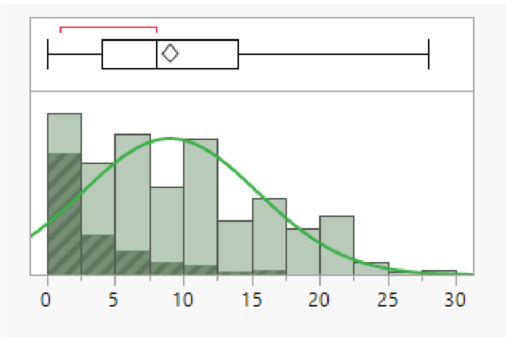
regeneration threshold is therefore appropriate although it may underestimate / fail to identify all areas. Any potential bias in these lower cover areas however may be non-substantive if the bias is due to including small trees, provided the vegetation can realise the potential to achieve 2 m in height over the remaining project period.

The algorithm used in AEX has a similar overall statistical fit to PG (R^2 = 94%, RSME = 0.074) but Lao (2020) concludes there is no bias in the very low canopy cover areas (Figure 5). However, I believe the 2012-2019 drought was so severe that by 2019 the AEX model was being extrapolated outside its reliable range – many estimates were 0%, even for cells identified as forest in 2018 and 2020. This review will use the maximum AEX estimates for 2020-2022 as the reference for canopy cover to demonstrate regeneration progress.

Most projects started modelling in about 2010 after the millennium drought broke and regeneration started appearing. With the exception of a few cells that may approach forest levels of canopy cover (see 3.3 above), most CEA had 0 – 3% tree canopy cover before the drought broke and prior to modelling commencement.

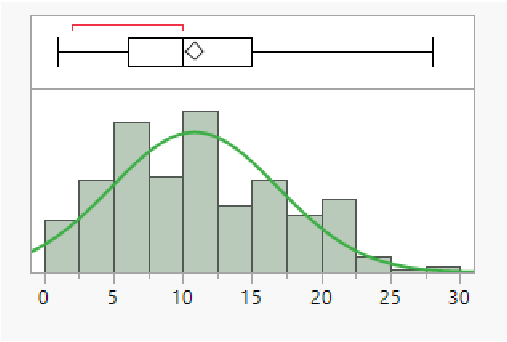
Many CEA cells increased canopy cover relatively rapidly after modelling started, but declined again after 2012-2013 as the new drought began to impact. Canopy cover appears to be recovering / regenerating quite strongly after 2019 and in many cases 2020-2022 has increased well above the thresholds required.

The mean tree canopy cover for 2020-22 estimated by AEX for all the CEA cells investigated in this report was 9.1% (8.5% - 9.6% at p=0.05) (Figure 6). With the exception of six projects (highlighted in Figure 6), the mean canopy area for each project was significantly greater than 7.5% and the overall mean canopy cover of just these projects was 10.8% (10.2% - 11.5% at p=0.05) (Figure 7). Overall, the CEAs appear to be regenerating well in the project areas, especially since 2020 and on average are significantly (p=0.05) above the 7.5% canopy cover threshold.



Mean	9.05
Std Dev	6.42
Std Err Mean	0.294
Upper 95% Mean	9.63
Lower 95% Mean	8.47
N	477

Figure 6: Whiskers plot, histogram and summary statistics of tree canopy cover (%) for all cells classified as CEA. Highlighted bars represent projects with mean significantly less than 7.5% [The box in the Whiskers plot contains 50% of the data – from the 25th percentile to the 75th percentile and is divided by a vertical line at the 50th percentile or median value. The diamond is centered on the mean with a width of ± standard error of the mean. The "whiskers" extend to the furthest observation that is not assumed to be an outlier]



Mean	10.85
Std Dev	6.042
Std Err Mean	0.3158
Upper 95% Mean	11.4708
Lower 95% Mean	10.2286
N	366

Figure 7: Whiskers plot, histogram and summary statistics of tree canopy cover (%) for all cells classified as CEA, but excluding projects with mean significantly less than 7.5% % [The box in the Whiskers plot contains 50% of the data – from the 25th percentile to the 75th percentile and is divided by a vertical line at the 50th percentile or median value. The diamond is centered on the mean with a width of ± standard error of the mean. The "whiskers" extend to the furthest observation that is not assumed to be an outlier]

CER did accept the projects identified in Figure 6 with significantly low AEX canopy cover as passing the 7.5% canopy cover regeneration threshold. However, before passing, they found that PG maps indicated there were 100 ha blocks with less than 7.5%. Comparisons were made with NFSW and other resources, plus select areas were investigated using *Wayback* to "see" changes in regeneration. Proponents were also required to provide additional supportive material, including *in situ* evidence of sufficient regeneration.

Over half the samples in one CEA in one project where AEX estimated significantly less than 7.5% average tree canopy cover contained species of mulga with only 1 – 2% cover. PG and NFSW gave much higher canopy estimates. This discrepancy may be explained by the potential bias of including vegetation less than 2 m in the PG models but not in the AEX models (see above). However, Tree Change models indicate that mulga have reached more than 2 m in areas surrounding the project and *in situ* photographs demonstrate that there are sufficient plants to reach forest cover thresholds at maturity. I consider it reasonable to accept this project as progressing towards forest cover as required.

Of the remaining five projects identified by AEX as potentially having low tree cover, CER review of the regeneration report identified evidence of less than 7.5% at 100 ha scale and/or potential discrepancies between proponent's estimates, persistent green and NFSW in three and required further work.

Proponents could re-stratify CEA areas as non-regenerating in response to the CER review (see 3.3 above) and then resubmit their reports. However, if restratification was not undertaken, or where it did not substantially improve the canopy cover estimates, CER reviewers reported a range of more detailed interrogation and analysis (Figure 8).

The final two projects potentially identified by AEX did not require further work by CER reviewers after their analysis. One of these did have some of the 100 ha scale blocks identified with PG as not meeting the threshold, but as these blocks contained only very small areas of CEA they were not considered substantive. The AEX mean tree cover for this project was significantly less than 7.5% at p=0.05, but not at p=0.01, so this difference may be the result of sampling error.

As part of the further interrogation and analysis of the regeneration check and re-stratification, the following was undertaken:

- Analysis of the 1.5m pixel classification based off SPOT imagery
- Site photo analysis, including comparing site photos to CER data checks
- ESRI Wayback Imagery
- Assess accuracy and precision for various data sources at a project specific level
- Address concerns raised by initial CER checks
- Analyse areas that were removed from CEA and areas that remained in the CEA
- Audit report findings

Figure 8: Description of reported further interrogation and analysis undertaken due to projects appearing to have substantive areas less than 7.5% canopy cover at regeneration check

4. Conclusions

The independent audit reports and the CER reviews provide strong assurance that projects are being managed as per the legislative requirements and that appropriate methods have been used by the proponents or their agents in classifying the CEA and identifying changes in regeneration canopy cover.

Although the model used in projects and this review have all been peer reviewed, there are discrepancies between estimates of tree canopy cover generated. These discrepancies are due to the use of different remote sensing data, integration of other data sources, underpinning modelling assumptions and other statistical factors. Triangulation with different models is an effective way to gain confidence in results or identify areas where models are defective or being extrapolated beyond their bounds. Acceptance (or rejection) of regeneration thresholds should not be based on a single remote sensing based model and important decisions where models disagree need to be supported by high resolution imagery and/or *in situ* georeferenced data.

The CER reviews utilize multiple information sources (maintained by TERN and other government agencies) to confirm regeneration thresholds at project and 100 ha scales are being met. Where there are substantive discrepancies between sources and/or with the project reports, further information has been required by CER before the regeneration check is accepted. The further information included *in situ* measurements or georeferenced photographs, but high-resolution aerial photography is also acceptable as evidence of sufficient regeneration to demonstrate progression to a forest level.

On average, stratification into CEA and non-CEA is reliable and accords with good practice.

On average, the sampled CEA had very low tree canopy cover at the beginning of their modelling periods (about 2010) and despite variation due to droughts and breaking droughts, they have achieved significant growth. The mean canopy cover over the full sample set 10 – 12 years after modelling commencement (2020 – 2022) was significantly more ($p=0.05$) than 7.5%. Excluding the six identified projects above, raised the tree canopy cover to significantly more ($p=0.05$) than 10%.

The 25 projects used in this review were objectively chosen to cover the range of projects, registration dates, methodologies and agents. I reasonably expect that the results of this review are representative of the HIR projects managed under CER.