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DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Woody vegetation change, Statewide Landcover and Tree Study

Summary report 2019

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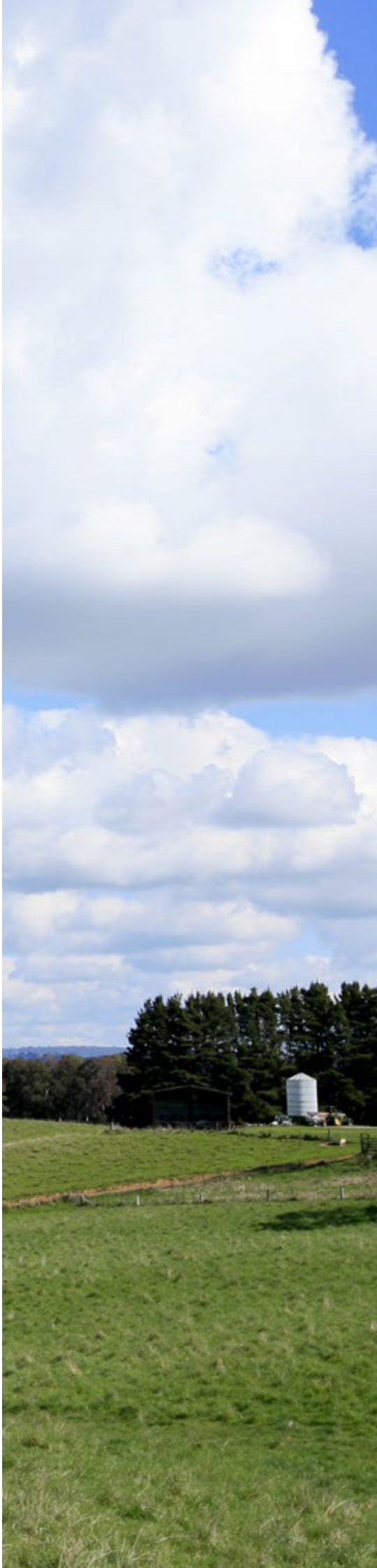

Contents

Introduction 1

Statewide trends in woody vegetation loss 2

Woody vegetation loss by landcover class 3

Agriculture 6

Forestry 7

Infrastructure 9

Changes in satellite imagery 11

List of figures

Figure 1 Trends in annual rate of woody vegetation loss **2**

Figure 2 Proportion of woody vegetation loss for 2019 by landcover class **3**

Figure 3 Woody vegetation loss by landcover class **3**

Figure 4 Geographic distribution of woody vegetation loss **4**

Figure 5 Geographic distribution of existing woody vegetation **4**

Figure 6 Woody vegetation loss as a percentage of existing woody vegetation **5**

Figure 7 Geographic distribution of agricultural clearing **6**

Figure 8 Trends in forest harvesting by tenure **8**

Figure 9 Geographic distribution of forest harvesting **8**

Figure 10 Trends in woody vegetation loss in the four main categories of the infrastructure landcover class **9**

Figure 11 Proportion of vegetation loss for categories of the infrastructure landcover class **10**

Introduction

This summary report provides key findings for loss of woody vegetation due to agriculture, forestry and infrastructure activities across New South Wales (NSW) in 2019.

Methods used to detect woody vegetation change have changed since yearly monitoring began in 2007. The results for woody vegetation change in 2017–19 were generated using imagery from the Sentinel-2 satellite (Figure 1). Results for 2015 and 2016 were based on analysis of imagery from SPOT-5, SPOT-6 and Sentinel-2 satellite sensors (Figure 1). Results reported between 1988 and 2014 were based on SPOT-5 and Landsat imagery. The full results for each year from 1988, including rates of woody vegetation loss across different land management units, are available in Results woody vegetation change statewide landcover and tree study 2019 (XLS 200KB) for comparison.

Woody vegetation change is detected through a combination of automated and manual interpretation of the differences between images captured during summer each year. Satellite images are selected as close as possible to 1 January for that year. Images must have a clear view of the ground and not be impacted by smoke or cloud cover. This requirement can result in images being captured on a range of dates each year. For example, the 109 Sentinel-2 images selected for the 2019 Statewide Landcover and Tree Study (SLATS) were generated between September 2019 and late April 2020; however, clearing figures are reported as rates of change in hectares for each calendar year. Visit our Statewide Landcover and Tree Study webpage for more information.

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

Figures on woody and non woody vegetation loss after 25 August 2017 under the Local Land Services Act 2013 are available in the Woody and non woody landcover change on rural regulated land: Summary report 2019.

Fire extent and severity is now reported each year using fire extent and severity mapping, an approach developed by our scientists in collaboration with the NSW Rural Fire Service. Read the Fire extent and severity mapping annual report for the 2019–20 fire season.

See our 2019 Landcover change reporting webpage for information about woody and non woody vegetation change in 2019.

Statewide trends in woody vegetation loss

The calculated annual loss of woody vegetation for 2019 was 54,500 hectares or 0.08% of the area of NSW.

Annual rates of woody vegetation loss were slightly lower for the 2019 reporting year compared with 2016–18 (Figure 1). The 2019 figure continues to exceed the 2009–2017 average of 38,800 hectares.

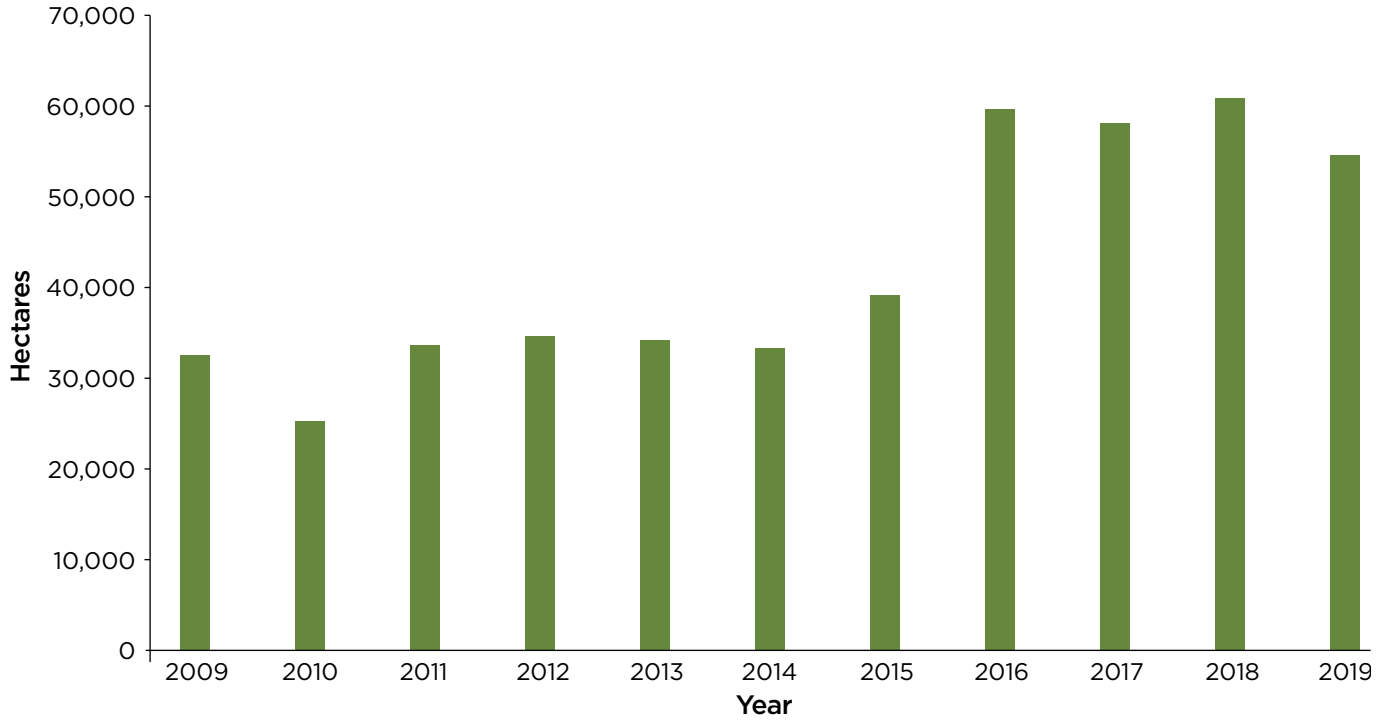

Figure 1 Trends in annual rate of woody vegetation loss (hectares/year). Results for 2009–2014 are based on SPOT-5 and Landsat imagery; 2015–16 results are based on SPOT-5, SPOT-6 and Sentinel-2 imagery; and results for 2017–19 are based on Sentinel-2 imagery

Woody vegetation loss by landcover class

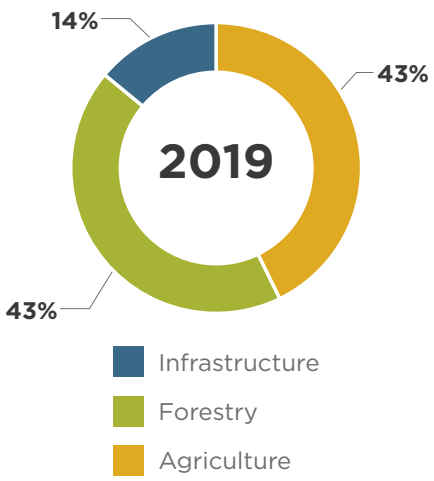

Figure 2 Proportion of woody vegetation loss by landcover class

Vegetation loss is assigned a landcover class that indicates the likely purpose for which vegetation was removed. These classes are assigned using visual cues and a range of ancillary data when interpreting imagery.

Woody vegetation clearing is identified in three classes:

- agriculture
- forestry
- infrastructure.

Woody vegetation loss from agricultural practices such as cropping, pasture and thinning, and forestry (state and private) were each 43% of total vegetation cleared (Figure 2). When combined these practices account for 86% of all clearing.

Clearing activities related to infrastructure accounted for the remaining 14% of vegetation loss, which was comparable to the previous year's figures (Figure 3).

There was a 20% decrease in clearing of woody vegetation due to agriculture in 2019 compared to 2018. This varied from the previous trend of increased clearing due to agriculture between 2017 and 2018 (Figure 3). This decrease in clearing for agriculture accounted for 95% of the overall decrease in the 2019 total annual clearing figure.

Vegetation loss for the forestry class remained relatively stable. In comparison to 2018, clearing for forestry increased by about 1% at 23,500 hectares.

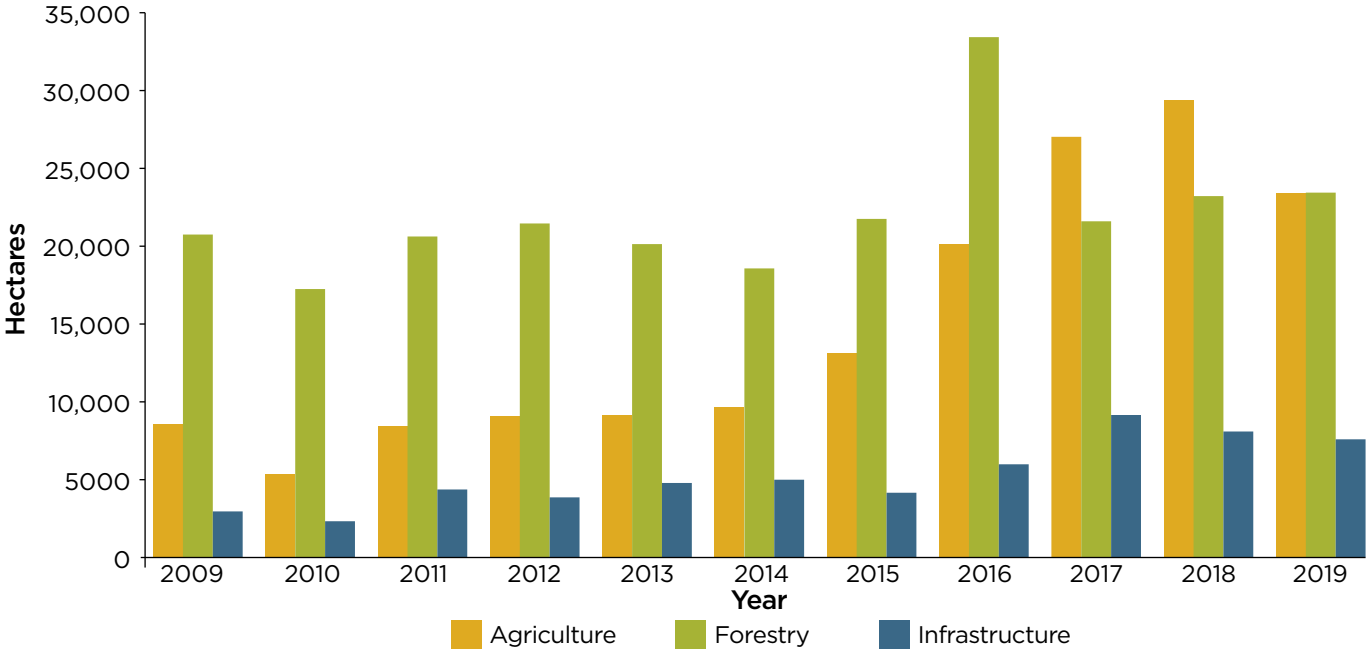

Figure 3 Woody vegetation loss by landcover class. Results for 2009–2014 are based on SPOT-5 and Landsat imagery; 2015–16 results are based on SPOT-5, SPOT-6 and Sentinel-2 imagery; and results for 2017–19 are based on Sentinel-2 imagery

Figure 4 shows the location of clearing for 2019. The hot spots in central NSW were attributed to agricultural clearing (Figure 7), and those in the south and east were attributed to forestry (Figure 9).

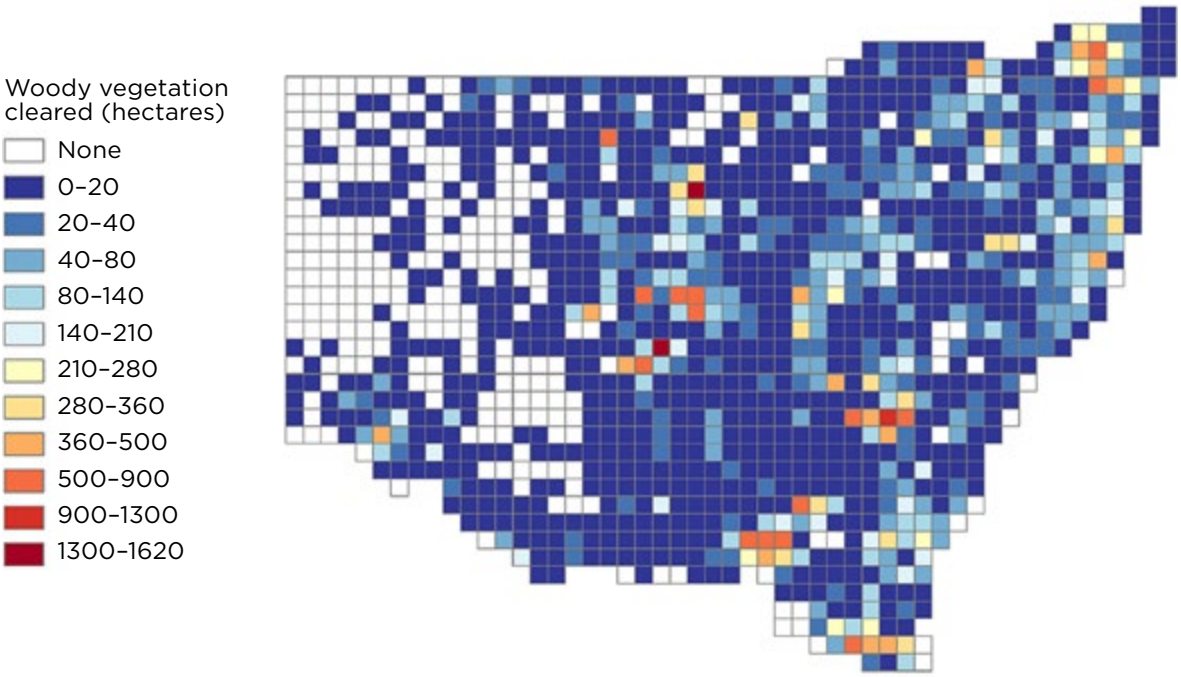

Figure 4 Geographic distribution of woody vegetation loss

The geographic distribution of existing woody vegetation across NSW in 2019 is represented by a 25×25-kilometre grid cell map in Figure 5.

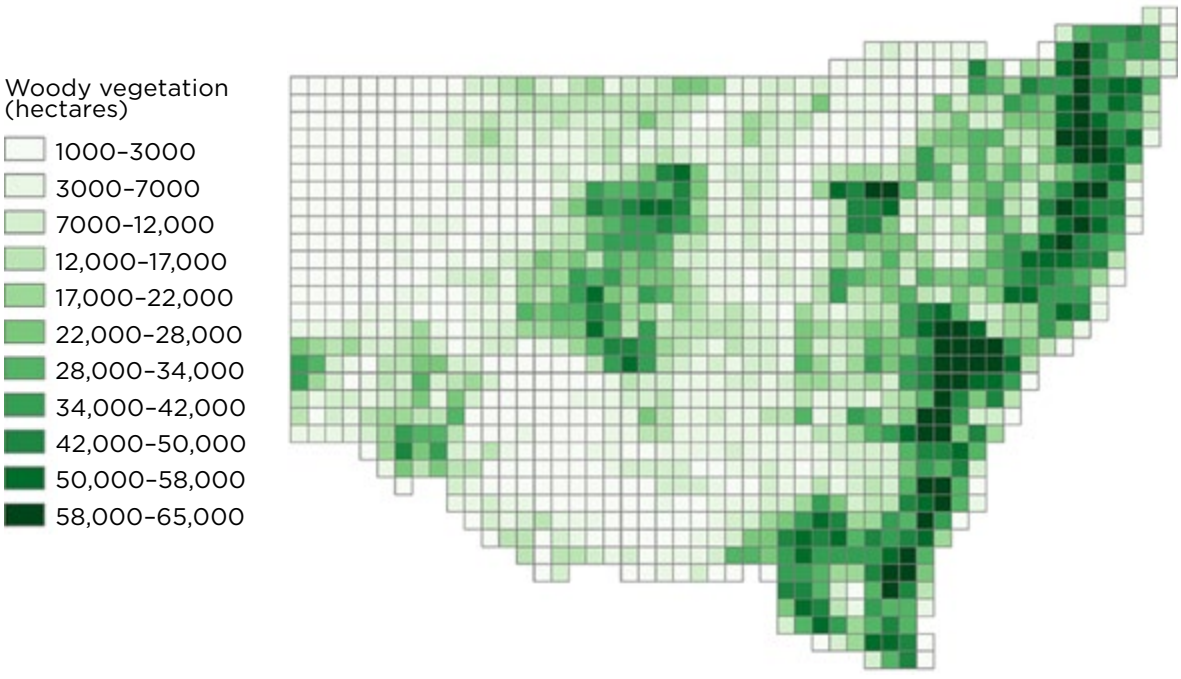

Figure 5 Geographic distribution of existing woody vegetation

Figure 6 shows where vegetation loss had the greatest proportional impact on areas of existing woody vegetation.

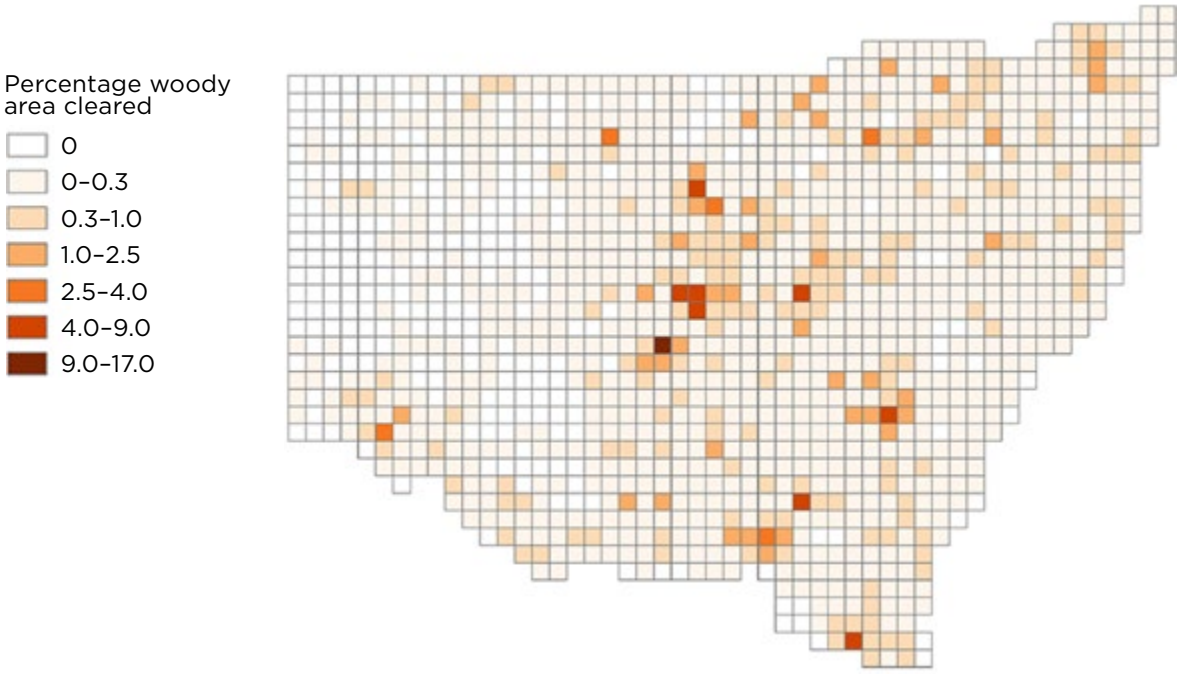

Figure 6 Woody vegetation loss as a percentage of existing woody vegetation

Agriculture

This landcover class includes areas of woody vegetation loss due to agricultural activities such as cropping or establishing pasture. There was a decrease in the rate of vegetation loss due to agricultural activity from 29,400 hectares in 2018 to 23,400 hectares in 2019 (Figure 3). Figure 7 shows the increased rate of woody vegetation loss due to agriculture is focused in central NSW.

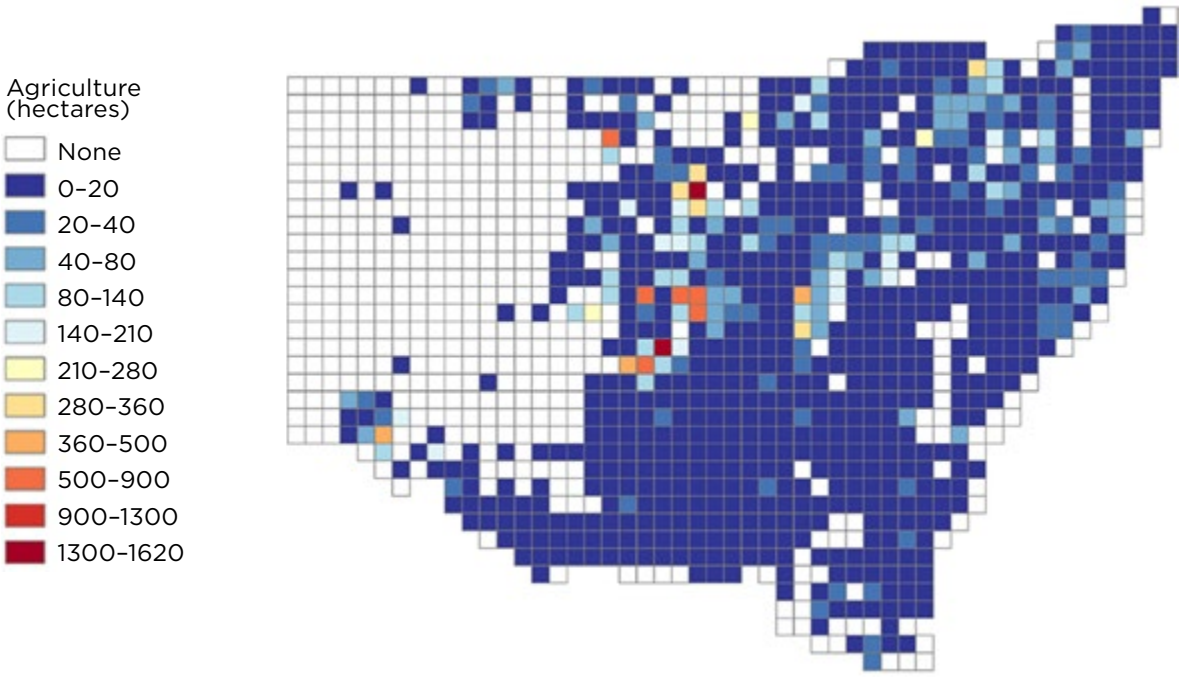

Figure 7 Geographic distribution of agricultural clearing

Forestry

The forestry landcover 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. Geographic information system analysis was used to divide woody vegetation loss due to forestry into categories based on land tenure and management practice (Table 1).

Rates of forest harvesting for the last 3 years has been relatively stable, with 23,500 hectares of forest harvested in 2019.

Table 1 Woody vegetation loss by tenure and forestry activity.

Tenure	Forest activity	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Previous years' average (2009–18)	Average for all years	Total
State forest	Native	8,310	5,290	8,100	8,720	7,490	6,180	5,390	10,010	5,240	4,650	4,850	6,940	6,750	74,240
	Plantation pine	7,020	8,350	8,240	9,170	8,210	7,230	7,250	9,100	6,730	8,520	7,300	7,980	7,920	87,120
	Plantation hardwood	310	450	280	240	270	130	140	140	540	650	900	320	370	4,060
	Sub total	15,640	14,090	16,620	18,130	15,970	13,540	12,780	19,250	12,520	13,820	13,050	15,240	15,040	165,410
Freehold/ leasehold	Native	1,950	980	1,540	1,590	1,430	970	1,230	2,190	4,030	2,920	2,050	1,880	1,900	20,880
	Plantation pine	3,080	2,260	2,520	1,810	2,690	3,810	6,060	6,540	3,650	3,990	5,060	3,640	3,770	41,470
	Plantation hardwood	130	0	0	0	110	280	1,730	5,560	1,400	2,430	3,160	1,160	1,350	14,800
	Plantation harvested – other	–	–	–	–	–	–	–	–	110	150	190	130	150	450
	Sub total	5,160	3,240	4,060	3,400	4,230	5,060	9,020	14,290	9,180	9,490	10,470	6,710	7,050	77,600
Sub total	Native	10,260	6,270	9,640	10,310	8,920	7,150	6,620	12,200	9,280	7,580	6,900	8,820	8,650	95,120
	Plantation	10,540	11,060	11,040	11,220	11,280	11,450	15,180	21,340	12,420	15,730	16,630	13,130	13,450	147,900
Total	**Forestry**	**20,800**	**17,330**	**20,680**	**21,530**	**20,200**	**18,600**	**21,800**	**33,540**	**21,700**	**23,310**	**23,520**	**21,950**	**22,090**	**243,010**

Figure 8 shows a significant increase in the proportion of forest harvesting on freehold/leasehold land from 2015. It should be noted that forest re-establishment usually occurs in areas subjected to forest harvesting.

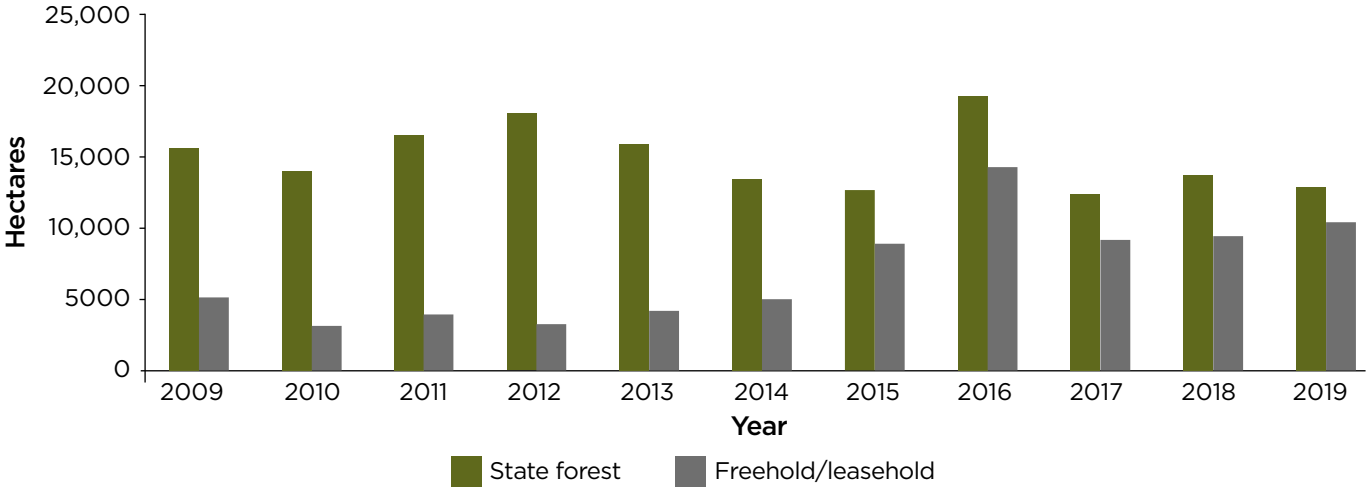

Figure 8 Trends in forest harvesting by tenure. Results for 2009–2014 are based on SPOT-5 and Landsat imagery; 2015–16 results are based on SPOT-5, SPOT-6 and Sentinel-2 imagery; and results for 2017–19 are based on Sentinel-2 imagery

Figure 9 shows that forestry activity continues to be widespread over the eastern third of the state.

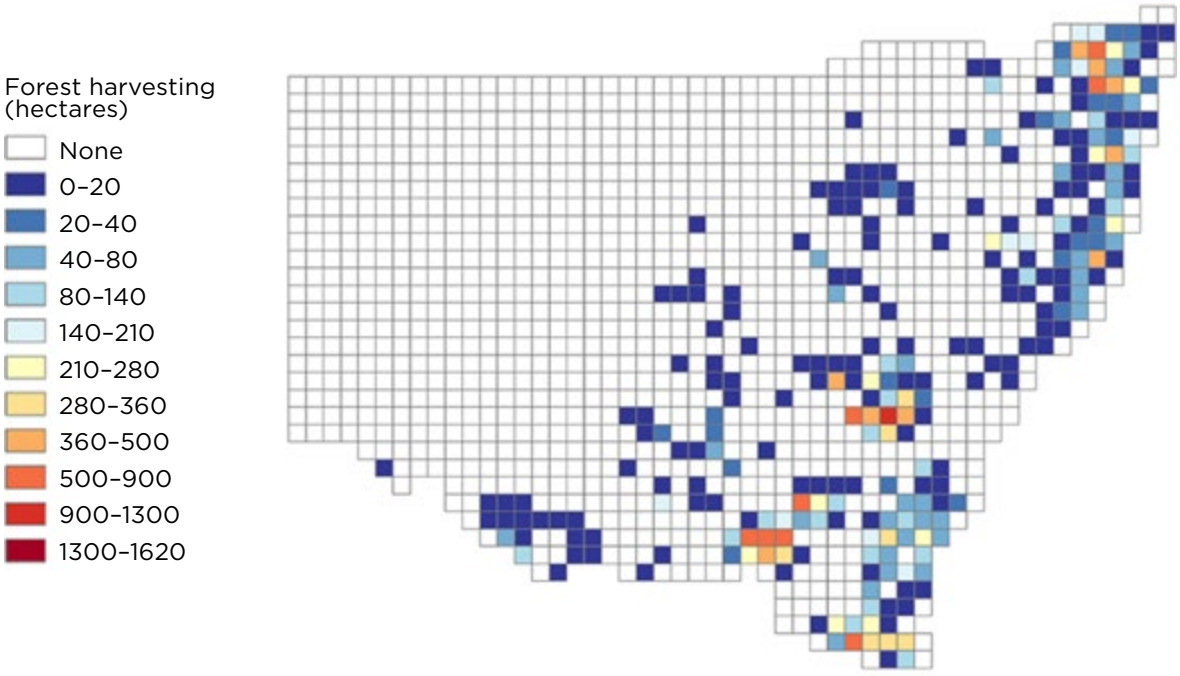

Figure 9 Geographic distribution of forest harvesting

Infrastructure

This landcover class includes activities where woody vegetation loss is 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 decreased to 7580 hectares in 2019 from 8070 hectares in 2018. Figure 10 shows infrastructure clearing trends across four main categories in the infrastructure class since 2015. This figure demonstrates that farm infrastructure has been the major contributor to vegetation loss due to infrastructure; however, this has continued to decrease since 2017.

Due to the extent of the 2019–20 fire season clearing due to firefighting activities, such as clearing for roads and trails surrounding or within recent fire scars, was captured as a separate category. Clearing for regular maintenance of fire trails is not included in this category.

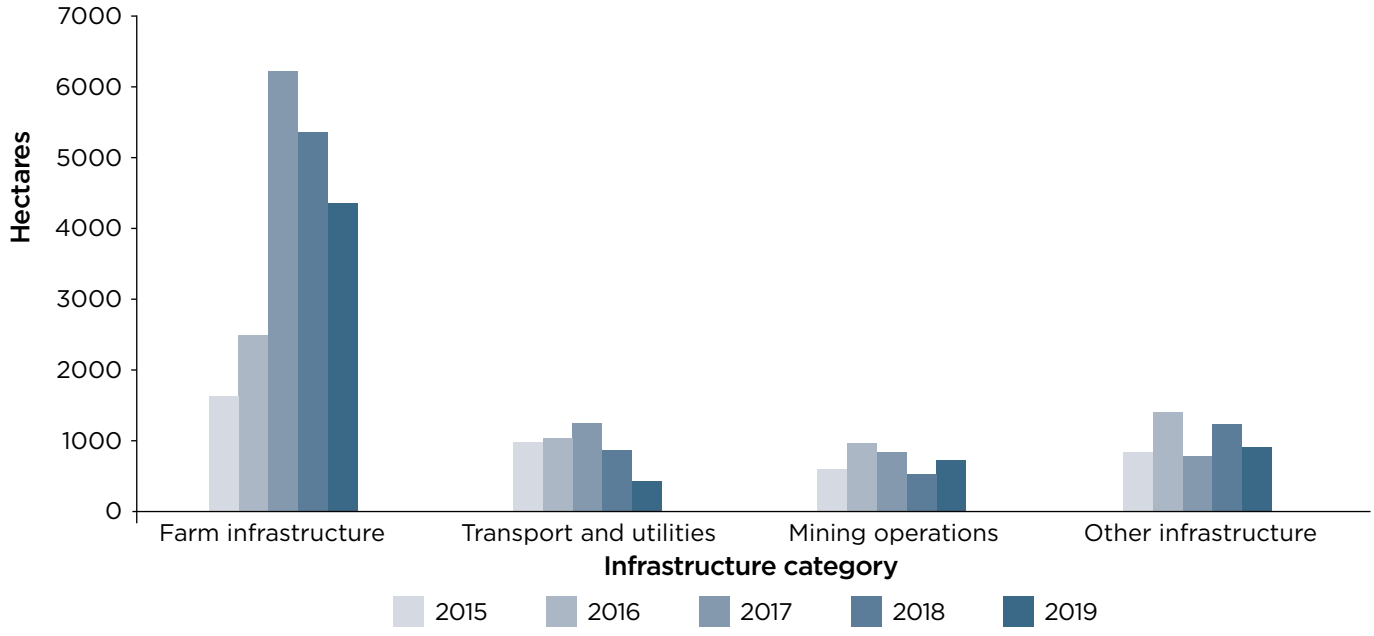

Figure 10 Trends in woody vegetation loss in the four main categories of the infrastructure landcover class. Results for 2015–16 are based on SPOT-5, SPOT-6 and Sentinel-2 imagery; and results for 2017–19 are based on Sentinel-2 imagery

In 2019, 1080 hectares of vegetation was cleared for firefighting, accounting for 14% of vegetation loss in the infrastructure class. This surpassed individual figures for transport and mining, which were 450 and 740 hectares respectively, and combined accounted for 16% of vegetation loss in the infrastructure class (Figure 11).

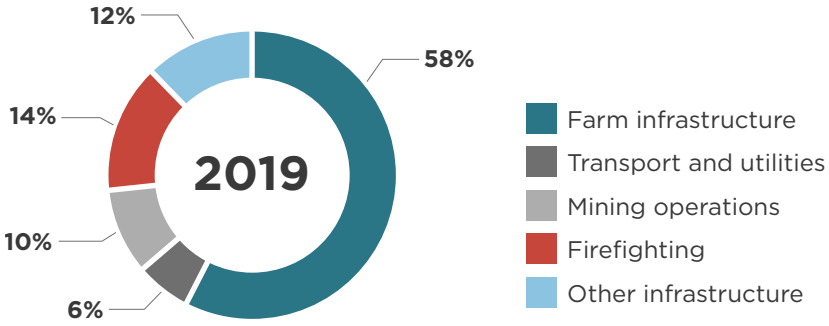

Figure 11 Proportion of vegetation loss for categories of the infrastructure landcover class

Changes in satellite imagery

Previous Statewide Landcover and Tree Study (SLATS) analyses between 2009 and 2014 included measurements of woody vegetation change based on analysis of SPOT-5 imagery. The SPOT-5 satellite was decommissioned on 31 March 2015. The Sentinel-2 satellite mission was launched on 23 June 2015, and the SLATS program transitioned to this newer satellite during the 2015 and 2016 reporting periods. From 2017 onwards, annual woody change analysis has been undertaken using Sentinel-2 imagery. For both satellite sources, probability change data from an automated process is visually interpreted and categorised by a team of expert interpreters.

SLATS datasets are available on the NSW Government's Sharing and Enabling Environmental Data (SEED) portal, and our Landcover monitoring and reporting webpage has more information about how we monitor and report on landcover change.