SUBMISSION

WESTERN AUSTRALIA NATIVE VEGETATION POLICY CONSULTATION DRAFT

[redacted]

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Findings and Recommendations

Refer: Policy Strategy 3.1; 3.4;

1. The Native Vegetation Extent (NVE) dataset is severely out-of-date, especially in the Wheatbelt and adjacent to the eastern South Coast.

2. The Land Monitor vegetation datasets, although being produced on a timely (annual) basis, contain significant problems due to the failure to identify native vegetation loss, as opposed to all vegetation loss (and gain).

3. The provision of a new tool for identifying vegetation loss should be advanced rapidly, but it must be able to distinguish native vegetation. The new tool must be built to either

- Allow automated discrimination of remnant vegetation from other vegetation (plantations, revegetation etc.), or
- Integrate an up-dated version of the NVE dataset.

4. The new tool has to be based on imagery that is both regularly updated, but also of sufficient resolution to allow accurate identification of native vegetation.

5. To allow for support to remotely-sensed datasets, and to provide cover in the period of development of a replacement, the NVE dataset should be resourced to update all areas where the basis of vegetation identification is over 5 years old. These areas are identified in this submission.

6. In the short term, the Land Monitor website should provide a facility to overlay the NVE data over the top of the various products (such as Vegetation Extent), with additional information showing the age of the NVE polygons.

7. The State Government should provide funds to properly make existing data on vegetation extent (as provided through Land Monitor) more available, and support efforts to make this data useful to practitioner-level users.

Refer: Policy Strategy 3.4

1. A series of projects, providing a consistent vegetation classification to the standard of the Albany Regional Vegetation Survey, should be funded and rolled out over the south-west of WA.

2. These projects should initially be in areas not covered by the Coastal plan mapping of Heddle, or the RFA area.

Refer: Policy Strategy 4.3

1. Strategy 4.3 completely fails to address the complexity of the current situation in regard to fire management in a drying Climate, and the impacts of prescribed burning on native vegetation.

2. The strategy should be focussed on finding ways of maintaining hazard reduction through non-burning alternatives for hazard reduction.

3. The Strategy should promote research into the impacts of fire on native vegetation.

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Introduction

This submission to the Policy Consultation Draft has the following aims:

1. To expand on points I made in my submission to the Draft Strategy in May 2020;

- That the quality, but particularly the currency of vegetation extent mapping is poor; and
- That the quality of vegetation type/association mapping is poor.

2. To provide feedback on Roadmap Priorities in Strategy 3 of the Native Vegetation Policy Consultation Draft ('the Draft'), particularly 3.1, 3.3 and 3.4.

Background:

I am a consultant working in the area of conservation prioritisation and management, in many cases for regional NRM groups. I have been involved in sourcing and analysing GIS data for these groups for over 20 years. During this time I have not only carried out many projects, but have also conducted GIS training for nearly 200 people working in NRM and with State and Local government.

Over this time, one common issue has been the provision and quality of digital datasets. This problem has been rectified to some extent with improvements in data provision through Landgate, and Geoscience Australia at the federal level. However, data quality remains an issue, most notably (in my work) with vegetation data.

Over the last 18 months, I have been slowly progressing a project examining native vegetation mapping in WA, in particular the Native Vegetation Extent (NVE) dataset. In the first stage I examined the age of the photography used in the delineation of native vegetation across the SW of the State in the NVE mapping. While the deficiencies of this dataset are well understood (and clearly lie underneath proposals in Strategy 3.1 of the Draft), I will present some of my results to illustrate both how pressing a review of this dataset is, but also how geographically selective the shortcomings are. The second stage of this project is an evaluation of the NVE dataset versus the current digital extent mapping on LandMonitor, which is derived from Landsat imagery. This stage is still in progress, but I will extract a few examples to compare the NVE dataset to the Land Monitor data, and show that a much better digital alternative is required.

Native Vegetation Extent Mapping

Background

Loss of native vegetation is a major and on-going problem in South-Western Australia (and everywhere else in Australia probably). It is one major driver of species stress and species extinctions, and contributes to land degradation through dryland salinity and erosion.

The current commonly used estimates of native vegetation extent are based on work done by the WA Department of Primary Industry and Regional Development (DPIRD) – formerly the WA Department of Agriculture and Food, to develop the 'Native Vegetation Extent' datasets. These datasets contain vegetation extent polygons from the mapping of remnant vegetation in Western Australia.[1] A significant aspect of the Native Vegetation Extent dataset is that updating of the data is done piecemeal, based on the latest aerial photography for an area, so that in any year's release much of the data is old – up to 20 years out-of-date. Thus the picture given of vegetation clearing is inaccurate: up to 20 years out-of-date.

Similar concerns about the nature of this data are expressed in a recent report done for the WA Biodiversity Science Institute paper by McFarlane and Wallace (2019), which is referenced in the Native Vegetation Strategy Issues paper.

These problems are highly significant - because this dataset is intersected with pre-European vegetation mapping and used as the basis for the annual analyses of the conservation status of vegetation produced by DBCA, which informs conservation status rankings under the Biodiversity Conservation Act 2016 and clearing decisions under the Environment Protection Act 1986.

Selected Results

I am not sure if another detailed study has been made of the extent of out-of-date polygons. From the analysis I have carried out it is clear that the shortcomings are located in specific areas. The simple map below indicates that substantial parts of the Wheatbelt – where the most severe clearing for agriculture has taken place, and where vegetation associations are most under threat - have not been updated for up to 20 years.

[1] The data was originally compiled as part of the vegetation theme of the National Land and Water Resource Audit (NLWRA), and in the intensive land-use zone (ILZ) in south-western Australia was derived from 1995 LandSat TM satellite imagery. It has been progressively updated and corrected over time using digital aerial photography (orthophotos) by DAFWA/DPIRD post-NLWRA with assistance from CALM/DEC/DPAW/DBCA.

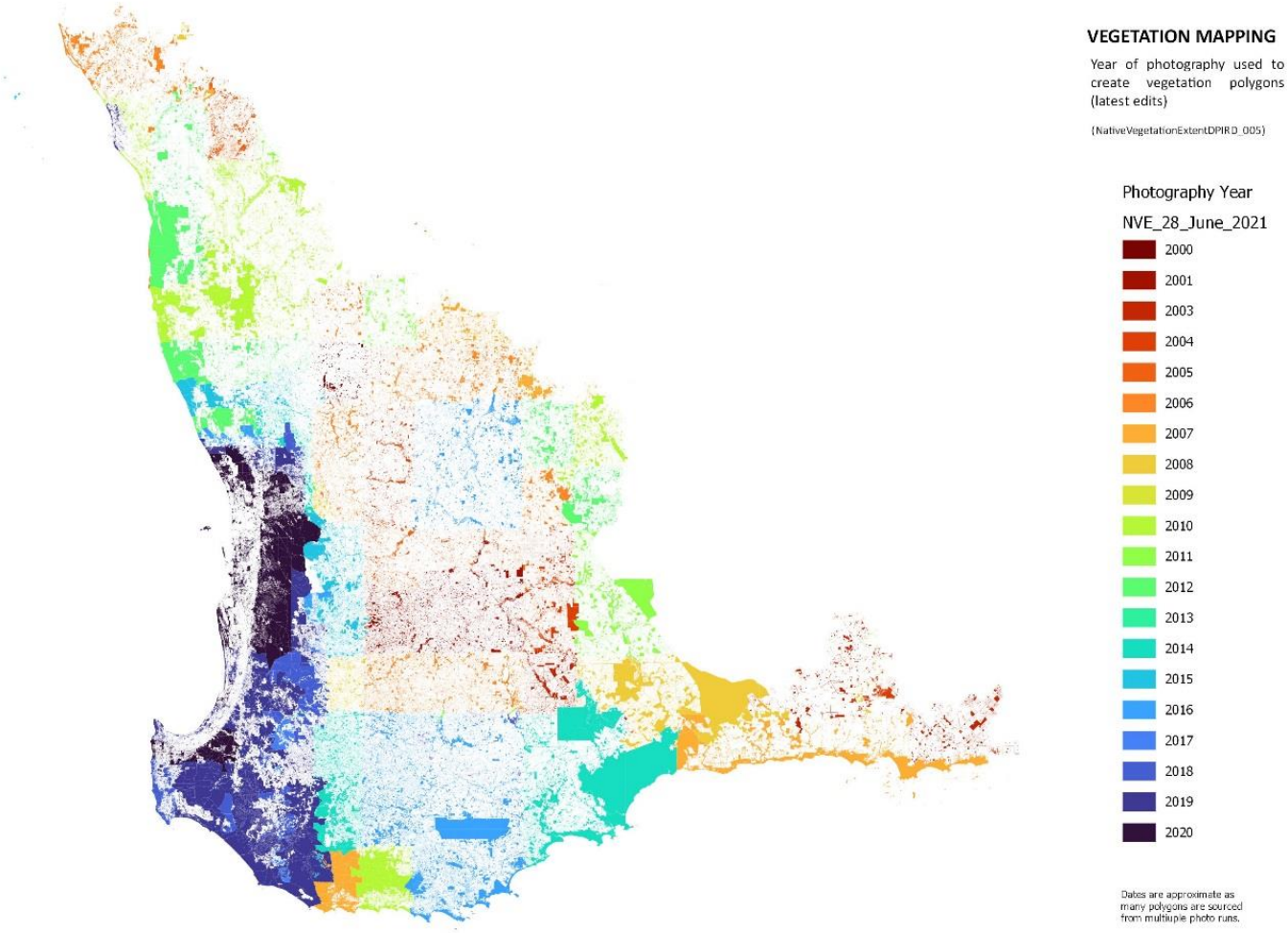

Figure 1 - Photography Dates for NVE dataset downloaded 28th June 2021

The following two tables present a regional analysis of the update time of the NVE dataset. They show that in some sub-regions (Forest, Leeuwin-Scott Coastal plain) there has been significant progress in data updating over the last year, but that in some subregions (Esperance Coastal and Esperance Wheatbelt) there has been no improvement to a poor situation, and that in others (Albany Coastal, Wheatbelt) the situation is slipping.

At 2020	Albany Coastal	Esperance Coastal	Esperance Wheatbelt	Fitzgerald Coastal	Forests	Leeuwin-Scott Coastal	Northern and Interior	Northern Coastal Plain	Swan Coastal Plain	Wheatbelt
Less than 5 years old	60.9%	0.0%	0.0%	0.0%	47.8%	18.2%	0.0%	0.0%	72.4%	16.9%
5 to 9 years old	7.3%	0.0%	0.0%	80.6%	36.4%	69.6%	22.6%	78.4%	27.6%	29.0%
10 to 14 years old	31.7%	99.3%	60.5%	19.4%	15.7%	11.5%	75.6%	21.6%	0.0%	39.9%
15 or more years old	0.0%	0.7%	39.5%	0.0%	0.0%	0.7%	1.7%	0.0%	0.0%	14.3%

Table 1 - 2020 Categorised Photography Year (%) – All Zones

At 2021	Albany Coastal	Esperance Coastal	Esperance Wheatbelt	Fitzgerald Coastal	Forests	Leeuwin-Scott Coastal	Northern and Interior	Northern Coastal Plain	Swan Coastal Plain	Wheatbelt
Less than 5 years old	0.0%	0.0%	0.0%	0.0%	79.9%	100.0%	0.0%	0.1%	62.5%	2.1%
5 to 9 years old	68.3%	0.0%	0.0%	80.6%	9.8%	0.0%	0.1%	78.4%	37.5%	39.4%
10 to 14 years old	31.7%	99.3%	60.5%	19.4%	10.3%	0.0%	98.3%	20.7%	0.0%	29.8%
15 or more years old	0.0%	0.7%	39.5%	0.0%	0.0%	0.0%	1.5%	0.8%	0.0%	28.7%

Table 2 - 2021 Categorised Photography Year (%) – All Zones

The data currency is strongly related to distance from Perth and the south-west tip of the state, as priority would appear to be given to areas with rapid development pressures. This is illustrated in the next figure.

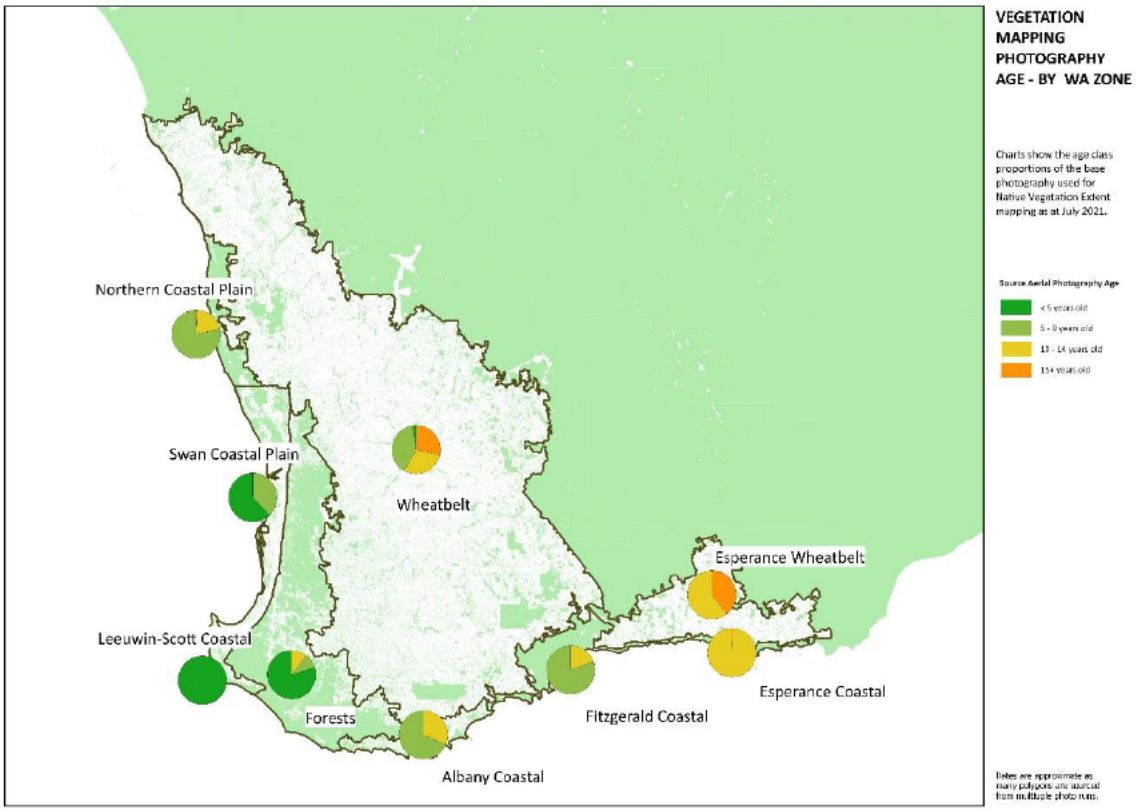

Figure 2 - Vegetation Mapping Photography Age 2021 – By Zone

Looking at NVE dataset currency by the regional NRM areas, we can see the development focus clearly, with the Swan, Peel-Harvey and South-West regions all getting preferential updates to photography, while the NACC, Wheatbelt RNM and SCNRM have virtually no recent updates and at least 50% of the vegetation mapping over 10 years old:

	Wheatbelt NRM	Northern Agricultural Region	Peel-Harvey Region	Rangelands Region	South Coast Region	South West Region	Swan Region	Total
Less than 5 years old	1.5%	3.8%	78.7%	0.8%	0.2%	77.9%	86.3%	29.8%
5 to 9 years old	30.6%	42.7%	14.3%	0.0%	49.3%	13.1%	13.7%	31.4%
10 to 14 years old	30.8%	39.7%	1.4%	84.4%	45.3%	3.2%	0.0%	25.9%
15 or more years old	37.1%	13.8%	5.6%	14.8%	5.2%	5.7%	0.0%	12.9%

Table 3 - 2021 Categorised Photography Year (%) – NRM Regions

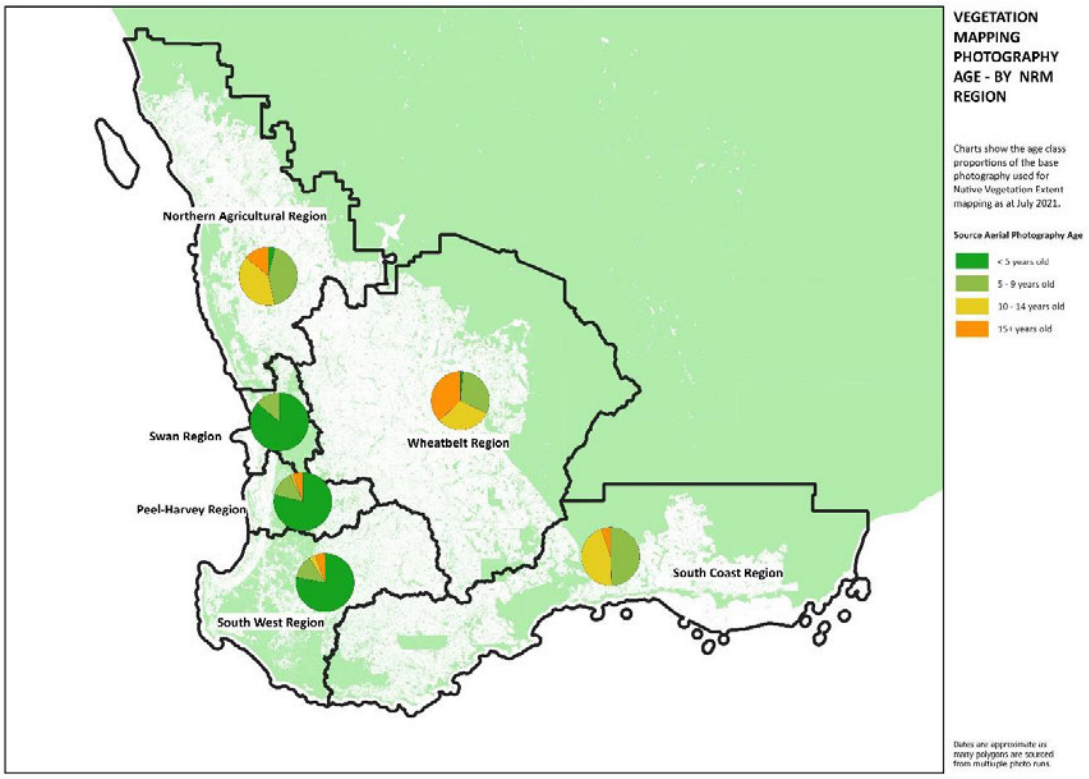

Figure 3 - Vegetation Mapping Photography Age 2021 – By NRM Region

Finally, if we look at photography age by LGA, we see an even more disturbing trend, where the NVE dataset is very dated throughout the Wheatbelt – even though this is the area of the state with the greatest level of historical clearing and pressure on remnant vegetation.

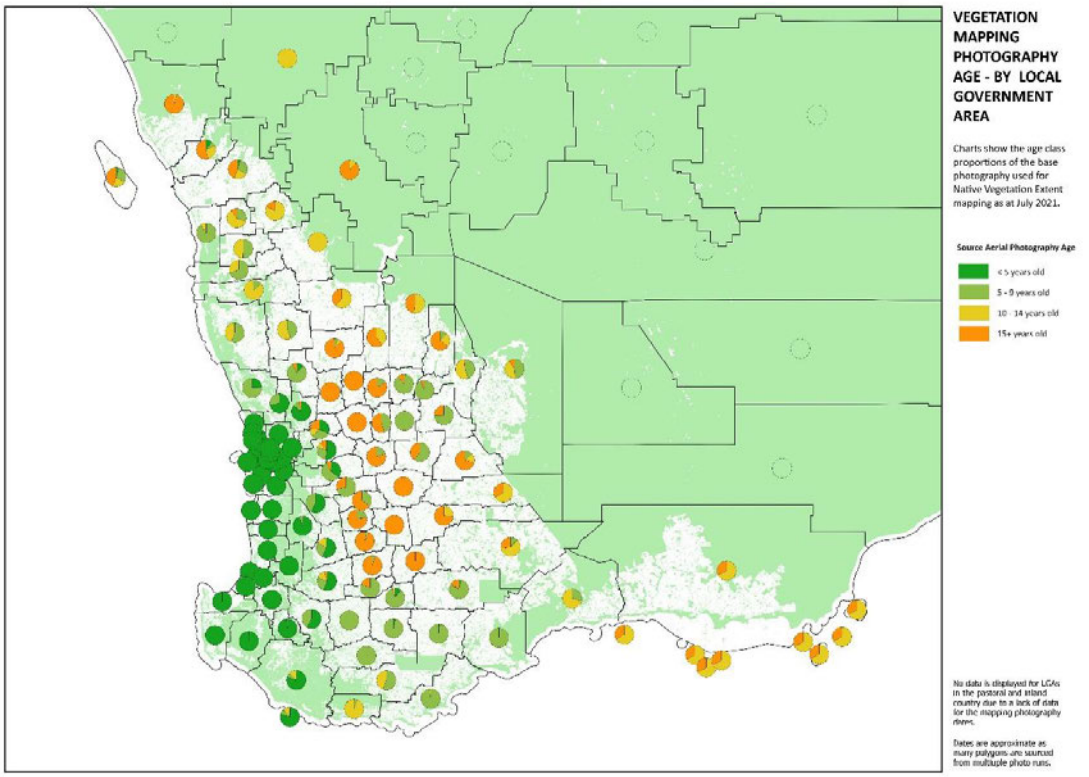

Figure 4 - Vegetation Mapping Photography Age 2021 – By LGA

Table 4 shows how the vegetation mapping in a large number of LGAs is largely or completely based on old photography. The most notable LGAs are below. The table indicates (in italics) a sub-set of "key concern" LGAs – which combine high levels of vegetation mapping largely or completely based on old photography with high levels of vegetation clearing. LGAs where vegetation is heavily cleared should surely be the area where we want the most up-do-date vegetation mapping.

						NVE Photography Age				
LGA	**LGA Area (ha)**	**Total Vegetated Area**	**Total Vegetation as % of LGA**	**Area (ha)**	**Age-Specified Vegetation % of LGA**	**Less than 5yrs**	**5–9 Years**	**10-14 years**	**15 or more years**	**10+ years**
CORRIGIN	268,132	23,035	8.6%	23,035	8.6%	0%	0%	0%	100%	100%
CUNDERDIN	186,257	12,180	6.5%	12,180	6.5%	0%	0%	0%	100%	100%
DOWERIN	186,268	13,771	7.4%	13,771	7.4%	0%	0%	0%	100%	100%
GOOMALLING	183,555	29,676	16.2%	29,676	16.2%	0%	0%	0%	100%	100%
WICKEPIN	203,947	24,496	12.0%	24,496	12.0%	0%	0%	0%	100%	100%
DUMBLEYUNG	254,067	33,600	13.2%	33,600	13.2%	0%	0%	1%	99%	100%
WAGIN	195,262	28,874	14.8%	28,874	14.8%	0%	5%	0%	95%	95%
NARROGIN	162,498	32,081	19.7%	32,081	19.7%	0%	4%	3%	94%	96%
WONGAN-BALLIDU	336,569	21,998	6.5%	21,998	6.5%	0%	6%	6%	88%	94%
WYALKATCHEM	159,509	13,125	8.2%	13,125	8.2%	0%	16%	0%	84%	84%
QUAIRADING	201,651	20,520	10.2%	20,520	10.2%	0%	20%	0%	80%	80%
CUBALLING	119,534	26,377	22.1%	26,377	22.1%	0%	22%	1%	78%	78%
KULIN	471,891	76,039	16.1%	76,039	16.1%	0%	0%	26%	74%	100%
NAREMBEEN	383,169	38,979	10.2%	38,979	10.2%	0%	13%	16%	71%	87%
PINGELLY	129,437	21,900	16.9%	21,900	16.9%	0%	35%	0%	65%	65%
MUKINBUDIN*	342,696	120,781	35.2%	51,931	15.2%	0%	12%	23%	65%	88%
KOORDA	283,085	40,495	14.3%	36,522	12.9%	0%	0%	40%	60%	100%
TAMMIN	110,139	9,269	8.4%	9,269	8.4%	0%	45%	0%	55%	55%
CHAPMAN VALLEY*	398,048	134,679	33.8%	55,343	13.9%	10%	8%	28%	54%	81%
MOUNT MARSHALL*	1,018,436	639,698	62.8%	70,231	6.9%	0%	0%	52%	48%	100%
GREATER GERALDTON*	989,287	429,239	43.4%	110,076	11.1%	4%	29%	23%	44%	66%
BRUCE ROCK	272,526	24,493	9.0%	24,493	9.0%	0%	60%	0%	40%	40%
DALWALLINU*	722,667	167,574	23.2%	55,427	7.7%	0%	0%	61%	39%	100%
KONDININ*	741,935	398,039	53.6%	145,634	19.6%	0%	0%	67%	33%	100%
ESPERANCE*	4,464,274	3,212,840	72.0%	309,666	6.9%	0%	0%	67%	33%	100%

LGAs indicated with an asterisk* have significant areas of vegetation with no age-attribution.

Table 4 - LGAs with vegetation mapping largely or completely based on old photography.

These poorly-updated LGAs are mainly located in the Wheatbelt as shown in Figure 5 below:

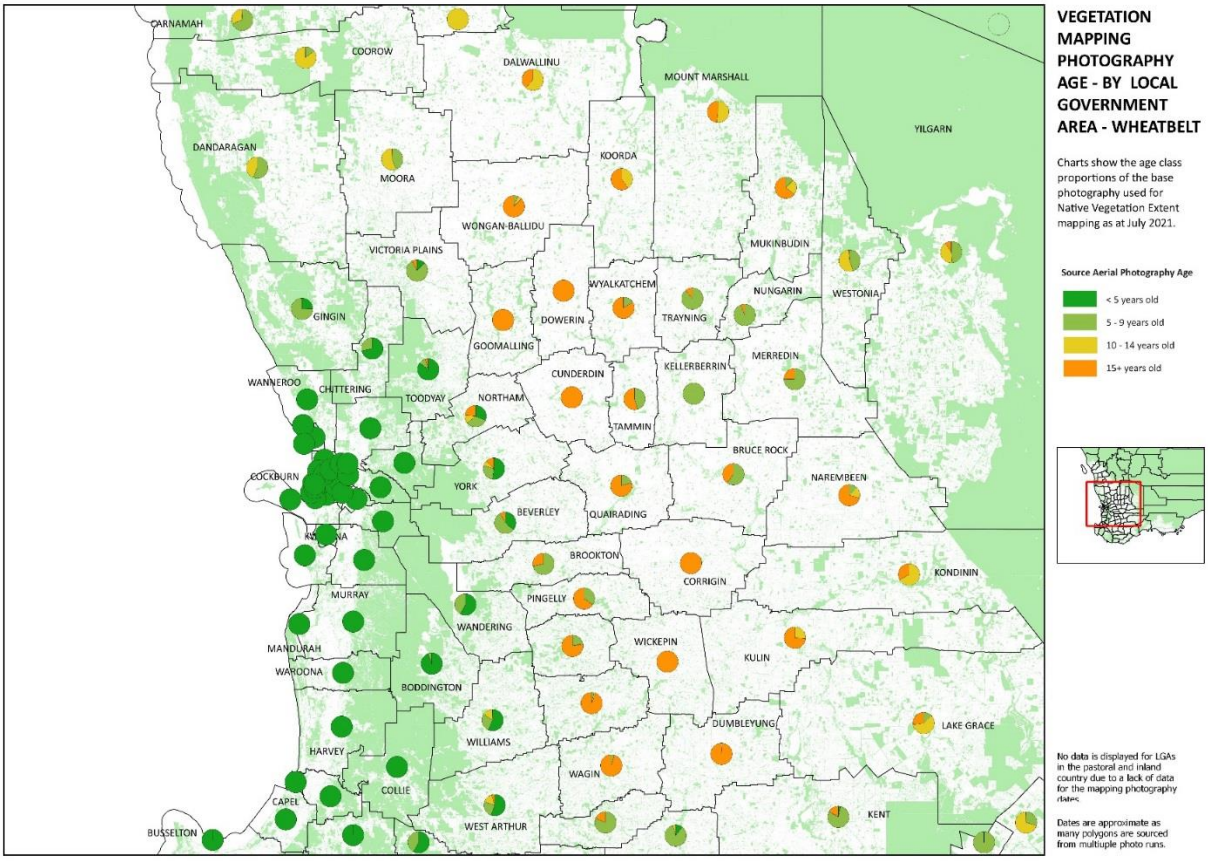

Figure 5 – Vegetation Mapping Photography Age in Wheatbelt LGAs

Overall

These data have been analysed during the course of this year prior to the Policy Draft being released, and clearly demonstrate serious problems with the existing NVE dataset in terms of currency. However in the light of the Draft Policy (notably Strategy 3.1), which clearly recognises the need to improve remnant vegetation mapping in WA, they are less relevant than they were a year ago. Which is a good thing!

I would not right-off the NVE dataset at this stage however. My understanding is that its currency is primarily a problem with resourcing. The figure of a 'half-time officer' is quoted as being the resourcing provided. No wonder the datasets are out-of-date, and what an indictment of the priority ascribed to native vegetation protection!

While I can criticise the currency of the dataset, my experience with actually using it is that the data are generally accurate. Not something that can be said for the LandMonitor data!

The NVE dataset's strength is accuracy, whilst its weakness is a failure of update frequency due to inadequate resourcing. It is critical that a similar lack of resources does not impact on the proposals in the Native Vegetation Policy.

To allow for support to remotely-sensed datasets, and to provide cover in the period of development of a replacement, the NVE dataset should be resourced to update all areas where the basis of vegetation identification is over 5 years old.

In the short term, the Land Monitor website should be updated with the facility to overlay the NVE data over the top of the various products (such as Vegetation Extent), with symbolisation showing the age of the NVE polygon photography.

There are good reasons for the NVE dataset to continue, in particular to provide checking of remotely-sensed datasets, and to provide cover in the period of development and testing of a replacement. However to do this it must see an injection of funds to source appropriate aerial photography (or satellite-derived high resolution imagery) for areas currently out-of-date, and to provide additional digitising staff to update the dataset on this new photography.

LandMonitor

A recent review of vegetation mapping in WA (McFarlane and Wallace 2019) has outlined numerous issues with native vegetation mapping as part of a review of measurement of native vegetation extent and condition using remote sensing technologies. Many of these issues are based in the resourcing described above. McFarlane and Wallace argue for moving to the use of remote sensing for resolution of some of the issues with vegetation extent and condition. And indeed this is clearly what the Policy is proposing.

My experience is that while the technologies may exist, the platforms for their promotion and distribution to the spatial data-using community are still maturing, and will require more investment in order to roll out a simple and effective platform – based on accurate assessment - that replaces the existing (if flawed) vegetation extent dataset.

Using LandMonitor

LandMonitor in its current form is an excellent platform for accessing both the various Land Monitor datasets as well as some other datasets (such as DEMs and derived salinity-related products)). However there are two initial issues for the practitioner:

- While the user can view a large range of data for the State, most datasets are downloadable only for a limited area (a 'Layer Extract' no more than 5000 pixels or 125km on an edge)[2];
- Some datasets (the Vegetation Cover Maps) are not downloadable at all, even though they may be one of the most useful data, and are the dataset on which many other products are base. Finally,
- Some datasets on the website have been re-classified to improve storage efficiency and have suffered a reduction in information[3] provided as a result.

It is probably fair to say that most users of the data will be satisfied with the scale of extract available, and that changes could be made to give better access. But it is concerning that the accuracy of the data may be compromised to reduce storage costs, as this may become a far great issue in future with the necessary use of higher resolution satellite products[4].

[2] Exceptions can clearly be made for some purposes, and I have been fortunate in being provided with State-wide coverage for some requested datasets.

[3] For example reducing the number of classes by combining them.

[4] One simple solution to this would be that the high resolution raw data (~5m pixel) and processed results are then re-sampled to provide a lower resolution product at the same 25m resolution used currently.

The State Government should provide funds to properly make available existing data on vegetation extent as provided through Land Monitor and other platforms, and support efforts to make this data useful to practitioner-level users.

Land Monitor Issues

Website and data provision apart, there are a number of issues with the current data provided through LandMonitor that are of concern and must be addressed in the future products being proposed under Strategy 3.1a. These can be summarised as:

- False Positives
- False negatives
- Lack of detail

False Positives

False positives occur where areas are assessed to have had vegetation return, where the vegetation in question is actually plantation establishment or even pasture condition improvement. When this occurs in the forested areas as a result of regeneration following clear-felling it is relatively simple to see, but when it occurs in the agricultural areas confusion is easy.

The following map (Figure 6) shows an area where the LandMonitor TrendClass datasets indicates a large increase in vegetation from 1990-2019. It is accurate, in that it is an area of plantation east of the Porongorups which were planted during this time. But it is also misleading, as by the end of the period they are gone again, and they were never native vegetation.

The areas shown in blue in the figure, and classified as 'Large Increase' (in vegetation) were progressively cleared from 2016 to 2018, and were then re-established again from 2018 onwards. The VegChange layer from Landmonitor in Figure 7 shows that the areas were cleared between 2016 and 2018, going from 'Forest' to 'Non-woody' vegetation.

So in one sense the data is quite correct, there was an increase in vegetation. According to the WoodyCover dataset from LandMonitor, it was "Forest >20%". Also correct. But it is not native vegetation, and this is not clear to a user who is not ground truthing the data.

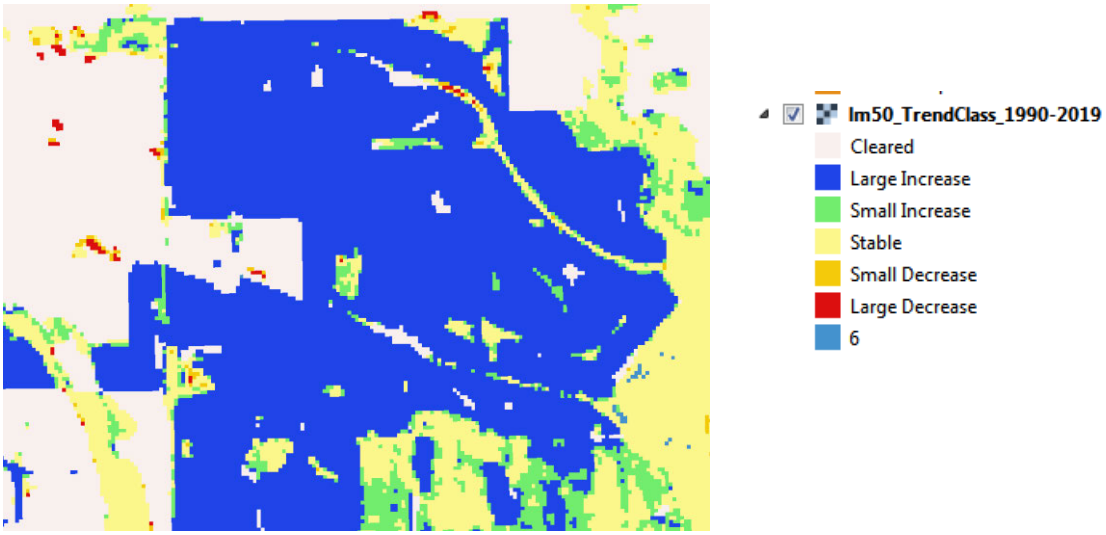

Figure 6 - TrendClass extract showing 1990-2019 vegetation change. Note the large Increases.

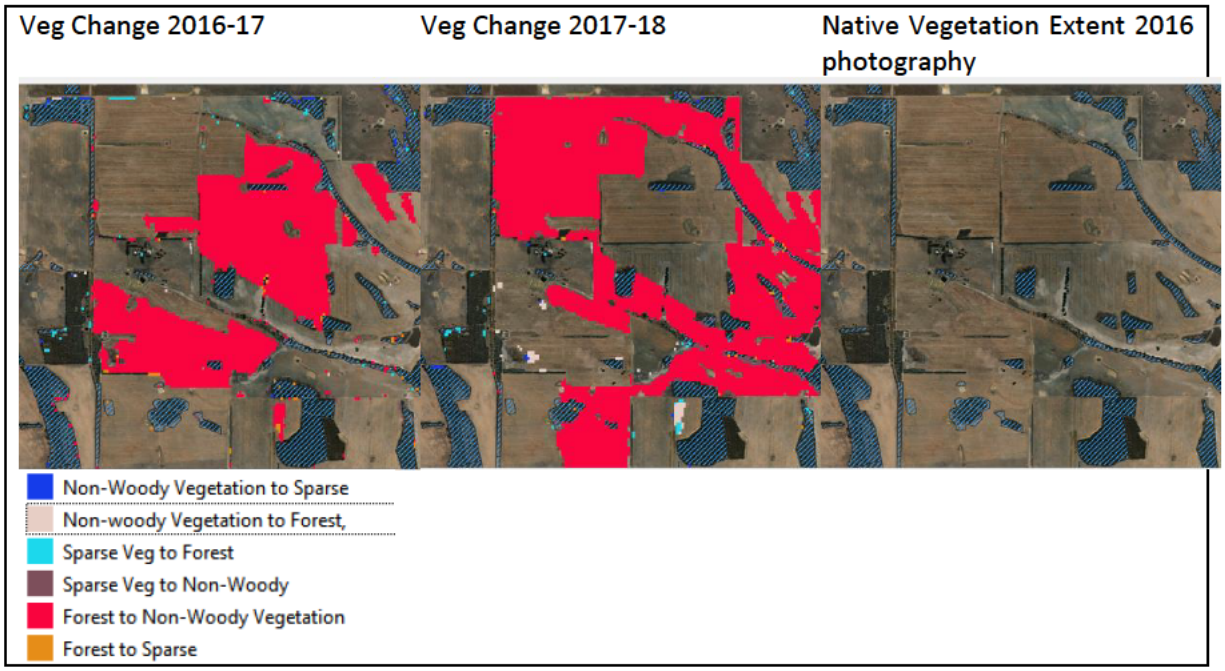

Figure 7 - VegChange extract showing annual vegetation change 2016-17 & 2017-18

The key issue is that what these are reporting is not 'native vegetation' – it is vegetation.

In practice, if the LandMonitor website was to provide an overlay of the Native Vegetation Extent dataset such confusion would be clear to the user.

We believe that data provided from the LandMonitor analysis is not giving a clear picture of what is happening. The implications of this are significant. At the small scale – perhaps a local-scale project – the data can be (and probably should be) ground-truthed using other data sources – such as current satellite RGB imagery such as provided by Google Earth and other sources; as well as possibly historical imagery from Google Earth Pro for example.

At the large scale, when such problems are occurring repeatedly throughout the south west, the errors will mount up and the scale of the problem means it will not be ground-truthed. So using this data for any large-scale analysis has potential problems. The increases and decreases will be counted against totals of native vegetation for various years when they are nothing of the sort.

So how do we discriminate between plantations and native vegetation? One could argue that there needs to be a line drawn in the sand about what is native vegetation, and that it doesn't actually come back in such a way. So we need a register of native vegetation that actually exists, and which can't come back following removal. The most appropriate way of doing this seems to be to update and maintain the native vegetation extent dataset.

False Negatives

The flip side of the points made above is that areas can be assessed to have had vegetation cleared, which is actually plantation removal or even changes in pasture condition. When this occurs in the forested areas as a result of regeneration following clear-felling it is relatively simple to see, but when it occurs in the agricultural areas confusion is easy. And the figures associated with it will give a false picture about native vegetation extent and clearing.

Lack of Detail

This is a simple critique – Land Monitor is based on Landsat imagery, which uses 25m pixels. While this may be acceptable at the very broad scale (such as assessing over vegetation status for all of Western Australia) it is inadequate for local-scale information. The following figure illustrates this: the grid representing "Woody Cover' is has both poor classification and inaccurate edges.

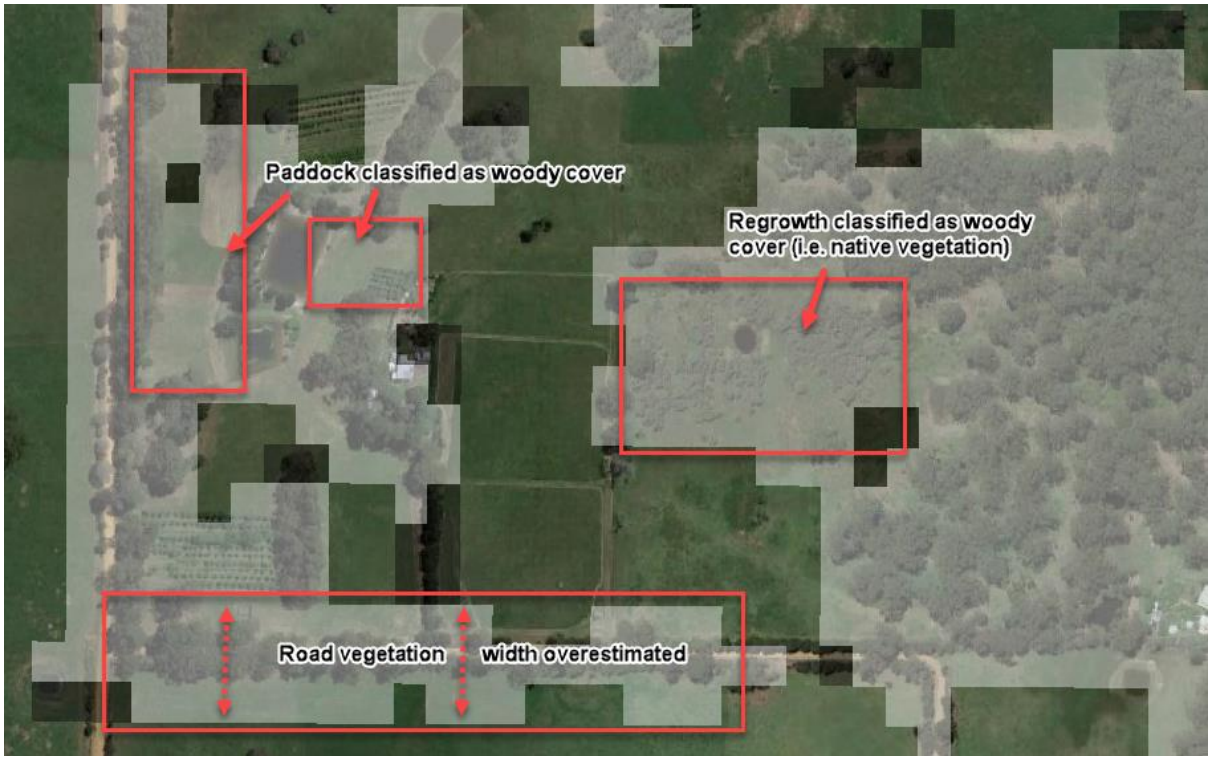

Figure 8 - Vegetation grid from LandMonitor – Light-coloured cells classified as Woody Cover

Such inaccuracy stems from two sources – the difficulty of assessing vegetation based on reflectance alone, and the low resolution of the data in relation to the distribution of vegetation in highly-cleared landscapes. The result is that at the scale that I would want native vegetation information, this data is not usable.

A New Vegetation Mapping system

Clearly a much more precise dataset is required in order to make Vegetation Mapping accurate. A report was prepared in 2019 for the WA Biodiversity Science Institute by Don McFarlane and Jeremy Wallace (2019) – and was referenced in the recently-released Native Vegetation Strategy Issues paper. This paper looks at measurement of native vegetation extent using remote sensing technologies. It raises concerns about the NVE dataset, reviews remote-sensing as a basis for vegetation mapping, and clearly has had an impact in moving the State Government ahead in this area.

The State Government should immediately implement the recommendations of McFarlane and Wallace (2019), especially as they relate to establishing vegetation extent, and if feasible, condition.

Strategy 3.1 of the Policy Draft offers the Opportunity to "Leverage satellite imagery and machine learning to develop a semi-automated, regularly updated, state-wide terrestrial native vegetation extent product". I fully support this aim, subject to the critical caveat: that the dataset used has to be of sufficient resolution to allow for discrimination of plantings, paddock growth and fire scars, all of which provide opportunities for incorrect assessment relative to native vegetation. Landsat clearly is

not appropriate, and selection of the appropriate dataset must be based on rigorous test of the resolution required.

From my understanding of the needs of aerial assessment (based on years of aerial photography use and mapping), I suspect the necessary resolution will be in the sub-5 meter scale. The data will be required on an annual basis to meet the needs of identifying illegal clearing on an opportune time frame (see Strategy 3.1a & 3.1c), and so will represent a large investment for acquisition, storage and analysis. But it is a necessary prerequisite if the system is to be accurate and meet the stated needs. Note however that Strategy 3.1c can only be met if a better extent data is intersected with decent native vegetation type mapping. And the latter is completely lacking at present (see below).

Vegetation Type/Association Mapping

WA lacks a large-scale[5] and accurate state-wide vegetation classification dataset. The only state-wide mapping currently available is the VegetationComplexes_SouthWestForestRegion_DBCA_047 – more commonly called the Beard vegetation mapping (see Beard et al 2003). This work, originally carried out at a scale of 1:250,000, was never intended to be used as a definitive classification of vegetation in the way it is now used.

The other large vegetation type datasets that I am aware of are the Swan Coastal Plain (Heddle et al 1980) or the Regional Forest Agreement area (Mattiske & Havel 1998). The Mattiske and Havel mapping was done at a 1:50,000; whereas the Heddle was mapped at 1:250,000 – no better than the Beard. But even these do not cover much of the south west of WA – especially the agricultural areas where clearing has been concentrated, and cannot be used to assess vegetation loss at even the south-west scale, let alone the state. There are a few very good smaller regional datasets of vegetation type – notably the Albany Regional Vegetation Survey (ARVS) – which have been mapped at a much finer scale, but these cover very small areas of the state.

[5] I would note that this term is highly misleading – by this I mean a map which shows small areas in great detail. But that means a smaller scale (e.g.1:5000 verses a large scale 1:250000).

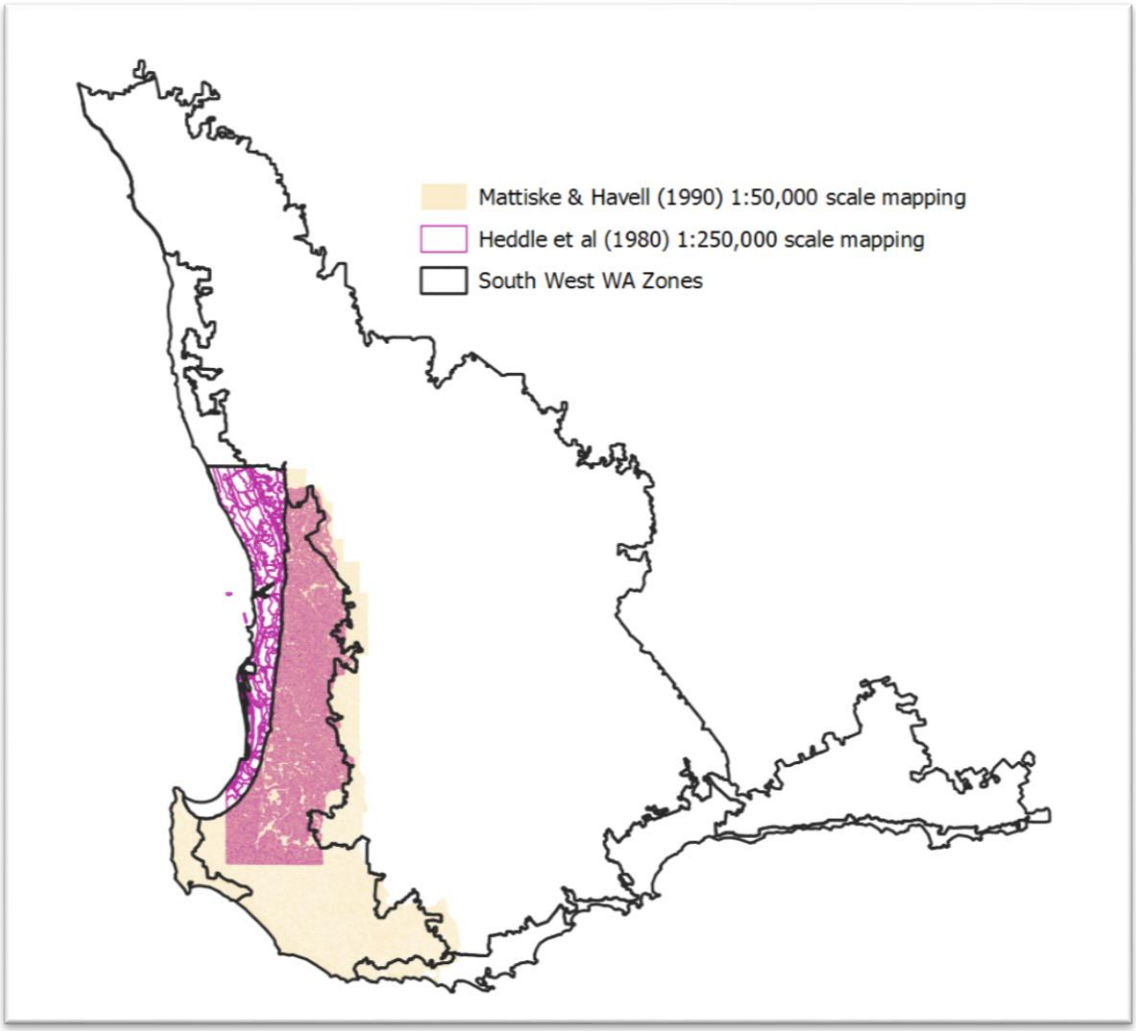

Figure 9 - Large Scale Vegetation Classification Datasets

Ecotones & Associates carry out a range of assessments – conservation values, association rarity etc. – often at fine scale, and have to use the Beard dataset because it is the ONLY available south-west scale resource. At the recent Vegetation Strategy workshop in Albany, the botanists at the table discussing data were unanimous in their condemnation of the dataset, and called for it to be replaced by updated and accurate surveys, to a standard similar to the ARVS.

Any mapping exercise which compares the Beard mapping with a detailed set of local mapping will find high levels of disjunction between the two. The figure below shows a comparison of the level of detail in the Beard dataset verses the recent ARVS in an area east of Albany. (The ARVS only surveys existing remnant vegetation, and was mapped at a very fine scale.)

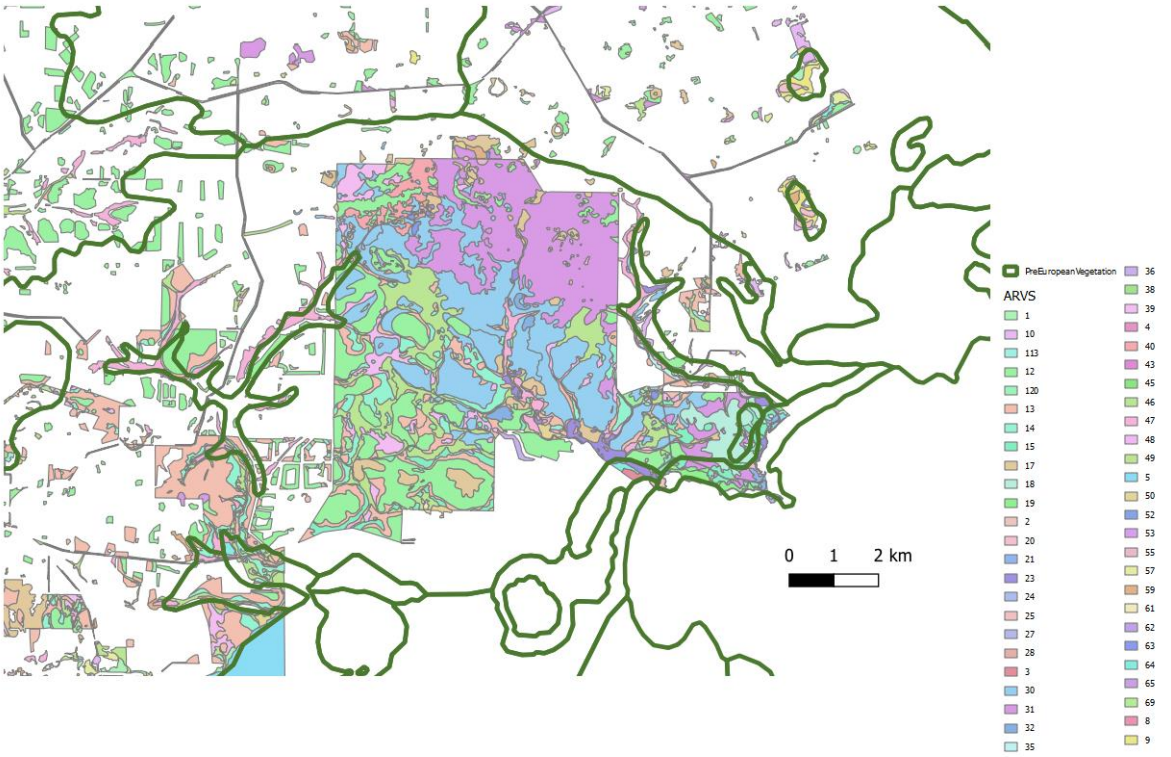

Figure 10 - Beard Vegetation Mapping compared to ARVS, east of Albany. Green lines show Beard polygons.

The problems with both the NVE and the Beard vegetation mapping are highly significant, because the NVE is intersected with pre-European vegetation mapping (Beard) and used as *the basis for the annual analyses of the conservation status of vegetation* produced by DBCA, which informs conservation status rankings under the *Biodiversity Conservation Act 2016* and clearing decisions under the *Environment Protection Act 1986*. **We would argue that neither is fit for purpose.**

The Draft Policy contains two proposals under Strategy 3 to address the lack of vegetation classification mapping across WA. Both of them fall far short of the required level of investment of time and resources.

The strategy suggestion is to expand capture of native vegetation data through the Index of Biodiversity Surveys for Assessment (IBSA) mapping. This is to be carried out by DWER with the support of 'EPA and proponents'. No detail is provided, but it appears to be a stop-gap method that will never provide broad coverage, only covering areas where proponents are required to do surveys. In other words, we will have no new mapping of vegetation in areas not being investigated for IBSA – which is the bulk of the state. The draft policy offers no funding for a significant project to remedy the current lack.

A series of projects, providing a consistent vegetation classification to the standard of the Albany Regional Vegetation Survey, should be funded and rolled out over the south-west of WA. These projects should initially be in areas not covered by the existing coastal plan mapping of Heddle, or the RFA area.

Fire Management and its Impact on Vegetation

Huge areas are burnt each year in Western Australia – much as a result of management burns. And yet the impact of fire is poorly understood.

Strategy 4.3 completely fails to address two issues:

- the complexity of the current situation in regard to fire management in a drying Climate, by referencing only the *enhancement* of 'fuel-mitigation progams'; and
- the impact of prescribed burning on native vegetation.

Given the increasing risks of fire management through prescribed burning as a result of climate change, and the poorly-understood impacts of frequent fire on vegetation, the strategy should be looking to find ways of maintaining hazard reduction through non-burning alternatives. There is a significant amount of research from the Eastern States showing that prescribed burning will become more difficult in future, as drying continues and suitable conditions retract towards the winter. Assessment of such impacts in WA would be an appropriate strategy for the Policy to pursue. The strategy should also focus on finding alternative hazard reduction strategies, and research the impact of the current regimes on native vegetation.

Another area of focus should be the impact of prescribed burning on native vegetation. In 2009 a major Fire Workshop (Barrett et al 2009) was held in Albany to assess issues around conservation of fire sensitive ecosystems and species in the South Coast NRM region. The report brought together many expert s in the field and reviewed a large amount of relevant literature. The report authors concluded:

"..it is clear that *our knowledge of ecosystem function and fire responses is far from complete* and research priorities to aid our understanding of sensitive systems have been identified in response to these knowledge gaps. *Ongoing data collection* and monitoring can further inform the adaptive management process." (Barrett et al 2009:71, emphasis added).

They concluded that knowledge is "far from complete" and that more data collection is needed. They made a series of detailed recommendations about what needs to be done to understand the impact of fire on vegetation. To my knowledge very little of this research has been done. The policy proposal in relation to fire must address this glaring lack of understanding, and at the very least pair this with any recommendation regarding enhancing prescribed burning.

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