



Woody vegetation change, Statewide Landcover and Tree Study (SLATS) for 2018

Summary

This summary provides figures relating to the loss of woody vegetation due to agriculture, forestry and infrastructure activities across NSW. It also reports on fires visible in the imagery due to a reduction in woody canopy cover.

The woody vegetation change figures for the 2017 and 2018 periods are generated using Sentinel 2 imagery (see Figure 1**). The figures for the 2015 and 2016 periods are based on analysis between SPOT5, SPOT6 and Sentinel 2 imagery (see Figure 1 *). Previously reported periods between 1988 and 2013 are based on SPOT5 and Landsat imagery, these are included in **Results Woody Vegetation Change Statewide (SLATS) 2018 (758KB XLSX)** for comparison.

Woody change is detected through a combination of automated and manual interpretation of the differences between images captured during summer of each year. Satellite images are selected as close as possible to 1 January each year and must have a clear view of the ground and not impacted by smoke or cloud cover. This requirement can result in a range of imagery dates being selected for each SLATS year, e.g. the 109 Sentinel-2 images required to cover NSW for SLATS 2018 ranged from November 2018 to late January 2019. For this reason, resulting clearing figures are reported as rates of change for each calendar year. For more information about SLATS, visit **Statewide Landcover and Tree Study**.

Figures generated within each SLATS report may be updated in future reports to reflect improved processing methods, data availability or changed administrative boundaries

Figures on both woody and non woody vegetation loss after 25 August 2017 under the *Local Land Services Act* are available from the **Landcover Change on Rural Regulated Land 2018 reports**.

Activities to manage Invasive Native Species (INS) is generally identified as non woody cover loss, however some is counted in the overall woody cover loss. INS management is intended to improve the local environment by removing some native plants that have reached very high densities, dominating an area. These activities are designed to promote the regeneration and regrowth of a more natural, and more diverse, range of native vegetation.

Statewide trends in woody vegetation loss

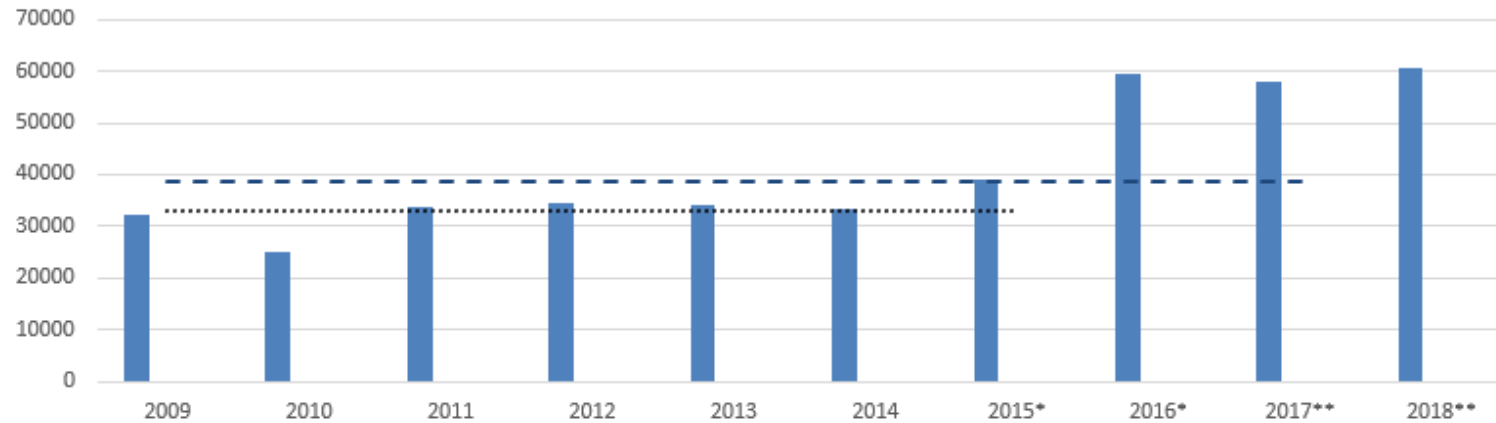


Figure 1. Trends in annual rate of woody vegetation loss (ha/year) against the average 2009 –2017 (dashed line) and average 2009-2015 (dotted line)

The calculated annual reduction of woody vegetation across NSW for 2018 was 60,800 ha/year or 0.08% of the area of NSW.

Figure 1 shows annual rates of woody vegetation loss are trending up and continue to be well above the 2009-2017 annual average.

Figure 1.1 Statewide woody vegetation clearing by landcover class for 2018 (ha/year)

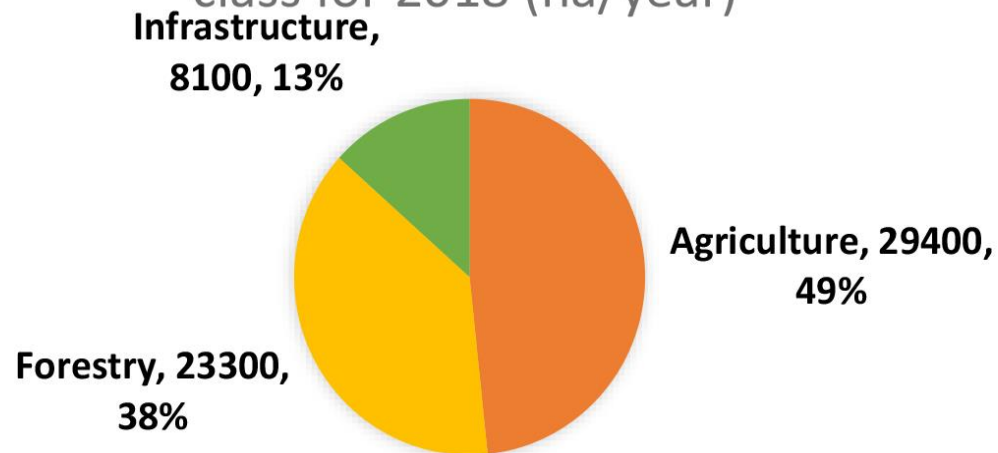


Figure 1.1 Proportion of woody vegetation loss for 2018 by landcover class

Figure 1.1 shows woody vegetation loss for agricultural practices (cropping, pasture and thinning) accounted for almost half of the total woody vegetation loss for 2018 (29,400 ha/year), followed by forestry and infrastructure (rural and major infrastructure).

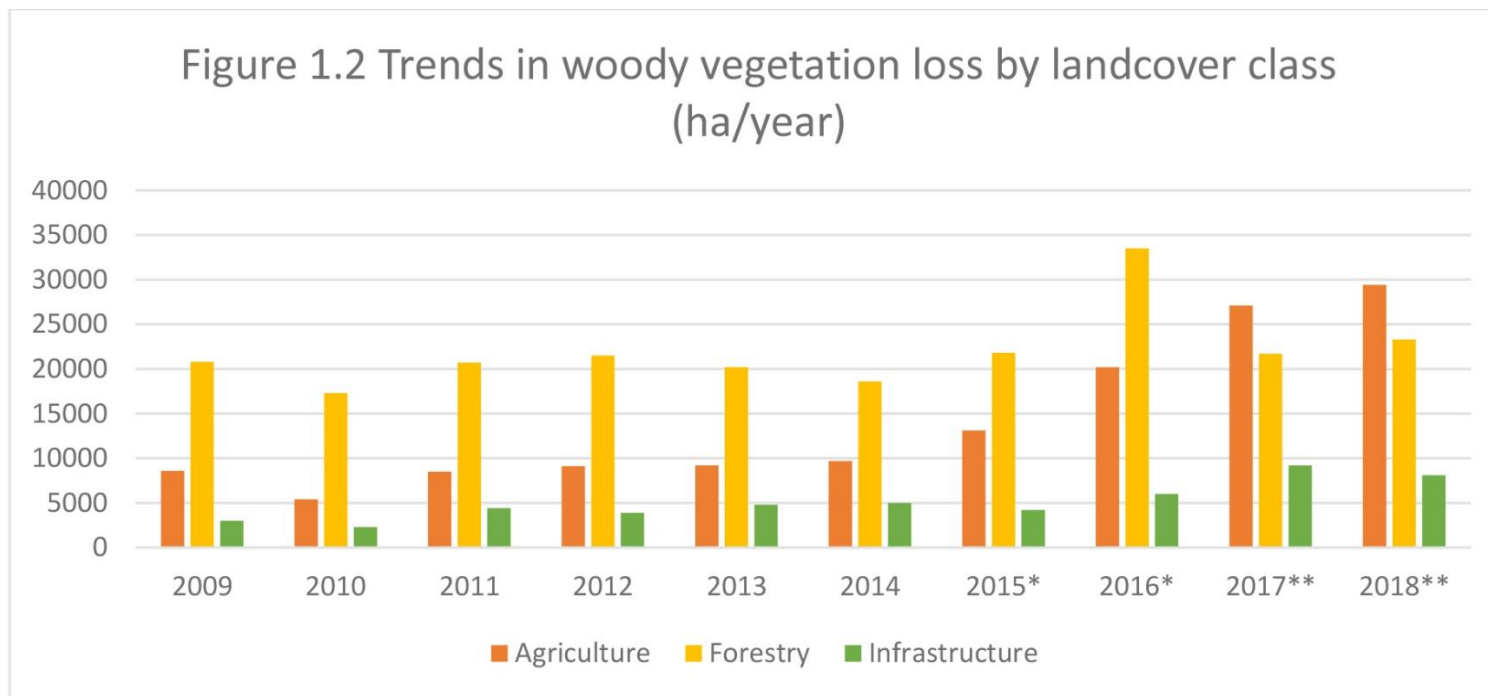


Figure 1.2 Woody vegetation loss by landcover class over time

Figure 1.2 shows that woody vegetation loss for agriculture is driving the upward trend. At 29,400 ha/year the annual rate for agriculture is over twice the 2009-2017 annual average (12,300 ha/year). Forestry is slightly above average (23,300ha/year) and for the second consecutive year, agriculture surpassed forestry as the dominant driver of vegetation loss. Figure 1.3 shows the location of clearing for 2018. The hot spots in central NSW are attributed to agricultural clearing (Figure 3.0), those in the south and east are attributed to forestry (Figure 2.1).

Summary woody vegetation change statewide (SLATS) 2018

All clearing (hectares)

- None
- 0 - 20
- 20 - 40
- 40 - 80
- 80 - 140
- 140 - 210
- 210 - 280
- 280 - 360
- 360 - 500
- 500 - 640
- 640 - 1160
- 1160 - 1470

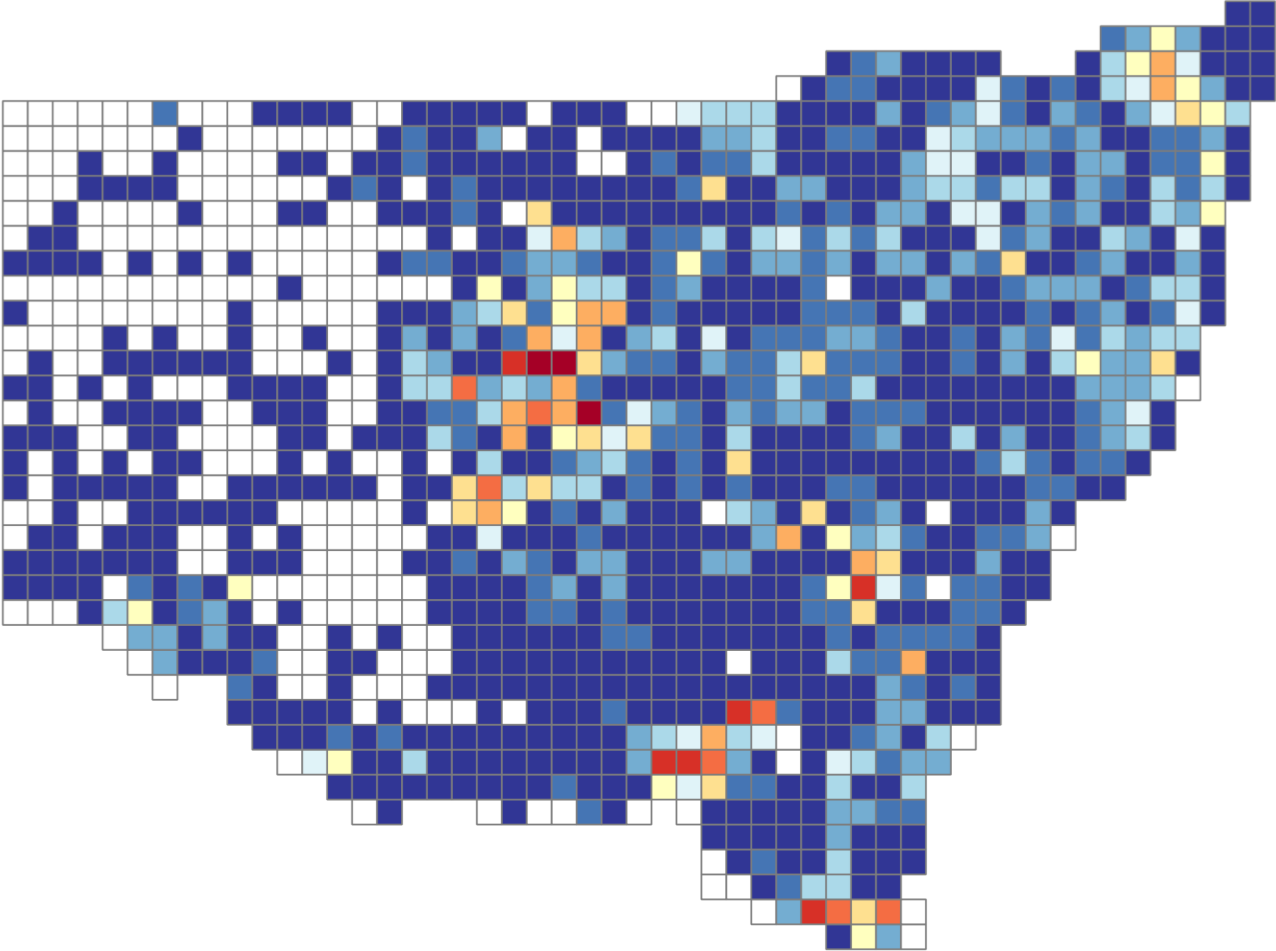


Figure 1.3 Geographic distribution of woody vegetation loss

Summary woody vegetation change statewide (SLATS) 2018

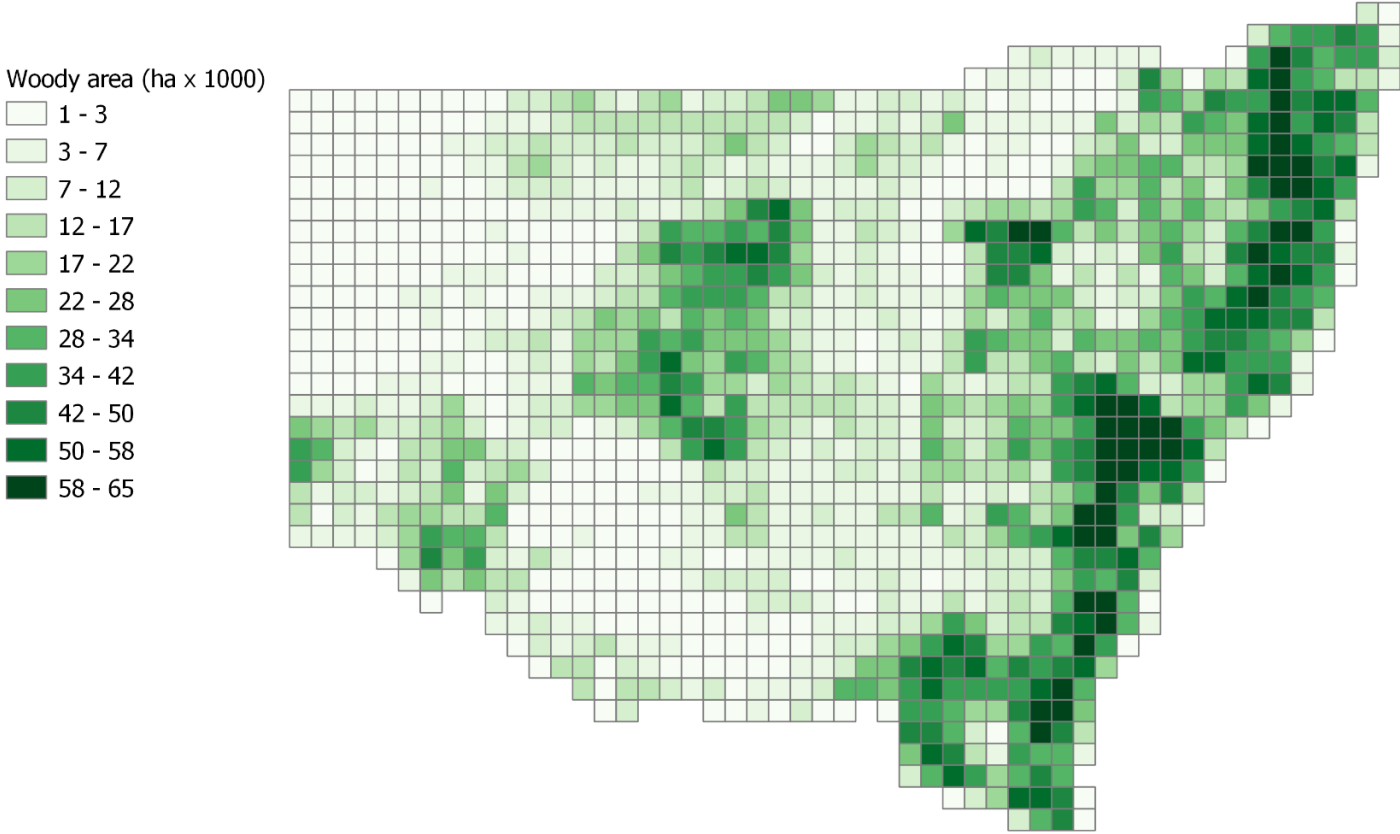


Figure 1.4 Geographic distribution of existing woody vegetation

Summary woody vegetation change statewide (SLATS) 2018

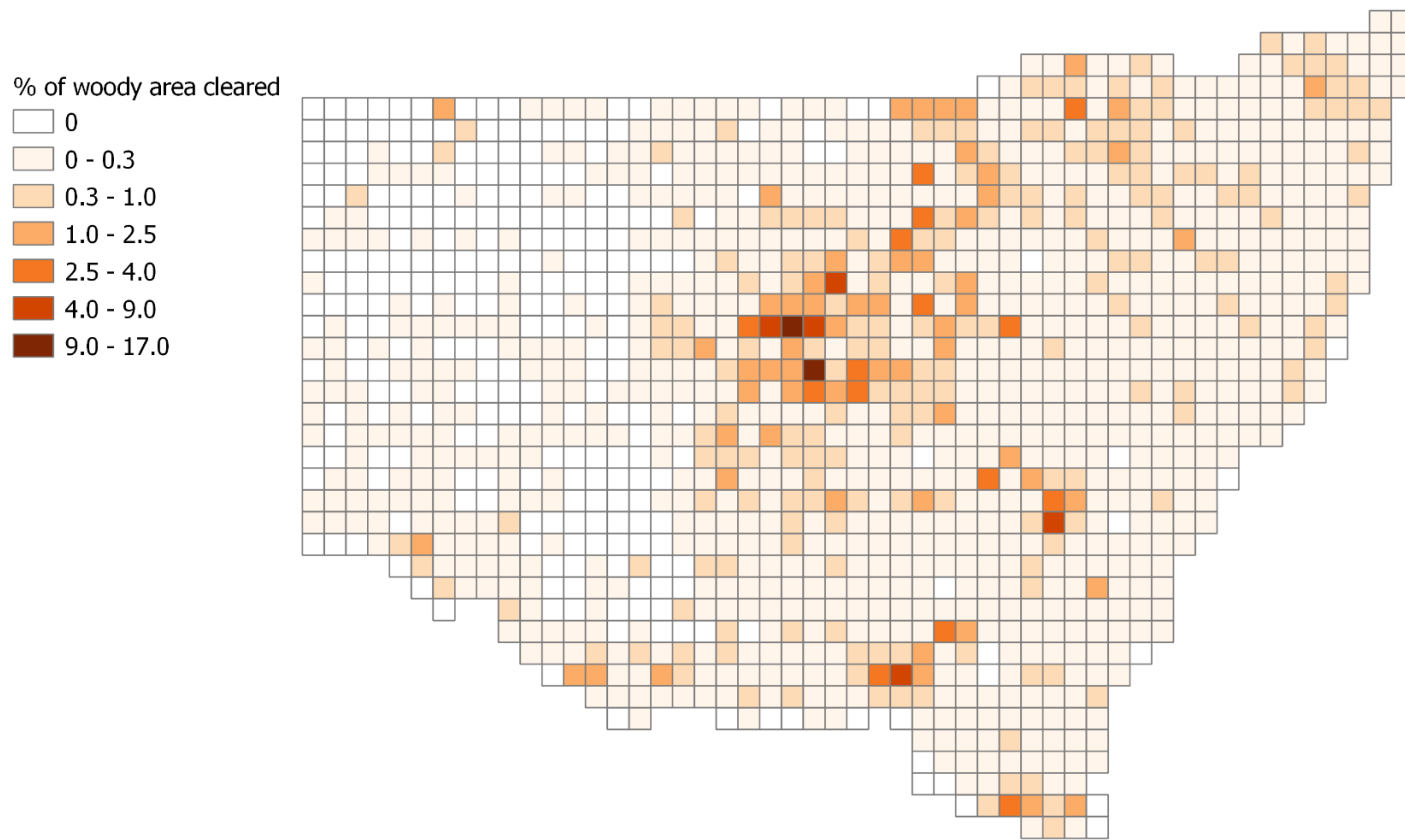


Figure 1.5 Woody vegetation loss as a percentage of existing woody vegetation

Figure 1.4 shows the geographic distribution of the existing woody vegetation by 25X25km grid cell across NSW. Figure 1.5 shows where the vegetation loss is having the greatest proportional impact on the area of existing woody vegetation.

Forestry

Forestry class includes areas where vegetation loss has been attributed to forest harvesting activities. This includes private native forestry, harvesting within state forests and harvesting within plantations. Figure 1.2 shows rates of forestry harvesting for the 2018 period has increased to 23,300 ha/year compared to the 2017 rate of 21,700 ha/year, the rate remains well below the 2016 rate of 33,540 ha/year.

Geographic information system analysis was used to divide woody loss due to forestry into categories based on the tenure and management practice. These woody vegetation loss rates are presented in Figure 2.

31% of forestry woody vegetation loss in 2018 occurred on freehold or leasehold tenure and the other 69% occurred on state forest tenure. 60% of woody vegetation loss was in plantations and the other 40% was in native forests.

It should be noted that forest re-establishment usually occurs in the areas subjected to forest harvesting. Figure 2.1 shows the forestry activity was widespread over the eastern third of the state.

Summary woody vegetation change statewide (SLATS) 2018

Era		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Av. of previous years	Av. of all including latest year	Total
State Forest	Native	8310	5290	8100	8720	7490	6180	5390	10010	5240	4650	7190	6940	69390
	Plantation pine	7020	8350	8240	9170	8210	7230	7250	9100	6730	8520	7920	7980	79820
	Plantation hardwood	310	450	280	240	270	130	140	140	540	650	280	320	3150
	Sub total	15640	14090	16620	18130	15970	13540	12780	19250	12520	13820	15390	15240	152360
Freehold and Leasehold	Native	1950	980	1540	1590	1430	970	1230	2190	4030	2920	1770	1880	18830
	Plantation pine	3080	2260	2520	1810	2690	3810	6060	6540	3650	3990	3600	3640	36410
	Plantation hardwood	130	0	0	0	110	280	1730	5560	1400	2430	1020	1160	11630
	Plantation harvested - other									110	150	110	130	260
Sub total	5160	3240	4060	3400	4230	5060	9020	14290	9180	9490	6400	6710	67130	
Sub total	Native	10260	6270	9640	10310	8920	7150	6620	12200	9280	7580	8960	8820	88220
	Plantation	10540	11060	11040	11220	11280	11450	15180	21340	12420	15730	12840	13130	131270
Total	Forestry	20800	17330	20680	21530	20200	18600	21800	33540	21700	23310	21800	21950	219490

Figure 2. Woody vegetation loss split by tenure and forestry activity.

Forestry (hectares)

- None
- 0 - 20
- 20 - 40
- 40 - 80
- 80 - 140
- 140 - 210
- 210 - 280
- 280 - 360
- 360 - 500
- 500 - 640
- 640 - 1160
- 1160 - 1470

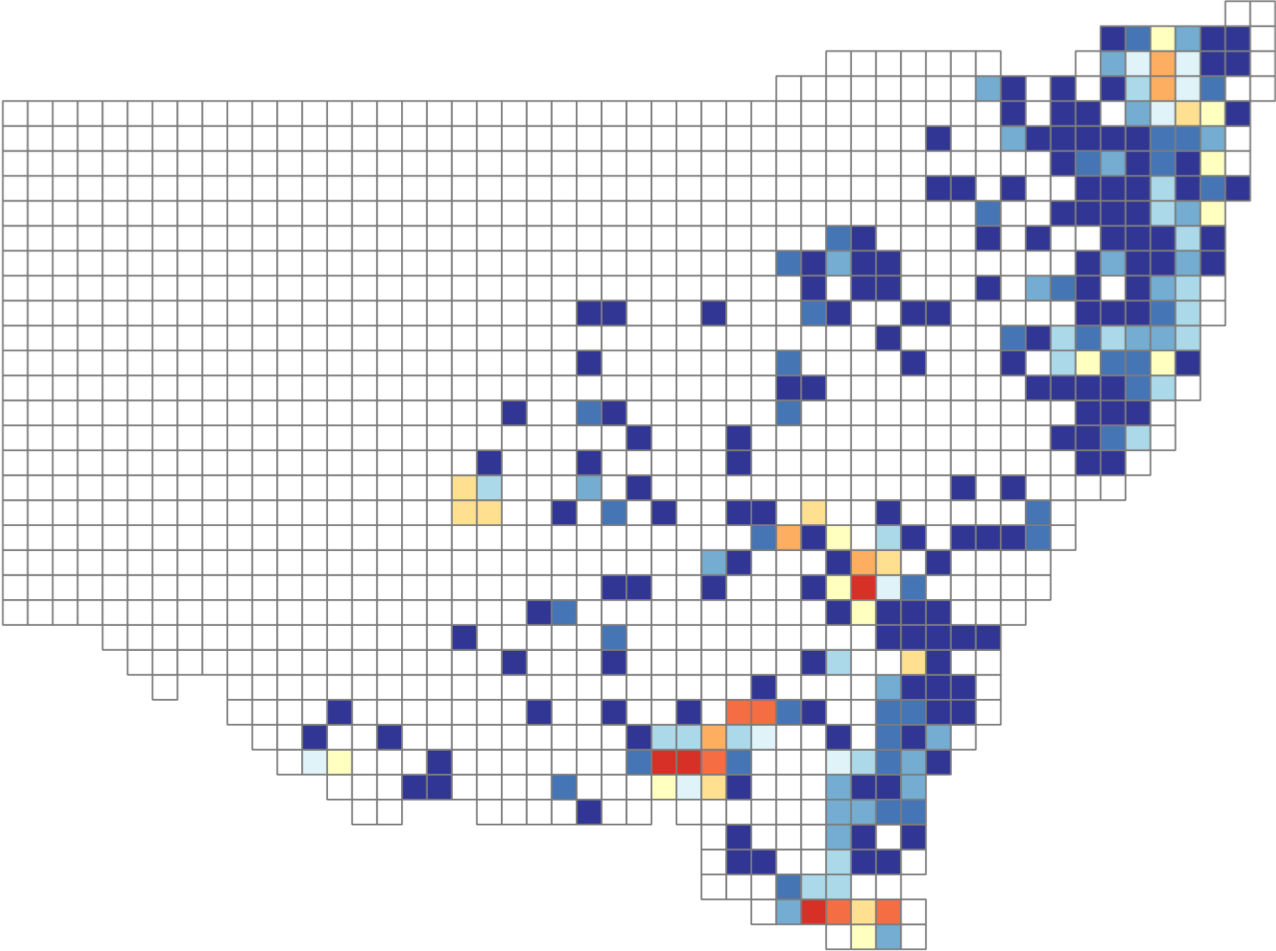


Figure 2.1 Geographic distribution of woody vegetation loss due to forestry

Agricultural

This class includes areas of woody vegetation loss due to agricultural activities such as cropping or pasture. Figure 1.2 shows a steady increase in the rate of vegetation loss due to agricultural activity. The annual rate for 2018 was 29,400 ha/year compared with 27,100 ha/year in 2017 and 20,200 ha/year in 2016. Figure 3. shows the increased rate of woody vegetation loss is focused in central NSW.

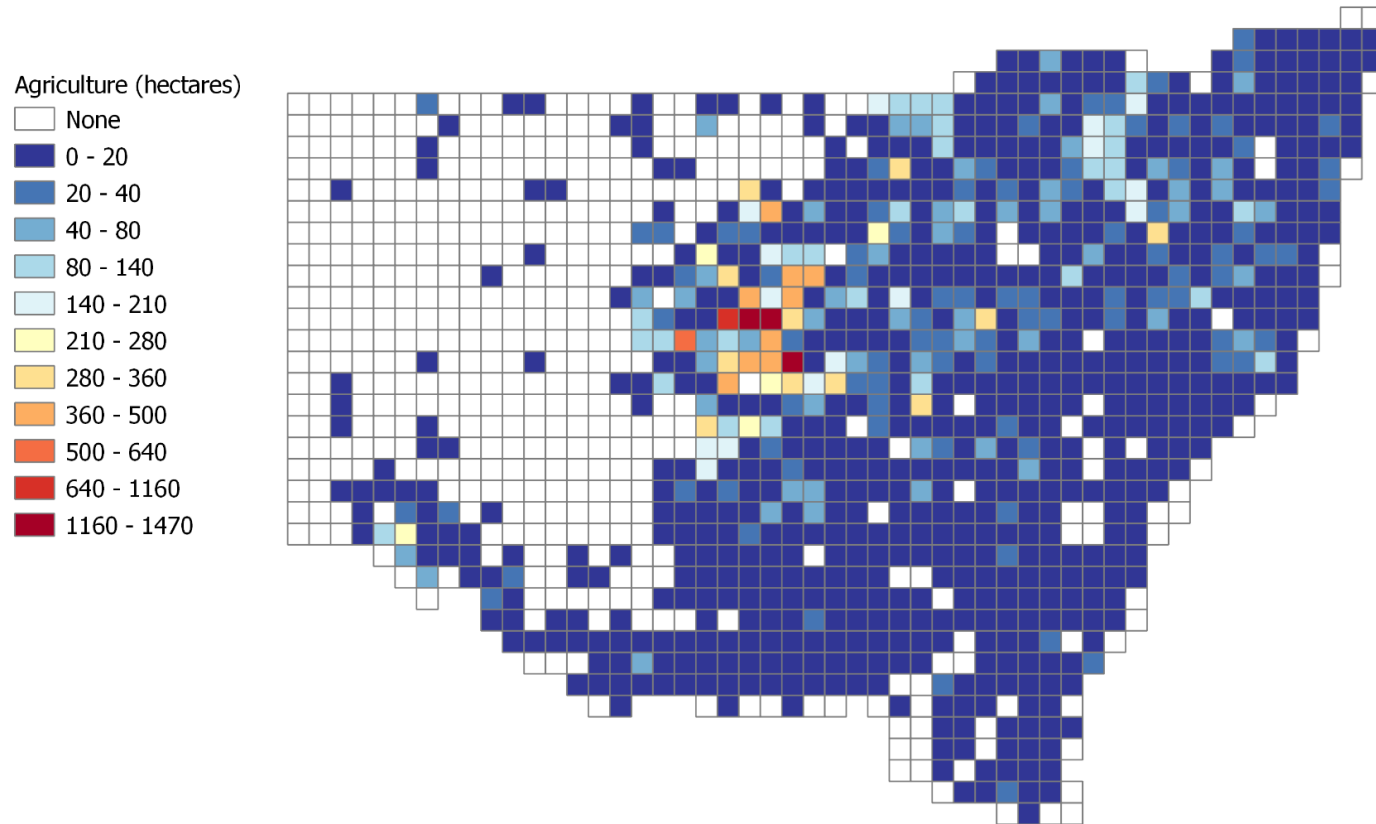


Figure 3. Geographic distribution of agricultural clearing

Infrastructure

This class includes all activities where the woody vegetation loss may be due to rural infrastructure activities including creation of fence lines and firebreaks, or major infrastructure activities such as installing power lines, water pipelines, highways, roads and major works. This class includes mine extensions and related mining activities.

The rate of woody vegetation loss due to rural and major infrastructure has decreased 12% to 8,100 ha/year in 2018 from 9,200 ha/year in 2017. Figure 4. shows a relatively even distribution of woody vegetation loss due to infrastructure across the state.

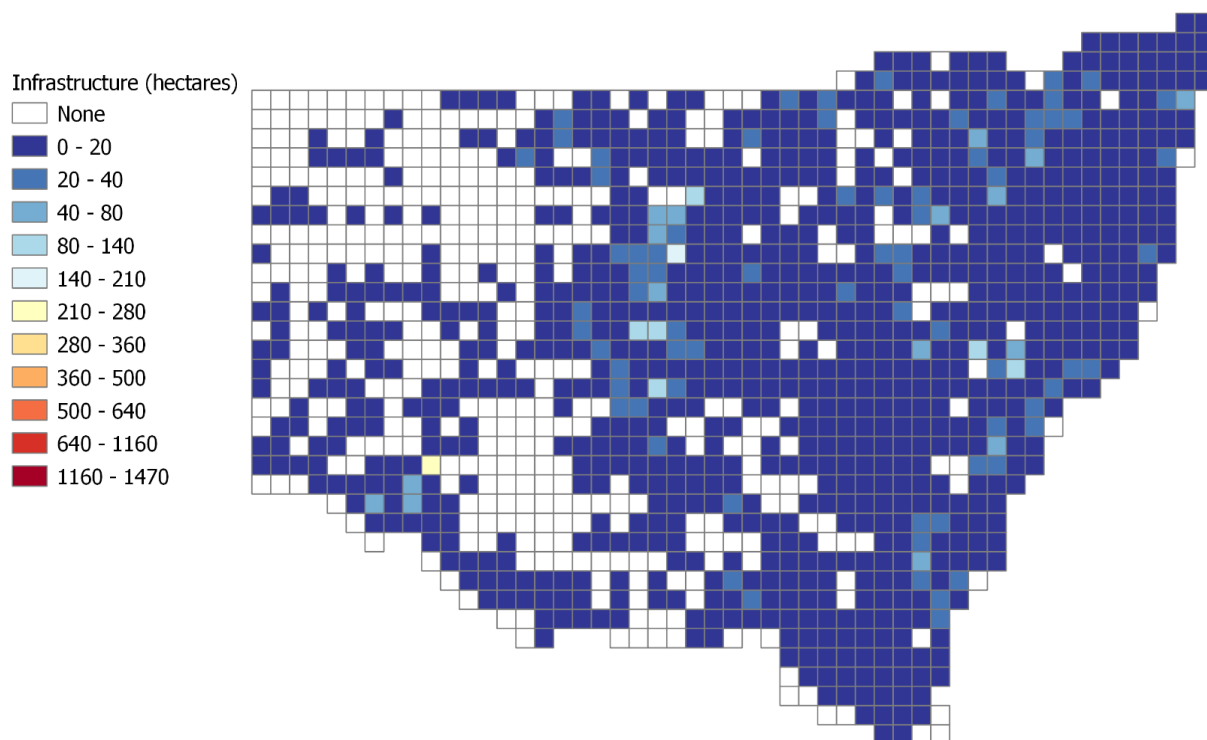


Figure 4. Geographic distribution of woody vegetation loss classed as infrastructure

Fire

Fire is not considered permanent woody vegetation loss and is therefore not included in total woody clearing figures.

This class includes areas where the woody canopy cover has been reduced due to fire-related effects. This class does not capture all historic fire scars, only those that had substantial leaf reduction at the time of image acquisition compared to the previous year. In most cases the reduction in woody vegetation cover in areas identified as fire scars is temporary and does not result in a permanent reduction in woody vegetation cover.

The rate of woody vegetation loss due to fire for 2018 was 38,600ha/year; the highest recorded since 2013.

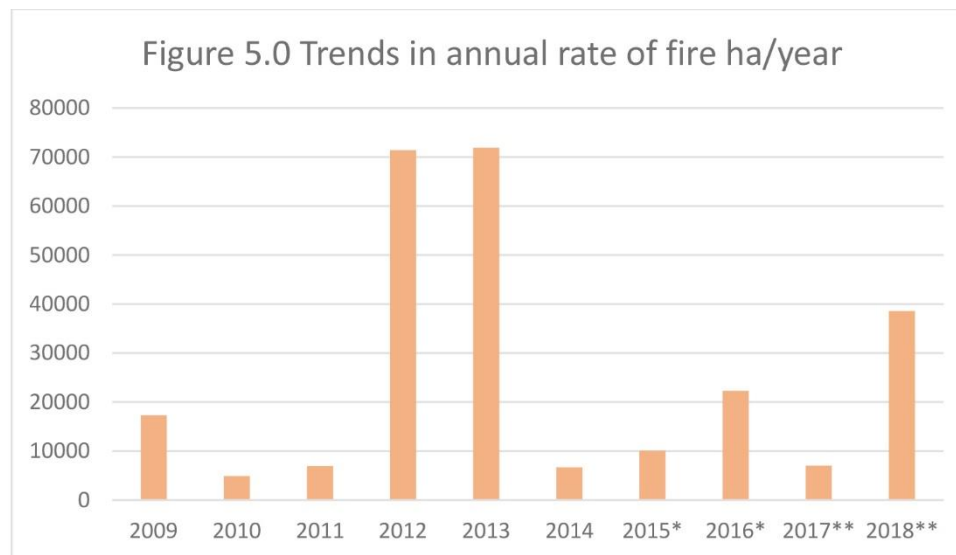


Figure 5. Trends in annual rate of fire ha/year

Changes in satellite imagery

Previous SLATS analysis in the period 2009–2014 included measurements of woody vegetation change based on analysis of SPOT5 imagery. It was not possible to continue the annual SPOT5 based monitoring beyond 2014 due to the decommissioning of SPOT5 on March 31, 2015. The replacement SPOT6 and 7 satellites don't capture the spectral bands required for existing change detection algorithms.

The Sentinel 2 satellite was launched on June 23, 2015, captures very similar spectral bands to SPOT5 and provides some additional spectral bands. With these additional bands Sentinel 2 imagery has higher spectral resolution compared to SPOT 5. While the Sentinel 2 pixel size is nominally coarser (10m) compared to SPOT5 (5m), it's more similar to SPOT5 resolution than the previous Landsat (30m) imagery. For the 2015 and 2016 reporting period, the change detection algorithm was run across a 2-year period (including both 2015 and 2016 based on a combination of SPOT5 for images closest to 1 January 2015 and Sentinel 2 for or images closest to 1 January 2017. The year the change occurred was attributed by spatial analysts based on a change image created from these two images and visual interpretation of a SPOT6 2016 image.

From 2017 onwards annual woody change analysis is undertaken using Sentinel 2 imagery. Approximately 109 Sentinel 2 tiles covering NSW were analysed using the SLATS automated processing methods at a resolution of 10m. A small percentage (approximately 2%) of the total NSW area is not interpreted each year due to cloud cover in the imagery used.

The probability of woody vegetation change data from the automated process is then visually interpreted and categorised to ensure a high level of accuracy and consistency. This interpretation of the change analysis is performed by a team of regionally based interpreters with local expertise. During the validation stage, all interpretation of change was cross checked by a second image interpreter.

More information

- **Landcover monitoring and reporting ([link](#))**
- [SEED](#)

Environment, Energy and Science (EES), Department of Planning, Industry and Environment
Locked Bag 5022, Parramatta NSW 2124; Phone: 1300 361 967 (EES enquiries);
Email: info@environment.nsw.gov.au; Website: www.environment.nsw.gov.au
ISBN 978-1-922431-36-3; EES 2020/0258; June 2020.