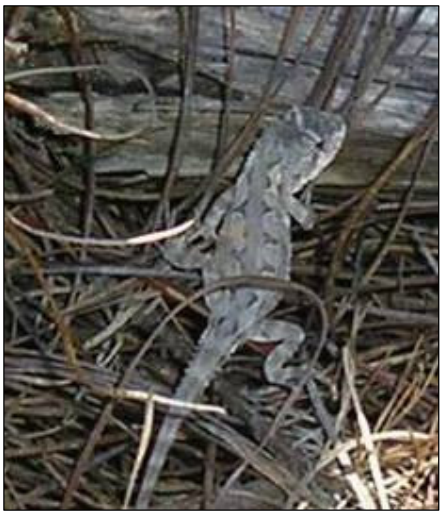
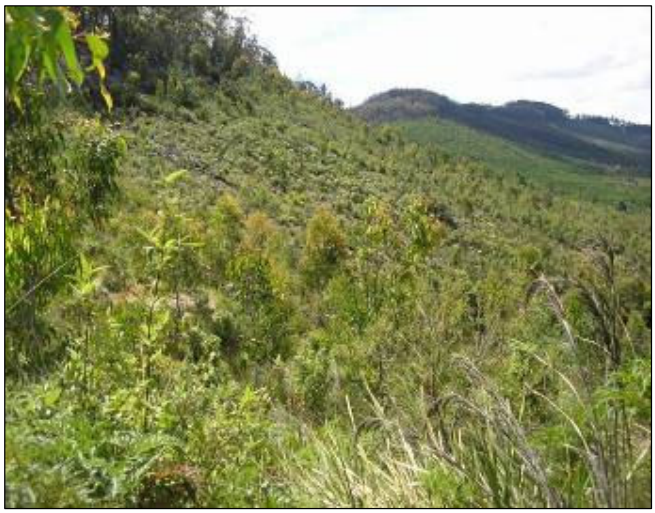
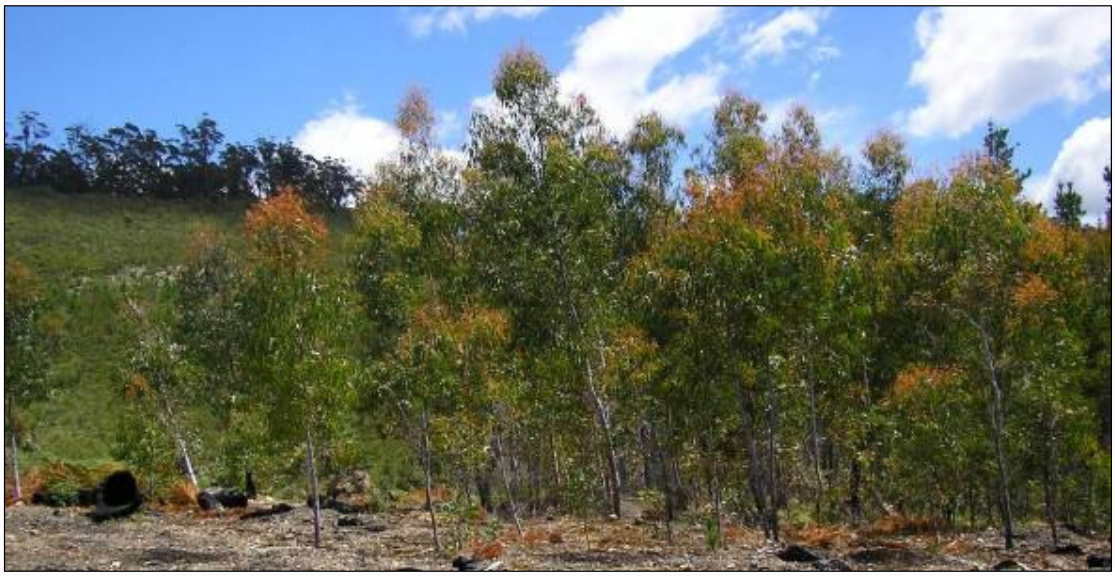
Restoration of Skyline Tier
Scamander Plantation, Tasmania

Review December 2009







Bushways
Environmental Services – Tasmania

for the

Northeast Bioregional Network

Prepared for:
The North East Bioregional Network

Cover photographs:
Clockwise from top left: Mountain Dragon in regeneration area; Excellent native regeneration at southern end, adjacent to Scamander Forest Reserve; Ironbark regeneration in Wrinklers Lagoon catchment following pine removal.

ACKNOWLEDGEMENTS

Bushways thanks the following people who provided assistance or were consulted in the preparation of this report: Todd Dudley, North East Bioregional Network; Chris Ringk, Timberlands.

Mapping data in this draft has been taken from the TASMAP Series, DPIPWE Natural Values Atlas, The List, TASVEG, Todd Dudley's records and field work conducted by Bushways.

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EXECUTIVE SUMMARY

The Northeast Bioregional Network engaged Bushways Environmental Services Tasmania to conduct a review of the ecological restoration works undertaken at Skyline Tier, Scamander Pine Plantation. Since July 2007 active management of the site removing pines and regenerating native vegetation has resulted in impressive progress towards the successful restoration of:

- habitat for threatened flora and fauna species,
- threatened vegetation communities,
- native riparian buffer zones,
- connected regenerating native forest,
- high conservation value catchment areas and
- scenic values.

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Potential habitat for threatened fauna species occurring on site has been enhanced, including areas of Thatch Saw-sedge (which could support Chaostola Skipper), areas of Blue and Black Gums (habitat for Swift Parrots) and streams (Australian Grayling). Regeneration of moist vegetation in some of the gullies indicates that potential Giant Velvet Worm habitat may be restored in the future. Similarly, regeneration of heath species in the lower areas may provide potential habitat for the New Holland Mouse.

Populations of threatened flora species *Hovea corrickiae, Heirochloe rariflora* and *Glycine latrobeana* have been discovered regenerating on site since the restoration works began. Pine control has been successful in the two threatened vegetation communities, Blue Gum forest and Black Gum forest, which are recovering well.

Regeneration of native flora was found to be excellent across most of the site. Eucalypt and understorey species are diverse and continuing to regenerate vigorously in all sites where work has progressed. The high priority Trout Creek site has five species of eucalypt naturally regenerating and has advanced regeneration of understorey and a high level of connectivity to the surrounding high conservation value forests and wetlands. Direct seeding with *Eucalyptus obliqua* has been implemented on several steep slopes where eucalypt regeneration was not occurring naturally.

Across large areas, where pines were prolific in 2006, there are now few. Pine control through hand-pulling or manual cutting out has been an effective means of control, made possible with many hours of volunteer labour. Controlling the spread of pines into surrounding native vegetation, along Skyline Tier, as well as remnants within the site, and post-harvest areas has been a priority with successful results. Machinery has been used successfully in areas where large or mature pine removal was undertaken from existing threatened native vegetation.

Other weeds remain largely absent, enhancing ongoing regeneration potential and the conservation aims of the project. Weeds that have been identified on site are being controlled and monitored with a view to future management if necessary.

Future management activities proposed include:

- Second stage manual control of remaining pines in weeded areas.
- First stage pine removal from regenerating sites not yet weeded.
- Continued mechanical removal of pines from natural remnants and surrounding forest.
- Pine wilding removal from post harvest sites.
- Monitoring and control of isolated other weeds.
- Further direct seeding where natural regeneration is insufficient.

Further proposals for additional restoration areas and for expanding conservation reserves around Skyline Tier are outlined.

This restoration project at Skyline Tier possibly represents the largest ecological restoration project in Tasmania and is extremely significant in its protection of high conservation values. The dedication and resourcefulness of the North East Bioregional Network has enabled achievement and success in this ambitious endeavour so far. Further support providing resources for ongoing works is necessary to ensure that the restoration continues and these valuable habitats are protected into the future.

1 INTRODUCTION

1.1 Background

Todd Dudley of the Northeast Bioregional Network engaged Bushways Environmental Services Tasmania to conduct a review of the ecological restoration works undertaken at Skyline Tier, Scamander Pine Plantation.

The North East Bioregional Network oversees and implements the restoration works on nominated sites under a contractual agreement with the leaseholder, Timberlands (previously Rayonnier). This agreement outlines an area of radiata pine plantation of approximately 285ha to be restored to native forest. Restoration work has been underway since July 2007.

This report documents the findings of the review in December 2009 and, in consultation with Todd Dudley, recommends future strategies for continuing works and further opportunities for conservation in the region.

1.2 Supporting documentation

In 2006 Bushways conducted an assessment of the potential of the Scamander Pine Plantation for natural regeneration following harvest. The Report on Natural Regeneration, Scamander Plantation, Scamander, Tasmania (2006) documented high conservation values to be restored and protected including threatened flora habitat, potential threatened fauna habitat, threatened vegetation communities and catchment areas of high conservation value wetlands and streams. The report provided management recommendations and priorities for pine removal, promotion of natural regeneration, and enhancement of the conservation values that have been applied with significant success.

A survey of radiata pine wildings at the Scamander Pine Plantation was carried out several months after weeding works commenced (Fitzgerald 2007).This survey mapped the extent of pine invasion in native forest adjacent to the pine plantation, documented the effectiveness of pine control works and identified priorities for pine control.

A Regeneration Survey and Stocking Standards transect survey has been completed by Timberlands (December 2009), mapping the eucalypt and pine regeneration occurring on three of the regeneration sites.

Benefits to the community from this project are simultaneously being covered by another report.

1.3 Site description

The plantation is situated 1-2 kms inland from the coast and north of the township of Scamander.

The plantation is surrounded mainly by State Forest, but with private land on the eastern side, and Scamander Forest Reserve on the south-western edge. The site was planted with pines as an employment program in the 1960s and 1970s. Coupes were harvested and replanted with pines from 1998.

The sites for implementing the initial pine control works are a large regeneration area on the east facing slopes and one smaller site on Trout Creek on the western slopes.

2 METHODOLOGY

2.1 Background Research

A Natural Values Report was conducted (December 2009) for all threatened flora and fauna recorded within 5 kilometres of the site.

Todd Dudley has co-ordinated and implemented the works since 2006 and guided the field review providing information on methods and achievements and the proposed works and resources still required.

2.2 Field Survey

Helen Morgan conducted the field review with Todd Dudley on 23rd December 2009.

The major roads through the plantation were driven, similarly to the initial survey, to gain an overview of the different sites and their stage of pine control and natural regeneration.

Stops were made at sites that have been worked on with short walks into each to assess the presence of pine wildlings, record native species (noting threatened species and any weeds present) and discuss methods used for restoration works. Each site was viewed from an observation point and photographed.

Progress of works towards implementing recommendations made in previous reports was noted and discussed at each site including recommendations that were not achievable and resources still required for continuing works.

Observation points and locations of any notable features were recorded by handheld GPS. Locations given in this report were taken in WGS 84 (=GDA94)

All botanical names are in accordance with the recently updated "A Census of the Vascular Plants of Tasmania" (Buchanan, 2005).

2.3 Restoration assessment

Restoration progress was reviewed using the priorities and recommendations for the Scamander Plantation (Bushways 2006 and Fitzgerald 2007). These are summarised below:

1. Priority areas are those:
   - already showing excellent regeneration and few pines,
   - most likely to have good natural regeneration,
   - near native vegetation,
   - riparian areas, especially with high CFEV values
   - potential threatened species habitat,
   - landscape/wildlife linkages,
   - of strong community importance, and/or
   - of low economic viability.

2. Works for rehabilitation areas
   - removal of pine wildings
   - direct seeding with eucalypts
   - burning trials for pine control

3. Works to prevent spread of pines in native bush
   - strategic wilding control for native forest areas
   - eradicate low density pine infestations in bushland
   - target mature pines in bushland
   - liaise with landowners on eastern boundary

- controlled burning

4. Follow up wilding control

5. Monitoring and evaluation of works

6. Control other weeds on site (Spanish Heath and Pampas Grass)

2.4 Limitations

This was not intended to be a scientific survey, but an assessment of the progress of restoration works due to natural regeneration and pine control occurring since 2006. Not enough time was available to conduct site specific flora surveys or precisely map or quantify the natural regeneration and pine density.

3 SITE ASSESSMENT

3.1 North East Bioregional Network restoration area

The area of the Scamander Pine Plantation the North East Bioregional Network is currently restoring includes the eastern facing slopes of Skyline Tier including catchments to Wrinklers Lagoon, Freshwater Creek, Yarmouth Creek and Diana's Basin and a small area to the west of Skyline Tier on Trout Creek, a tributary of the Scamander River.

These sites contained different stages of native forest regeneration when restoration work began and were identified in the original survey as being significant for threatened vegetation communities, Black Gum and Blue Gum forests, potential threatened flora and fauna habitat for many species, water quality and conservation of aquatic habitat in streams feeding the coastal lagoons and estuaries.

Skyline Tier restoration areas are strategically located to connect coastal habitats to inland natural areas including the conservation areas Scamander Forest Reserve, and large tracts of intact forest proposed for reservation. The Skyline Tier restoration area is significant for scenic values.

Fig. 4 Skyline Tier and Wrinklers Lagoon in the foreground (Photo Matt Newton)

3.2 Restoration methods

It is clear that restoration work at this scale is not possible without the resources to support a high level of manual labour. Mechanical assistance is also necessary. Volunteer labour has been relied upon to achieve the results obtained so far. The largest volunteer group engaged in the work at one time was 27 and it is conceivable that this work could employ 30 people part time (pers. com. Todd Dudley December 2009).

Works have been undertaken since July 2007 and have entailed:

- extensive removal of pine wildings from regenerating areas, native forest and State Forest,
- control of other weeds and
- direct seeding with eucalypt species.

Manual removal of pine wildings is the main form of removal. This allows the natives regeneration to continue with little disturbance. Methods include hand pulling of small pines and cutting and painting with herbicide where necessary. Cutting of larger pines with hand saws and chainsaws has been possible with teams of volunteer labour from Conservation Volunteers Australia, Green Corps, Mersey NRM and local community groups and individuals. The Break O' Day Council has also provided assistance with trucks and machinery for rubbish removal.

Fig 5 Volunteer team at work cutting dense pine wildings, February 2009.

Machinery has been used, when resources were available, to remove the large pines from existing native forest areas.

Direct seeding was achieved by volunteers walking down the steep slopes shaking seed from jam jars.

Fire has not been used as a restoration tool.

3.3 Results

3.3.1 Areas restored and regenerating

Manual pine removal has been conducted over approximately 120ha; with approximately 8ha of this being mechanical removal and 11.5ha of revegetation with direct seeding. In the 30 months from July 2007 to December 2009, work crews, nearly all volunteer other than the contracted Feller Buncher, have weeded 42% of the NEBN restoration area.

Weeded areas on the eastern slopes have had mostly one round of manual pine removal which has been extremely successful (Appendix 7 Map reference 3, 7, 8). The Trout Creek site has been entirely manually weeded twice (Map reference 18). Remaining pines in all weeded areas are few with small wildings occasionally present.

Restoration activity undertaken 2007-2009	Ha	Catchment
Areas manually weeded	120	Wrinklers Lagoon, Freshwater Creek, Yarmouth Creek, Diana's Basin, Trout Creek.
Areas of Feller Buncher work	8	Yarmouth Creek
Direct seeding	11.5	Wrinklers Lagoon

Fig 6 Volunteer work crews, Green Corps, Conservation Volunteers Australia and local volunteer groups

Excellent native regeneration and pine control is evident at all sites that have been worked on (see before and after images in section 3.4). The vascular plant list in Appendix 1 (updated with more recordings since 2006 including weeds and threatened species) shows that (even without a thorough flora survey) over ninety native species have been recorded at Skyline Tier including six eucalypt species, 11 wattle species and 11 native pea species. Four threatened flora species have been recorded at Skyline Tier, three of these found since the restoration works began.

Eucalypt species are regenerating vigorously in all the sites.

Diverse understorey species are regenerating in all areas including Silver Wattle, Narrow Leaf Wattle, Yellow Dogwood, Trailing Native Primrose and Twiggy Daisybush with Thatch Sawsedge and Sagg providing dense ground cover. Musk, a wet forest understorey species, occurs in dense patches in gullies and on slopes close to the existing forest indicating that soil water is available and that moist gully habitat is rehabilitating. Fishbone Fern is also apparent re-establishing in dense patches in once wet gullies that must be retaining moisture and seed bank.

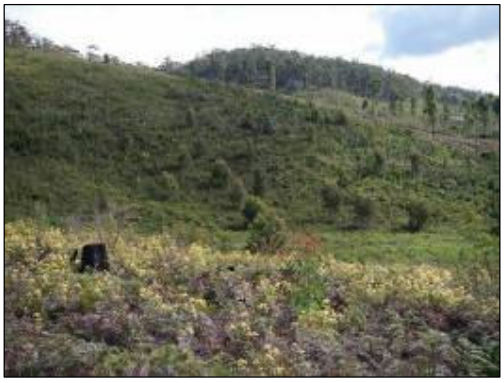


Fig 7 Regeneration September 2009 with Yellow Dogwood flowering in the foreground (Photo Todd Dudley)

Weeds other than pine have been identified and are being controlled. These are listed in Appendix 5.

3.3.2 Wrinklers Creek catchment,

- Ironbark is abundant throughout most of the regeneration area, often more dense on the upper slopes, closer to the seed source in the adjoining forest reserve. Black Gum and Blue Gum are established and regenerating well mostly on the lower slopes, in areas adjoining existing Blue Gum and Black Gum forests. Stringy Bark and White Gum are also regenerating on the lower slopes. Wattles, Yellow Dogwood, Twiggy Daisybush and Thatch Sawsedge regeneration is excellent throughout.
- Three threatened flora species *Hovea corrickiae,* Glossy Purplepea, *Heirochloe rariflora,* Cane Holygrass, and *Glycine latrobeana,* Clover Glycine have been recorded here since weeding began.
- Successful pine control is evident in all work areas with only some small wildings present (Map reference 3, 7, 8, 11, 12).
- Pine wildlings remain in unweeded areas on the upper and lower slopes. They are most dense at the bottom of the slope, (Map reference 4, 7).
- In areas remaining to be weeded pine wildings are dense and growing to a height of 3-4 metres with the highest densities on the lower slopes. Ironbark regeneration and native understorey species are present, with their regeneration most vigorous at the top of the slopes. The recent presence-absence survey by Timberlands (2009) showed that parts of these areas have a 46% - 49% pine presence.
- Mature pines remaining that have not been thinned or pruned will continue to be a threat to native regeneration and a long term seed source if not controlled (Map reference 3, 8).
- Pines have been re-established in two plantations adjacent to the NEBN regeneration area. The first, at the southern end, has been planted without herbicide treatment and the native seed bank is expected to survive for future regeneration. The second is on The Wrinklers Creek and the riparian buffer zone between the plantation and the Blue Gum Forest has been reserved for native regeneration. It is well vegetated with native species although at this point in time there is little canopy, and therefore little shading for the aquatic habitat. The restored buffer zone will increase catchment connectivity between existing and regenerating native forest up and downstream including threatened vegetation communities, Blue Gum and Black Gum Forests. (Map reference 11)

Fig 8 Wrinklers Creek riparian buffer zone between the pine plantation and the Blue Gum Forest, reserved for native regeneration

- The Blue Gum Forest has been completely weeded of pines, both mature and wildings.
- Direct seeding of Stringy Bark Gum has been carried out in the very steep gullies upstream of the Blue Gum Forest. (Map reference 12)

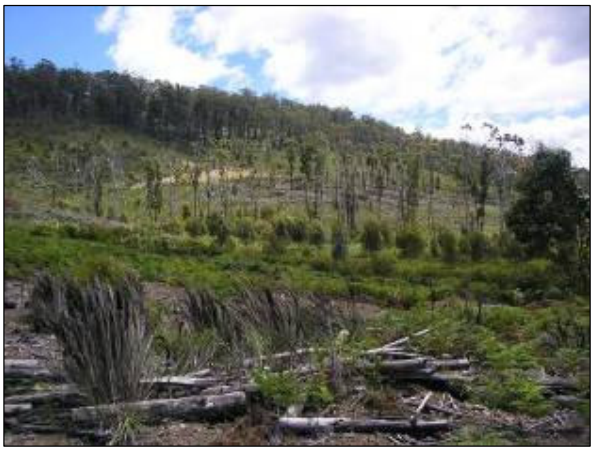
3.3.3 Freshwater Creek catchment,

- Patches of mature native forest remain on the ridgeline of this catchment, with old growth trees that are important for tree hollows and as a seed source. There is good representation of native species, structure and age groups in the forest. There are mature pines present that require mechanical removal. (Map 13)
- The ridge has been partially weeded with large mature pines chain sawed from the old growth native forest. The slope north of this site has been completely weeded.

3.3.4 Yarmouth Creek catchment

- Mechanical removal of pines with the Feller Buncher has been carried out in the Black Gum Forest. This has enables large mature pines to be removed without excessive disturbance to the existing forest and regenerating plants. Pines have been windrowed to allow better native regeneration.

Fig 9 Feller Buncher working.



- Excellent healthy Black Gum regeneration has occurred since the works, probably assisted by good winter rainfalls. A wide diversity of understorey species is present including Trailing Native Primrose, Southern Grasstree, Waxflower, Dolly Bush, Blue Dampiera and Sweet Wattle.
- The Yarmouth Creek gully has been manually weeded all the way to the top. (Map 15, 16)

Fig 10 Mature and regenerating Black Gums remain after the Feller Buncher work.

3.3.5 Diana's Basin catchment

- The Diana's Basin catchment site was weeded manually within months following pine harvest. Pine wilding and native regeneration was present in 2007 prior to work beginning. Native regeneration is excellent. Pine wildings are regenerating but a secondary weeding will control them. (Map 19)
- Ironbark is regenerating across the site with Stringy Bark on the higher slopes and wet forest understorey species including Stringybark, Viscid Daisybush, Musk, Indigofera, Heartleaf bushpea, Native Currant, Guitar Plant, Tall Sedge, Sand Swordsedge and Batswing Fern.
- Potential habitat for the Giant Velvet Worm is rehabilitating with the moisture in the gullies and the wet forest species.

Fig 11 Endemic species Lomatia tinctoria, guitar plant flowering in the Diana's Basin site.

3.3.6 Trout Creek site

- The natural values on this high priority site have been significantly enhanced by the restoration work. The adjacent forest and wetlands are in excellent condition and the pine removal has ensured their ongoing high conservation value. (Map 18)

- Five species of eucalypt are present, Black Gum, White Gum, Black Peppermint, Stringy Bark and Ironbark. Regeneration is excellent with a diverse understorey providing almost continuous ground cover. This site has been direct seeded with Stringy Bark.

- Few weeds are present, patches of Foxglove are being monitored and it is expected that they will become shaded out by the regenerating forest. The benefits for habitat and conservation are significant and the restoration is progressing successfully. This site now requires follow up monitoring and weed control.

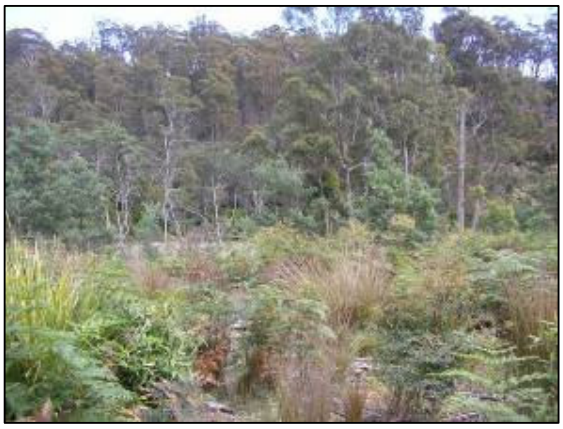


Fig 12 Excellent regeneration at Trout Creek with the Scamander Forest Reserve in the background.

3.3.7 Scamander Forest Reserve

Pine removal has been undertaken successfully from the roadside in the Scamander Forest Reserve. (Map 20).

This area was identified as being very low pine density (Fitzgerald 2007) and a high priority to maintain native forest in good condition (Bushways 2006).

Fig 13 Pine removal site along Skyline Tier in Scamander Forest Reserve

3.4 Before and After Images 2006 and 2009

Fig.14 Trout Creek site 2006

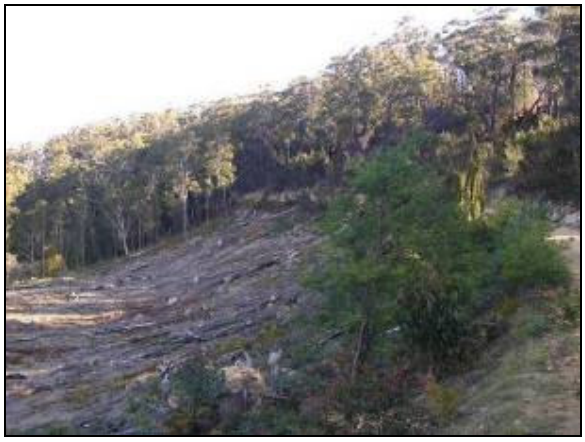


Fig 15 Trout Creek site 2009

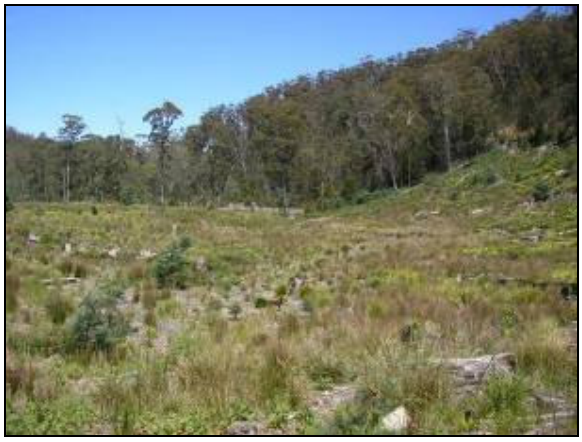


Fig. 16 Trout Creek site 2006

Fig. 17 Trout Creek site 2009

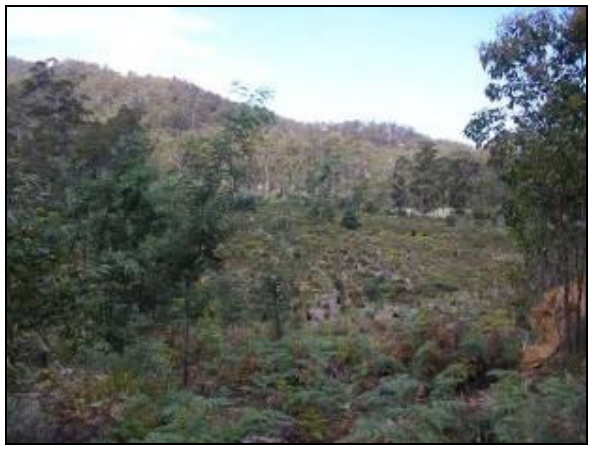


Fig. 18 Wrinklers Creek catchment 2006

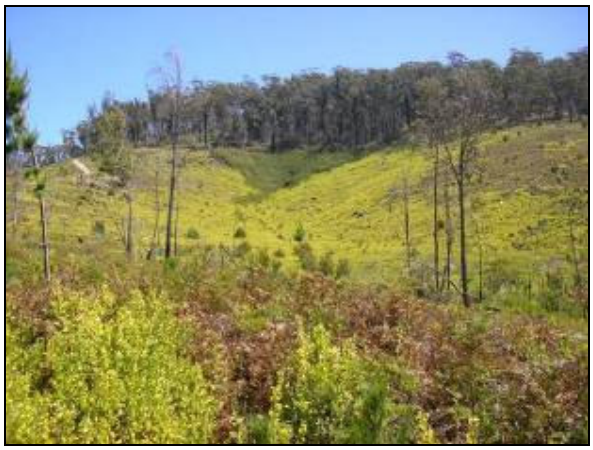


Fig. 19 Wrinklers Creek catchment 2009

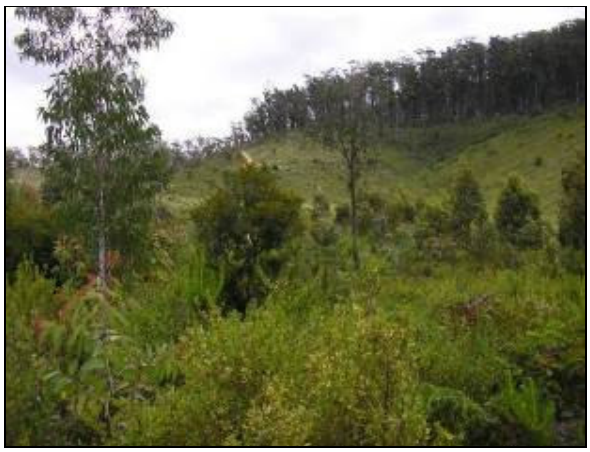


Fig. 20 Southern end of regeneration area 2006

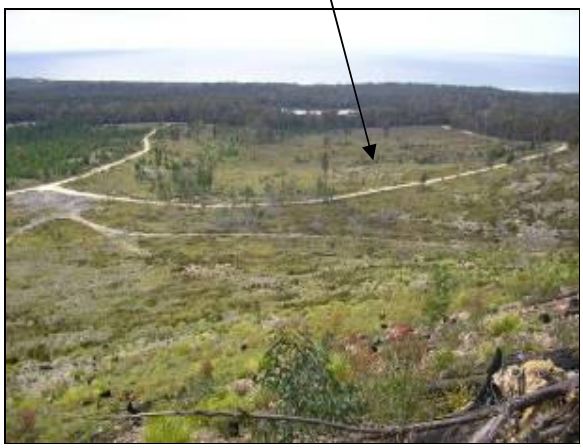


Fig. 21 Same area recently planted with pines

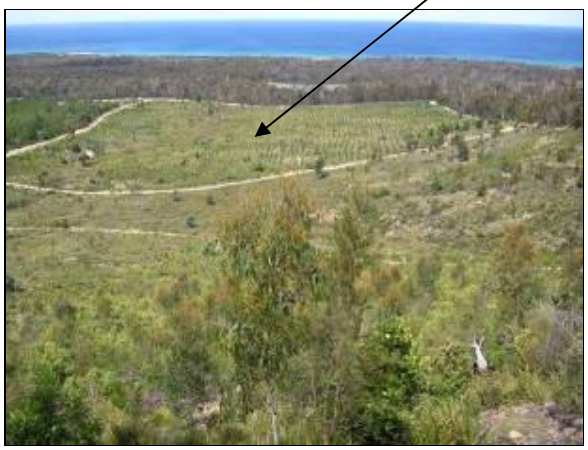


Fig. 22 Diana's Basin site 2006

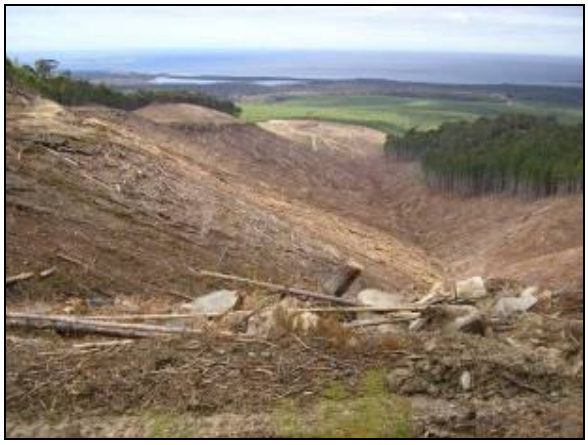
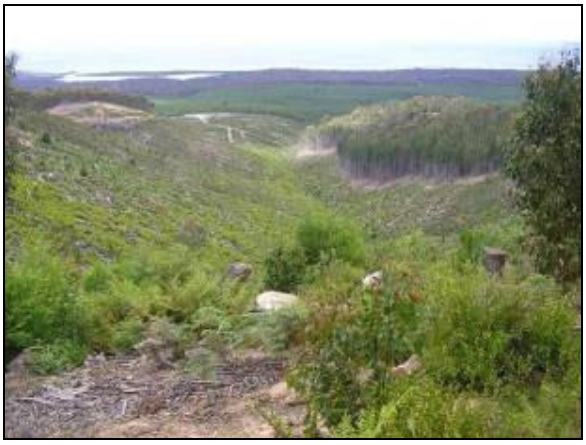


Fig. 23 Diana's Basin site 2009



4 BENEFITS FOR BIODIVERSITY AND CONSERVATION

The benefits for biodiversity and conservation here are numerous including:

4.1 Restoration and conservation of threatened species habitat

4.1.1 Threatened flora habitat

Skyline Tier is now known to provide habitat for four threatened flora species (see also Appendix 3):

- *Glycine latrobeana,* Clover Glycine, listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and vulnerable under the Tasmanian Threatened Species Protection Act 1995. This plant is fairly widespread across the regeneration area (pers com Todd Dudley).
- *Heirochloe rariflora,* Cane Holygrass, listed as rare under the Tasmanian Threatened Species Protection Act 1995 (see map for known locations).
- *Hovea corrickiae,* Glossy Purplepea listed as rare under the Tasmanian Threatened Species Protection Act 1995. (see map for known locations). Glossy Purplepea has regenerated on site since weeding work began. The habitat area is situated in a moist gully down slope from a mature pine plantation which will be restored to native forest following harvest.
- *Hibbertia calycina,* Lesser Guinea Flower listed as vulnerable under the Tasmanian Threatened Species Protection Act 1995 (see map for known locations).

4.1.2 Potential threatened fauna habitat

Currently the native regeneration area provides potential habitat for ten threatened fauna species and this is likely to increase with further regeneration. The restoration activity is increasing potential habitat for:

- Australian Grayling, known to occur in the middle and lower reaches of the Scamander River.
- Chaostola skipper, in areas where Thatched Sawsedge occurs, across the site.
- Giant Velvet Worm, in moist gullies that will rehabilitate as restoration proceeds.
- Green and golden frog, in wetlands and permanent creeks nearby.
- New Holland Mouse, in regenerating heath and open forests on sandy substrates in the lower areas.
- Masked Owl, nesting habitat in remaining protected tree hollows and hunting across the landscape.
- Spotted-tailed quoll and Eastern Quoll are both likely to inhabit the forests here with large areas available for hunting and denning sites.
- Swift Parrot, foraging and nesting habitat in the Black Gum and Blue gum forests. These forest areas will enlarge as restoration proceeds, thus increasing habitat away from the urban coastal zones will provide benefits for this migratory bird.
- Wedge Tailed Eagle, a known nest site on Skyline Tier and further suitable nesting habitat nearby. Cessation of logging activity over time will further suit this raptor in the future.

Threatened fauna recorded in the area and possible on site are listed in Appendix 2.

4.2 Restoration and conservation of threatened vegetation communities

Threatened vegetation communities being restored and protected include Black Gum Forest (TASVEG code DOV), Blue Gum Forest (TASVEG code DGL) and several high conservation value wetland communities associated with the coastal and freshwater systems. All these communities are improving in condition with increased species diversity, improved structure and expanding habitat availability due to the restoration works.

4.3 Habitat for non-threatened native plants and animals and vegetation communities

Over 30 birds have been recorded, and many other animals including marsupials, reptiles and invertebrates are either recorded or likely to be on site. These are listed in Appendix 4.

Across the site regeneration is excellent indicating that native seed sources and germination, from nearby forests and the soil bank, is clearly functioning effectively. The diversity of native regeneration is outstanding and there are relatively few weeds occurring on site.

The native vegetation community Ironbark forest not on granite (TASVEG code DSO) is expanding in area significantly with the reduction of pine, extensive regeneration across the site and a distribution of remnants of different ages.

4.4 Landscape Linkages

This restoration project is providing:

- A large area of native habitat for conservation and there is potential to increase this area.
- Enhanced connectivity and habitat availability across the landscape.
- Improved riparian and aquatic habitat, and there is an opportunity to restore whole catchments.
- An important future refuge for organisms against climate change impacts with moist gullies and multiple habitat niches becoming more available over time.
- Improvement of water quality and reduction of erosion potential.

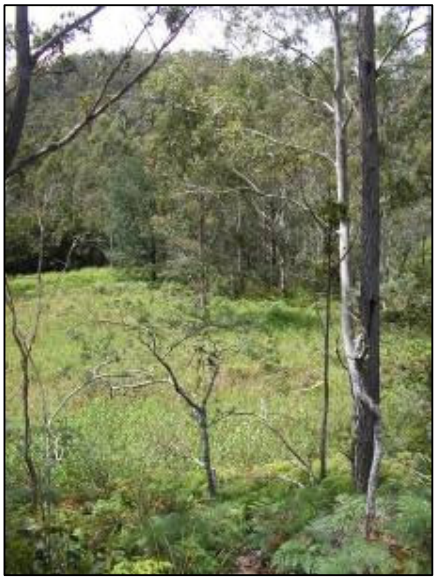


Fig 24 Beautiful healthy wetland adjacent to the Trout Creek site. This high priority area has several wetlands in excellent condition and connects the Scamander Forest Reserve and Scamander River tributaries

4.6 Weed control

Pine wilding control at this scale is necessary to have any positive effect on the potential spread of pine in this area. This restoration project is clearly providing enormous ecological benefit by removing thousands of pines which have the capacity to out compete native forests in time (Fitzgerald 2007).

Considering the size of this site there are relatively few weeds present. Those that are onsite are being controlled. The presence of work crews allows early detection and control of weeds. For example the weedy herb *Dittrichia graveolens*, Stinkwort, was found on site by a volunteer and early control was possible. This weed was unrecorded in the area prior to this.

4.7 Promoting environmental care and management skills within the community

Scenic values and are considerably increased by this project. This will benefit the tourism industry and the region's economy as well as promoting local pride and satisfaction and responsibility for the environment.

Ecological restoration on this site is a large scale project engaging a knowledgeable work force. This means there are opportunities for the community in training and employment with obvious additional economic benefits for the region as a whole.

This project is a positive demonstration of achievement and provides a good example of alternative land management and community participation.

It is potentially an iconic achievement for the region.

5. ONGOING RESTORATION REQUIREMENTS

5.1 Weeded sites

- Priority area for maintenance is Trout Creek where excellent results have been achieved so far. Follow up here will not be arduous but should be maintained to continue pine control. Monitor foxgloves and other weeds that may become evident and treat if necessary.
- Ensure follow up control of pines with second stage manual removal of wildlings within two years in Wrinklers, Yarmouth, and Diana's Basin catchments. Big work crews will be required to cover these areas within this time.
- Further mechanical weeding is required for large and mature pine trees, especially those in native forest areas in Yarmouth, Freshwater, Wrinklers and Diana's Basin catchments.
- Priority areas include tall pines remaining in the middle of weeded areas that are regenerating well eg: Yarmouth Creek sites, Machinery and a big crew for manual weeding are required to deal with these.

5.2 Sites not yet weeded

The sites not yet weeded are urgent for resources due to the growth stage and density of the pine wildings. These areas are urgent for weeding as soon as resources are available. (Map 9, 14)

Fig25 Site not yet weeded, dense pine wildlings threatening native regeneration.

5.3 Pine harvest areas

- Mature pines on top of the hill behind the threatened flora habitat area (Map reference 4), Diana's Basin (Map reference 19) and Yarmouth Creek (Map reference 15, 17) will be harvested then these areas will be regenerated with natives and the pine wildings controlled.
- Removal of pine wildings early following pine harvest is clearly an advantage as shown by the successful control in the Diana's Basin site.
- Big work crews will be required to cover the areas before the pine wildings become established.

5.4 Restoration areas adjacent to recently planted pines

- Monitor and maintain regeneration and weed control in the Yarmouth Creek buffer zone and Blue Gum forest.
- Practice pine control around the edges to contain them within the plantation.
- Following pine harvest replant and regenerate native forest and control wildings.

5.5 Scamander Forest Reserve and State Forest

Continue to monitor and control pine wildings and other weeds in State Forest.

5.7 Revegetation

Direct seeding is a suitable method of revegetation for assisting recovery of native vegetation on a site of this scale. The success of the direct seeding is not yet evident so monitoring these sites will be required. Further direct seeding may be necessary in areas where the seed bank has become depleted or where erosion is a risk.

5.8 Proposed restoration areas

Additional areas proposed for restoration are shown on the map and include:

1) Pine in State Forest that should be eradicated
2) Harvest or fell pines that are within the regeneration areas
3) Current pine plantation that should be harvested and restored to native forest

4) Areas currently being harvested that should be restored to native forest
5) Areas that should be added to the restoration area
6) Areas recently planted to pine that should be restored to native forest following harvest.

5.9 Resources and support required

The restoration effort requires more resources and support in order to continue with the excellent work being achieved so far. The methods are proving to be very successful and it is clear that complete restoration of Skyline Tier to native forest is possible. The size of the area and the nature of the work require ongoing engagement of big manual work crews with suitable equipment and machinery.

This restoration project at Skyline Tier possibly represents the largest ecological restoration project in Tasmania and is extremely significant in its protection of high conservation values. The dedication and resourcefulness of the North East Bioregional Network has enabled achievement and success in this ambitious endeavour so far. Further support providing resources for ongoing works is necessary to ensure that the restoration continues and these valuable habitats are protected into the future.

6. EXPANDING RESERVES FOR CONSERVATION

Considering this restoration project within a landscape context it is apparent that there are additional areas suitable for inclusion in the restoration area or within adjacent protected land tenures. This would expand the area of land reserved for conservation in the region. These additional areas have not been fully surveyed for this purpose, with the exception of the Constable Creek-Loila Tier area, but it is clear that the natural diversity and values for conservation are high.

The map in Appendix 7 displays proposed reserve areas including State Forest, crown land with conservation values to maintain, and adjacent private land that contains land suitable for private conservation reserves.

6.1 Expanding the Scamander Forest Reserve

Two large areas of State Forest to the north and south east of the Scamander Forest Reserve should be incorporated into the reserve to create a larger area of protection and conservation. Once these areas are reserved within the Scamander Forest Reserve 572ha would be protected as a connected tract of native forest. This would significantly enhance conservation values in the region through increased protection of the Scamander River sub-catchments, protecting threatened species habitat and maintaining natural bushland in good condition.

6.2 Protecting adjacent crown land vegetation

Crown Land south and southeast of the restoration area and Scamander Forest Reserve contains a further tract of native vegetation and habitat that would benefit from protection and maintenance. These areas of land extend between the Scamander River and Scamander Forest Reserve in the south and connect Wrinklers Lagoon and privately owned forests with the Skyline Tier restoration area in the southeast. It is important that the native vegetation in these areas is maintained and managed for conservation.

6.3 Constable Creek Reserve Proposal

The proposal to create a new reserve, the Constable Creek – Loila Tier Reserve (North East Bioregional Network 2007), has a vision of protecting a vast tract (13,000ha) of pristine bushland with high conservation values. The proposed reserve would connect to the Skyline Tier restoration area and other reserves, thereby protecting a large natural area of beauty in the hinterland of St Helens and Scamander.

6.4 Conservation on adjacent private land

There are opportunities for private conservation reserves to be established between the Skyline Tier restoration area and the coast. A lot of private land in this area contains high conservation value forests and heathland adjacent to the coastal lagoons. Their protection would enhance the connection from Skyline Tier and Scamander Forest Reserve to the coastal lagoons and support a healthier coastal environment. Opportunities exist for creating further private conservation reserves and there are programs to assist landowners with protecting and restoring native vegetation.

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8 APPENDICES

Appendix 1. Vascular Plant list – Skyline Tier regeneration areas.

Plants noted during site visits in October 2006 and December 2009 and during works between 2006 and 2009. These plants were found across the regenerating plantation area, with both dry and damper aspects. Many more plant species could be expected to be found with a thorough survey.

Key:
i = introduced and naturalised in Tasmania; eT= endemic in Tasmania**; threatened plants are in bold.**

Family	Species name	Common name	Endemism
	Broad-leaved plants (Dicotyledonae)		
APIACEAE	*Hydrocotyle hirta*	hairy pennywort	
	Xanthosia pilosa	woolly crossherb	
ASTERACEAE	*Bedfordia salicina*	tasmanian blanketleaf	e
	Cassinia aculeata	dollybush	
	Chrysocephalum apiculatum	common everlasting	
	Dittrichia graveolens	stinkweed	i
	Helichrysum scorpioides	curling everlasting	
	Lagenophora stipitata	blue bottledaisy	
	Leptorhynchos sp.	shiny buttons	
	Olearia argophylla	musk daisybush	
	Olearia lirata	forest daisybush	
	Olearia myrsinoides	silky daisybush	
	Olearia ramulosa	twiggy daisybush	
	Olearia viscosa	viscid daisybush	
	Onopordum acanthium	scotch thistle	i
	Ozothamnus ferrugineus	tree everlastingbush	
	Ozothamnus thyrsoideus	arching everlastingbush	
	Senecio jacobaea	ragwort	i
	Senecio sp.	groundsel	
CAMPANULACEAE	*Lobelia sp.*	lobelia	
CAMPANULACEAE	*Wahlenbergia sp.*	bluebell	
CARYOPHYLLACEAE	*Stellaria pungens*	prickly starwort	
CASUARINACEAE	*Allocasuarina littoralis*	black sheoak	
CLUSIACEAE	*Hypericum gramineum*	small st johns-wort	
CONVOLVULACEAE	*Dichondra repens*	kidneyweed	
DILLENIACEAE	*Hibbertia empetrifolia*	scrambling guineaflower	
	Hibbertia riparia	erect guineaflower	
DROSERACEAE	*Drosera sp.*	sundew	
EPACRIDACEAE	*Astroloma humifusum*	native cranberry	
	Epacris impressa	common heath	
	Epacris lanuginosa	swamp heath	
	Lissanthe strigosa	peachberry heath	
ERICACEAE	*Erica lusitanica*	spanish heath	i

Family	Species name	Common name	Endemism
EUPHORBIACEAE	*Amperea xiphoclada*	broom spurge	
	Beyeria viscosa	pinkwood	
	Phyllanthus gunnii	shrubby spurge	
	Poranthera microphylla	small poranthera	
FABACEAE	*Bossiaea cinerea*	showy bossia	
	Bossiaea prostrata	creeping bossia	
	Glycine clandestina	twining glycine	
	Glycine latrobeana	**clover glycine**	
	Goodia lotifolia	smooth goldentip	
	Hovea corrickiae	**glossy purplepea**	
	Indigofera australis	native indigo	
	Kennedia prostrata	running postman	
	Platylobium triangulare	arrow flatpea	
	Psoralea pinnata	blue butterflybush	i
	Pultenaea daphnoides	heartleaf bushpea	
	Pultenaea gunnii	golden bushpea	
	Pultenaea juniperina	prickly beauty	
GERANIACEAE	*Pelargonium australe*	southern storksbill	
GOODENIACEAE	*Dampiera stricta*	blue dampiera	
	Goodenia lanata	trailing native-primrose	
	Goodenia ovata	hop native-primrose	
HALORAGACEAE	*Gonocarpus tetragynus*	common raspwort	
	Gonocarpus teucrioides	forest raspwort	
LAMIACEAE	*Prostanthera lasianthos*	christmas mintbush	
	Leonotis sp.	lion's tail	i
LAURACEAE	*Cassytha sp.*	dodder	
MENYANTHACEAE	*Villarsia sp.*	marshflower	
MIMOSACEAE	*Acacia dealbata*	silver wattle	
	Acacia genistifolia	spreading wattle	
	Acacia sophorae	coast wattle	
	Acacia melanoxylon	blackwood	
	Acacia mucronata	erect caterpillar wattle	
	Acacia myrtifolia	redstem wattle	
	Acacia retinodes	wirilda	i
	Acacia stricta	hop wattle	
	Acacia suaveolens	sweet wattle	
	Acacia terminalis	sunshine wattle	
	Acacia verniciflua	varnish wattle	
	Acacia verticillata	prickly moses	
	Paraserianthes lophantha	cape wattle	i
MYRTACEAE	*Eucalyptus amygdalina*	black peppermint	e
	Eucalyptus globulus	tasmanian blue gum	
	Eucalyptus obliqua	stringybark	
	Eucalyptus ovata	black gum	
	Eucalyptus sieberi	ironbark	
	Eucalyptus viminalis	white gum	
	Kunzea ambigua	white kunzea	
	Leptospermum scoparium	common teatree	

Family	Species name	Common name	Endemism
OLEACEAE	*Notelaea ligustrina*	native olive	
ONAGRACEAE	*Epilobium sp.*	willowherb	
OXALIDACEAE	*Oxalis perennans*	grassland woodsorrel	
PITTOSPORACEAE	*Billardiera sp.*	purple appleberry	e
	Bursaria spinosa	prickly box	
	Rhytidosporum procumbens	starry appleberry	
PLANTAGINACEAE	*Plantago varia*	variable plantain	
POLYGALACEAE	*Comesperma volubile*	blue lovecreeper	
	Muehlenbeckia gunnii	forest lignum	
PROTEACEAE	*Lomatia tinctoria*	guitarplant	e
	Persoonia juniperina	prickly geebung	
RANUNCULACEAE	*Clematis aristata*	mountain clematis	
RHAMNACEAE	*Pomaderris aspera*	hazel dogwood	
	Pomaderris elliptica	yellow dogwood	
	Pomaderris pilifera	hairy dogwood	
ROSACEAE	*Acaena novae-zelandiae*	common buzzy	
RUBIACEAE	*Coprosma hirtella*	coffeeberry	
	Coprosma quadrifida	native currant	
	Opercularia varia	variable stinkweed	
RUTACEAE	*Correa reflexa*	common correa	
	Philotheca virgata	twiggy waxflower	
	Zieria arborescens	stinkwood	
SANTALACEAE	*Exocarpos cupressiformis*	common native-cherry	
SCROPHULARIACEAE	*Veronica calycina*	hairy speedwell	
	Veronica formosa	speedwell bush	e
SOLANACEAE	*Solanum laciniatum*	kangaroo apple	
STACKHOUSIACEAE	*Stackhousia monogyna*	forest candles	
STYLIDIACEAE	*Stylidium graminifolium*	narrowleaf triggerplant	
THYMELAEACEAE	*Pimelea humilis*	dwarf riceflower	
	Pimelea linifolia	slender riceflower	
TREMANDRACEAE	*Tetratheca sp.*	pinkbells	
VIOLACEAE	*Viola hederacea*	ivyleaf violet	
	Conifers (Gymnospermae)		
PINACEAE	*Pinus radiata*	radiata pine	i
	Narrow-leaved plants (Monocotyledonae)		
CYPERACEAE	*Carex appressa*	tall sedge	
	Gahnia radula	thatch sawsedge	
	Lepidosperma concavum	sand swordsedge	
	Lepidosperma ensiforme	arching swordsedge	
	Lepidosperma gunnii	narrow swordsedge	
	Lepidosperma laterale	variable swordsedge	
IRIDACEAE	*Diplarrena moraea*	white flag-iris	
JUNCACEAE	*Juncus pauciflorus*	looseflower rush	
LILIACEAE	*Burchardia umbellata*	milkmaids	

Family	Species name	Common name	Endemism
	Caesia parviflora	pale grasslily	
	Dianella sp.	forest flaxlily	
ORCHIDACEAE	*Dipodium roseum*	rosy hyacinth-orchid	
	Dipodium spp.		
POACEAE	*Austrodanthonia sp.*	wallaby grass	
	Austrostipa sp.	speargrass	
	Cortaderia selloana	silver pampas grass	i
	Ehrharta sp.	weeping grass	i
	Ehrharta stipoides	weeping grass	
	Hierochloe rariflora	**cane holygrass**	
	Poa rodwayi	velvet tussockgrass	
XANTHORRHOEACEAE	*Lomandra longifolia*	sagg	
	Xanthorrhoea australis	southern grasstree	
	Ferns (Pteridophyta)		
BLECHNACEAE	*Blechnum nudum*	fishbone waterfern	
CULCITACEAE	*Calochlaena dubia*	rainbow fern	
CYATHEACEAE	*Cyathea australis*	rough treefern	
DENNSTAEDTIACEAE	*Histiopteris incisa*	batswing fern	
	Pteridium esculentum	bracken	
LINDSAEACEAE	*Lindsaea linearis*	screw fern	

Appendix 2. Threatened fauna possible on site

Species that have been recorded within 5km (Natural Values Atlas December 2009), (excluding marine species) or that may occur in similar habitat on the Beaumaris mapsheet (Bryant & Jackson 1999). Chaostola Skipper may be found wherever there is *Gahnia radula* (P.Bell, pers.comm.1/11/06). **Species possible on site are in bold.** *No habitat on site but will benefit from restoration work.

Common name	Scientific name	Tas. status TSPA 1995	Cwth status EPBC 1999	Comments
Australian grayling	***Prototroctes mareana***	**v**	**VU**	**Middle and lower Scamander River is known site. Possible stream habitat on site (e.g. Arm Creek), and management of streamside vegetation may affect downstream habitat.**
Chaostola skipper	***Antipodia chaostola***	**e**		**Abundant areas of *Gahnia radula* habitat in the southeast of the site.**
Fairy tern	*Sterna nereis nereis*	v		* Coastal shoreline species.
Green and golden frog	***Litoria raniformis***	**v**	**VU**	**Potential habitat in creeks and dams on site and Trout Creek wetlands.**
Giant velvet worm	***Tasmanipatus barretti***	**r**		**Possible wet habitat with rotting logs in adjacent gullies, but currently no habitat on site. Eucalypt logs on site and gullies could provide habitat once regenerated. Habitat improving in regeneration areas.**
Little tern	*Sterna albifrons sinensis*	e		*Coastal shoreline species.
Masked owl (Tasmanian)	***Tyto novaehollandiae castanops***	**e**		**Few mature trees in remnants on site that may have large enough hollows for nesting.**
New Holland Mouse	***Pseudomys novae-hollandiae***	**e**		**Possible in regenerating heath on site. Some habitat–indicator flora species are present but still sparse.**
Spotted-tailed quoll	***Dasyurus maculatus maculatus***	**r**	**VU**	**Possible habitat in dense heathy vegetation on site, with some logs, though lacking ideal wet forest. Regeneration would improve habitat. Eastern quoll (of high conservation significance and extinct on the mainland) also possible here.**
Swift parrot	***Lathamus discolor***	**e**	**EN**	**Very likely to forage in Blue and Black Gums on site, may nest in mature trees.**
Wedge-tailed eagle	***Aquila audax fleayi***	**e**	**EN**	**Near Skyline Tier is known nest site. Unlikely to nest within plantation area itself, but may be affected by operations.**
White-bellied sea-eagle	***Haliaeetus leucogaster***	**v**		**Seen on site, future potential habitat here.**
White fronted tern	*Sterna striata*	v		*Coastal shoreline species.

Appendix 3. Threatened flora previously recorded within 5 km of site
(Natural Values Atlas December 2009 and pers. com. Todd Dudley).
Habitat comments are in reference to Listing Statements (TSU 2003), and relate to potential habitat restoration proceeds. Threatened species known on site are in **bold.**

Key:
Tasmanian status (*Threatened Species Protection Act 1995*):
en = Endangered; x = Presumed Extinct; v = Vulnerable; r = Rare
Commonwealth status (*Environment Protection and Biodiversity Conservation Act 1999*):
EX = extinct; CR = Critically Endangered; EN = Endangered; VU = Vulnerable.

Scientific name	Common name	Tas. status TSPA 1995	Cwth status EPBC 1999	Comments
Acacia ulicifolia	juniper wattle	r		Heath and open forest habitat on site.
Austrostipa blackii	crested spear grass	r		Open woodland habitat on site.
Austrostipa nodosa	knotty speargrass	r		Recorded in grassland or open forest, possible here.
Caladenia filamentosa	daddy long-legs	r		Heathy and sedgey open forest habitat on site.
Conospermum hookeri	variable smoke bush	v		Heathy woodland habitat on low nutrient soils on site.
Cynoglossum australe	Australian hound's tongue	r		Dry open forest habitat on site.
Epilobium pallidiflorum	showy willowherb	r		Inhabits wet places.
Euphrasia collina deflexifolia	eastern eyebright	r		Disturbed open areas with high soil moisture in heath or open woodland habitat possible on site.
Glycine latrobeana	**clover glycine**	**v**	**VU**	**Found on site throughout the regeneration area**
Hibbertia calycina	**lesser guinea flower**	**v**		**Ironbark forest on mudstone habitat on site. Found immediately adjacent to plantation edge, over road in ironbark forest.**
Hierochloe rariflora	**cane holy grass**	**r**		**Eucalypt forest on granite, habitat on site. Recorded on site see map.**
Hovea corrickiae	**glossy hovea**	**r**		**Rocky riparian wet sclerophyll or open forest habitat Recorded on site see map.**
Plantago debilis	shade plantain	r		Found in boulder crevices and both wet and dry forest/woodland on the East Coast and in the north-east, not recorded yet but likely on site.
Prostanthera rotundifolia	roundleaf mintbush	v		Occurs in the north and east along riverbanks and on rocky hillsides, possible on site.
Schenkia australis	spike centaury	pr		Found in cleared forest pasture, rainforest/wet sclerophyll forest and heathland in the east and north of the State
Sporobolus virginicus	salt couch	r		Salt marshes and sand hills near the coasts.
Thelymitra malvina	mauvetuft sunorchid	e		Occurs in coastal heath and sedgeland, and in heathy open eucalypt forest, on sandy loams or clay loams

Appendix 4. Fauna recorded and/or likely around Skyline Tier

T = listed as threatened; eT = endemic to Tasmania; i = introduced; Animals in red are known on site.

Common Name	Species Name	Family
Invertebrates		
Chaostola skipper (et)	*Entopodia chaostola*	
Giant velvet worm (et)	*Tasmanipatus barretti*	Peripatopsidae
Reptiles		
Blotched bluetongue	*Tiliqua nigrolutea*	Scincidae
Lowland copperhead	*Austrelaps superbus*	Elapidae
Mountain dragon	*Tympanocryptis diemensis*	Agamidae
Tiger snake	*Notechis ater*	Elapidae
White-lipped snake	*Drysdalia coronoides*	Elapidae
Fish		
Australian grayling	*Prototroctes mareana*	
Frogs		
Banjo frog	*Limnodynastes dumerili subsp. insularis*	Myobatrachidae
Brown froglet	*Crinia signifera*	Myobatrachidae
Brown tree frog	*Litoria ewingi*	Hylidae
Green and golden frog (T)	*Litoria raniformis*	Hylidae
Southern toadlet	*Pseudophryne semimarmorata*	Myobatrachidae
Spotted marsh frog	*Limnodynastes tasmaniensis*	Myobatrachidae
Tasmanian froglet	*Crinia tasmaniensis*	Myobatrachidae
Birds		
Australian magpie	*Cracticus tibicen*	Cractidae
Australian pelican	*Pelecanus conspicillatus*	Pelecanidae
Australian shelduck	*Tadorna tadornoides*	Anatidae
Beautiful firetail	*Stagonopleura bella*	Ploceidae
Black swan	*Cygnus atratus*	Anatidae
Black currawong	*Strepera fuliginosa*	Cracticidae
Black-faced cuckoo-shrike	*Coracina novaehollandiae*	Campephagidae
Black headed honeyeater	*Melithreptus affinis*	Meliphagidae
Brown falcon	*Falco berigora*	Falconidae
Brown thornbill	*Acanthiza pusilla*	Acanthizidae
Brush bronzewing	*Phaps elegans*	Columbidae
Caspian tern	*Sterna caspia*	Laridae
Chestnut teal	*Anas castanea*	Anatidae
Common tern	*Sterna hirundo*	Laridae
Crescent honeyeater	*Phylidonyris pyrrhoptera*	Meliphagidae
Crested tern	*Sterna bergii*	Laridae
Double-banded plover	*Charadrius bicinctus*	Charadriidae
Dusky woodswallow	*Artamus cyanopterus*	Artamidae
Eastern spinebill	*Acanthohynchus tenuirostris*	Meliphagidae
Fan tailed cuckoo	*Cacomantis flabelliformis*	Cuculidae
Forest raven	*Corvus tasmanicus*	Corvidae
Green rosella (et)	*Platycercus elegans*	Platycercidae
Grey butcherbird	*Cracticus torquatus*	Artamidae
Grey currawong	*Strepera versicolor*	Cracticidae

Grey fantail	*Rhipidura fuliginosa*	Rhipiduridae
Grey goshawk	*Accipiter novaehollandiae*	Accipitridae
Grey shrike-thrush	*Colluricincla harmonica*	Pachycephalidae
Golden whistler	*Pachycephala pectoralis*	Muscicapidae
Horsfield's bronze-cuckoo	*Chrysococcyx basalis*	Cuculidae
Kookaburra (i)	*Dacelo novaeguineae subsp. novaeguineae*	Halcyonidae
Little grassbird	*Megaulurus gramineus*	Sylviidae
Little wattlebird	*Anthochaera chrysoptera*	Meliphagidae
Masked owl	*Tyto novaehollandiae*	Tytonidae
New Holland honeyeater	*Phylidonyris novae-hollandiae*	Meliphagidae
Pallid cuckoo	*Cuculus pallidus*	Cuculidae
Quail	*Coturnix sp.*	Phasianidae
Scarlet robin	*Petroica multicolor*	Muscicapidae
Shining bronze-cuckoo	*Chrysococcyx lucidus*	Cuculidae
Silver gull	*Larus novae-hollandiae*	Laridae
Silvereye	*Zosterops lateralis*	Zosteropidae
Southern boobook	*Ninox novaeseelandiae subsp. leucopsis*	Strigidae
Spotted pardalote	*Pardalotus punctatus*	Pardalotidae
Striated pardalote	*Pardalotus striatus*	Pardalotidae
Superb fairy-wren	*Malurus cyaneus*	Maluridae
Swamp harrier	*Circus approximans*	Accipitridae
Swift parrot	*Lathamus discolor*	Platyceridae
Tasmanian scrub wren	*Sericornis humilis*	Acanthizidae
Wedge tailed eagle (et)	*Aquila audax*	Accipitridae
Welcome swallow	*Hirundo neoxena*	Hirundinidae
Whistling kite	*Haliastur sphenurus*	Accipitridae
White-bellied sea-eagle (T)	*Haliaeetus leucogaster*	Accipitridae
White-faced heron	*Ardea novae-hollandiae*	Ardeidae
White-fronted chat	*Ephthianura albifrons*	Ephthianuridae
White-throated needletail	*Hirundapus caudacutus*	Apodidae
Willie wagtail	*Rhipidura leucophrys*	Rhipiduridae
Yellow wattlebird (et)	*Anthochaera paradoxa*	Meliphagidae
Yellow-throated honeyeater (et)	*Lichenostomus flavus*	Meliphagidae
Yellow tailed black cockatoo	*Calyptorhynchus funereus*	Cactuidae

Monotremes

Echidna	*Tachyglossus aculeatus*	

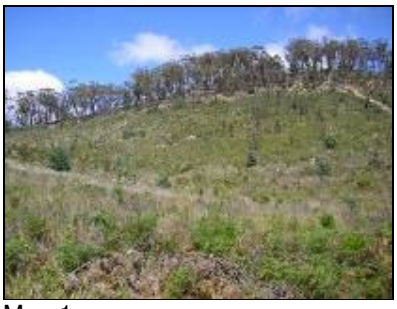
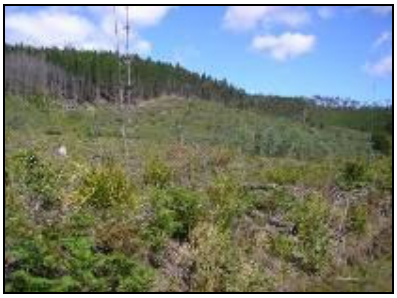
Mammals

Common brushtail possum	*Trichosurus vulpecula subsp. fuliginosus*	Phalangeridae
Common ringtail possum	*Pseudocheirus peregrinus*	Phalangeridae
Eastern quoll	*Dasyurus viverrinus*	Dasyuridae
Bennettes wallaby	*Macropus rufogriseus subsp. rufogriseus*	Macropodidae
New holland mouse	*Pseodomys novaehollandiae*	
Spotted-tailed quoll	*Dasyurus maculatus*	Dasyuridae
Tasmanian devil	*Sarcophilus harrisii*	Dasyuridae
Tasmanian pademelon	*Thylogale billardierii*	Macropodidae

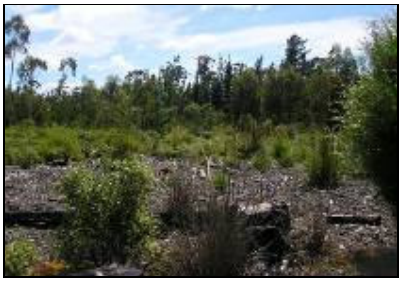
Appendix 5. Weeds recorded at Skyline Tier

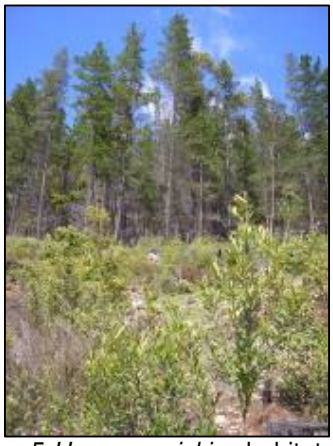
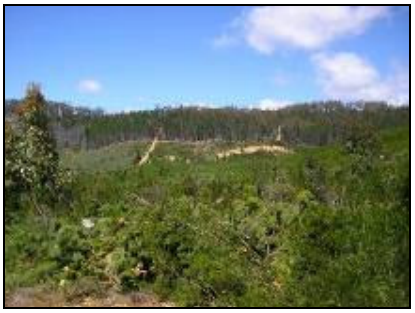
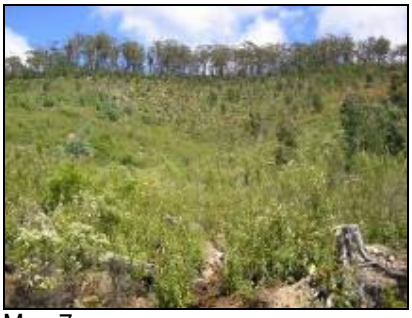
Scientific name	**Common name**
Dittrichia graveolens	stinkweed
Cortaderia selloana	silver pampas grass
Ehrharta sp.	weeping grass
Pinus radiata	radiata pine
Paraserianthes lophantha	cape wattle
Psoralea pinnata	blue butterfly bush
Acacia retinodes	wirilda
Leonotis sp.	lion's tail
Erica lusitanica	spanish heath
Onopordum acanthium	scotch thistle
Senecio jacobaea	ragwort

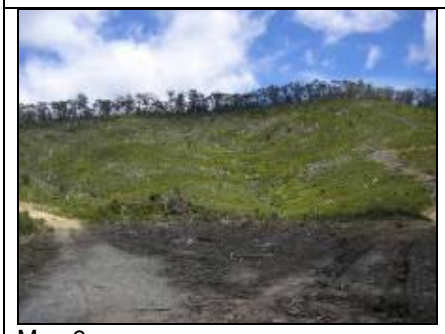
Appendix 6. Field notes summary
Wrinklers Lagoon Catchment

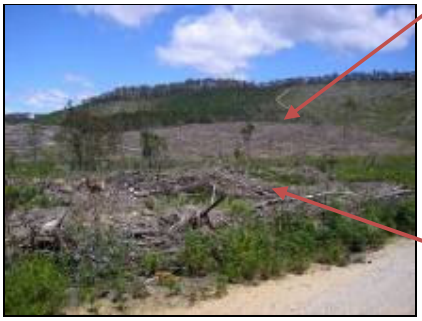
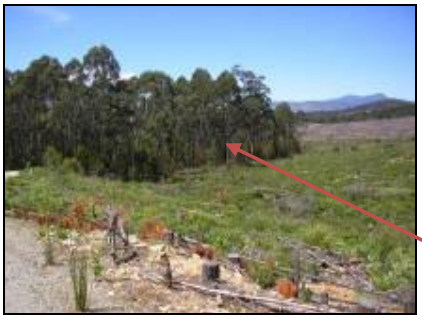
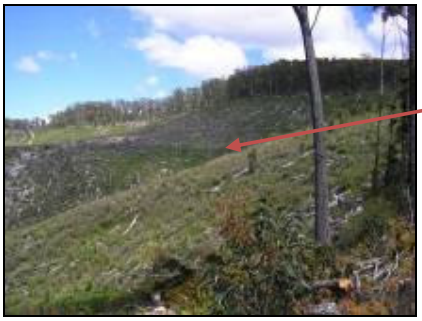
Site image and map reference	Restoration work implemented July 2007- December 2009	Observation and assessment	Future management and proposed restoration works
 Map 1  Map 2	First stage of pine removal completed. Manual hand weeding, including pulling, cutting with hand saws and chainsaw on larger pines, cut and paint used where necessary. Volunteer labour relied upon, the largest group was 27. This work could employ 30 people part time	Excellent native regeneration and pine control. Ironbark dense at top of hill, closer to the seed source in the forest reserve. Diverse understorey plants, patches of Silver Wattle, Narrow Leaf wattle, Yellow Dogwood, Thatch Sawsedge and other sedges on lower slopes, with Musk in moist gullies. Pines very few, wildings occasionally visible 1-2 m high. Pine control evidently very successful to date, with the methods used being sensitive to promoting natural regeneration which is vigorous providing competition to weed invasion, reducing soil erosion, and enhancing habitat values. Native seed source and germination is clearly functioning effectively.	Continue follow up control of pines with second stage manual removal within two years. Mature pines on top of the hill will be harvested then this area will be regenerated with natives and the pine wildings controlled.

Catchment area for Wrinklers Lagoon cont

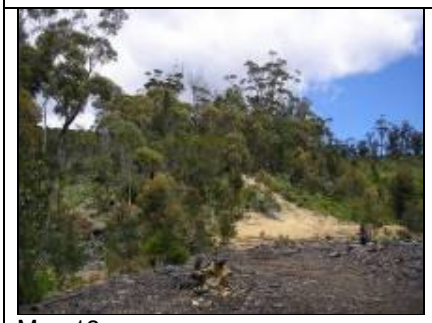
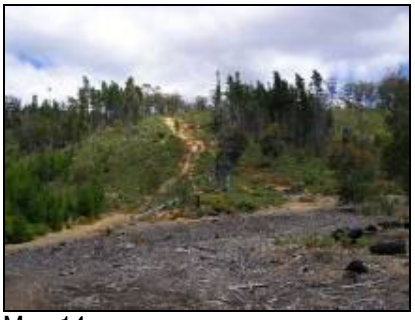
Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 3  Map 3	Some manual weeding has been done on the edges	Area of pines east of the road here has been mis-managed - not been thinned or pruned. Black Gum patch in this area to protect. Black Gum forest here and the native regeneration is strong. Black Gum, Ironbark, Blackwood, Narrow-leaf wattle,Yellow Dogwood, Prickly tea tree, Dusty Daisy Bush and Cutting Grass are present and native cover is dense. Pine seedlings and mature pines are present.	Further manual weeding of wildlings. Mechanical weeding required as many pine trees large and mature. Leave Black Gum forest intact.
 Map 4	Monitoring, unable to begin work on this site yet due to limited labour and resources	Pine wildings dense, burning would be the most effective and efficient form of control. Regeneration of Ironbark evidently quite dense at the top of the hill, near the seed source. Pines most dense at the bottom of the slope.	Chainsaws and manual removal necessary to control wildings. Big work crew required. This site is urgent for resources due to growth stage and density of pine wildings.

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 5 *Hovea corrickiae* habitat  *Hovea corrickiae*	Weeded manually with chainsaws and volunteers crews.	Threatened flora species *Hovea corrickiae* regenerating since restoration work began. Valuable moist gully habitat is regenerating well with diversity of species including Ironbark, prolific Yellow dogwood, Silver Wattle, Sunshine Wattle, Thatch Sawsedge, Sagg, Bracken. Some small pine wildings present.	Continue follow up control of pines with second stage manual removal within two years. Mature pines on top of the hill will be harvested then this area will be regenerated with natives and the pine wildings controlled.
 Map 6  Map 7	Weeded areas, freshly cut pine along the road, areas still to restore after harvest. Gully weeded all the way to the top, excellent result, very hard manual work, hand pulling.	Regeneration evident, Black Gum regenerating more densely on the lower slopes, Ironbark on the upper slopes. Some areas of dense pine wildings remain. Regeneration excellent very few pine wildings. Diversity of eucalypts with White Gum, Blue Gum, Ironbark, Stringy Bark present, with dense regeneration of understorey dominated by Twiggy Daisybush and Yellow Dogwood.	Further manual removal with chainsaws necessary to control wildings. Continue follow up control of pines with second stage manual removal within two years.

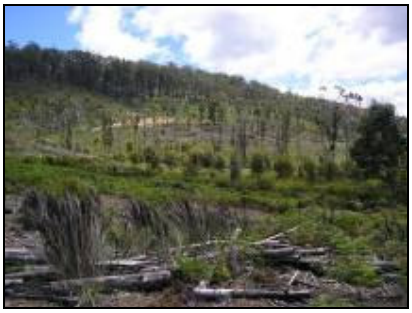
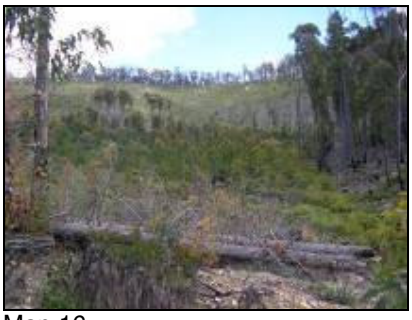
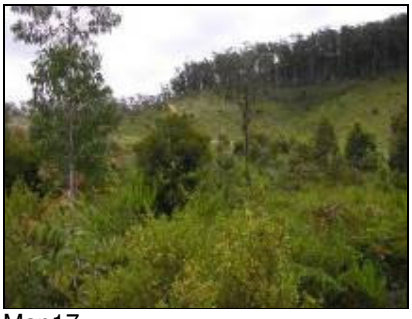
Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 8  Map 8	Manually weeded most of wildings and smaller trees removed.	Excellent native forest regeneration of eucalypts and understorey. Some tall pines remaining but predominantly native regeneration and existing native forest to the coast. Wrinklers Creek Lagoon Catchment, two tributaries meet here. Tall pines remaining in Y junction of tributaries, weeded areas surrounding this are regenerating extremely well.	Priority as tall pines remain in the middle of weeded areas that are regenerating excellently. Require machinery and a big crew to deal with this.
 Map 9  Map 9	Recently harvested of pine.	Excellent native forest regeneration evident both eucalypts and understorey, Fishbone ferns re-establishing densely in once wet gullies that must be retaining moisture and seed bank. This site has good native vegetation adjacent; it should regenerate extremely well and be self sustaining, no revegetation necessary, very few weeds.	Priority Requires manual weeding soon, big work crew needed as large site.

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 10  Map 12  Map 12	Pine plantation recently sprayed with herbicide (helicopter flying 5-10m above ground) and replanted with pines. Buffer zone along the creek has been reserved and planted with natives, native species regeneration also evident. Manual weeding has been carried out along the watercourse. The Blue Gum forest has been weeded - pine individuals taken out from the forest and patches form adjacent regenerating land. Headwater gullies have been direct seeded with *Eucalyptus obliqua*, Stringybark, as there was limited eucalypt regeneration. Used mechanical removal of large mature pines from the top of the ridge.	Buffer zone for stream is quite well vegetated with good native regeneration but has little canopy for shade. Eucalypts White Gum, Black Gum, Blue Gum and a range of understorey species including Thatch Sawsedge, Fishbone Ferns, Trailing Native Primrose, are present with Bracken. The restored buffer zone will increase catchment connectivity with the existing native forest and regenerating areas upstream, the nearby Blue Gum forest and the native forest downstream to Wrinklers Lagoon. Excellent benefits for conservation and biodiversity - potential Swift Parrot habitat in the Blue Gum forest and nearby Black gum forests. - important riparian and aquatic habitat being protected for future refuge from climate change impacts. The very steep gullies where direct seeding was done several months earlier have not been re-visited to date.	Monitor and maintain revegetation and weed control in the buffer zone and Blue Gum forest. Follow up pine control to contain them within the plantation. Following pine harvest replant and regenerate native forest.

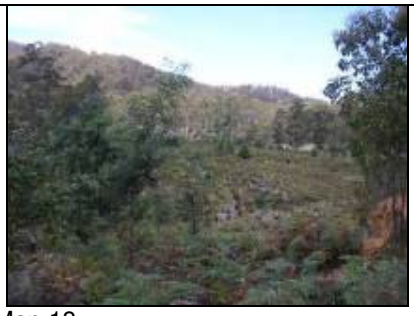
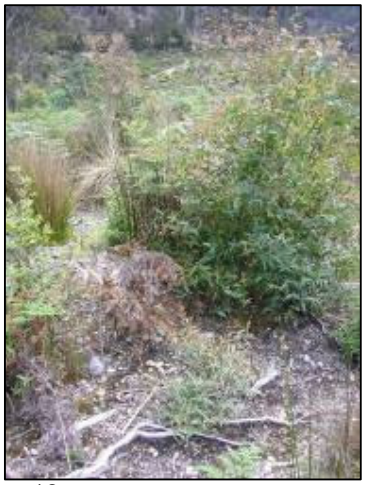
Freshwater Creek Catchment, Wrinklers and Yarmouth Creeks Watershed.

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 13	Large mature pines have been chain sawed from native forest.	Mature native forest on the ridgeline, old growth trees with tree hollows providing important habitat and seed source for surrounding regeneration areas.	Follow up pine control.
 Map 14	Weeding has occurred under mature pines	Pines in native forest. Good representation of diverse native species and a range of structure and age in the eucalypts, Ironbark is dominant.	The mature pines require mechanical removal.
 Map 14	No weeding here yet on slope south of pines pictured left	Good native regeneration and excellent surrounding native vegetation. Pine wildings dense but still small enough for manual removal.	This slope to be manually weeded soon.
 Map 14	Manually weeded the slope north of the mature pines pictured left	Excellent regeneration and diversity present.	Follow up pine control.

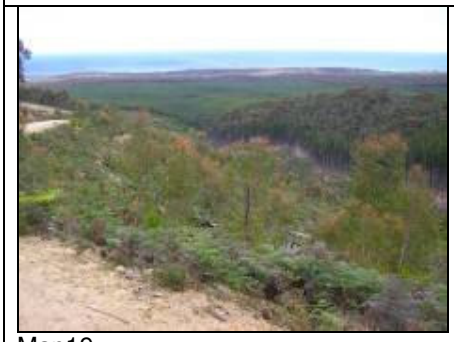
Yarmouth Creek Catchment

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 15	Mechanical pine removal of mature pines from within Black Gum forest with the Feller Buncher. Pines were windrowed which assists maintenance.	Excellent healthy Black Gum regeneration, fast growth observed this year with the good rainfalls. Species diverse including Black Gum, Blue Gum with Blackwood, Silver Wattle, Trailing Native Primrose, Thatch Sawsedge, Southern Grass tree, Waxflower, Sand Sword sedge, Dolly Bush, Sweet Wattle, Blue Dampiera.	Tall pines left to chainsaw. Further mechanical weeding required. Follow up control of wildings. Priority site to maintain excellent level of restoration.
 Map 16	Mechanical pine removal of mature pines from within Black Gum forest with the Feller Buncher.	Excellent natural values being restored in Yarmouth Creek catchment with threatened vegetation community and potential threatened fauna habitat.	
 Map17	Manually weeded all the gully to the top.	Moist gully, excellent regeneration and growth of Black Gum and Ironbark, Bulloak, and dense and diverse understorey.	
 Map 17	View from top of Yarmouth catchment: Feller Buncher work area with windrows left and thick regeneration on the slopes		

Trout Creek and Scamander River Catchment

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 18  Map 18  Map 18	Two seasons of manual weeding and follow up have been completed. Direct seeding with Stringybark July 2009.	Excellent native regeneration, very healthy and diverse. Excellent outcomes for conservation values with nearby wetlands and surrounding native forest already reserved as Scamander Forest Reserve. Regeneration most established around the edges for 30-40m and younger in the centre. Five different eucalypt species regenerating Black Gum, Black Peppermint, Ironbark, Stringybark and White Gum. Understorey species include Sliver Wattle, Narrow Leaf Wattle, Indigofera, White Flag Iris, Dolly Bush, Sagg, Bracken, Fishbone Fern, Pale Rush. Very few pines remain on site. Foxgloves have invaded bare ground in disturbed areas. It is possible these will become shaded out as regeneration progresses.	Monitor weeds, especially pines and foxgloves. Priority to maintain pine wilding control. If Foxgloves persist then control with manual removal or herbicide.

Diana's Basin Catchment

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map19	Pine harvested 2006 and regenerated immediately with both pines and native species. Weeded 2 years ago following harvest and regeneration. Weeding took 2-3 months with a CVA team.	Excellent native regeneration with Ironbark, Stringybark, Viscid Daisybush, Musk, Indigofera, Heartleaf bushpea, Native Currant, Guitar Plant, Tall Sedge, Sand Swordsedge, Batswing Fern. Moist gully habitat regenerating very well. Potential habitat for threatened Velvet Worm and other wet gully species. Important for future refuge from climate change impacts.	Follow up manual weeding to control wildings. Pines in adjacent plantation to be harvested, leaving older eucalypts.

Scamander Forest Reserve

Site image and map reference	Restoration work implemented July 2007-December 2009	Observation and assessment	Future management and proposed restoration works
 Map 20	Removal of mature and large pines from either side of the road.	Keeping pines out of the Forest Reserve and healthy native bush is a priority for this restoration project. Excellent pine control here in good condition forest. This is threatened flora habitat for *Hibbertia calycina* and potential fauna habitat for several threatened and non-threatened fauna species.	Monitoring and control of pine wildings and other weeds.

Appendix 7. Map of Skyline Tier Restoration Area