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BUSHLAND DESTRUCTION IN QUEENSLAND SINCE LAWS AXED

Key findings

The Queensland Government has promised "cessation of remnant clearing" and a ban on clearing for "High Value Agriculture" (HVA). "Remnant" means mature bushland that has either never been cleared or has been cleared but has regrown back to maturity. However, HVA approvals explain only 10% of the clearing of all regulated vegetation (remnant and regulated regrowth) in Queensland.

Most clearing of regulated vegetation in Queensland in the period 2013-16 was traced to self-assessable codes, particularly the so called thinning code which allows bulldozing of forests into paddocks with scattered trees, at unlimited scales, with no permit required. Any attempt to rein in clearing of regulated vegetation must either eliminate or greatly restrict clearing under these codes.

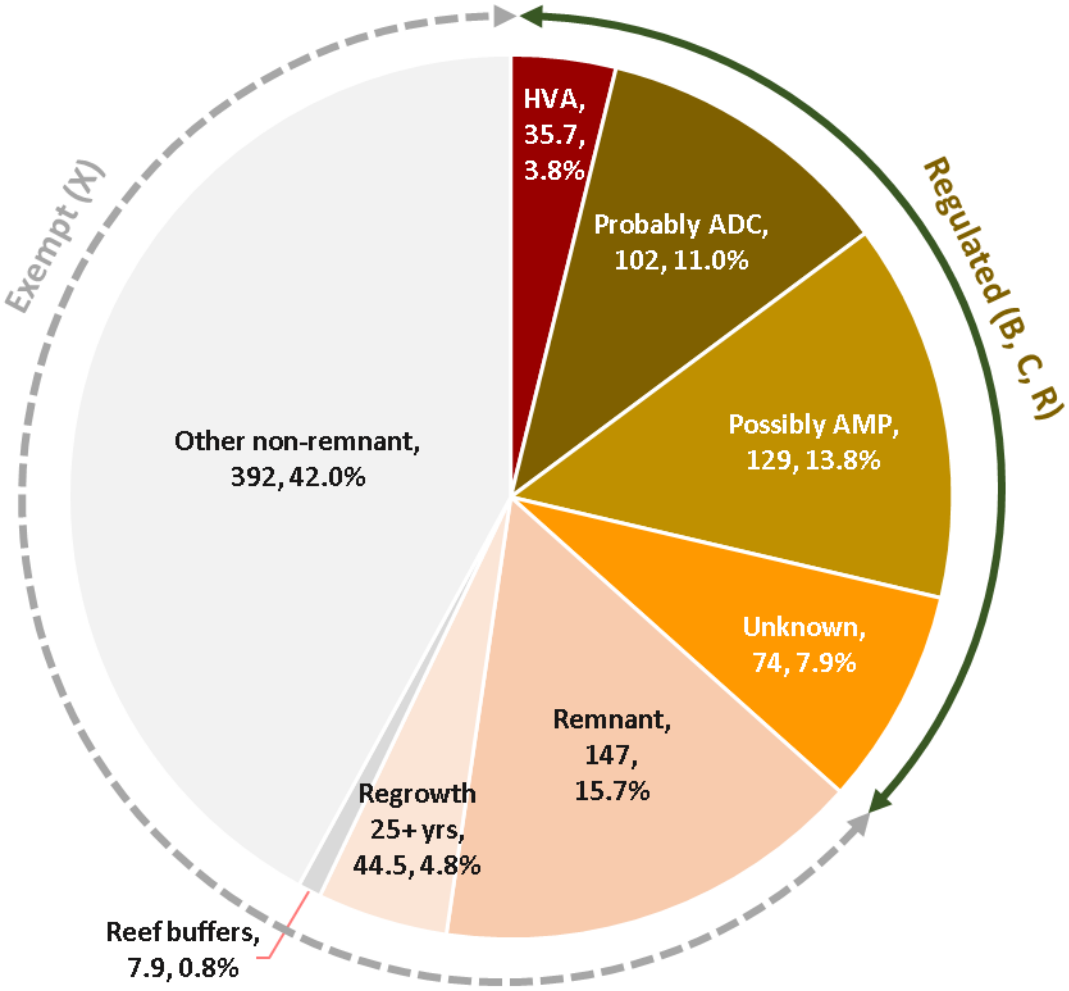
Large areas are also cleared without evident authorisation, indicating that much greater public transparency is needed for clearing authorisations and better enforcement to stop unauthorised clearing.

The clearing of remnant bushland has been greatly underestimated, because large areas of actual or regrown remnant are mapped exempt from clearing controls on regulatory maps, and because there is no process of detecting and protecting remnant bushland that has regrown. About 324,000 ha of mapped regulated remnant bushland was cleared from 2013 to 2016 according to state government maps. In fact, about 470,000 ha of actual remnant was cleared, nearly half a million hectares in three years and half of all clearing, because so much is exempt from clearing controls.

Far from being knee-high shrubs, the majority (67%) of exempt vegetation being cleared is either remnant, advanced regrowth more than 25 years old, or if younger, still has foliage cover that meets the international definition of a forest.

The government has promised to protect not only remnant but also, high conservation value non-remnant vegetation. Current definitions of "High Value Regrowth" are flawed and inadequate. This new commitment will require a major reappraisal of regrowth vegetation in Queensland, most of which is currently exempt and free to clear.

The major stumbling block for the government in meeting its election commitment is the vast area of the state that is either remnant or high conservation regrowth but which can be cleared under self-assessable codes or because it is currently mapped as exempt from any clearing controls.



Summary infographic: All areas cleared 2013 to 2016, whether of mapped regulated or exempt bushland.

For clearing of mapped **regulated** bushland, authorisation was either: a) High Value Agriculture development approvals (HVA); b) linked to and probably authorised by notification under Accepted Development Codes (ADC); c) within an area covered by an Area Management Plan (AMP) and thus, possibly authorised under such plans; or d) unknown.

Areas of mapped **exempt** bushland cleared were either: a) remnant as mapped by Qld Herbarium or as determined to be regrown remnant in this analysis; b) 25 years or older regrowth; c) Reef buffers within 50m of a Great Barrier Reef watercourse or wetland; or d) other non-remnant vegetation.

KEY: Label names are followed by, the areas cleared (1000 ha), and the percentage that represents of the total area cleared.

Key statistics

- Annual bulldozing of native bushland in Queensland rose from 92,000 ha in 2010-11 to 395,000 ha in 2015-16, following weakening of safeguards starting early in 2012 by the Newman government.
- Annual clearing of mature or remnant bushland jumped more than fivefold in that same five-year period, from just 26,000 ha in 2010-11 to 138,000 ha in 2015-16.
- In the three years after laws were axed in mid-2013, about 932,000 ha of bushland was bulldozed up to mid-2016. Of this total area cleared:
    - 35% was in Great Barrier Reef Catchments;
    - 35% (323,690 ha) was mapped as remnant on the Regulated Vegetation Map (category B)[1];
    - 1.9% (17,444 ha) was mapped as High Value Regrowth or Reef Watercourse Regrowth (categories C and R);
    - 63.4% (590,785 ha) was mapped exempt (X) or outside the scope of the Act, of which:
        - 25% (146,554 ha) was remnant according to the Queensland Herbarium's Regional Ecosystems v9, or had regrown to remnant status and so should be mapped as category B;
        - 7.5% (44,539 ha) was regrowth more than 25 years old and should be mapped as category C;
        - 1.3% (7,897 ha) was regrowth within 50m of a Great Barrier Reef watercourse or wetland that should be mapped as category R.
- Of all regulated vegetation (categories B, C & R) cleared from 2013 to 2016, *up to* 68% (231,394 ha) may have been self-assessable under Accepted Development Codes or Area Management Plans.
- Only about 10% was due to High Value Agriculture approvals.
- Of all notifications to clear under self-assessable codes for which areas were specified:
    - Thinning is the most prevalent, representing approx. 60% by area notified, all of which is for clearing of remnant bushland;
    - Fodder harvest represents about 17%, all of which is for clearing of remnant bushland
- From 1 up to 6.6 million ha or regulated vegetation almost all remnant bushland has been committed for future clearing (as of July 2016 to end Sept 2017) based on Accepted Development Code notifications or unexercised High Value Agriculture approvals. The large uncertainty is due to poor transparency.

[1] Note this also includes small areas mapped as category A, which is banned to all clearing. However, it most likely was not category A at the time it was cleared. Rather it would have been assigned to category A as a penalty for clearing it without authorisation.

History of bushland safeguards

In 2004, the *Vegetation Management Act* (VMA or "the Act" hereafter) in Queensland was greatly strengthened with a ban on "broadscale" clearing of "remnant" (mature or intact) vegetation (now mapped as category B on the Regulated Vegetation Map) which came into effect at the end of 2006. "Broadscale" is not defined in the Act, and is taken here to mean the clearing of large areas of bushland.

Then in 2009, the Act was further amended to regulate clearing of two types of regrowth: High Value Regrowth, which had been cleared previously, but had been regrowing since 1989 (now termed category C), or regrowth of any age within 50 metres of a Great Barrier Reef watercourse or wetland (now termed category R). Not all such regrowth was protected by these changes however. Rather clearing of these categories was permissible under a self-assessable code.

Clearing both of remnant and regrowth bushland declined sharply following these two initiatives, despite most regrowth still being exempt from clearing controls (Fig. 1).

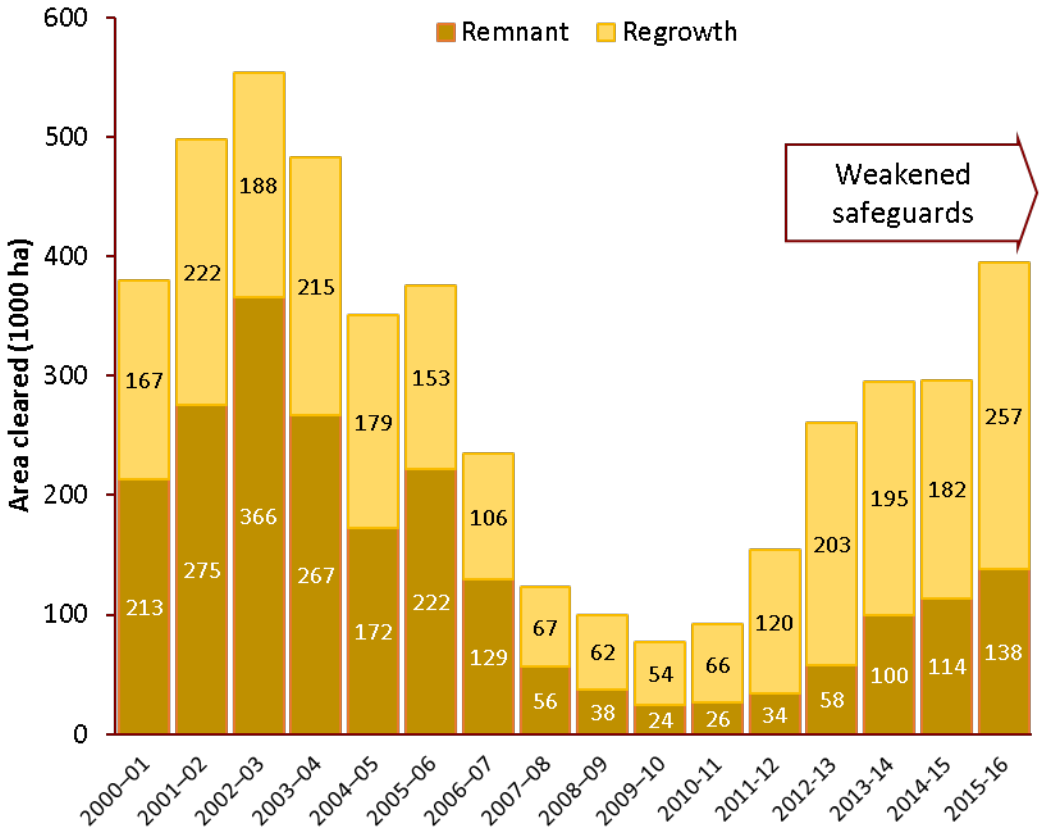


Fig. 1. Areas of bushland cleared in Queensland 200-2016 according to Queensland Government SLATS reports for 2013-14, 2014-15 and 2015-16.

Safeguards axed

In April 2012, the newly elected Newman LNP government (2012-2015) immediately set about weakening enforcement of the Act. The 2012-14 Queensland Government SLATS report released in 2015, after the fall of the Newman government, revealed that enforcement efforts had been intentionally cut:

> *"Clearing trends were also likely to be driven by a shift in clearing culture and perceptions brought about by the change in government in 2012. The change in landholder perceptions was supported by a new compliance approach, introduced soon after the change in government in 2012. The Department of Natural Resources and Mines shifted the priority to assisting landholders to undertake clearing rather than the previous priority on assessment and compliance."*[2]

The need for permits was removed for particular activities of thinning, fodder harvest and treatment of "encroachment"[3] with new self-assessable clearing codes created under Area Management Plans (AMPs) which came to occupy the entire southwest of the state (Fig. 2).[4]

Then in mid-2013, the Newman government broke a pre-election promise that they would *"retain the current level of statutory vegetation protection"*[5], and drastically weakened the Act itself. The key changes were:

- Ending the ban on broadscale clearing of remnant bushland by:
    - Allowing broadscale clearing under new allowable uses of "High Value Agriculture" and "High Value Irrigated Agriculture".
    - Allowing clearing of remnant bushland under self-assessable codes without the need for a permit.
- Ending the 2009 regulation of clearing of High Value Regrowth (category C) on freehold properties.

[2] p.6 in Department of Natural Resources and Mines, 2015. *Vegetation clearing rates in Queensland: Supplementary report to the Statewide Landcover and Trees Study Report 2012–14,* November 2015

[3] *Thinning* is the bulldozing of forests to turn them into paddocks with scattered trees, supposedly to correct unnatural "thickening", a phenomenon for which no scientific evidence exists. Nor is any evidence currently required by law.
Fodder harvest is the bulldozing of mulga (native wattle) trees in the semi-arid southwest of the state, to feed livestock on their foliage, whilst also establishing more pasture grass cover.
Encroachment is the bulldozing of native trees growing in what are mapped as grasslands, despite this likely being a natural response to climate change.

[4] https://www.qld.gov.au/environment/land/vegetation/area-plans

[5] http://www.parliament.qld.gov.au/documents/committees/SDIIC/2013/10-VegetatationMgmtFramewk/submissions/057.pdf

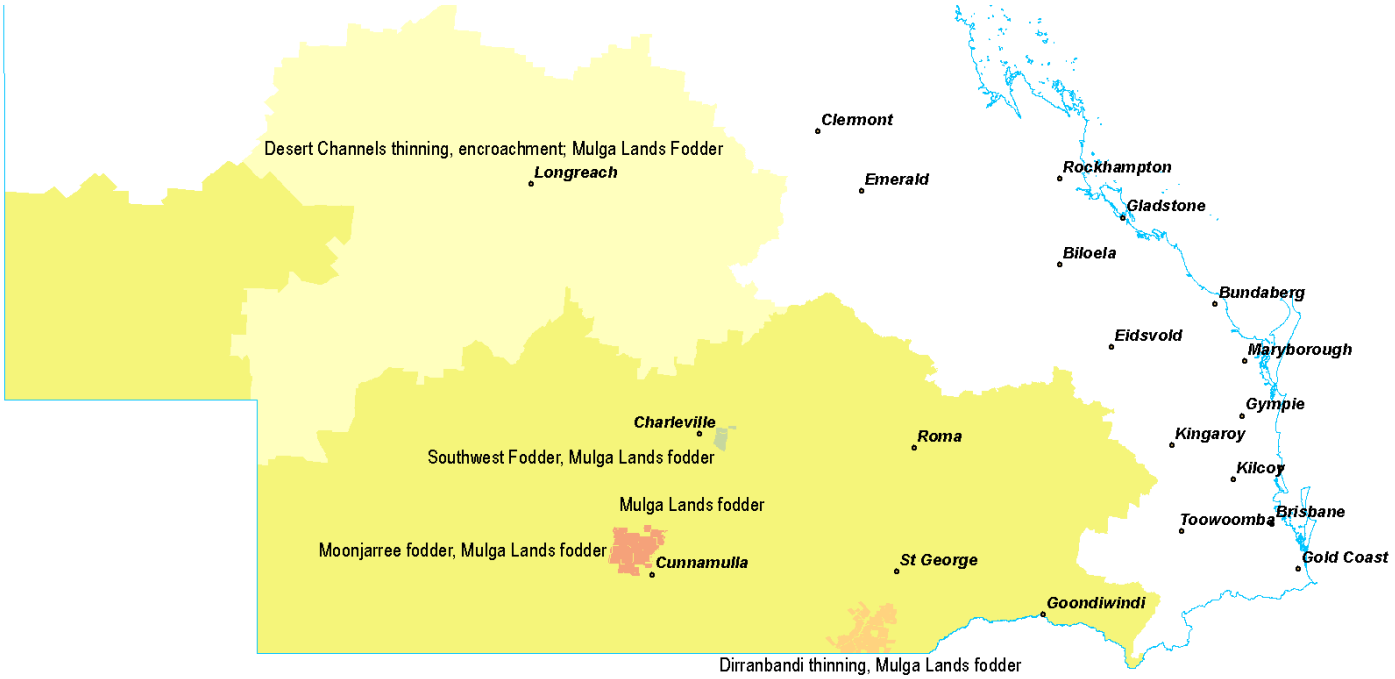


Fig. 2. Geographic scope of Area Management Plans established to allow self-assessable clearing for thinning, fodder harvest and encroachment prior to the VMA amendments of 2013.[6]

Bushland destruction resurges

Tree-clearing resurged dramatically (Fig. 1) following these changes, with the rise starting even before the laws were axed, likely due to reduced enforcement, and the creation of Area Management Plans allowing clearing of remnant bushland without permits over the entire southwest of the state as discussed above (Fig. 2).

The latest SLATS report for 2015-16 reveals that nearly all bulldozing of bushland in Queensland, over 90%, is simply to make pasture or provide fodder for livestock (Table 1).[7]

About this analysis

It has been claimed by industry interests that there is "nothing to see here" in these dramatic changes, that clearing is just "routine" agricultural management mostly controlling young regrowth, or harvesting mulga for stock feed, which is presumed to be unquestionably benign. Since regrowth is not accurately assessed by the Queensland Government, the claim has also been made that there are "more trees than ever" and that regrowth is outpacing destruction.

In this analysis, we:

- breakdown clearing by regulated vegetation categories;
- quantify bushland that has regrown to remnant;
- quantify how much exempt clearing is actually remnant or advanced regrowth;
- attempt to identify the regulatory authorities for clearing since mid-2013 when the law changed until mid-2016, the latest clearing data available; and
- quantify latent clearing yet to be exercised.

[6] https://www.qld.gov.au/environment/land/vegetation/area-plans
[7] https://www.qld.gov.au/environment/land/vegetation/mapping/slats

Clearing by regulatory categories and vegetation stages

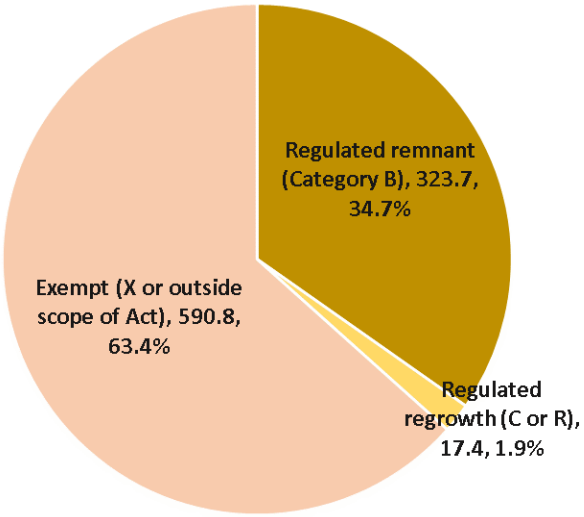


Fig. 3. Areas cleared 2013-16 by categories on the regulatory map as of Nov 2015.
KEY: The number after the label is the total area cleared (1000 ha), and the second number is the percentage of all clearing this represents.

About 35% of all clearing over the 2013-16 period was clearing of mapped regulated remnant (323,690 ha, Fig. 3).

A small fraction (~2%, 17,444 ha, Fig. 3) was of regulated regrowth in the two categories C and R.

The majority (63.4%, 590,785 ha, Fig. 3) of all clearing was exempt from all clearing controls.

The majority (60%, 356.242 ha, Fig. 4) of exempt clearing was woodland or forest above 11% foliage projective cover-equivalent to the Kyoto Protocol definition of "forest"[8] and 25% (146,554 ha) was of actual or regrown remnant bushland (Fig. 4).

Only 38% of exempt clearing was of *sparse* regrowth (less than 11% foliage cover) (Fig. 4).

[8] Scarth P, Armston J, Danaher T (2008), 'On the Relationship between Crown Cover, Foliage Cover and Leaf Area Index' Proceedings of the 14th Australasian Remote Sensing and Photogrammetry Conference, Darwin, Australia, October 2008.

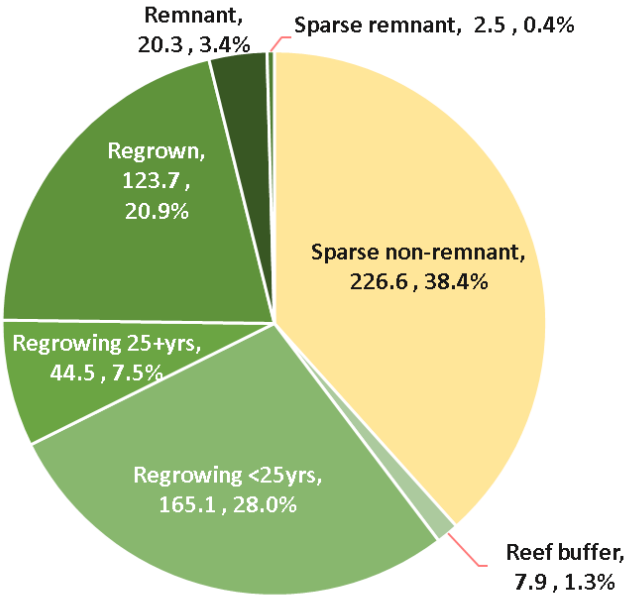


Fig. 4. Regrowth stage of bushland mapped exempt (X) in Nov 2015 (or outside the scope of the Act), and cleared from 2013 to 2016. *Reef buffer* means within 50 m of a regulated watercourse or wetland in a Great Barrier Reef catchment. Sparse means below 11% foliage cover. KEY as in Fig. 3.

Although the Queensland Government detects loss of bushland through the Statewide Land and Tree Study or SLATS, it does not conduct regular systematic assessments of how much bushland has regrown. Nor is any effort made to re-map regrowth that has regrown to remnant status from exempt to regulated remnant. It remains exempt from all clearing controls and large areas that have regrown to remnant are cleared as a result (125,000 ha Fig. 4).

We estimate approx. 3.9 million ha of forest and woodland in Queensland has regrown to the point it is remnant again, mostly in higher rainfall areas closer to the coast ("Regrown" in Figs 4-5). Almost all of this is mapped as exempt non-remnant on regulatory maps and so can be cleared again without restriction.

This oversight should be corrected as soon as possible.

In addition, 3.9% of exempt clearing was mapped as remnant in 2013 according to the Queensland Herbarium's Regional Ecosystems version 9 map (22,858 ha, Fig. 4).

Of the non-remnant that was either sparse or had been regrowing less than 25 years, 7,897 ha was within 50 m of a Great Barrier Reef watercourse or wetland, but is mapped exempt when it should be mapped as category R ("Reef buffer" in Fig. 4).

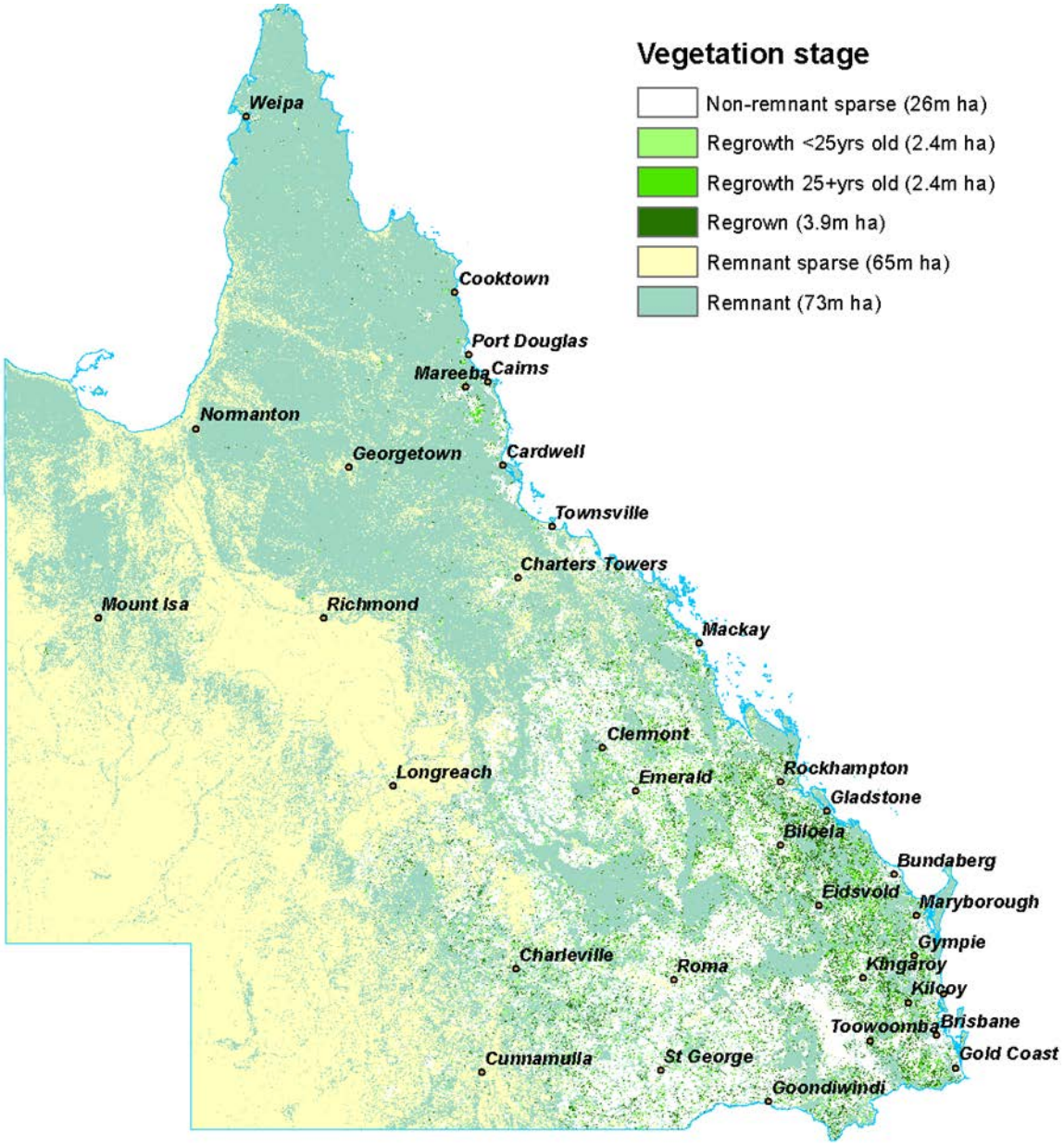


Fig. 5. Vegetation stages in Queensland as of mid-2013. “Sparse” means below 11% foliage projective cover, otherwise all categories are above that threshold. Regrown means regrowth that meets criteria to be considered remnant. See Methods for more details. Note that regrown areas are predominantly closer to the coast where rainfall is higher.

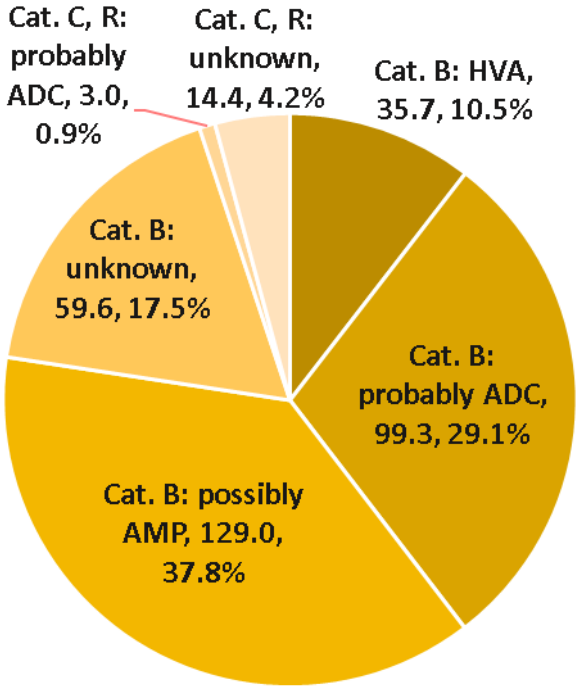


Fig. 6: Regulatory authority for clearing of regulated vegetation from 2013 to 2016, where known or implied. HVA means High Value Agriculture (including Irrigated) approvals; "Probably ADC" means overlaps a property with a notification under an Accepted Development Code; "Possibly AMP" means occurs in the areas covered by Areas Management Plans in Fig.2 and so may be self-assessed under those codes. Otherwise clearing is of unknown authority.

Regulatory authority for clearing

Authorities for clearing of vegetation are classified as follows.

1. **Regulated remnant category B.**[9]
   - 1.1. **High Value Agriculture** (HVA) (including Irrigated) approvals for clearing of Cat. B).
   - 1.2. **Probably Accepted Development Codes** (ADC, formerly called "Self-Assessable Code")
   - 1.3. **Possibly Area Management Plans** (AMP) a parallel system of self-assessable codes (Fig. 2).
   - 1.4. **Unknown** other than above.

2. **Regulated Regrowth categories C or R.**
   - **2.1. Probably ADC.**
   - 2.2. **Unknown** other than above.

3. **Exempt**
   - 3.1. **X** exempt on the regulated vegetation map, other than on a Property Map of Assessable Vegetation (PMAV).
   - 3.2. **X (PMAV)** exempt on a Property Map of Assessable Vegetation.
   - 3.3. **Outside** the jurisdiction of the Act (mostly national parks or state forests).

Clearing of regulated vegetation

Of a total of 931,919 ha cleared between mid-2013 and mid-2016 according to SLATS, 35% fell in Great Barrier Reef catchments and 36.6% (341,134 ha) was of regulated vegetation (Fig. 3).

Of this, clearing that overlapped an approval for High Value Agriculture represented only about 10% (35,726 ha, Fig. 6).

[9] Note that some small areas of category A as of Nov 2015, were cleared, but this is was assigned to category B because it was sure to have been category B at the time of clearing, then was found to be unauthorised and then remapped as category A -– totally protected -by the regulator as an enforcement action.

Up to 68% (231,394 ha) of clearing of regulated vegetation was likely or possibly self-assessed comprising: notifications under Accepted Development Codes (29% remnant + 0.9% regrowth) or overlapping areas subject to Area Management Plans (37.8% Fig. 2) (Fig. 6).

Of this, as seen below, about 60% was probably for thinning, and 17% for fodder harvest the two dominant codes (Fig. 7). This means that up to 40% of regulated vegetation clearing was likely for thinning, and 11% for fodder harvest.

SLATS only ascribes 6.6% of all clearing to thinning (Table 1), but this is likely to greatly underestimate the true contribution from thinning as determined here by cross-comparing clearing with notifications made. SLATS should be doing the same to avoid under-reporting.

SLATS also misclassified clearing in High Value Agriculture approval areas as for "pasture" when it was surely for cropping.

Linkage to self-assessable code notifications was assumed and was not verified in detail in this analysis. It was sufficient for clearing to occur on a property for which a notification had been made sometime in the register from 2013 till mid-2016 to be flagged as *probably* ADC authorised. The exact timing of clearing in relation to timing of the notification was not checked as the register did not include areas or dates over that period. Likewise, it was sufficient for clearing of regulated remnant vegetation to occur anywhere within the areas covered by AMPs (other than that already ascribed to HVA or ADCs) (Fig. 2) to flag it as *possibly* AMP authorised.

No remnant clearing authorisation was evident for 22% (74,014 ha) of regulated vegetation clearing (mostly remnant, Fig. 6). This could include development approvals for other clearing than agricultural clearing. These are generally small but multitudinous and difficult to map because there is no central registry available to the public.

SLATS only identifies ~21,000 ha as due to mining, infrastructure and settlements (Table 1), which accounts for less than one third of the ~74,000 ha of "unknown authority" clearing of regulated vegetation (Fig. 6, Table 2). Hence most of the "unknown authority" clearing cannot be explained by development approvals for these purposes.

Note also that adding all three years of clearing 2013-2016 from SLATS reports (Fig. 1) gives a total of 986,000 ha. However, after excluding repeat clearing within the period, natural tree death including natural disasters, plantation harvest and clearing missed in earlier epochs (SLATS does not say which epoch), the total area unambiguously attributed to clearing within the period reduces to ~932,000 ha (Table 1).

Table 1. Breakdown of purpose of clearing 2013-16 according to SLATS**.**

Purpose	2013-14	2014-15	2015-16	TOTAL (ha)	TOTAL (%)
Pasture	244,927	257,039	334,512	836,478	90%
Thinning	11,158	15,523	34,669	61,350	6.6%
Crop	3,881	5,096	4,005	12,981	1.4%
Mine	4,919	2,902	2,833	10,654	1.1%
Infrastructure	4,061	1,148	1,511	6,719	0.7%
Settlement	1,200	1,625	911	3,737	0.4%
TOTAL	270,146	283,332	378,441	931,919	100%

Clearing of exempt vegetation

Of all clearing, 63.4% (590,785 ha) was exempt from *Vegetation Management Act* clearing controls, including a small area outside of the jurisdiction of the Act (1,759 ha) (Fig. 3, Table 2).

Most exempt clearing (80%) is exempt on a Property Map of Assessable Vegetation (PMAV, Table 2).

Despite being mapped exempt, as noted above, the majority of exempt clearing was clearing of regrowing forest or woodland (11%+ foliage cover) at the time it was cleared, and one quarter 25% was actual or likely remnant (Fig. 4).

Table 2. Breakdown of areas cleared 2013-2016 by vegetation category and presumed authority; and estimated area committed for clearing under approvals or self-assessable code notifications, but yet to be exercised as of mid-2016. See Methods for details. ADC means Accepted Development Code self-assessed clearing. AMP means self-assessed clearing under Area Management Plans shown in Fig. 2. PMAV means Property Map of Assessable Vegetation.

category	Authority	Cleared 2013-16 (ha)	Yet to be exercised
Regulated remnant (B)	High Value Agriculture	35,726	80,159
	Probably ADC	99,316	903,521-6,541,090
	Possibly AMP	129,028	
	Unknown	59,619	
Regulated regrowth (Cor R)	Probably ADC	3,049	7,416-17,601
	Unknown	14,395	
Exempt (X)	Not PMAV	113,458	
	PMAV	475,628	
Outside Act		1,699	
TOTAL		931,919	991,096-6,638,849

1m – 6.6 m ha of bushland destruction in the pipeline

As of end of October 2017, 115,586 ha of remnant bushland had been approved for bulldozing under 67 High Value Agriculture approvals, primarily for forage or forage crops like sorghum.[10]

As of mid-2016, 35,427 ha had been cleared, leaving 80,159 ha yet to be cleared (Table 2). At time of writing in Jan 2018, considerably more than 35,427 ha is known to have been cleared in the two largest approval areas of Strathmore in the Gulf region and Olive Vale on Cape York, but we will not be able to quantify how much more until SLATS data are released for 2016-17.

Some local governments can approve clearing for agriculture, which goes unrecorded on the central register. Also there are sure to be more development approvals for urban, industrial and mining clearing than are shown here, but which in the absence of central registries and maps, are subsumed in the "Unknown authority" categories (Table 2).

These figures are dwarfed however by the areas notified for self-assessable clearing under Accepted Development Codes (ADC), which add up to nearly 1 million ha of notifications for which areas of intended clearing have been made public, but which could be as much as 6.6 million ha after including notifications from 2013 to July 2016, where the areas of intended clearing were not made public, and in which cases, the entire area of regulated vegetation on the property was assumed to be at risk (Table 1). This does not include any notifications that may have been made under AMPs, for which no public register exists.

The dominant ADCs by area are for thinning and fodder harvest, representing 60% and 17% respectively of all notified ADC areas from 20 July 2016 to 28 Sept 2017 (Table 2, Fig. 2). These are included under "yet to be exercised" in Table 1. Notifications have increased exponentially over this 14 month period with a peak of over 200,000 ha notified in July 2017 under all codes (Fig.7).

[10] Information provided by the Department of Natural Resources and Mines

Why thinning should be removed as an allowable purpose

Under the thinning code made law by the former Newman government, a remnant or mature forest can legally be converted into a paddock leaving scattered trees or thin lines of trees behind, on the pretence that a problem of anthropogenic "thickening" is being corrected (see Fig. 8 for a graphic example of legal "thinning" below).

This one code represents 60% of all areas notified for clearing in the period July 2016- Sept 2017 and on that basis is estimated to account for up to 40% of all remnant clearing.

Strangely, areas bulldozed under this code are still considered to be remnant vegetation, even though it may be recorded as cleared by SLATS.

There is no requirement to show that any actual thickening has taken place by empirical comparison with "floristic composition and range of densities typical of the regional ecosystem surrounding that locality", as the Act specifies [11]. Nor is there any requirement to show that any thickening, even if genuine, has been caused by past mis-management (mostly, inappropriate fire and livestock grazing). Studies of changes in tree densities in Queensland have failed to find any impact of management, indicating there is no anthropogenic problem to be corrected in the first place.[12] Even assuming there might be instances of genuine anthropogenic thickening, there is no requirement to show that is it ecologically undesirable and therefore in need of correction. Scientific evidence suggests the opposite. Dense thickets of trees, whether anthropogenic or not, are found to be more beneficial for biodiversity than "thinned" forests, and thinning them is harmful.[13] None of these concerns entered into the formulation of current legislation or codes by the former Newman government, codes that remain in force at time of writing.

There is no cap or limitation on how much can be "thinned". Entire properties of thousands of hectares have been notified and entirely bulldozed under this code (see example in Fig. 8). The code is supposed to be confined in theory to a subset of regional ecosystems. Amazingly, this list includes endangered and of-concern regional ecosystems, but the code then also allows landholders to alter the regional ecosystem map "on the fly" based on their own assessment, turning regional ecosystems not on the thinning list into ones that are, with no requirement for any expert to check their decisions. This has actually happened in practice.

Bulldozing forests and woodlands to turn them into open paddocks with scattered trees is not a valid or defensible means of redressing any genuine thickening that may have been caused by past grazing or fire mismanagement. If grazing or fire mismanagement has caused genuine change in forest structure, then the only legitimate remedy is to correct the management, not to bulldoze the forest.

There is no question that the thinning code lacks scientific support and represents a gaping loophole in the legislation which allows broadscale clearing by stealth for pasture, in defiance of the 2006 ban on such clearing, on a pretence of doing ecological "good".

It must be removed as an allowable purpose.

[11] "**Thinning** means the selective clearing of vegetation at a locality to restore a regional ecosystem to the floristic composition and range of densities typical of the regional ecosystem surrounding that locality" *Vegetation Management Act*

[12] Fensham, R.J., Fairfax, R.J. and Archer, S.R., 2005. Rainfall, land use and woody vegetation cover change in semi-arid Australian savanna. *Journal of Ecology*, 93(3), pp.596-606; Witt, G., Luly, J. and Fairfax, R.J., 2006. How the west was once: vegetation change in south-west Queensland from 1930 to 1995. *Journal of Biogeography*, 33(9), pp.1585-1596; Silcock, J.L., Witt, G.B. and Fensham, R.J., 2016. A 150-year fire history of mulga (Acacia aneura F. Muell. ex Benth.) dominated vegetation in semiarid Queensland, Australia. *The Rangeland Journal*, 38(4), pp.391-415.

[13] Thompson, W.A. and Eldridge, D.J., 2005. Plant cover and composition in relation to density of Callitris glaucophylla (white cypress pine) along a rainfall gradient in eastern Australia. *Australian Journal of Botany*, 53(6), pp.545-554.

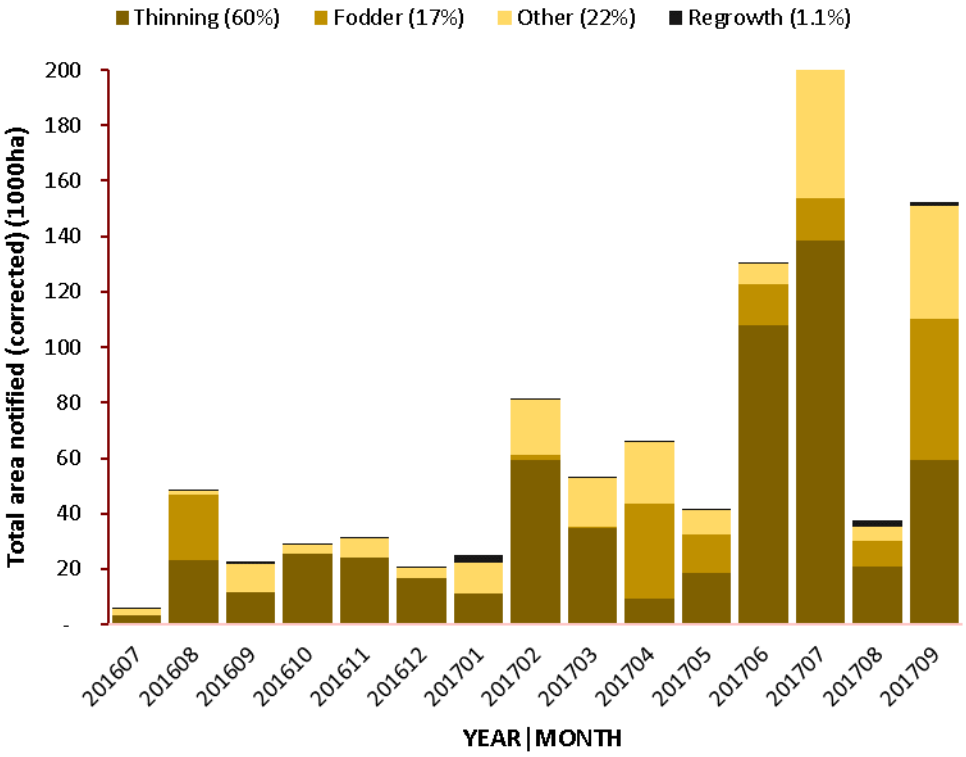


Fig. 7. Areas notified under different Accepted Development Codes by month from 20/7/16 to 30/9/17. Note that the totals for 07/2016 (ie. July 2016) are only for the 11 days out of that month after 20/7/16, and do not represent a whole month of records. See Methods for details of corrections for double counting.

Fig. 8. Legal "thinning" of remnant ironbark forest near Alpha, central Queensland, 2015-16. The original forest is almost totally cleared with only a few trees left behind.

DISCUSSION

The present government promised in the 2017 election to (*inter alia*): [14]

- Introduce legislation to protect remnant and high conservation value regrowth vegetation;
- Cease remnant clearing;
- Remove the provision to allow High Value Agriculture clearing of remnant vegetation;
- Continue self-assessable codes (for fodder harvest in particular) as long as they are providing appropriate protections and are low ecological risk

Ceasing remnant clearing

The results of this analysis suggest that ending remnant clearing as promised will not be possible only by ending High Value Agriculture clearing of remnant vegetation since this only represents about 10% of clearing of regulated vegetation, and it accounts for an even smaller fraction of the clearing in the pipeline that we know about.

The largest source of remnant clearing is self-assessed clearing which does not require a permit, and among these, thinning and fodder harvest are the most prevalent.

There is no scientific justification for thinning as explained above. First, there is no evidence that supposed thickening has taken place as a result of past mis-management. Second, even it had taken place, the solution is surely to change management, not bulldoze forests into open paddocks.

Likewise fodder harvest, knocking down mulga trees to feed stock during drought, should not require bulldozing entire tracts of trees. Rather lopping of branches can meet stock requirements during droughts without any need to knock down whole trees, killing all the wildlife there.

The scope of all self-assessed clearing also needs to be capped to ensure "low ecological risk". At present the areas that can cleared this way can and do encompass entire properties.

The scale of self-assessed clearing under Area Management Plans is a major unknown because transparency via notifications on public register is absent. These legacy plans need to be eliminated since they duplicate and sometimes clash with Accepted Development codes.

The other disturbing discovery is just how much clearing of remnant bushland which is supposed to be banned and which is promised by the government to cease entirely is going on without readily available evidence of an authority. A major increase in transparency and public accountability is needed, making sure that all clearing authorities are publicly notified on a single central register. At the moment, there is no single central register of authorities for clearing. To the extent that these large areas of uncertain authority may be unauthorised, there will also need to be major effort put into enforcement.

The missing remnant

The other major stumbling block for the Queensland Government's election commitment is the bushland that is mapped as exempt on the regulatory map, but is either mapped as remnant by the Queensland Herbarium [15] or has regrown to remnant (this analysis).

Large areas are erroneously mapped exempt and as shown above represent 25% of all exempt clearing (Fig. 4). The clearing of actual (22,858 ha) and regrown remnant (123,696 ha) that is mapped Exempt (X) on the regulatory map (Fig. 4), is nearly half (45.3%) as much again as the 323,690 ha of regulated remnant (B) cleared from 2013 to 2016 (Fig. 3). The real area of remnant being cleared is therefore 470,244 ha, which represents half of all clearing.

[14] Queensland Labor Party 2017 *Saving Habitat, Protecting Wildlife and Restoring Land: Ending broadscale tree-clearing in Queensland (again)* Election policy and letter to WWF from the Party.
[15] Regional Ecosystems Version 9 current for 2013.

Government has no process for taking stock of how much regrowth has regrown to remnant. We estimate here that approx. 3.9 million ha of regrowth has regrown to the point it now meets this definition of remnant, but almost all of which continues to be mapped as exempt.

If the Government is serious about ceasing the clearing of actual remnant, then this error needs to be corrected, and regrown or exempt remnant recognised and protected.

The Act should be amended to ensure mandatory annual updating of the Regulated Vegetation Map, including all property maps.

The PMAV loophole

Currently the Department administering the Act (Natural Resources) must provide a certified copy of the regulatory map for a property if the landholder requests it, and may correct the regulatory map if the landholder presents evidence to show it is incorrect. But the Department has limited powers under the Act to later alter certified property maps (Property Maps of Assessable Vegetation or PMAVs) once issued, which may "freeze" exemptions that are inappropriate, such as when regrowth is found to be high conservation value, or regrows back to maturity or remnant condition.

The Government however, can and must make sweeping changes to PMAVs through legislation. For example, the Newman Government in 2013 removed regulated High Value Regrowth (category C) from all freehold properties and replaced all the PMAVs to re-classify such High Value Regrowth as X (exempt), without landholder consent or consultation.

PMAVs need to be returned to their legitimate role as a ground-truthed corrections to the Regulated Vegetation Map, whether requested by the landholder or initiated by the Department. PMAVs should always be subject to further revision at any time as required to meet the purposes of the Act and in particular, when exempt regrowth regrows to the point it is remnant again or if High Conservation Value Regrowth reaches age thresholds to be counted as such.

High Conservation Value Regrowth

The government has made an election promise to *"introduce legislation to protect remnant and high conservation value non-remnant vegetation"* where *"'High conservation value' will be defined consistently with the international definition advocated by the High Conservation Resource Network, including (but not limited to) endangered vegetation species and communities, vegetation in reef catchments, riparian areas, threatened species habitat and areas where landscape integrity is at risk."*

This is quite a significant expansion beyond the regulated regrowth categories of High Value Regrowth (now category C) and regrowth in Great Barrier Reef watercourse or wetland buffers (now category R) as originally conceived by the Bligh government in 2009.

The three major problems with the current definition of High Value Regrowth are that a) it is now confined only to leasehold land (since it was removed from freehold land by the Newman government in 2013), b) it is based on a threshold date (31/12/1989) rather than a threshold age and c) involves no other defined conservation values such as habitat value for threatened species or ecosystem recovery, value as a corridor or riparian buffer or whether it is on land vulnerable to degradation. These details are buried in codes that govern self-assessed clearing of regulated regrowth. Great Barrier Reef watercourse and wetland regrowth (category R) was not constrained by an age or date threshold, but was limited by the fact that it was restricted to northern and central Great Barrier Reef catchments. In 2016, the Palaszczuk government attempted to restore category C back to freehold land and to expand category R to all Great Barrier Reef watercourses, but was unsuccessful.

In meeting the election promise, the present government will have to move beyond the limits of these categories. High conservation value regrowth needs to be redefined and explicitly mapped as a) on any tenure, b) based on a threshold age (or where landscape integrity is at risk, as for category R, no threshold age) and c) high conservation value as outlined in the promise, and elaborated further below.

The use of a threshold date as at present means that High Value Regrowth will inevitably disappear as it regrows back to remnant. Any other regrowth subsequently attaining or exceeding the same age of 20 years that High Value Regrowth had when it was first defined in 2009, will be perversely excluded from protection under the current definition.

This is poor policy. In contrast, for example, clearing of endangered brigalow regrowth triggers referral for approval under Commonwealth biodiversity law if the brigalow reaches a threshold age of 15 years.[16] Using threshold ages means that maps must be revised regularly to capture new regrowth which has attained the threshold age and also meets the conservation value criteria.

We propose that high conservation value regrowth be defined as:

1) any regrowth vegetation of 15 years or more in age on any land tenure that is important to the maintenance and conservation of biodiversity including:
    a. at risk, rare, threatened or endangered ecosystems; or
    b. habitat necessary for recovery of threatened species to the point they are no longer threatened including:
        i. dispersal corridors* including those needed for successful adaptation under projected climate change, or
        ii. refugia* needed for successful adaptation under projected climate change, or
        iii. centres* of endemism.
2) any regrowth vegetation of any age on any tenure where landscape integrity is at risk, including:
    a. within 100m of any watercourse, wetland, lake or spring, or
    b. within 1km of a wild or pristine river, or
    c. on slopes above 10%, or
    d. on fragile or erodible soils*, or
    e. in areas prone to salinity or rising water tables*, or
    f. in areas prone to mass movement by gravity of soil or rock*, or
    g. in an area that would result in declining water quality*, or
    h. in an area within a catchment that is important to the health of the Great Barrier Reef or the Murray Darling Basin.

The criteria marked * above are already listed in the Act under section *19G Particular criteria for declaration*.

METHODS

Area Management Plans

Boundaries were mapped using the property descriptions or local government areas identified as the scope of particular AMPs.[17] Boundaries were obtained from the *Digital Cadastral Database* (DCDB) for November 2016, and *Local government area boundaries – Queensland*.[18] All boundaries were combined with some polygons identified as overlapping more than one AMP (Fig. 2).

Clearing by regulatory categories

We combined SLATS[19] raster files for the years 2013-14. 2014-15 and 2015-16, excluding the categories: 6 Timber Plantation, 8 Missed clearing in previous era, 10 Natural disaster damage, and 11 Natural tree death. This left only active clearing of natural, native vegetation in the period in question. Double counting was removed as follows. If clearing occurred in one year and a later year, the clearing was ascribed only to the earlier year, ignoring later

[16] http://www.environment.gov.au/system/files/resources/43e7adb3-247e-4285-9a2e-386be94c9523/files/brigalow-regrowth.pdf
[17] https://www.qld.gov.au/environment/land/vegetation/area-plans
[18] http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={3F3DBD69-647B-4833-B0A5-CC43D5E70699}
[19] http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={04F163B3-F898-47E0-9411-BBCDEBC8D592}

repeat clearing. We intersected this combination SLATS raster with the *Regulated Vegetation Map* as current in 24/6/2015 after conversion of the latter to 30x30m raster aligned or "snapped" to SLATS.

Clearing by vegetation stages

We created a six-level classification for vegetation stages combining four spatial data layers: Foliage projective cover (FPC) 2013, Regional Ecosystems (RE) v9, SLATS 1988-2013 combined and Land use (QLUMP) 2014 with criteria as shown in Table 3. We converted all spatial layers to 30 x 30 m grids aligned to SLATS and combined them using raster arithmetic to produce the raster shown in Fig. 5.

The thresholds of FPC for regrowth to be considered remnant were derived as follows. We constructed histograms of non-zero FPC values for the remnant portions of 29 categories of *Dominant Broad Vegetation Groups (2M scale) version 10* (excluding grasslands and marshes), by intersecting these two layers after conversion to the same 30 x 30 m grid. We used the FPC value representing the 25th percentile of the histogram as the threshold for regrowth to be considered equivalent to remnant, provided it was also more than 25 years old (had not been cleared previously in the entire SLATS record 1988-2013) and in a "natural" land use (Table 4).

We intersected the final six level vegetation stage raster with areas mapped as cleared by SLATS from 2013-2016 after conversion to a 30x30m rasters aligned to SLATS, and confined or masked to include only the Exempt or Outside pixels from the *Regulated Vegetation Map* for 2015 as described above.

From within the categories of exempt, non-remnant sparse vegetation, or regrowth less than 25 years old (Table 3), we extracted those pixels which were within 50 m of a Great Barrier Reef watercourse or wetland using the 2015 regulatory maps for watercourse and wetlands, and totalled those areas separately.

Table 3. Six-level classification for vegetation stages.

	Source spatial data layers[20]			
Description	**FPC 2013**	**RE v9**	**SLATS 1988-2013**	**QLUMP 2014**
Sparse non-remnant	<11%	Non-remnant	disregard	OR not Natural, non remnant
Regrowing <25 yr old	11%+	Non-remnant	Cleared	AND Natural[21]
Regrowing 25+ yr old	11%+	Non-remnant	Not detected	AND Natural
Regrown	Above thresholds (Table 3)	Non-remnant	Not detected	AND Natural
Remnant	11%+	Remnant	disregard	disregard
Sparse remnant	<11%	Remnant	disregard	disregard

[20] FPC is Foliage Projective Cover, RE is Regional Ecosystems of Queensland, SLATS is Statewide Land and Tree Study, QLUMP is Queensland Land Use Mapping Program.
[21] Primary levels of "Conservation and natural environments" or "Production from relatively natural environments" or "Water" the last only with the secondary level of "Marsh or wetland"

Table 4. Thresholds of Foliage Projective Cover (FPC) specific to dominant Broad Veg Groups version 10, for regrowth to be considered remnant, and areas that meet criteria.

DBVG 2M	FPC 25th percentile (%)	DESCRIPTION
1	64	Complex mesophyll to notophyll vine forests of the Wet Tropics bioregion.
2	60	Complex to simple, semi-deciduous mesophyll to notophyll vine forest, sometimes with Araucaria cunninghamii (hoop pine).
3	43	Notophyll vine forest/ thicket (sometimes with sclerophyll and/or Araucarian emergents) on coastal dunes and sandmasses.
4	41	Notophyll and mesophyll vine forest with feather or fan palms on alluvia, along streamlines and in swamps on ranges or within coastal sandmasses.
5	61	Notophyll to microphyll vine forests, frequently with Araucaria spp. or Agathis spp. (kauri pines)
6	67	Notophyll vine forest and microphyll fern forest to thicket on high peaks and plateaus.
7	36	Semi-evergreen to deciduous microphyll vine thicket.
8	57	Wet eucalypt tall open forest on uplands and alluvia.
9	28	Moist to dry eucalypt open forests to woodlands usually on coastal lowlands and ranges.
10	36	Corymbia citriodora (spotted gum) dominated open forests to woodlands on undulating to hilly terrain.
11	17	Moist to dry eucalypt open forests to woodlands mainly on basalt areas (land zone 8).
12	33	Dry eucalypt woodlands to open woodlands, mostly on shallow soils in hilly terrain (mainly on sandstone and weathered rocks, land zones 7 and 10).
13	16	Dry to moist eucalypt woodlands and open forests, mainly on undulating to hilly terrain of mainly metamorphic and acid igneous rocks, Land zones 11 and 12).
14	24	Woodlands/tall woodlands dominated by Eucalyptus tetrodonta (Darwin stringybark) (or E. megasepala), and/or Corymbia nesophila (Melville Island bloodwood) and/or E. phoenicea (scarlet gum).
15	38	Temperate eucalypt woodlands.
16	14	Eucalyptus spp. dominated open forest and woodlands drainage lines and alluvial plains.
17	18	Eucalyptus populnea (poplar box) or E. melanophloia (silver-leaved ironbark) (or E. whitei (White's ironbark)) dry woodlands to open woodlands on sandplains or depositional plains.
18	19	Dry eucalypt woodlands to open woodlands primarily on sandplains or depositional plains.
19	15	Eucalyptus spp. (E. leucophloia (snappy gum), E. leucophylla (Cloncurry box), E. persistens, E. normantonensis (Normanton box)) low open woodlands often with Triodia spp. dominated ground layer.
20	27	Woodlands to open forests dominated by Callitris glaucophylla (white cypress pine) or C. intratropica (coast cypress pine) (land zones 3, 5, 10, 12) (BRB, DEU, EIU, MUL)
21	17	Melaleuca spp. dry woodlands to open woodlands on sandplains or depositional plains.
22	23	Melaleuca spp. on seasonally inundated open forests and woodlands of lowland coastal swamps and fringing lines. (palustrine wetlands).
23	12	Acacia aneura (mulga) dominated associations on red earth plains, sandplains or residuals.
24	14	Acacia spp. on residuals. Species include A. clivicola, A. sibirica, A. shirleyi (lancewood), A. microsperma (bowyakka), A. catenulata (bendee), Acacia rhodoxylon (ringy rosewood).
25	21	Acacia harpophylla (brigalow) sometimes with Casuarina cristata (belah) open forests to woodlands on heavy clay soils.
26	13	Acacia cambagei (gidgee) / A. georginae (Georgina gidgee) / A. argyrodendron (blackwood) dominated associations.
27	14	Mixed species woodlands - open woodlands (Atalaya hemiglauca (whitewood), Lysiphyllum spp., Acacia tephrina (boree), wooded downs.
28	29	Open forests to open woodlands in coastal locations. Dominant species such as Casuarina spp., Corymbia spp., Allocasuarina spp. (she-oak), Acacia spp., Lophostemon suaveolens (swamp box), Asteromyrtus spp., Neofabricia myrtifolia.
29	29	Heathlands and associated scrubs and shrublands on coastal dunefields and inland/ montane locations.
30-35	excluded	Grasslands, forblands, wetlands, mangroves and marshes.

Regulatory authority for clearing

We created a 12 level raster map for the major types of authorisation of clearing as follows to enable classification of areas cleared 2013-2016. As above, this raster was also 30m pixel size, aligned to SLATS as described above.

1. Regulated remnant category B[22]

1.1. **High Value Agriculture** (HVA) (including Irrigated HVA) approvals for clearing. The approved areas were converted into shapefiles from tables of coordinates defining the areas approved for clearing in approvals documentation as posted on the *State Assessment and Referral Agency* public register,[23] or as provided by the Queensland Government Department of Natural Resources. Resulting polygons where checked against publicized paper maps and corrected where necessary.

1.2. **Probably Accepted Development Codes** (ADC, formerly called "Self-Assessable Code"). Under changes to the Act made in 2013, landholders are required to give prior notice to the Department of Natural Resources and then follow the applicable code governing clearing of regulated vegetation for allowed purposes. Notifications did not include maps of areas proposed for clearing nor areas intended to be cleared. Only property descriptors and codes being followed are provided in the online register notified from 2013 up until 20/7/2016.[24] The register in this earlier period also contained many errors, typos and lacked information which would enable the notification to be linked to a particular lot. For those with a readable lot on plan descriptor, and excluding notifications for clearing of regrowth (see below), weeds or environmental clearing, we extracted boundaries for those lots on plans from successive downloads of the *Queensland Digital Cadastral Database* (DCDB) for the dates 14/5/13, 14/12/14, 20/12/15 and 27/11/16. If a lot could not be found in one version it was sought in a later. This was necessary because the DCDB is dynamic, with lots being reconfigured split or renamed. We then combined all lots because, for example, a lot might have been notified earlier that was later notified again under another changed lot descriptor. The combined property boundary was clipped to only remnant category B according to the regulatory map as it was on 24/6/2015. The register contains no specified date for the notification and so we did not attempt to determine whether the clearing observed preceded or succeeded the notification. Also we did not attempt to identify whether the regional ecosystems being cleared were those allowable under the code, a complex undertaking and in any case moot because some of the codes allow landholders to change the regional ecosystem map "on the fly" and without approval. It was sufficient for any clearing over the 2013-16 to occur on category B on a property for which notification was given at anytime over the 2013-16 period to be deemed *probably* authorised under an ADC.

1.3. **Possibly Area Management Plans.** AMPs provide a parallel system of self-assessable codes (Fig. 2 and see above). However, since there is no public register of notifications under these codes, it was only possible to identify clearing as possibly authorised under an AMP if it fell within the AMP areas (Fig. 2). Hence any and all clearing of category B over the 2013-16 period within an AMP boundary other than that specifically authorised under HVAs or ADCs above was deemed *possibly* authorised under an AMP.

1.4. **Unknown.** All other category B clearing fell in this category. Unknown does not mean unauthorised. It could include development approvals for other clearing than HVA clearing. These are generally small but multitudinous and difficult to track down because there is no comprehensive central registry available to the public. The SARA registry only contains development applications for which the state is the assessment manager. Most non-agricultural development and even some agricultural development can be approved by local councils.

2. High Value Regrowth categories C or R.

2.1. **Probably Accepted Development Codes**. Boundaries were extracted from the DCDB for any properties for which clearing of these categories was notified, and clipped to categories C and R respectively extracted from the *Regulated Vegetation Map* as current on 24/6/2015, largely as described above for category B remnant. Any clearing which overlapped these extracted category C and R areas were deemed possibly due to these regrowth specific ADCs.

2.2. **Unknown** any clearing of these vegetation categories other than that above.

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[22] Note that some small areas of category A as of Nov 2015, appeared to have been cleared in 2015-16, but this is was disregarded because it was sure to have been category B at the time of clearing, then was found to be unauthorised and then remapped as category A –totally protected—by the regulator as an enforcement action.

[23] http://www.dilgp.qld.gov.au/planning/development-assessment/sara-assessment-manager-decisions.html

[24] https://data.qld.gov.au/dataset/vegetation-management-register-of-self-assessable-code-notifications

3. **Exempt**

   3.1. **X** any clearing that intersected category X on the *Regulated Vegetation Map* as current on 24/6/2015, exclusive of the below.

   3.2. **X (PMAV)** any clearing that intersected category X on a Property Map of Assessable Vegetation (PMAV) current as of 18/3/2015.

4. **Outside** the jurisdiction of the Act. The *Regulated Vegetation Map* as current on 24/6/2015 was modified to ensure all national parks and state forests were classified as outside the scope of the Act as provided in section 7, and any clearing there classified accordingly.

Notified or approved clearing yet to be exercised

We mapped and quantified areas of remnant (Cat B) or High Value regrowth (C or R) with potential yet to be cleared as follows.

First, any regulated vegetation overlapping a High Value Agriculture approval area as mapped above, but not mapped as cleared from 2013-16, was deemed to be category B yet to be exercised under a HVA (1.1 above).

Second, all areas of category B (or C or R combined) on properties notified under ADCs up to 20/7/2016 which did not overlap areas cleared from 2013 to 2016, were deemed to be probably at risk of future clearing. To these areas, we added areas notified from 20/7/2016 up until 30/9/2017, the latest that had been posted to the register as of Jan 2018 (see Fig. 7).

For these later notifications, all of which are "yet to be exercised", actual areas intended to be cleared are provided in the public register. We extracted property boundaries as described above and clipped to categories B, C or R respectively. There were many instances where an area greater than that of the relevant category actually present on the property was notified. In such cases, we corrected the area notified to be no more than the area of regulated vegetation available.

There were also multiple notifications made under different codes which added up to more than the area of the regulated vegetation category available. In such cases, we assigned areas to codes in a hierarchy starting with thinning (the most prevalent), then fodder, then other minor codes, until the total area available was filled, so that the total of areas notified under respective codes could not exceed the area of regulated vegetation available.

Finally, there were many instances where the same properties had also been notified for clearing in the earlier period before 20/7/16. The areas notified later from 20/7/2016 up until 30/9/2017, were subtracted from the total areas of the relevant categories available, to give corrected estimates of the areas available for clearing in the 2013-16 period, but not yet exercised.

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