Greater Glider Management Plan: South Gippsland.

Draft

Greater Glider, Mirboo Regional Park (HVP).

Powerful Owls, Mirboo Regional Park (Dickies Hill).

INDEX

1. Aim

This report aims to present information regarding the management of the Federally listed Greater Glider within the South Gippsland Shire. We aim to document areas of suitable habitat where Greater Gliders persist and to assess and plan for consolidating suitable habitat with a range of revegetation and nest box installation methods. In this report we aim to list the threats to Greater Gliders and give recommendations in order to secure the future for the greater Glider in South Gippsland.

2. Biology

The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers (Kehl & Borsboom 1984; Kavanagh & Lambert 1990; van der Ree et al., 2004). Like a lot of threatened fauna species, the Greater Glider is hollow dependant, nesting in large hollows during the day. Greater Gliders will usually not occur in South and West Gippsland forests without hollow densities of approx. 6/ha. There have been a few exceptions at some sites, however not all hollows will be visible from the ground and could be missed during counts. Home ranges are typically relatively small (1−4 ha: Henry 1984; Kehl & Borsboom 1984; Comport et al., 1996; Gibbons & Lindenmayer 2002; Pope et al., 2005), but are larger in lower productivity forests and more open woodlands (up to 16 ha: Eyre 2004; Smith et al., 2007). They are larger for males than for females (Kavanagh & Wheeler 2004; Pope et al., 2005), with male home ranges being largely non-overlapping (Henry 1984; Kavanagh & Wheeler 2004; Pope et al., 2005). The breeding season in South Gippsland has been observed to be March-June.

3. Current Distribution South Gippsland

There are currently 4 known isolated populations of Greater Glider persisting within the South Gippsland Shire. These populations occur at Gunyah Rainforest Reserve, Mirboo Regional Park (East of Old Thorpdale Rd), Mirboo Regional Park (Dickies Hill) and Mirboo Regional Park (Hallston). Within these populations, areas of suitable habitat are fragmented, separating Greater Gliders with vegetation which has unsuitable hollow densities, and in most cases voids between populations lack hollows or Eucalypts all together. Logging has occurred at all sites; however, fire has also contracted areas of suitable habitat. Up until early 2018, historic records in the Victorian Biodiversity Atlas were low and in some cases such as Hallston there were no records. Dickies Hill had one record from 2006. Since Feb 2018 we have added 118 Greater Glider records and 9 Powerful Owl, uncovering South Gippsland Greater Glider populations as some of the highest densities in Victoria. However, because of previous poor record keeping or survey efforts, we do not know for sure how large populations have been historically. Anecdotally, locals report of a much larger population and distribution in the past.

South Gippsland Shire

4.

Mountain Grey-Gum *Eucalyptus cypellocarpa* form an important role in Greater Glider ecology in South Gippsland. Greater Gliders are rarely detected without Grey-gums being present.

5. Greater Glider Populations

4.1 Mirboo Regional Park & Dickies Hill

Installing nest boxes 35m up a large Grey-gum on HVP managed land.

Mirboo Regional Park has patches of healthy Greater Glider populations, however due to historic selective logging and high severity fires in 2009, suitable habitat is fragmented. *See maps under Management Actions page 12.*

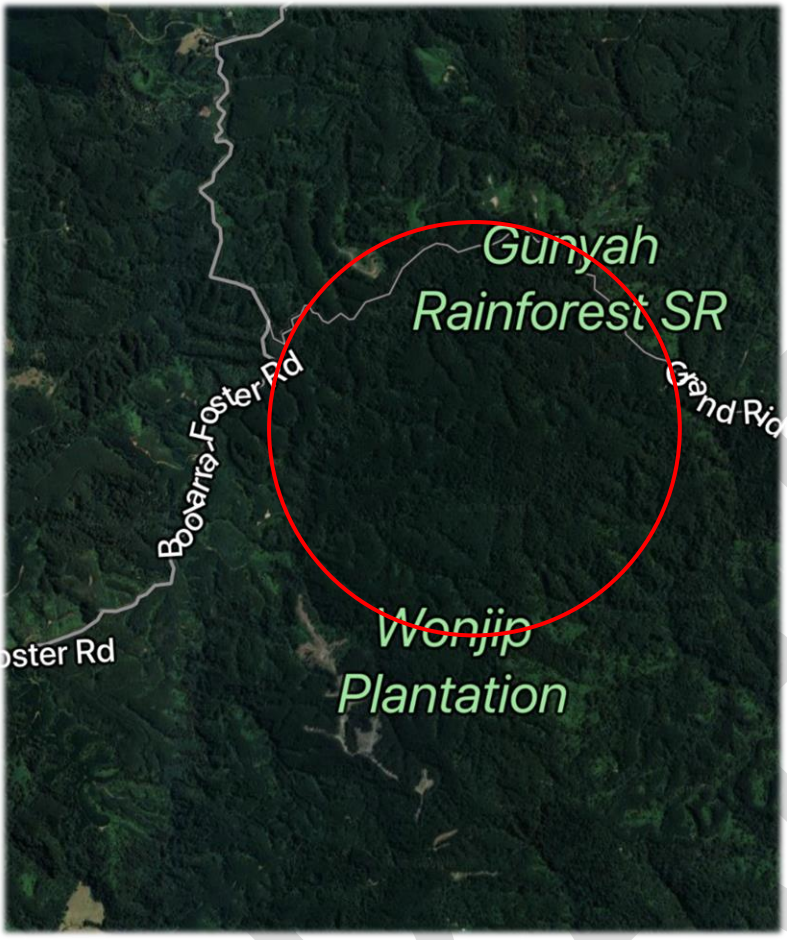
Dickies Hill has only been surveyed by us recently, however initial reports suggest Dickies Hill to be the largest most intact area of suitable habitat in South Gippsland. With an area of approx. 230ha of suitable habitat which is connected. Powerful Owls reared two chicks here in 2018, so we suspect Greater Glider densities had dropped prior to our spotlight counts. *See map2 under Management Actions page 8.*

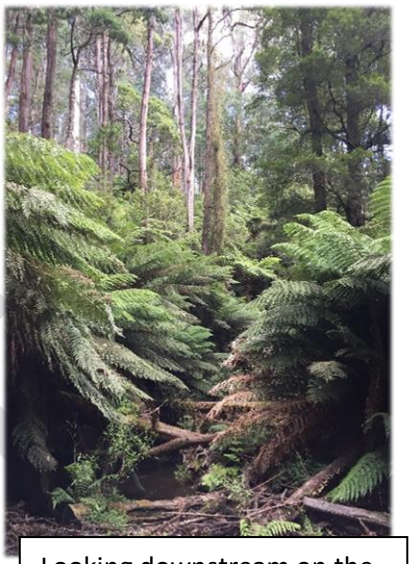
4.2 Hallston

Hallston is part of the Mirboo Regional Park despite there being a 5km strip of farmland between Dickies Hill. Hallston has approx. 190ha of suitable continuous habitat, including a patch of disconnected habitat of approx. 23ha with 8 Greater Gliders persisting. A planned burn which got out of control on the 27th March 2013 burnt 600ha, including a population of 20+ Gliders known by a few locals. *See maps under Management Actions page 9.*

Long-nosed bandicoots are thought to persist on Boyles

4.3 Gunyah Rainforest Senic Reserve





Looking downstream on the Franklin River from Gunyah RSR

Gunyah.

There is approximately 130ha of suitable habitat running south along the Grand Ridge Rd. This area is extremely hard to survey off tracks, however initial surveys reported low densities of Greater Gliders. Larger concentrations of gliders may exist further down the Franklin River.

There is a small amount of suitable habitat on Toora-Gunyah Rd, before heading into West Gippsland down into the Agnes River catchment. We assume that the Agnes holds a healthy population of Greater Gliders, however further investigation is needed to determine this. There is also a small population at Devils Pinch Rd which remains isolated by a lack of hollow bearing Mountain Ash.

Grand Ridge Rd, Franklin River Headwaters.

6. Threats

5.1 There are many threats to Greater Gliders, probably the most notable is the lack of continuous suitable habitat within their known areas of occupancy. In most cases, Greater Gliders in South Gippsland are restricted to relatively small patches of suitable habitat. Given the low dispersal ability of juveniles and the reality that outside core areas of habitat, suitable hollow bearing trees are very few and populations are basically fenced in with no way to expand. It is thought that adult females will tolerate female offspring within their home range, however young male gliders will be forced to find new habitat outside of its mothers' range. If suitable habitat for young males is absent, poor quality or occupied by older more dominant male gliders, young male Greater Gliders would be more vulnerable to predation by Powerful Owls without the cover of dense vegetation and hollows. Further to this, there is a high probability that a percentage of young male gliders will simply not establish home ranges and would die from exposure or predation by diurnal birds of prey. This could well be trending to a female bias population within the most suitable areas of forest, with males pushed to the edges, occupying larger home ranges. During the 2018 breeding season we detected multiple pairs which stayed within proximity to each other during the entire night. In the same patch of forest, we also detected multiple single adults that had presumably not found a mate. This led us to believe there could indeed be a female skewed sex ratio. Further investigation is required with the help of genetic testing.

5.2 It is highly likely that Greater Glider populations are still feeling the effects of habitat loss and fragmentation. It is feasible Greater Gliders have poor genetic diversity due to populations being isolated from each other for a long period of time. The farmland adjacent to the Mirboo Regional Park was cleared as early as 1878 and therefore the Greater Glider population has possibly slowly been declining to its current distribution for the past 140 years.

5.3 Powerful Owls are a direct threat to isolated populations of Greater Gliders. Breeding pairs predate on approx. 300 arboreal mammals per year. There are at least one known breeding pair in the Mirboo Regional Park, and since their successful rearing of two healthy chicks late in 2018 we have already seen drops in Greater Glider detections. Powerful Owls are likely to leave a few Greater Gliders when numbers get low from predation and hunt elsewhere to allow prey to breed. However, if the Greater Glider population is low (<5/km) and is restricted to one gully without connecting suitable habitat to re-establish populations from, it can easily lead to localised extinction. We are observing this effect in other parts of Victoria and have no doubt this has happened in Alberton West State Forest. There is a concern that other prey species for the Powerful Owl such as Ringtail and Brushtail Possums are at very low densities, due to a range of threats such as controlled burning, wildfire and predation. South Gippsland typically has a large fox population, fox predation on Ringtail Possums in forests is high. Without Ringtails to supplement owl prey items, further pressure is put on the Greater Glider populations rendering them prone to localised extinction.


Photo: Mark Lamble

5.4 Climate change poses a serious threat to many species and the effects on some species are already apparent. At this stage the effects on Greater Gliders are unknown, however due to the suspected moisture and nutrient levels required in Eucalypt leaves to sustain gliders, the warmer dryer weather will certainly pose a serious threat to Greater Gliders. Also, wildfires will become more frequent across the landscape creating further risk to isolated populations. During the recent hot weather spell (Jan-Feb 2019), Greater Gliders were only detected deep in thick forested gullies, whereas in previous cooler months they occupied forest further away from damp nutrient rich gullies. This could be due to a range of unknown factors, including taking cover in dense vegetation due to an increase in Powerful Owl activity. This could also be a direct result of the Eucalypt canopy drying out and concentrating the glider population into damper areas that contain more nutrient rich leaves. It was clear that water stress was affecting Eucalypts during this period. Heat stress will also likely effect Greater Gliders across the entire country. Greater Glider populations in South Gippsland may remain very important due to a cooler climate compared to the rest of the Greater Gliders distribution.

5.5 Illegal firewood collection in the Mirboo Regional Park is a threat to Greater Gliders. Hundreds of trees have been cut down over a period of years. A number of these trees were hollow bearing and the remainder of the fallen trees would have formed hollows in 20-80 years. Illegal or legal firewood collection opens the forest canopy, leaving more sun to penetrate the forest floor and further drying it out. Unnatural open canopies will also leave Greater Gliders more susceptible to predation by Owls. In other forests where Greater Gliders persist such as the Wombat State Forest, simultaneous regeneration has occurred due to logging. This has given the forest a single age class of Eucalypts in many places.

5.6 Timber production is a direct threat to Greater Gliders. There are multiple sites set for logging in South and West Gippsland which contain healthy populations of Greater Gliders. Mountain Grey Gum is a high-quality grade timber perfect for the timber industry. Unfortunately, in Gippsland, forests containing Grey Gum are also favoured by the Greater Glider, due to its ability to form hollows faster than other Eucalypt species.

5.7 Controlled burns and wildfire can affect Greater Glider populations. David Lindenmayer has found in fire-damaged forests in New South Wales the Greater Glider can be relatively sensitive to fire, even when dominant canopy trees can survive moderate-high severity fire (Lindenmayer et al., 2011b). The true effect on Greater Gliders in response to fires in 2009 and 2013 at Mirboo and Hallston is unknown, however monitoring of Hallston and Mirboo RP has revealed Greater Gliders are still not occupying high severity areas.

5.8 Other threats such as competition for hollows is not fully understood in South Gippsland, however in other parts of Victoria Sulphur-crested Cockatoo pose a threat by occupying hollows suitable for Greater Gliders. We have not yet observed large parrots using hollows in South Gippsland, however it is occurring in West Gippsland at Mullungdung and Won Wron. At the HVP custodial forest nest box site a large proportion of hollows (including nest boxes) are being used by King Parrots and Rosellas. We can assume this is adding pressure on hollow availability. Little is known about cohabitation between Greater Gliders and other arboreal mammals, however Greater Gliders have been observed sharing hollows with Yellow-bellied Gliders. Sugar Gliders may also be competing with Greater Gliders for hollows. Although Sugar Gliders can use hollows 30mm in diameter, during our nest box trial we found Sugar Gliders are continuously using hole sizes of 100-140mm designed for Greater Gliders.

7. Management Actions

An integrated approach to the long-term management of Greater Gliders in South Gippsland is required to prevent the species becoming locally extinct. Not one action alone is likely to prevent the decline of Greater Gliders, however using a range of habitat restoration methods could secure Greater Glider populations in South Gippsland.

Action Steps below correspond to **Threats** on *page 6.*

5.1 - Current and Future Habitat Restoration

Current habitat restoration is enhancing what habitat is left. This can be done by installing artificial hollows to consolidate suitable patches of forest. As we have seen from our next box trial at the HVP site, a range of species will benefit from nest boxes including Sugar Glider, Boobook Owl, King Parrot, Rosella, Eastern Pygmy Possum and Greater Glider. Patches of thin forest can be improved by planting eucalypt species that Greater Gliders favour in South Gippsland such as Mountain Grey Gum and Narrow-leaved Peppermint.

Future habitat restoration is a long-term plan to re-establish forest on farmland and logging coups to connect areas of suitable habitat and priority is given to connectivity between current populations of Greater Glider. Where possible naturally occurring drainage lines should be planted out with endemic species to connect habitat.

Hallston

The 23ha Foresters site has hollow densities of approx. 9/ha, which is a suitable number of hollows, however 23ha of suitable forest is not sufficient to allow Greater Gliders to persist. Hollow densities are similar at Boyles Ck within some locations, however other patches of forest lack multiple hollows. Since 2013 Greater Gliders have been isolated by patches of unsuitable habitat due to the fire scar and we believe Greater Gliders take extensive amounts of time to re-establish back into badly burnt areas. Greater Glider populations we have been monitoring in the Mirboo RP 10 years after the fire have not been recorded in the intensely burnt areas. At Hallston Greater Gliders are absent from the fire scar 6 years on.

There is a 21ha area of unsuitable habitat between the Boyles Ck and Foresters populations *(map 2 blue polygon), p*resumably the site of a timber mill from the late 1800's. With a canopy cover comprising of only Blackwood and Acacia, this is a physical boundary which we do not believe Greater Gliders will pass through due to an absence of hollows, food and gliding space. Eucalypt densities in core Greater Glider habitat in South Gippsland typically range from 25-40 per hectare.

Actions

I. Areas that have been selectively logged will be revegetated, planting Mountain Grey and Peppermint Gums at a spacing of 20-40m apart. In areas that clear felling has occurred *(map 2 blue polygon)*, cutting back of mid and understorey may be required to enable trees to grow. 1300 guarded trees are required at approx. 60/ha and this will ensure long term connectivity and will help in keeping the gene pool diverse.

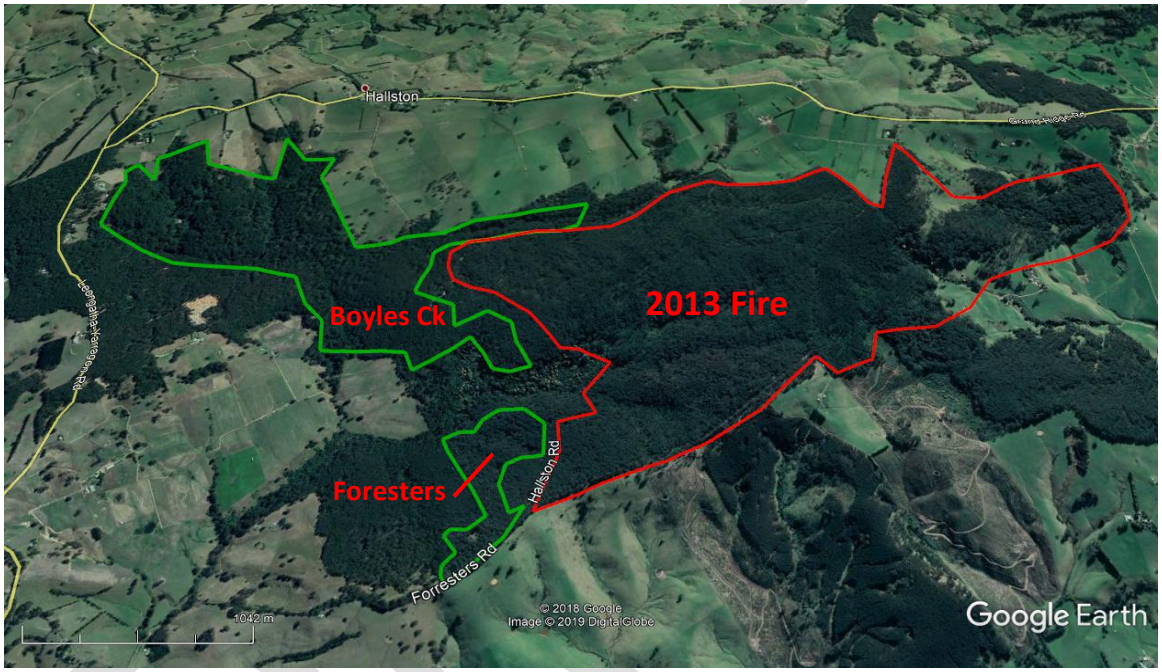
II. Nest boxes should be installed around the parameter of the Foresters site at approx. 10/ha over a 100ha area *(map 2, purple polygon).* This will allow the Hallston Greater Glider population to become more robust over time. Nest boxes should also be installed at 2/ha at the Boyles Ck site to increase the number of available hollows.

III. Revegetation of private land is important at Hallston. Mature trees already persist on the drainage line which links Boyles Ck to the Foresters population *(Map 2 yellow)*. However, trees are spaced too far apart for Greater Gliders to use the corridor as is. It is a 6ha area, planting 200-300 trees will be sufficient.

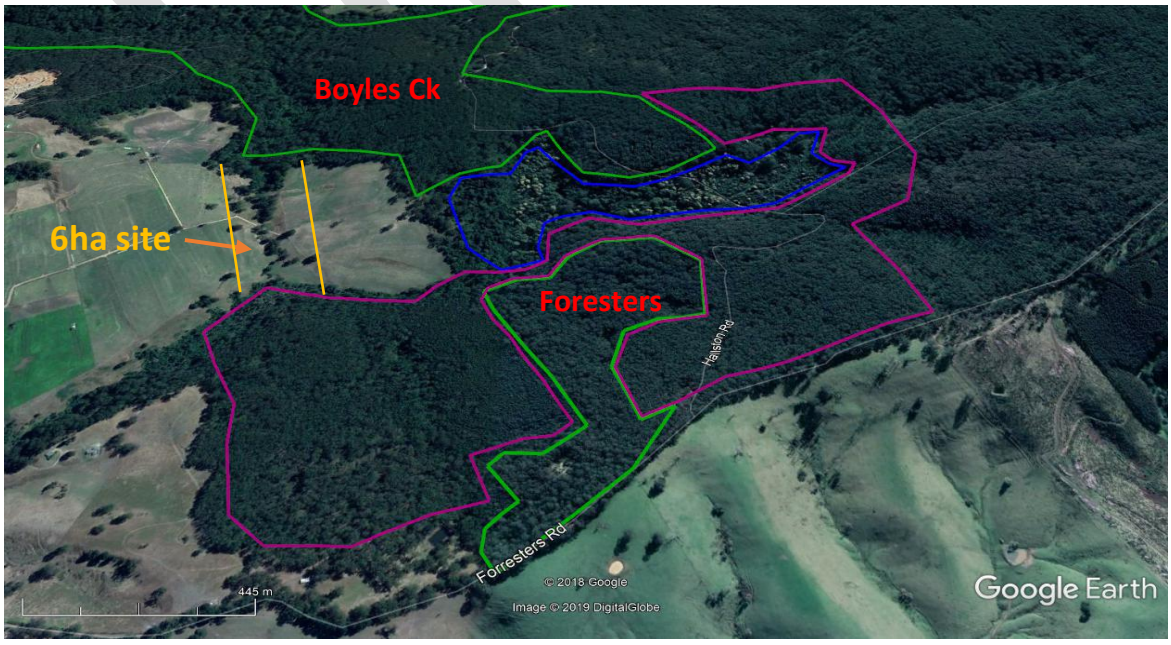
Maps

Refer to Map 1 which highlights the core areas of habitat located in the green polygon. A population of approx. 8 gliders persist at Foresters, isolated from the main population at Boyles Ck. Further monitoring is required at the Boyles Creek site; however, population estimates range from 25-40 individuals within the 190ha area.

Map 1



Map 2



Mirboo Regional Park & Dickies Hill

Mirboo RP and Dickies Hill hold the highest quality continuous habitat in South Gippsland for Greater Gliders *(Map 3 green polygons)*.

Mirboo RP, East of Old Thorpdale Rd has approx. 130ha of suitable habitat out of 400 hectares of forest. As always, suitable habitat is partly fragmented by patches of forest which does not possess suitable hollows or has been badly burnt. The 2009 extreme fire event devastated Greater Glider habitat in some areas *(Map 3 red polygon),* while other areas escaped the fire front. Fire did not burn as hot in patches of forest where Mountain Grey Gums are prevalent, therefore a healthy number of Greater Gliders survived. However, we do believe larger concentrations of Greater Glider did occur prior to the fire. At present 17 gliders have been detected at Joes Tk, 19 at HVP and 9 at Vincent Tk East, with multiple random detections between sites.

The largest area of Greater Glider habitat of approx. 230ha is at Dickies Hill, however habitat containing low hollow densities still occurs between patches of suitable forest. This could be impeding on social dynamics and structures and as a result this could be reducing breeding and increasing the mortality rate in juvenile Greater Gliders pushed to unfavourable habitat.

Dickies Hill contains a breeding pair of Powerful Owls and this is likely to be the reason our initial spotlight surveys detected less gliders than we anticipated. 10 detected at Pines Rd #1, 7 at Pines #2, 2 at Pines #3, 5 at Void Tk and 5 at Sky Tk. 29 Greater Glider detections in 5km's of transects. Powerful Owl adults and chicks have also been heard at the HVP site, yet it is not known if they are the same birds from Dickies Hill. Only 2 Ring-tailed Possums have been detected during surveys.

The long-term survival of Greater Gliders in South and West Gippsland depends on the Mirboo North and Dickies Hill populations. Large areas of suitable forest like these are rare South of the Princess Hwy. These richly diverse expanses of remnant forest require special protection from industry, illegal activities and frequent fire. Further to this, Dickies Hill and Mirboo RP need to be consolidated, returning the HVP managed plantation back to a corridor between the two forests *(see Map 4 blue polygons revegetation plots).* Other revegetation sites are also numbered on Map 4.

Actions

I. Areas that have been logged will be revegetated *(Map 4, blue Polygons 1, 2 & 4)*. Planting Mountain Grey and Peppermint Gums at a spacing of 20-40m apart is necessary. Where clear felling has occurred, cutting back of mid and understorey may be required to enable trees to grow. Young Pine Trees and other invasive plants need to be removed.

II. Within area 1 on Map 4 is an 80ha pine plantation coup managed by HVP. At this stage 60ha has been harvested and is left bare and 20ha is young pine plantation. There is also a 20ha clear felled expanse with no Eucalypts managed by Parks Vic. To return this land back to native forest approx. 6000 endemic Gums are required at 60/ha. This will ensure connectivity between Mirboo RP and Dickies Hill and would be beneficial to a range of species, including Greater Gliders, Long-nosed Bandicoots and Powerful Owls.

III. Revegetation site 2 on map 4 encompasses Dickies Hill and a parcel of private land with an area of 40ha. The remnant patch of forest between site 2 and 4 has suitable habitat for Greater Gliders. There is a clear-felled parcel of land at Dickies Hill which is most likely the site of a saw mill from the late 1800's and just like the patch at Hallston it is a physical boundary for Greater Gliders. Unlike Hallston there are occasional young Eucalypts scattered

in amongst a sea of Blackwood and Wattle. The area in question also has a permanent spring fed creek running through the middle, which is an ideal location to plant Mountain Grey Gum, Peppermint Gum, Mountain Ash and Manna Gum. The revegetation of these species will act as the start of the corridor back up to Mirboo RP through the HVP logging coupe and private land. 2400 guarded Eucalypts are required at 60/ha.

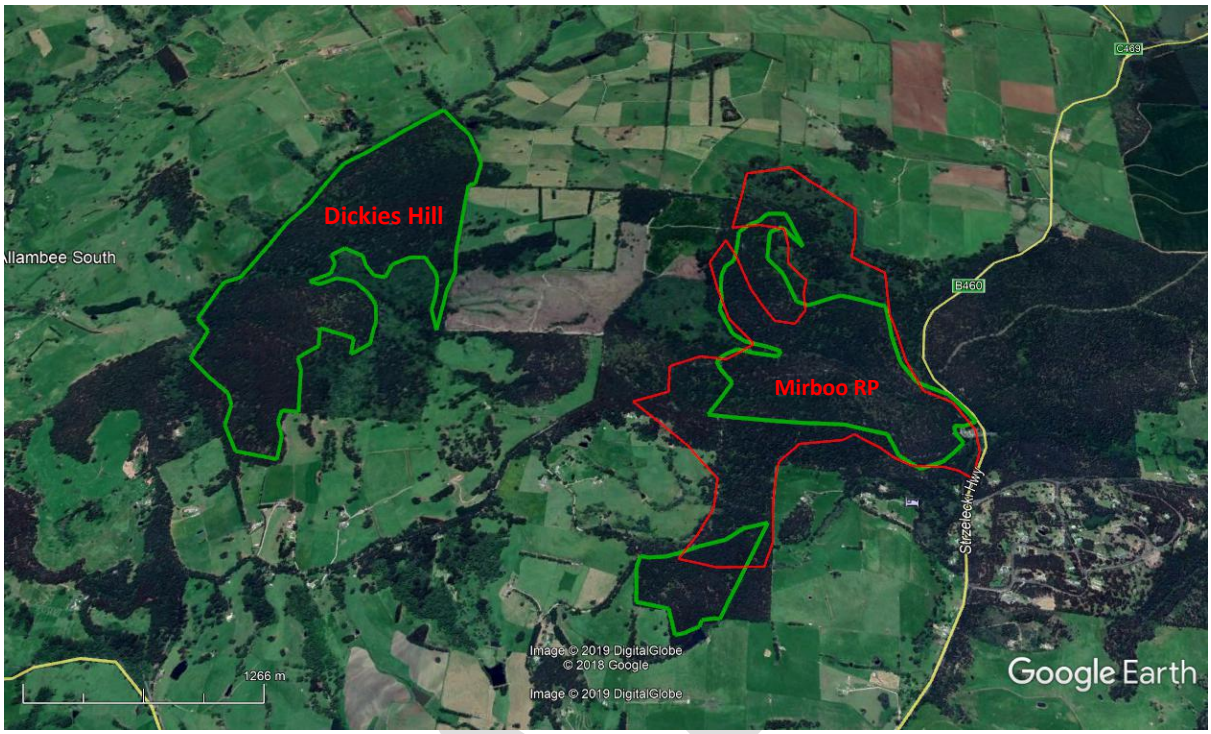
IV. Revegetation site 3 is on private land and runs along the road entrance to Dickies Hill. This plan is a simple 50m wide 4ha strip planted with suitable trees which would directly connect the two isolated populations. Some remnant hollow bearing trees occur along the road and nest boxes will be installed in the patch of forest at the East end of the plant zone. 240 guarded Gums are required.

V. Site 4 is similar to Site 2, whereby a patch of private land connected to poor quality Parks Vic managed land with very few Eucalypts occurring. The Revegetation site 4, although only 5ha could be an important link for the Joes Tk population. 300 guarded Gums are required.

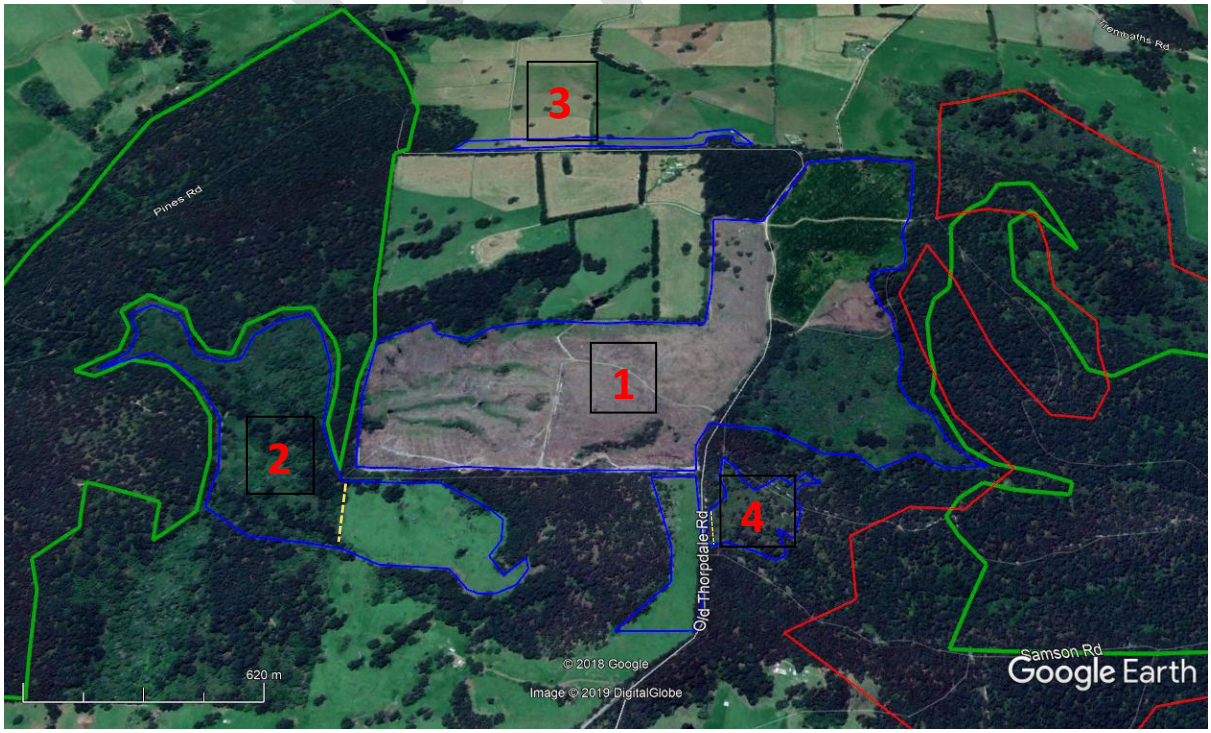
VI. Nest boxes are required in and around all Greater Glider populations at Dickies Hill and Mirboo RP. This will give juvenile gliders den sites outside of their mother's home range when it comes time to disperse. Nest boxes can be used to funnel population growth towards areas of other known populations, or into patches of suitable habitat where Greater Gliders have declined or died out. At revegetation sites, nest boxes can be installed on tall posts, Blackwoods or established Eucalypts.

Pictures showing nest box usage from Greater Gliders and a Boobook Owl. Nest boxes were used by Greater Gliders within 8 weeks of installation.

Map 3


Dickies Hill
Mirboo RP
Allambee South
B460
C439
Strzelecki Hwy
1266 m
Image © 2019 DigitalGlobe
© 2018 Google
Image © 2019 DigitalGlobe
Google Earth

Map 4


3
1
2
4
Pines Rd
Old Thorpdale Rd
Samson Rd
620 m
© 2018 Google
Image © 2019 DigitalGlobe
Google Earth

5.2 – Genetic diversity

"Some threatened species aren't very genetically diverse, due in part to factors like inbreeding and the butterfly effect of global warming. Pollution and habitat degradation can lead to population loss, which can also shrink and muck up an animal's gene pool. Species with lower genetic diversities are becoming increasingly less suited to adapt to factors such as climbing temperatures, emerging diseases, and other effects of climate change. Understanding these patterns of loss of diversity are important for conservation because the capacity for future evolution is based, at least in part, on the depth of the gene pool. If genetic diversity is low, the adaptive potential of a species is compromised. Therefore, the maintenance of genetic diversity is often important for the successful conservation of threatened and endangered species" *(Willoughby 2015).*

Greater Glider populations are most likely suffering from poor genetic diversity and by strategically expanding the range and distribution of suitable habitat allows populations to become more robust genetically. DNA sampling collected from fresh scat is required to understand the genetic diversity of all South and West Gippsland populations. This is a non-invasive method which also helps managers to understand which patches of forest are being used by males and females. It enables us to measure home range sizes in different qualities of forest and therefore allowing us to plan for habitat restoration. If indeed, Greater Glider populations are poorly represented genetically, future translocation of individuals between populations state wide could be an option. Juvenile Greater Gliders would need to be translocated and would need to be released into patches of forest with low hollow competition and released into a suitable hollow or nest box.

Actions

I. Implementing habitat restoration plans will directly benefit the genetic diversity of Greater Gliders in South Gippsland.

II. Engage with a University to plan and deliver a genetic testing project based around South and West Gippsland Greater Gliders. Fresh scat is to be collected at all isolated populations. If Greater Gliders are indeed poorly represented genetically, conversations with relevant government departments should start regarding the possibility of translocations between Gippsland juvenile Greater Gliders.

Map showing all known Greater Glider population in South & West Gippsland.

5.3 – Predation

Direct predation on Greater Gliders from invasive species such as foxes, cats and wild dogs would be rare. During the past 7 years of monitoring populations, we have only observed two Greater Gliders on the ground and only a small percentage of gliders have been seen at heights lower than 10m. It is of course possible for cats and even foxes to hunt in trees, however in South Gippsland, terrestrial prey is plentiful. Further to this, habitat trees within patches of forest where gliders occur are most likely to be tall and straight rendering them hard to climb for even a cat. Foxes are very common at all South and West Gippsland sites with the exception of Gunyah where cats are detected more frequently.

Foxes and cats can still pose a threat to Greater Glider populations by potentially spreading disease and predating on other arboreal species such as Ring-tailed Possums and Sugar Gliders. We have found evidence of fox predation on native species at all sites in South Gippsland and detection of Ring-tailed Possums during surveys is low. Fox scat collected from Greater Glider habitat in other regions of Victoria have all been analysed to contain Ring-tailed Possum. Our hypothesis is that when Powerful Owls move into Greater Glider populations which are lacking Ring-tailed Possums, predation levels on Greater Gliders will increase due to a low selection of prey items.

Actions

I. Collect and analyse fox scat from known Greater Glider populations to assess the diet of foxes within these areas.

II. Plan and implement targeted fox baiting across all sites during Ring-tailed Possum breeding periods. Breeding has been observed to occur in South Gippsland from late April-June. Baiting twice a year is recommended, with bait periods running for 7 weeks from April-mid May and from October-mid November. April-May baiting will knock down foxes as Ring-tailed Possums are activity searching for mates and October-November baiting will control foxes during the period when juvenile possums are dispersing. Both these periods are also ideal times to bait foxes.

5.4 - Climate Change

Continuous long-term monitoring and record keeping is required to document changes in abundance over time at all 4 populations. It is apparent that while conditions are dry, Greater Gliders adjust their home ranges accordingly to take advantage of young Eucalyptus leaves which grow more frequently on trees in damp gullies. Greater Gliders have been observed at the HVP site and Hallston concentrated in damp gullies during dry/hot weather, whereas during wetter conditions the populations are more wide spread, occupying most of the suitable forest. These ecological traits are complex and not much is known about Greater Glider behaviour in South Gippsland. Actions required to halt the decline of Greater Glider populations resulting from Climate Change and periods of extreme heat are challenging.

I. Ensure populations are robust by means of enhancing connectivity between patches of Greater Glider habitat on private and Government land.

II. Protect current and future habitat from logging and illegal firewood collection.

III. Strategically plan controlled burns in areas of known Greater Gliders, which will in turn ensure larger unburnt areas are left as buffers around core habitat and allow other arboreal species to breed. This will enable Powerful Owls to prey on other species other than Greater Gliders.

5.5 – Firewood Collection

Illegal and legal firewood collection in forested areas in South Gippsland remains a threat to Greater Glider populations. The loss of woodland birds in south eastern Australia has been linked to collection of firewood (Reid 1999). Greater Glider scat has been detected under trees that have recently been cut down. It is Illegal to fall trees and only firewood found on the ground within firewood collection periods is permitted. During planned burns by Parks Vic and DELWP, habitat trees are also dropped if they are deemed unsafe.

Actions

I. Community education is important to encourage people to collect firewood in a sustainable way.

II. Education of Parks Vic and DELWP fire crew staff is also necessary to highlight the importance of habitat trees within Greater Glider populations.

III. Appropriate signage should be installed at entrances into South Gippsland forested reserves explaining the importance of habitat trees, fallen timber and firewood regulations.

IV. Local communities should be urged to report any illegal activities to relevant authorities.

Picture collage showing just a few illegally felled trees at Hallston. Illegal firewood collection is occurring in all South Gippsland forests.

Picture showing Greater Glider scat found at the base of a cut down Mountain Grey Gum. Multiple felled trees were found to have Greater Glider scat, meaning these trees were used by gliders.

5.6 - Timber Harvesting

The greater glider is considered to be particularly sensitive to forest clearance (Tyndale-Biscoe & Smith 1969a). Greater Glider populations in South Gippsland are typically larger in patches of forest that has little to no disturbance. Areas that have been selectively logged still contain gliders, however patches of forest where selective logging has not occurred contain larger concentrations of Greater Glider. Vic Forests are planning to log at least three areas of core Greater Glider habitat in South and West Gippsland, Mirboo RP, Alberton West and Mullungdung.

Actions

I. Consult with logging companies about the locations of Greater Glider habitat and known distribution.

II. Engage and educate local communities about the plight of our native species in their region.

III. Support local lobby groups by providing training on delivering science-based data to reinforce the importance of local forests.

IV. Host community spotlighting events where locals can observe these majestic creatures first hand to develop a respect and understanding for them.

V. Engage school and youth groups to educate the next generation about the importance of protecting ecosystems.

One of many spotlight events held across Victoria to educate the community about threatened species.

5.7 – Fire

Greater Glider population loss or declines have been documented in and after high intensity fires (Lindenmayer et al., 2013). Habitat quality has been hindered after frequent prescribed burns at Alberton West State Forest. The frequency of fire is not allowing under and mid storey to reach suitable maturity, rendering habitat unsuitable for most arboreal species such as Ring-tailed Possums, Sugar Gliders, Eastern Pygmy Possums and Mountain Brushtail. All 4 species are declining partly due to an absence or low densities of Acacia species, therefore putting further pressure on Greater Gliders from Powerful Owls. We recently detected 29 Greater Gliders and a breeding pair of Powerful Owls at a planned burn site at Dickies Hill.

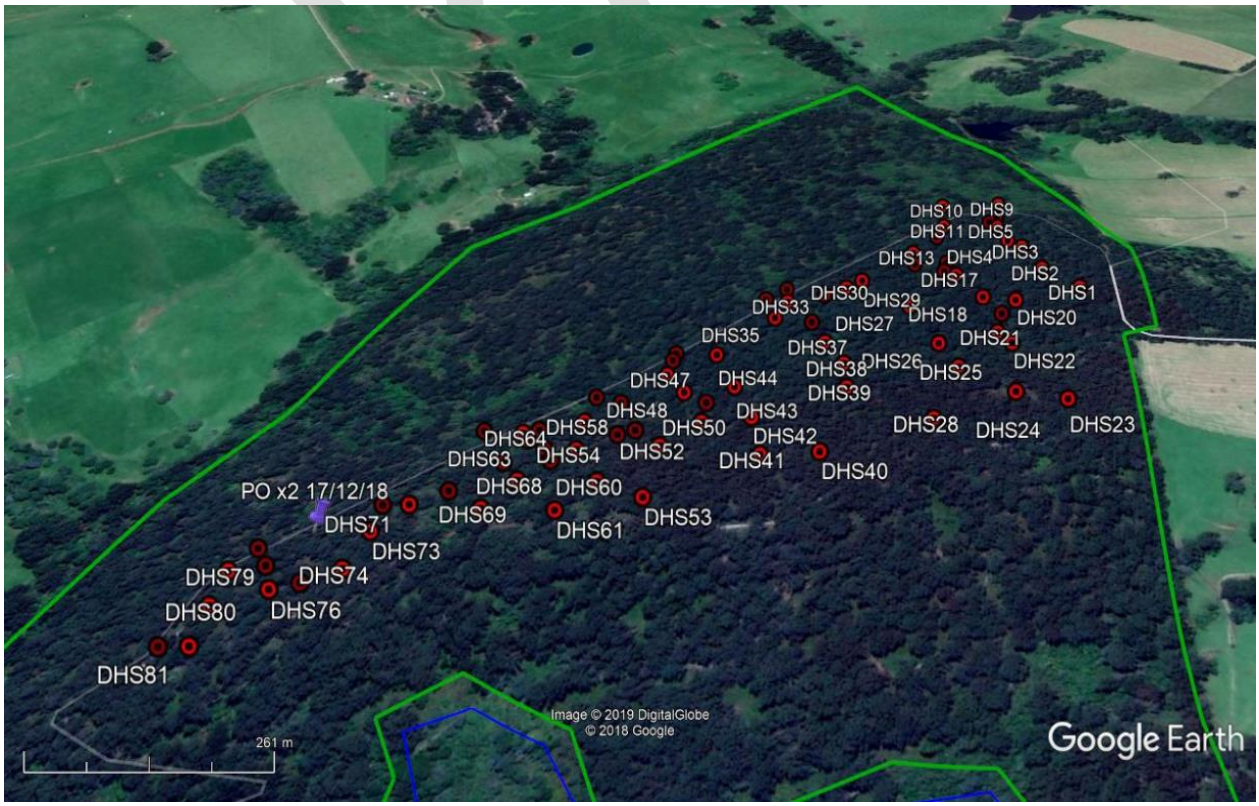
Actions

I. Communicate concerns with Parks Vic and DELWP regarding creating larger unburnt buffer areas around Greater Glider habitat. This will enable suitable habitat for arboreal and terrestrial species to flourish.

II. Stop controlled burns within known populations of Greater Gliders.

III. Independent surveys are required to locate threatened species before controlled burns take place. At present no surveys are undertaken to determine presence/absence of threatened species before controlled burns.

Map showing 81 active Greater Glider habitat trees within a planned burn site at Dickies Hill.



5.8 – Other Threats

Actions regarding other threats such as hollow competition have been covered in this report. The use of nest boxes and the revegetation of sites creating a more robust population is key to limiting all other threats.

Conclusion

Without appropriate management of Greater Glider habitat and populations within South and West Gippsland, it is our opinion that the species could become locally extinct at some sites within the next 30-50 years. It is obvious that Greater Gliders are declining due to a range of threats, some threats are easy to avoid if the species can gain enough attention. Long-term monitoring of populations is required to quantify patterns relating to breeding requirements and the effects of climate change. Populations must be reconnected using a range of revegetation methods for the species to persist. We now know well constructed nest boxes are used by a range of species in South Gippsland including Greater Glider. Nest boxes must be installed within and on fringes of known Greater Glider populations. This will provide den sites for gliders and limit competition for hollows. Further funding is required to assess Greater Glider genetic diversity by engaging a university PHD student. The HVP logging coupe between Dickies Hill and Mirboo RP is an important proposed revegetation site, which will directly ensure genetic flow between the two largest populations in South and West Gippsland.

References

Lindenmayer, D., Blanchard, W., McBurney, L., Blair, D., Banks, S., Driscoll, D., Smith, A. and Gill, A. (2013). Fire severity and landscape context effects on arboreal marsupials. *Biological Conservation*, 167, pp.137-148.

Kehl, J., & Borsboom, A. (1984). Home range, den tree use and activity patterns in the greater glider (Petauroides volans). In Possums and Gliders (eds. A. P. Smith & I. D. Hume), pp. 229-236. Surrey Beatty and Sons, Chipping Norton.

Department of the Environment and Energy. (2019) (Reid 1999). . *Department of the Environment and Energy*. [online] Available at: http://www.environment.gov.au/biodiversity/threatened/nominations/ineligible-ktp/continuing-loss-trees-due-to-firewood-harvesting-practices.

Environment.gov.au. (2019). [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-05052016.pdf [Accessed 24 Feb. 2019].

Willoughby (2015). Gene expression; posttranscriptional modifications (2C-01 - 2C-09). *Genes & Genetic Systems*, 79(6), pp.407-409.

Environment.gov.au. (2019). [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-05052016.pdf

Environment.gov.au. (2019). [online] Available at: http://environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf