GlobMap, The Swift Parrot Foraging Habitat Map.

Explanatory Notes for the datasets:

- *GlobMap* and
- *GlobMap*_unmapped

Biodiversity Conservation Branch
Department of Primary Industries, Parks, Water and Environment

Tasmania
Explore the possibilities

Caveat: There are a number of limitations that arise from the methods used to create the GlobMap and GlobMap_unmapped datasets. These limitations, as detailed in this document, need to be noted when interpreting this data. Despite these limitations, GlobMap is a significant improvement in the capacity to assess, quantify and make decisions relevant to swift parrot conservation management.

Executive Summary

The swift parrot, *Lathamus discolor*, is an endangered migratory species which breeds exclusively in Tasmania each year. The distribution of swift parrots during the breeding season is highly variable from year to year, so that monitoring and conservation planning for this species can be a challenging task.

In the process of developing a habitat planning guideline for the swift parrot the Fauna Strategic Planning Group (FSPG), a Forest Practices Authority (FPA) working group, identified knowledge gaps in the ability to plan strategically at a landscape scale for the conservation of breeding habitat of the species. These gaps arise from deficiencies in the mapping of the habitat, particularly foraging habitat.

Foraging habitat for swift parrots is primarily blue gum (*Eucalyptus globulus)* and black gum *(E. ovata)*. There are other food sources (e.g. flowers of other eucalypt species, lerps, fruits) but it is apparent that the flowering of *E. globulus* supplies the majority of the foraging resources necessary within the breeding season. *E. ovata* provides the key foraging resource earlier in the breeding season, particularly when the parrots arrive from mainland Australia.

There were a number of issues with the pre-existing TASVEG mapping of *E. globulus* such that it was not sufficiently accurate for landscape scale decision making. The pre-existing TASVEG mapping of *E. ovata* forest is more accurate than that of *E. globulus.*

This project aimed to improve the accuracy of the TASVEG mapping of *E. globulus* and *E. ovata*, as well as map forests with sub-dominant proportions of *E. globulus*, which are not documented under the protocol for TASVEG. This work was carried out in 2009 across the natural distribution of *E. globulus* within Tasmania. GlobMap is the compilation of mapping from this project and the pre-existing TASVEG mapping, providing a more accurate map with a wider coverage of breeding season foraging habitat for swift parrots.

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1. Aims

- Improve the resolution of *E. globulus* and *E. ovata* mapping in TASVEG data.
- Map areas of other forest types where *E. globulus* is present with a cover less than 50%.

Base data layer

This project used TASVEG 2.0 as a base layer, produced by the Tasmanian Vegetation Monitoring & Mapping Program (TVMMP) of DPIPWE. This project added to and altered the mapping of this base layer employing similar methods, mapping protocols and vegetation community codes (Harris and Kitchener, 2005).

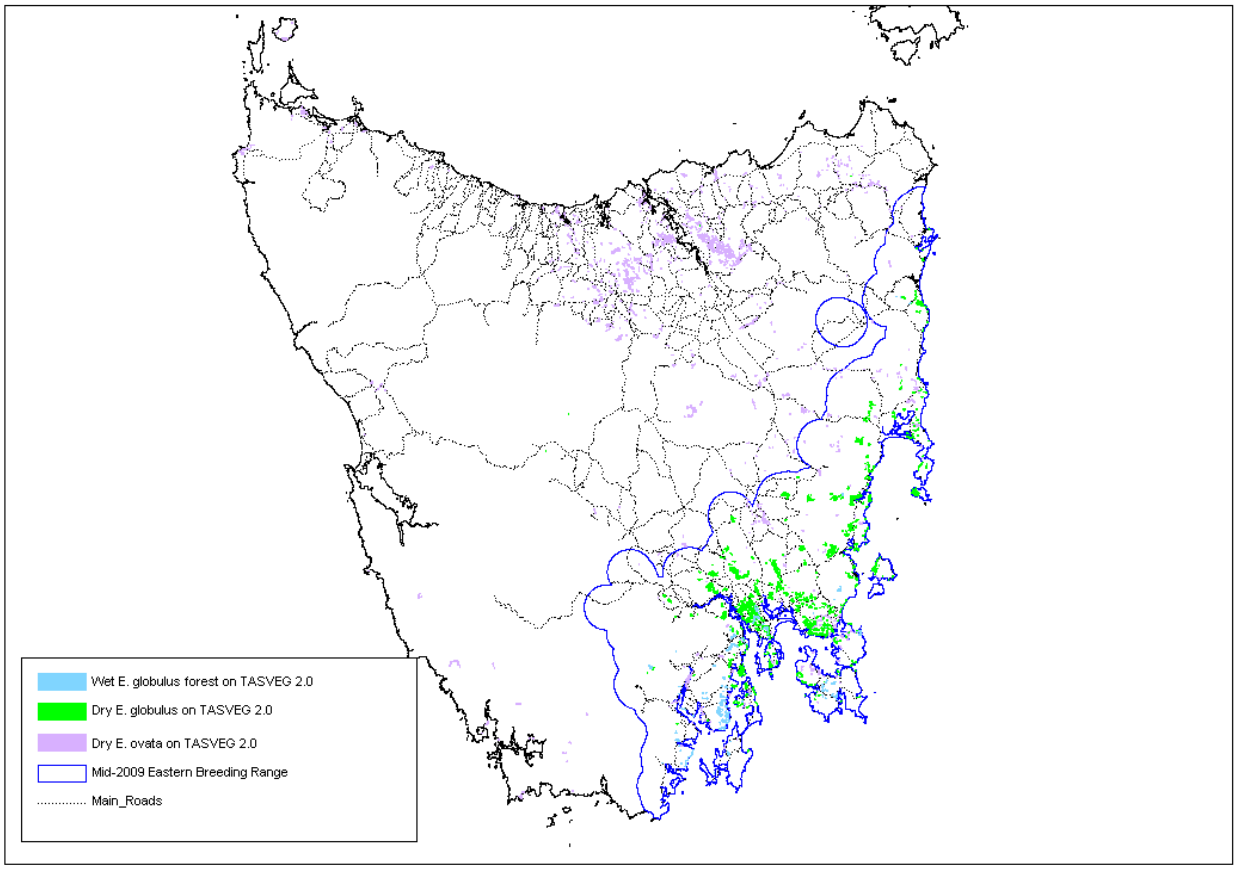

Figure 1. Pre-existing TASVEG 2.0 mapping of E. globulus and E. ovata with Swift Parrot Eastern Breeding Range as defined in mid-2009.

The majority of TASVEG mapping of *E. globulus* forest was completed as part of The Tasmanian Regional Forest Agreement (COASOT, 1997). This original mapping, primarily through aerial photo interpretation was improved upon through several projects remapping areas for purposes such as the formation of covenants.

The pre-existing TASVEG mapping was deficient for decision making and landscape planning for swift parrot conservation because:

- Many areas were only mapped to a regional scale (similar to 1:100, 000), with large areas of *E. globulus* forest incorrectly mapped as dry *E. pulchella* forest.
- *E. globulus* is only mapped where it is the dominant species, whereas this species is also utilised by swift parrots where it occurs as a minor component in a range of forest types.
- Only dry *E. globulus* forest was mapped. Previously the wet *E. globulus* forest category (now TASVEG WGL) did not exist and therefore were typically subsumed into wet swamp gum (*E. regnans*) forest.

The pre-existing TASVEG mapping of *E. ovata* forest was more accurate than that of *E. globulus* because of fewer problems with the resolution of mapping or presence as a minor component in other forest types.

Other data sources.

Point records

Point records of *E. globulus* were compiled by researchers at the CRC for Forestry (Potts and Tilyard, unpubl.) These point records were typically records of single trees and were from various sources including the Natural Values Atlas (DPIPWE), Forestry Tas. and University of Tasmania. Potts and Tilyard applied some filtering of these records, discounting those considered to be inaccurate records of natural *E. globulus*. These are more likely to be other species or planted *E. globulus* and often of different genetic stock to Tasmanian blue gum (genotype can influence flowering time, reducing their suitability for breeding swift parrots). Two sets of points were formulated after the filtering process:

1. Confident points – those considered likely to be accurate records of natural *E. globulus*.
2. Not likely points – those records considered inaccurate, but still worth checking.

Additional mapping.

A number of discrete datasets from other sources with spatial information about *E. globulus and E. ovata* were incorporated into GlobMap:

Huon Valley

Targeted vegetation mapping of threatened communities was carried out in the Huon Valley and Channel regions for the Huon Valley Council (Strain, 2009). This mapping captured areas of forest dominated by wet and dry *E. globulus, E. ovata*, and *E. viminalis–E. globulus* coastal forest and woodland. This dataset yielded extensive mapping of *E. globulus* and *E. ovata* dominated communities.

Forest Practices Plans.

Forest Practices Plans (FPPs, necessary documents for planned forest operations) can provide information on the presence of forest types, within FPP areas often based on on-the-ground assessments. A collection of FPPs certified in 2009 with swift parrot habitat values had detailed information on the presence and percentage cover of E. globulus.

Douglas Apsley National Park.

Vegetation mapping of the Douglas Apsley National Park on the East coast of Tasmania was carried out by TVMMP (Sib Corbett). This mapping is recorded on hard-copy map and includes areas with *E. globulus* as a subdominant within other forest types. The areas of *E. globulus* forest recorded from this mapping were previously incorporated into TASVEG.

West Coast

An outlying population of natural *E. globulus* had been mapped in recent years by various ecologists including Bill Brown (DPIPWE), Richard Barnes (SEMF) and Colin McCoull (SEMF). This mapping, carried out via a combination of helicopter and on-the-ground assessment, documents *E. globulus* dominated forest, but excludes areas where the species is found as a minor component of other forest types.

2. *Methods*

Study area

The mapping effort focussed on the swift parrot Eastern Breeding Range (see figure 1) as defined in mid-2009 following recommendations of a workshop of swift parrot ecologists hosted by the Threatened Species Section in early 2009. The Eastern Breeding Range was based on the point records of natural *E. globulus* from various sources considered accurate or 'confident' by Potts and Tilyard (unpubl.), buffered by 10km as an estimate of the maximum distance swift parrots may nest away from the primary food source.

Limitations

Constraints on the extent of mapping were imposed by

- Areas inaccessible by roads including roads in poor or wet condition,
- Areas where landholder permission was not received and
- Weather conditions (e.g. high winds).
- Due to time constraints, if areas had already been mapped to a fine scale (e.g. Meehan Range) they were not visited as part of the field mapping.

Unmapped areas

Large areas within the Eastern Breeding Range that were not accessed and not mapped are shown in GlobMap_unmapped, an accompanying file to GlobMap. Polygons of ' Unmapped' areas show *E. globulus* forest and *E. ovata* forest within these areas as they are from previous mapping efforts that were incorporated into TASVEG 2.0.

Data gathering

GIS data was accessible in the field with the use of a Tablet PC, GPS hardware including external aerial, GEOTRACKER software to link the hardware, GIS software (Mapinfo V. 8.5) and layers, including:

- Aerial orthographic photos,
- Existing TASVEG 2.0 data,
- Point records (Potts & Tilyard, unpubl.)
- Topographical data (contours)
- Roads, tracks and other infrastructure.

Data was entered in the field using a Tablet PC. In accordance with TVMMP protocols for field mapping, TASVEG forest type was assessed by dominant crown cover of the dominant species, but for the purpose of this project, the classifications and percentage of *E. globulus* was based on the number of stems in a patch as estimated by experienced observers.

A polygon is the basic unit of the mapping. A polygon is composed of a boundary line around a forest patch that is considered to be internally homogeneous, and supporting a certain set of characteristics. Each polygon is uniquely linked to a row of data in a table similar to Table 1.

Table 1: Data table

ID	VEGCODE	% *E. globulus* of forest	Age of *E. globulus*
EST234	e.g. WOB	20	mature
EST235	e.g. DGL		>40
EST236	e.g. DPU	30	pole

Data characteristics

ID

This identifies the source of the data and gives each entry a unique identifier. If the data were from field mapping, they were coded in regions (EST = East ; MID = Midlands ; DER = Derwent ; Sth = South ; TAS = Tasman Peninsula). Other codes represent data from other sources, including Henty, FPPs, TASVEG and STRAIN (see descriptions above). Please note that this is where previous TASVEG data is labelled, not in the following column.

VEGCODE:

Three letter code describing the TASVEG vegetation community (as per Harris and Kitchener, 2005).

e.g. DGL = Dry *E. globulus* forest

WGL = Wet *E. globulus* forest

WOB = Wet *E. obliqua* forest

% *E. globulus* of forest

A percentage estimate of *E. globulus* proportion within the polygon. This was only entered if the proportion of *E. globulus* individuals present in a patch (based on number of stems) was over zero percent and under 50 percent (as shown in Table 1)

Age of *E. globulus*

The pre-dominant age of the *E.globulus* component in forest polygons were classed in relation to swift parrot ecology (Brereton, Mallick and Kennedy, 2004) as shown in Table 2. This assessment is actually using size as a surrogate to classify the predominant relative ages of *E. globulus* in forest patches. Unfortunately, many areas in the southern forests region were mapped prior to a decision to collect this information and were not categorised.

Table 2. Age classes

REGEN	Very young regenerating *E. globulus*, possibly of different genetic origin than that useful for swift parrots.
POLE	Young, regenerating trees under 40cm Diameter at Breast Height (DBH). Found to flower less frequently (Brereton, Mallick and Kennedy, 2004).
>40CM	Medium height to tall trees with DBH over 40cm DBH, which has been found to be the size above which *E. globulus* flowers more frequently (Brereton, Mallick and Kennedy, 2004).
MATURE	Mature trees over 70cm DBH (in dry forest) or over100cm DBH (in wet forest). This class of *E. globulus* tends to flower less frequently (Brereton, Mallick and Kennedy, 2004), but has large canopies when flowering and are more likely to provide hollows for nesting.

3. Outputs

The Outputs delivered by the swift parrot foraging habitat mapping project are:

- A spatial dataset (GlobMap) with areas of newly mapped and pre- existing TASVEG mapped *E. globulus* and *E. ovata* forest and other forest types accompanied with percentage values of *E. globulus* cover. This file is accompanied by GlobMap_unmapped, which indicates areas where this project did not map, and so did not improve on the existing TASVEG information.
- Data that will be incorporated into a revised TASVEG dataset improving the accuracy of mapping with additional areas mapped as wet and dry *E. globulus* and *E. ovata* forest, but excluding areas where these species are present as minor proportions within other forest types.

4. Results

GlobMap is a spatial dataset showing the areas of wet and dry *E. globulus* dominated forest, *E. ovata* dominated forest and areas where the proportions of *E. globulus was* less than 50%. An accompanying dataset, GlobMap_unmapped, outlines areas not mapped by this project.

An updated TASVEG version will be subsequently released which will include the updated mapping of *E. globulus* and *E. ovata* dominated forest from the current project.

Table 3. Areas mapped.

Forest type	Area mapped (ha)					
	TASVEG 2.0		TASVEG 2.0 included in GlobMap	Newly mapped	GlobMap total	% of total *E. globulus*
Wet *E. globulus* forest	2,442		2,360	4,343	6,703	15%
Dry *E. globulus* forest	16,733		16,084	8,293	24,377	53%
Subdominant *E. globulus*	0		0	14,805	14,805	32%
Total *E. globulus*	19,175		18,444	27,441	45,885	100%
Dry *E. ovata* forest	13,814		13,784	1,556	15,340	

Table 3 indicates the mapped areas of each forest type and the relative proportions of forest with *E. globulus*. Points of note include:

- All mapped subdominant *E. globulus* has been recorded through this project and makes up 32% of the total area with *E. globulus*.
- Small proportions (4% & 0.2% respectively) of the total *E. globulus* and *E. ovata* forest from TASVEG 2.0 were excluded after verification through this project.
- A relatively minor addition to the total area mapped as *E. ovata* forest (11%).

Accuracy and validation of data.

The mapping methods used by this project comply with TVMMP protocols for field mapping. A recent review of the TVMMP (M. J. Brown, 2008), reports that the accuracy of TASVEG mapping has been estimated by a number independent validation studies to have an overall agreement of 75 - 85% between map attribute and on-ground vegetation. Brown concluded that, based on criteria of Minasny and Bishop (2008), at a strategic level TASVEG has a relatively high level of confidence.

For this project, where polygons were fully accessible in the field, the reliability of attribution is likely to be much higher, but that where other methods were employed (i.e. field validation of a polygon at one edge only, with field estimates of extent supported by remote sensing techniques), the reliability of attribution could be expected to be at the lower end of the confidence interval for some parts of the polygon.

- TASVEG data is normally captured at a scale of 1:25,000. Aerial photographs used in the mapping process are ortho-rectified and registered to within 15m of linear control features (e.g. drainage lines and roads) supplied in digital 1:25,000 topographic maps.

- The attribute (i.e. TASVEG code) accuracy is likely to be similar to TASVEG mapping, within the 75 - 85% range mentioned above.

Douglas Apsley National Park

In assessing the Douglas Apsley National Park by car and verifying pre-existing information, many of the point records (Potts and Tilyard, unpubl.) were noted to be single trees and therefore recorded as forest with 1% *E. globulus* component. The mapping carried out by Corbett (unpubl.) also allowed identification of areas with minor proportions of *E. globulus*, with those checked by car useful for calibration and estimation for those areas not accessible by this method.

5. Discussion

The newly mapped information on the presence of *E. globulus* provides much more detail and coverage than pre-existing mapping. In particular, the ability to quantify and assess the areas of subdominant *E. globulus* through desktop-means is very useful for getting a picture of the swift parrot foraging resources available in particular areas. Having the predominant age classes of *E. globulus* in certain areas is also useful as level of maturity affects capacity to provide foraging resources to swift parrots. Unfortunately, existing TASVEG mapping of *E. globulus* and the majority of new mapping in the Southern Forests and Channel regions did not record age of individual trees.

The distribution of *E. globulus* found and mapped confirms the concentrations of foraging resources in most of the Swift Parrot Important Breeding Areas (SPIBAs, conceptual management units based around regions known to host nesting swift parrots). The mapping may suggest other areas of potential importance for nesting swift parrots and warrant priority in surveying for nests (which is particularly time-consuming).

E. ovata

The area reassigned to *E. ovata* forest from this project was relatively minor. With the focus on *E. globulus*, this project did not:

- cover the full distribution of *E. ovata* (more extensive than the study area, see figure 1),
- document other forest types with minor proportions of *E. ovata* (less common than *E. globulus*) or
- record the age of *E. ovata* forest (which has a propensity to flower more frequently at younger ages than *E. globulus*, such that age is less deterministic in provision of foraging resources).

This is not considered a problem for mapping of swift parrot foraging resources as most of this forest type has been accurately recorded on TASVEG (notwithstanding issues about confusion with *E. brookeriana*)

6. References

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