North East Bioregional Network

Scamander River and Avenue River catchments from North Sister (photo: Rob Blakers)

Land Use Plan

Potato growing on the fertile soils of Pyengana, photo: Nick Fitzgerald

Forestry and farming in the hills of Pyengana, George River catchment (above), photo: Nick Fitzgerald

Acknowledgements

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This project would not have been possible without the assistance of Nicole Gill, Peter McQuillan, David Keast, Nick Fitzgerald and Simon Branigan.

The structure and layout of this report has been closely modelled on a document produced by the WildEyre team, who are working on a similar project in South Australia. The section 'Assessing threats to the conservation assets' (page 9) is largely based on the WildEyre plan. We thank them for allowing us to use their plan as a basis for our document. For more information: www.wildeyre.com.au

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THE NE TASMANIAN WILDCOUNTRY PROJECT

- using landscape scale ecological processes to guide conservation management

"Sustainable development" is a much-used term in the field of environmental planning. It's written into Tasmanian legislation[1], and few would deny it as an admirable goal. But what does it really mean in practice?

The North East Bioregional Network, in cooperation with the Wilderness Society's WildCountry project, are working together to discover what an "environmentally sustainable" plan for a landscape might actually mean.

WildCountry aims to determine what nature needs to survive and to act on this at the appropriate time scales and spatial scales. Consequently, WildCountry is a long-term vision operating from the regional to the continental scale. WildCountry is a science-based approach to conservation planning, built on the disciplines of landscape ecology and conservation biology to inform a whole of landscape approach to conservation and restoration. It recognizes that we need to consider ecological processes in addition to the more familiar components of biodiversity such as species and communities. Several WildCountry landscape conservation projects are being developed across Australia in collaboration with environmental organisations, government agencies and local community groups.[2]

We believe that to have truly "sustainable development", the needs of the local environment need to be considered at a landscape scale. We believe that it is not enough to create parks and reserves to protect local biodiversity – this can only be one piece of the land management puzzle.

We need to look more broadly at the ecological processes that maintain the health of the local area – fires, floods, capacity for species movement, over micro and macro scales. Much research has recently been done into what these ecological processes might be in Australia, and more specifically, for Tasmania.[3]

Through this process, we hope to identify areas where changes might be made to maximize sustainable land use for Tasmania's north-east.

This is the first version of what we hope will be a useful, evolving document, which links the theory of environmental sustainability to practical, on-ground outcomes that will help to maintain the health and security of Tasmania's north-east for the long-term future. We invite input from interested stakeholders to expand upon and improve this plan as we obtain new information.

CONSERVATION ACTION PLANNING

- a tool to help make sense of environmental complexity

Conservation action planning is a term that was first coined by The Nature Conservancy; it refers to a collection of planning tools and ideas that allow working groups to conceptualise, plan actions and monitoring, implement these actions and monitoring, then analyze the data obtained to adapt the project to improve it as more knowledge becomes available, and share this knowledge with the broader community[1]. This framework has been progressively improved by being put into practice in hundreds of successful environmental management projects internationally.

For this project, we have tried to follow the conservation action planning guidelines outlined in The Nature Conservancy's publication Landscape-scale conservation – *A practitioner's guide*[2]. An advantage of using the conservation action planning (CAP) process is that it is designed for flexibility. Data collected as part of the project is collected in a central database, which can be adapted and updated as new information comes to light.

1 Land Use Planning and Approvals Act 1993.

2. See http://www.wilderness.org.au/campaigns/wildcountry

3 See McQuillan, P.B., Watson, J., Fitzgerald, N.B., Leaman, D. & Obendorf, D. (1999) The importance of ecological processes for terrestrial biodiversity conservation in Tasmania – a review. Pacific Conservation Biology, 15, pp. 171-196.

1 http://conserveonline.org/workspaces/cbdgateway

2.Low, G. (2003) Landscape-scale conservation – a Practitioner's Guide. The Nature Conservancy.

Introduction

Tasmania's north-east is a place of great biodiversity. Internationally renowned for its natural beauty, the land rolls down from forested tiers, through farmland, forest, grassland and heath to the shores of the Tasman Sea. Many plants and animals find their homes here; some are found nowhere else in the world. This land use plan seeks to protect these values, strengthening the landscape, its ecosystems and local communities, to give them the best chance of adapting to a changing world and climate.

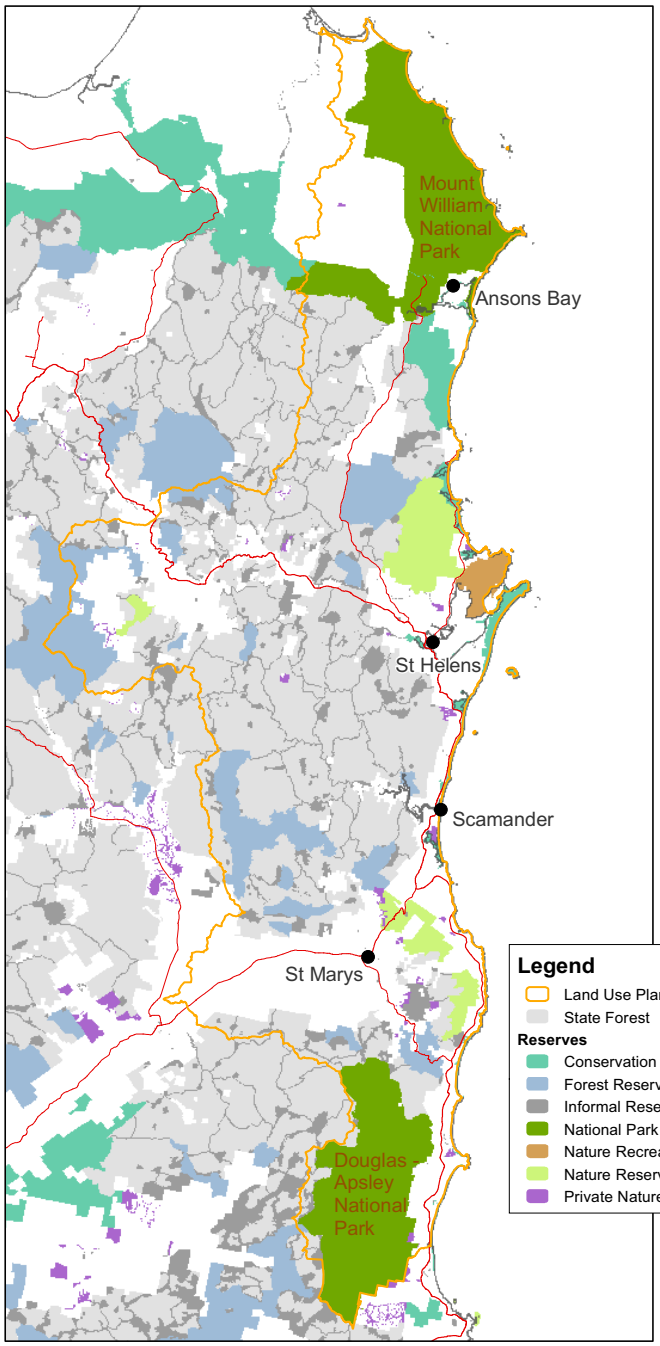
THE PROJECT AREA

The project area covers approximately 215 500 hectares, and takes in the major towns of St Helens, St Marys, and Scamander. It is largely contained within the Break'O'Day Municipality, with smaller sections extending into the adjacent Dorset and Glamorgan-Spring Bay Municipalities. The area supports a broad range of industries, including native and plantation forestry, sheep grazing, dairy farming, cropping, orchards, viticulture and aquaculture. Approximately 31% of the project area is privately owned – some of this area includes covenanted vegetation.

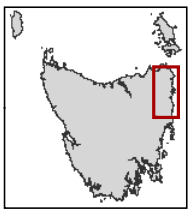
The project area contains the catchments of the Scamander, Douglas, George and Ansons rivers, as well as parts of the Apsley and Break o' Day river catchments. About a third of the project area is formally reserved at some level: formal reserves make up approximately 30% of the study area; informal reserves occupy a further 6%. The Douglas-Apsley National Park and Mt William National Park make up about half of the formally reserved area, or 16% of the entire project area. The Bay of Fires Conservation Area is currently being considered for an upgrade to National Park status.

It is home to a broad range of ecosystems and at least ninety five recognized vegetation communities. Included among these are 17 threatened vegetation communities, and a further seven vegetation communities considered to be of conservation significance; in combination, these vegetation communities cover only about 2% of the project area. The landscape also supports at least 123 threatened flora species, and an area around St Marys is a recognized hotspot of eucalypt biodiversity.

The project area supports at least 32 threatened fauna species, many of which are birds. Within the area are 3 of Tasmania's 43 Important Bird Areas (IBAs), as identified by Birds Australia. These include the Douglas Apsley and St. Helens IBAs, and parts of the Cape Portland IBA.



Land Tenure of North East Coast Land Use Plan Area



Legend

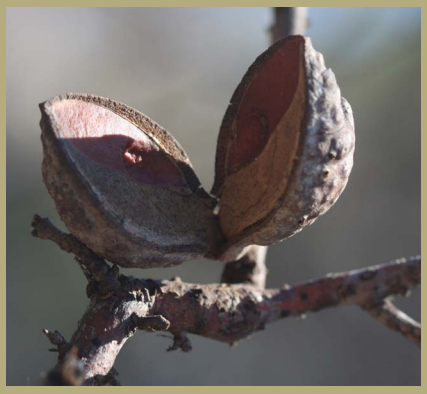
- Land Use Plan area
- State Forest

Reserves

- Conservation Area or Regional Reserve
- Forest Reserve
- Informal Reserve
- National Park
- Nature Recreation Area or Historic Site
- Nature Reserve or State Reserve
- Private Nature Reserve or Conservation Covenant

0 10 20 km

Spatial data from theLIST and TASVEG 2.0 © State of Tasmania



Many native shrubs such as this mountain needlebush (Hakea lissosperma) have woody seed capsules designed to survive fire even if the plant is killed, however too frequent fires can kill the new plants before they mature and produce more seed, photo: Nick Fitzgerald

Oldgrowth blackwood (Acacia melanoxylon) tree in wet eucalypt forest in State Forest at Siamese Ridge, photo: Nick Fitzgerald

UNDERSTANDING ECOLOGICAL PROCESSES

– what are they, and why are they important?

Eight ecological processes have been identified as key to the WildCountry approach to maintenance of healthy country[1]

1. Strongly interactive species
Some species play key regulating roles in the habitats in which they live. This may occur from 'top down', for example, predators such as wedge-tailed eagles control grazing animals such as wallabies; it may also be 'bottom up', with animals such as swift parrots providing critical pollination services. It is important to ensure that such species persist in the landscape in sufficient numbers to perform these roles.

2. Hydro-ecology
The presence and absence of water are critical in Australian ecology. There are important links between water, vegetation and wildlife. For instance, wetlands accumulate nutrients and water and therefore provide rich habitat. Forest vegetation plays a critical role in regulating groundwater.

3. Long distance biological movement
Long distance movement is a key part of the life history of many Tasmanian species. Many birds migrate large distances annually or move about the Tasmanian landscape seeking food. Conserving these species may require the protection of very large areas or critical stepping stones in the landscape.

4. Disturbance regimes
Natural disturbance regimes maintain diversity in many habitats. Fire is one critical source of disturbance, with frequency, spatial pattern and intensity of burns critical for maintenance of some species. Fire regimes across much of Tasmania have been altered in the past two centuries resulting in changes to the pattern and function of ecosystems. Likewise, floods are a natural phenomenon that maintains the health of rivers, floodplains and wetlands.

5. Climate change and variability
Climate is a key environmental determinant, affecting ecological processes at various scales and thus influencing associated species distributions. A better understanding of the likely ecological interactions with climate will aid management decisions both in response to and for mitigation of human-induced climate change.

6. Land / coastal zone fluxes
There is interaction and exchange between terrestrial and marine systems. For instance, rivers transport nutrients and sediments (and pollutants) from far inland to the sea. This affects productivity in the coastal zone. Conversely, seabirds can deposit large amounts of nutrient derived from the ocean on land. Tidal movement interacts with freshwater flows to determine the mixing of fresh and salt water as well as concentrating nutrients in estuaries.

7. Long-term, spatially-extensive evolutionary processes
The creation of new species often involves range expansion of the parent species followed by isolation and differentiation between the two populations. This evolutionary process is usually dependent on habitat continuity, when climatic conditions are suitable, allowing movement over relatively long distances. Destruction or fragmentation of habitat could prevent such processes and lead to local extinctions by inbreeding or random events.

8. Productivity
The living elements of landscapes vary with the quantity and rate of plant growth - 'productivity'. Productivity is dependent on local conditions including rainfall, seasonal climatic patterns and soil characteristics. The uneven distribution of productivity in the landscape – both in time and space – is an important consideration in conservation planning, particularly given the disproportionate loss and degradation of highly productive land compared to less arable land.

STEP 1: SELECTING THE FOCAL CONSERVATION ASSETS

The first step of the conservation action planning process is to choose a selection of environmental assets which, if protected, will ensure the long-term health and sustainability of the project area, and allow the landscape to express healthy broad-scale ecological processes.

These may be coarse-scale land system elements (e.g. rivers), broad vegetation classes (e.g.wet forests), groups of species with similar needs and threats (e.g. shorebirds), or broad-ranging individual species that might not be adequately protected by just conserving certain ecosystems (e.g. Tasmanian devils).

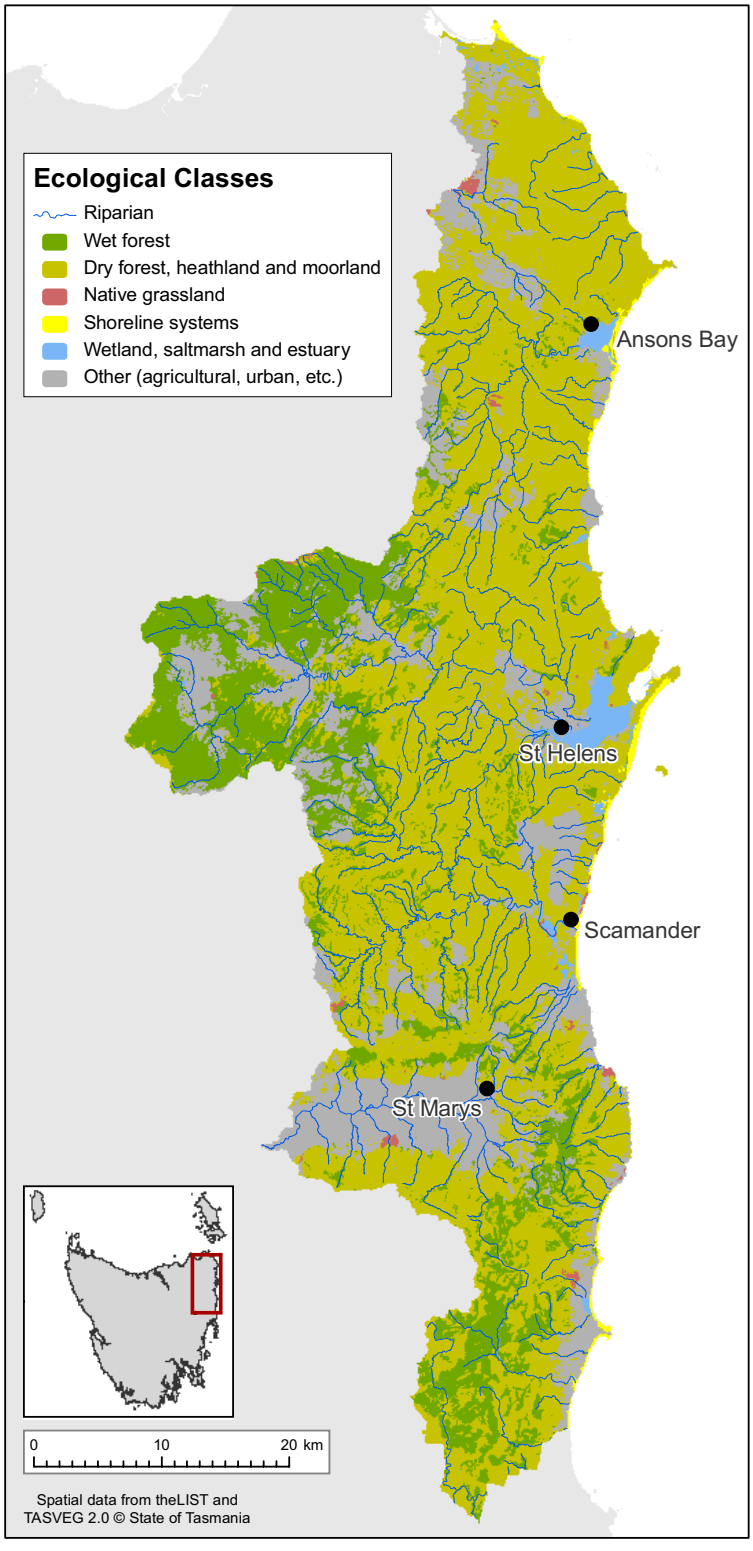
For most projects, it's thought that the biodiversity of the landscapes can and should be limited to eight or fewer focal assets. If carefully chosen, the protection and enhancement of these will also ensure the well-being of a broad variety of smaller nested assets. An example of this might be that the protection and maintenance of healthy functional wetlands (a focal conservation asset) can provide security for many types of migratory birds (a nested asset).

The focal conservation assets for this project were chosen by the North East Bioregional Network's Scientific Working Group, and informed by some consultation with relevant local experts.

It is important to note that while the marine systems of the north-east are a very important facet of the local environment, unfortunately, we did not have the capacity to include them within the scope of this document.

1 http://www.wilderness.org.au/articles/wildcountry-science-a-new-picture-of-the-continent.
Mackey, B. G., Soulé, M. E., Nix, H. A., Recher, H. F., Lesslie, R. G., Williams, J. E., Woinarski, J. C. Z., Hobbs, R. J. and Possingham, H. P., 2007. Applying landscape-ecological principles to regional conservation: the WildCountry project in Australia. Pp. 192-213 in Key topics in Landscape Ecology. ed by J. Wu, and R. J. Hobbs. Cambridge University Press, Cambridge.

Identifing Conservation Assets



Wet forest dominated by Brooker's gum (Eucalyptus brookeriana) is a threatened forest type in Tasmania, it occurs in small patches as at the Nicholas Range in the north-east, photo: Nick Fitzgerald

Wet forests

The wet forests of the north-east are very diverse in composition – they range from short forests dominated by native olive, dogwood and pinkwood, to tall wet eucalypt- dominated forests through to mixed forests where the eucalypts coexist with an understorey of rainforest trees, through to stands of pure rainforest without any eucalypts at all.

These are united in their roles in the local landscape as protectors of water quality and flows and as providers of habitat for a diverse range of species. Large raptors, such as the threatened wedge-tailed eagle, require large tracts of undisturbed tall wet forests to successfully nest and breed. Stag beetles, survivors of the last ice age, sought refuge in the north-eastern rainforests, and today, several species are found nowhere else.

Forests of swamp gum *(Eucalyptus regnans)*, the world's tallest flowering plant, still stand undisturbed in some corners of this region. On the trunks of wet forest trees grow fungi, lichens and bryophytes of myriad shapes and form. And beneath the forests' protective mantle, drop by drop, delicate underground karst systems continue to quietly evolve.

More than twenty distinct vegetation communities have been identified within the wet forests of the north-east. Included among these are the threatened vegetation communities *Eucalyptus viminalis* wet forest and *Eucalyptus brookeriana* wet forest.

Some of the best examples of wet forests within the north-east may be found at the Blue Tier, the Rattler Range, on Mt Elephant, and in the Douglas Apsley National Park.

Significant flora and fauna

Threatened stag beetles *(Hoplogonus bornemisszai, H. simsoni, H. vanderschoori)*
Wedge-tailed eagles *(Aquila audax fleayi)*
Grey goshawks *(Accipter novaehollandiae)*
Spotted-tailed quolls *(Dasyurus maculatus maculatus)*
Giant velvet worms *(Tasmanipatus barretti)*
Slender tree fern (*Cyathea cunninghamii)*

Healthy young Tasmanian devil (Sarcophilus harrisii); oldgrowth dry sclerophyll forest at Mt Pearson, photos: Nick Fitzgerald

Coastal sand dune vegetation at Taylors Beach, Bay of Fires, photo: Nick Fitzgerald

Tasmanian Devil

The Tasmanian devil is the only individual species we have chosen as a focal conservation asset. As well as being an animal which ranges over a broad area and habitat range, Tasmanian devils are highly interactive, playing an important role in the north-east project area, both in their role as scavengers, and as potential predators of introduced pest species such as foxes and cats.

The recent devil facial tumour disease outbreaks have decimated devil numbers state-wide, causing them to be listed as endangered. The disease originated in the north-east and has caused more devastation to devil populations here than elsewhere, resulting in very low population densities and a demographic shift to a younger population with very few mature devils. Without swift, coordinated action, there is a real risk of extinction for devils in the wild, a factor which also convinced us that they would make a good focal conservation asset in their own right

Oldgrowth dry forest dominated by ironbark (Eucalyptus sieberi) at Mount Pearson, photo: Nick Fitzgerald

Dry forests and heathlands

Dry forests and heathlands account for the great bulk of diversity and coverage within our project area – at least forty distinct vegetation types have been identified. The diverse dry forests of the north-east are dominated by a broad range of eucalypt species; their understoreys may be dominated by heathy, scrubby or grassy species. Old dry forests are critical nesting habitat for a variety of mammal and bird species – the masked owl relies on the hollows found in old trees to successfully breed. Dry blue gum (*Eucalyptus globulus*) and black gum (*Eucalyptus ovata*) forests provide critical foraging habitat for the endangered swift parrot, which relies on the energy-rich nectar of these trees.

Local heathlands also provide an important source of food for insects, small birds, reptiles and mammals – they are abuzz with a rich array of native bees, which share this habitat with many native spiders, insects and other invertebrates. Bettongs forage in them for underground fungi, and threatened New Holland Mice hop through them in search of seeds.

Important threatened dry forest communities within this area include Oyster Bay Pine (*Callitris rhomboidea*) forests, blue gum *(Eucalyptus globulus)* forests and woodlands, and black peppermint *(Eucalyptus amygdalina)* forests and woodlands on sandstone. Some of the best examples of dry forests in this area can be seen in the Douglas Apsley National Park, the Constable Creek catchment, around the Bay of Fires region and in the Nicholas Range.

Good examples of heathland communities in this area include buttongrass moorland in the highlands at Mt Victoria, and lowland sedgy heathland and wet heath which occur within a matrix of dry forest in the Bay of Fires and Ansons Bay region.

Significant flora and fauna

Swift parrots *(Lathamus discolor)*
Masked owls *(Tyto novaehollandiae castanops)*
Bettong *(Bettongia gaimardi)*
Glossy grass skink *(Pseudemoia rawlinsoni)*
Oyster Bay pine *(Callitris rhomboidea)*
Grass trees *(Xanthorrhoea species)*
Variable smoke bush *(Conospermum hookeri)*

Bay of Fires near Broadwater Creek lagoon, Hinterland forests visible in background. Photo: Martin Hawes

Shoreline systems

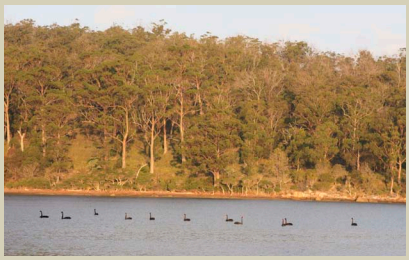
Perhaps the most dynamic of the focal conservation assets, the shoreline systems of the project area stretch along about 250 km of coastline. Sandy beaches and rocky shorelines are the mediators between land and sea, protecting one from the other. The shoreline systems are vital habitat for many migratory and resident shorebirds – the Birds Australia nominated Important Bird Areas (IBAs) of St Helens and Cape Portland fall wholly and partially respectively within the project area. White bellied sea eagles soar along the coastline, swooping to snatch fish from coastal waters, and constructing large nests of sticks in tall blue gums. Smaller birds, including the threatened fairy tern, create well-hidden nests on sandy beaches.

The coastal vegetation communities play an especially important role in maintaining shoreline integrity on sections of sandy coastline, especially in light of projected sea level rises. Communities represented in this zone include coastal grasslands and herbfields, and sand dune scrub dominated by coastal wattle *(Acacia longifolia)*. On the stunning granite beaches of the Bay of Fires, dramatic lichen lithoseres daub the rocks a fiery orange, backed by swaying swathes of black sheoak *(Allocasuarina littoralis)* forest, a threatened forest type.

Significant flora and fauna

Fairy terns *(Sterna nereis)*
Little terns *(Sterna albifrons sinensis)*
Sea eagles *(Haliaeetus leucogaster)*
Native spinifex *(Spinifex sericeus)*
Sea bindweed *(Calystegia soldanella)*

Wet heathland fringed by black gum (Eucalyptus ovata) forest at Kates Marsh, Bay of Fires hinterland, photo: Nick Fitzgerald



Estuaries (Black swans (Cygnus atratus) on Georges Bay, the largest estuary in the region, photo: Nick Fitzgerald

Coastal wetlands and estuaries

Coastal wetlands and estuaries provide a bridge between riparian and coastal systems, often providing habitat for species common to one or both of these systems. Local wetlands host unique arrays of freshwater algae, microscopic plants that form the basis of the wetland food chains. The wetlands support many insect species, including a range of dragon and damsel flies endemic to the area, some of whom will become food for the endangered green and gold frog, Tasmania's largest frog. A complex suite of migratory and resident birds rely on the north-east's coastal wetlands and estuaries for food and habitat, including the endangered eastern curlew, which probes through the mud with its long curved bill, and the unmistakable great crested grebe, which cruises the deeper waters, with its shock of head feathers and low crooning moan. Fish spawn in the estuaries, which act as nurseries for the local saltwater fish populations.

Important terrestrial vegetation communities associated with the north-east's coastal wetlands and estuaries include Melaleuca ericifolia swamp forest and succulent saline herbfields (saltmarsh).

Important wetlands within the area include Jocks, Windmill and Moriarty lagoons at Stieglitz, Sloop Lagoon and Big Lagoon in the Bay of Fires. Significant estuaries within the area include those at Ansons Bay, Georges Bay, and the Scamander River estuary.

Significant flora and fauna

Fairy terns *(Sterna nereis)*
Little terns *(Sterna albifrons sinensis)*
Sea eagles *(Haliaeetus leucogaster)*
Native spinifex *(Spinifex sericeus)*
Sea bindweed *(Calystegia soldanella)*

Native grasslands dominated by kangaroo grass (Themeda triandra) are a listed as Critically Endangered under Commonwealth legislation, photo: Nick Fitzgerald

Grasslands

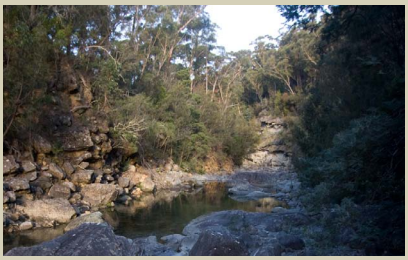
Tasmanian native grasslands have been reduced to approximately 1% of their pre-European coverage across the State. Although the coverage of native grasslands within the project area is not large they have been chosen as a focal conservation asset for their value as habitat for a diverse range of threatened species and communities. Lowland grasslands are also important to local graziers.

Grasslands often lack the profile of more dramatic forests and woodlands, but they are alive with activity. Marsupials such as wombats and bandicoots are prominent members of the grassland fauna, but they also support an astonishing array of insects, including native grasshoppers, bees and butterflies, and beneath the ground, native earthworms quietly make their way through the soil. Grasslands are also home to a variety of native ant species, upon which the echidna depends for its survival.

Highland Poa grasslands are a threatened community which occurs at the Blue Tier. There is limited highland habitat within the project area and this is reflected in the small extent of this community in the area. Lowland grasslands are more extensive, particularly coastal grasslands. Some of the best examples of lowland native grasslands within the north-east may be found at Four Mile Creek, where they occur on private land.

Significant flora and fauna

New Holland mouse *(Pseudomys novaehollandiae)*
Wombats *(Vombatus ursinus)*
Eastern-barred bandicoot *(Perameles gunnii gunnii)*
Chocolate lilies *(Arthropodium strictum)*



The Douglas River is one of the most pristine waterways in north-east Tasmania, Photo: Nick Fitzgerald

Riparian systems

Rivers are the arteries through which the lifeblood of the landscape courses. The water they carry brings life from the upper catchments down through the floodplains to the wetlands and estuaries below. Wetlands rely on them for an influx of critical nutrients and sediments that sustain their flora and fauna. In heavily modified landscapes, narrow strips of riparian vegetation provide shelter for fauna moving between patches of vegetation, adding connectivity to the landscape.
As well as providing a critical link between far-separated parts of the catchment, riparian systems are important habitat in themselves.

They shelter threatened fish, such as the Australian grayling, as well as more common, ecologically important species, such as the platypus. Riparian scrub and coast paperbark *(Melaleuca ericifolia)* swamp forest are threatened vegetation communities associated with river habitats. One of Australia's rarest plants, Davies' waxflower *(Phebalium daviesii)*, occurs only in riparian habitat on the George River.

Healthy Tasmanian rivers are complex in physical structure and bordered by intact native vegetation. Their habits are often meandering, and they maintain a good diversity of in-stream habitat, often provided by an "untidy" assemblage of logs and boulders, which allows them to shelter a broad range of aquatic invertebrates and larger animals.

Good intact riparian systems within the region can be found in the Douglas River, the upper reaches of the Scamander and Avenue rivers, Constable Creek, and the upper catchment of the Ransom River at the Blue Tier.

Significant flora and fauna

Australian grayling *(Prototroctes maraena)*
Freshwater crayfish *(Astacopsis franklinii)*
Platypus *(Ornithorhynchus anatinus)*
River boronia *(Boronia gunnii)*
Davies' waxflower *(Phebalium daviesii)*

With a very small population on the banks of the George River, the critically endagnered Davies' waxflower (Pheballium daviesii) is one of the rarest plants in Australia, photo: Nick Fitzgerald

The grey goshawk (Accipiter novaehollandiae) is an endangered bird of prey which nests in riparian wet forest around the Blue Tier, photo David Watts.

'Threatened Species in north-east Tasmania'

Over 150 rare and threatened species have been recorded from the project area. These are species that are offically listed under the Tasmanian Threatened Species Protection Act and/or the Commonwealth Environment Protection and Biodiversity Conservation Act. These Acts provide some legislative protection for the listed species by controlling actions that impact on the species. Recovery Plans have been prepared and implemented for a small number of threatened species.

Species are listed from lowest to highest level of risk of extinction according to the *Tasmanian Threatened Species Protection Act 1995.*

Species with * attached to them are included as part of the: *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* not the *Tasmanian Threatened Species Protection Act 1995.*

Species with ** attached to them are listed as threatened species in both *Tasmanian Threatened Species Protection Act 1995* and *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

Tasmanian smoke bush (Conospermum hookeri)
Photo: Naomi Lawrence

RARE FLORA

dagger wattle *Acacia siculiformis*
juniper wattle *Acacia ulicifolia*
swamp wallaby grass *Amphibromus neesii*
slender aphelia *Aphelia gracilis*
chocolate lily *Arthropodium strictum*
grassy woodruff *Asperula minima*
water woodruff *Asperula subsimplex*
tall wallaby grass *Austrodanthonia induta*
crested spear grass *Austrostipa blackii*
knotty spear grass *Austrostipa nodosa*
jointed twig rush *Baumea articulata*
slender twig rush *Baumea gunnii*
gristle fern *Blechnum cartilagineum*
spiny bossiaea *Bossiaea obcordata*
spreading brachyloma *Brachyloma depressum*
forest daisy *Brachyscome sieberi var. gunnii*
blue grass lily *Caesia calliantha*
daddy longlegs *Caladenia filamentosa*
tiny fingers *Caladenia pusilla*
sea bindweed *Calystegia soldanella*
mountain sedge *Carex gunniana*
thick twistsedge *Caustis pentandra*
scarce centrolepis *Centrolepis strigosa subsp. pulvinata*
tiny midge orchid *Corunastylis nuda*
Australian hound's tongue *Cynoglossum australe*
large gnat orchid *Cyrtostylis robusta*
Apsley bent grass *Deyeuxia apsleyensis*
trickery bent grass *Deyeuxia decipiens*
heath bent grass *Deyeuxia densa*
scarlet sundew *Drosera glanduligera*
Barbers gum *Eucalyptus barberi*
eastern eyebright *Euphrasia collina subsp. deflexifolia*
spiny bushpea *Eutaxia microphylla var. microphylla*
small mudmat *Glossostigma elatinoides*
broom wheel fruit *Gyrostemon thesioides*
twiggy guinea flower *Hibbertia virgata*
cane holy grass *Hierochloe rariflora*
glossy hovea *Hovea corrickiae*
hill hovea *Hovea tasmannica*
harsh groundfern *Hypolepis muelleri*
plain quillwort *Isoetes drummondii*
tall quillwort *Isoetes elatior*
gentle rush *Juncus amabilis*
small-awn blowngrass *Lachnagrostis billardierei subsp. tenuiseta*
shade peppercress *Lepidium pseudotasmanicum*
stout rapier sedge *Lepidosperma forsythii*
twisting rapier sedge *Lepidosperma tortuosum*
sticky sword sedge *Lepidosperma viscidum*
austral trefoil *Lotus australis*
Cranbrook or warty paperbark *Melaleuca pustulata*
yellow onion orchid *Microtidium atratum*
Hooker's or crimsontip daisybush *Olearia hookeri*
Lichen *Parmelina whinrayi*
hot rock fern *Pellaea calidirupium*
tiny mitrewort *Phyllangium distylis*
pygmy clubmoss *Phylloglossum drummondii*
curved rice flower *Pimelea curviflora*
yellow rice flower *Pimelea flava subsp. flava*
shade plantain *Plantago debilis*
soft poa grass *Poa mollis*
tree pomaderris *Pomaderris intermedia*
narrow leaf pomaderris *Pomaderris phylicifolia subsp. phylicifolia*
superb or cobra greenhood *Pterostylis grandiflora*
zig zag bog sedge *Schoenus brevifolius*
brock knawel *Scleranthus brockiei*
dwaft scullcap *Scutellaria humilis*
swamp fireweed *Senecio psilocarpus*
forest groundsel *Senecio velleioides*
rush lily *Sowerbaea juncea*
salt couch *Sporobolus virginicus*
soft Furneaux spyridium *Spyridium parvifolium var. molle*
Australian dusty miller *Spyridium parvifolium var. parvifolium*
rayless starwort *Stellaria multiflora*
swamp triggerplant *Stylidium beaugleholei*
small trigger plant *Stylidium despectum*
tiny trigger plant *Stylidium perpusillum*
forest germander *Teucrium corymbosum*
mauve-tufted sun orchid *Thelymitra malvina*
tiny arrow grass *Triglochin minutissimum*
trithuria *Trithuria submersa*
yellow bladderwort *Utricularia australis*
pink bladderwort *Utricularia tenella*
trailing speedwell *Veronica plebeia*
erect marsh flower *Villarsia exaltata*
Cunningham's violet *Viola cunninghamii*
white alpine everlasting *Xerochrysum bicolor*
swamp everlasting *Xerochrysum palustre*
pink zieria *Zieria veronicea subsp. veronicea*

RARE FAUNA

Hydrobiid snail (Terrys Creek) *Beddomeia tasmanica*
Spotted-tailed quoll *Dasyurus maculatus subsp. maculatus*
Caddisfly (St. Colomba Falls) *Hydrobiosella sagitta*
Glossy grass skink *Pseudemoia rawlinsoni*
Giant velvet worm *Tasmanipatus barretti*

VULNERABLE FLORA

water woodruff *Asperula subsimplex*
dolerite spleenwort *Asplenium trichomanes subsp. trichomanes*
Gunn's or river boronia** *Boronia gunnii*
tailed spider orchid** *Caladenia caudata*
South Esk pine *Callitris oblonga subsp. oblonga*
Tasmanian smoke bush** *Conospermum hookeri*
skirted treefern *Cyathea Xmarcescens*
slender tick trefoil *Desmodium gunnii*
great heath *Epacris grandis*
small leaf glycine *Glycine microphylla*
lesser guinea flower *Hibbertia calycina*
wiry mitrewort *Phyllangium divergens*
small leaf pomaderris *Pomaderris elachophylla*
roundleaf mint bush *Prostanthera rotundifolia*
grassland greenhood** *Pterostylis ziegeleri*
swamp fireweed* *Senecio psilocarpus*
small leaf spyridium *Spyridium lawrencei*
clubmoss bush pea *Stonesiella selaginoides*
yellow rush lily *Tricoryne elatior*
threatened grass tree** *Xanthorrhoea aff. bracteata*
sand grass tree** *Xanthorrhoea arenaria*
shiny grass tree *Xanthorrhoea bracteata*
swamp everlasting* *Xerochrysum palustre*

Assessing Landscape Health

The health of the landscape within the project area is determined by the viability of each of its individual conservation assets. The health of each asset is determined by looking at their size, condition and their context in the landscape.

The green and gold frog (Litoria raniformis) is Tasmania's largest and most endangered frog, photo: Nick Fitzgerald

VULNERABLE FAUNA

Dwarf galaxia** *Galaxiella pusilla*
White-bellied sea eagle *Haliaeetus leucogaster*
Green and gold frog *Litoria raniformis*
Crested grebe *Podiceps cristatus*
Australian grayling** *Prototroctes maraena*
Fairy tern *Sterna nereis subsp. nereis*
White-fronted tern *Sterna striata*

ENDANGERED FLORA

Tasmanian bertya** *Bertya tasmanica subsp. tasmanica*
blacktongue finger *orchid Caladenia congesta*
South Esk pine* *Callitris oblonga subsp. oblonga*
bristly rockfern *Cheilanthes distans*
slender treefern *Cyathea cunninghamii*
South Esk heath** *Epacris apsleyensis*
great heath* *Epacris grandis*
border heath *Epacris limbata*
yellow eyebright *Euphrasia scabra*
basalt peppercress** *Lepidium hyssopifolium*
Davies' wax flower *Phebalium daviesii*
ferny panax *Polyscias sp. Douglas-Denison*
snug greenhood** *Pterostylis atriola*
fairy fanflower *Scaevola aemula*
small leaf spyridium* *Spyridium lawrencei*
threadcress *Stenopetalum lineare*
clubmoss bush pea* *Stonesiella selaginoides*
rabbit-ears *Thelymitra antennifera*
shiny grass tree* *Xanthorrhoea bracteata*

ENDANGERED FAUNA

Grey goshawk *Accipiter novaehollandiae*
Wedge-tailed eagle** *Aquila audax subsp. fleayi*
Wandering albatross *Diomedea exulans*
Bornemizza's stag beetle *Hoplogonus bornemisszai*
Swift parrot** *Lathamus discolor*
Southern elephant seal *Mirounga leonina*
Eastern curlew *Numenius madagascariensis*
New Holland Mouse *Pseudomys novaehollandiae*
Tasmanian devil** *Sarcophilus harrisii*
Little tern *Sterna nereis subsp. nereis*
Blind velvet worm** *Tasmanipatus anophthalmus*
Masked owl *Tyto novaehollandiae subsp. castanops*

CRITICAL

border heath* *Epacris limbata*
Davies' wax flower * *Phebalium daviesii*

STEP 2: DETERMINING THE VIABILITY OF THE CONSERVATION ASSETS

Once conservation assets for the area have been identified, the next step is to do a rapid assessment of the viability of these conservation assets.

These assessments were derived using a combination of expert consultation and interrogation of publicly available databases.
An abbreviated summary of these results is below.
Explanations of the rankings may be seen below:

Poor – allowing the factor to remain in this condition for an extended period of time will make restoration practically impossible.

Fair – outside its range of acceptable variation, requires intervention, if unchecked is prone to serious degradation.

Good – Functioning within its range of acceptable variation, may require some intervention.

Very good – functioning at an ecologically desirable status, requires little intervention.

No.	Focal conservation asset	Focal conservation asset viability
1.	Tasmanian Devil	Poor
2.	Wet forests	Good
3.	Dry forests and heathlands	Good
4.	Grasslands	Fair
5.	Riparian systems	Good
6.	Coastal wetlands and estuaries	Fair
7.	Shoreline systems	Fair
Overall project area viability:		Fair

Root-rot disease (Phytophthora cinnamomi) is killing native plants such as grasstrees (Xanthorrhoea australis) in many parts of the north-east, photo: Nick Fitzgerald

(Above) Devil facial tumour disease is a contagious cancer which is invariably fatal;
(Above right) Extensive areas of mature giant ash (Eucalyptus regnans) forest have been converted to eucalypt plantations, photos: Nick Fitzgerald

High priority threats

The conservation action planning process identified high priority threats to biodiversity across the project area, and then examined the impact of each of these threats on the focal conservation assets (see table).

On a regional scale, the highest ranking threats included:

• **Historical land clearing** – which has left many ecosystems much reduced in coverage, and hence fragmented and vulnerable to other impacts,

• **Weeds –** which threaten all systems by depriving native species of food and habitat, and in some cases transform the physical geomorphology of the ecosystem,

• **Climate change** – especially for wetlands which are already affected by long-term drying, but also more broadly an impact on all ecosystems as local weather patterns change,

• **Sea level rise** – especially for coastal wetlands and estuaries and shoreline systems, where habitat for many species will be gradually submerged or destroyed,

• **Coastal development** – especially for coastal wetlands and estuaries and shoreline systems, where habitat for many species is either converted or negatively impacted by the development, and

• **Inappropriate recreational use** – particularly within shoreline systems, where birds are greatly threatened by off-road vehicles, unwary pedestrians and dogs; coastal vegetation is also sensitive to recreational impacts.

The conservation assets most at risk from threatening processes were:

• Shoreline systems

• Coastal wetlands and estuaries

STEP 3: ASSESSING THE THREATS TO THE CONSERVATION ASSETS

The third step in the conservation planning process is to identify high priority threats to the conservation asset. This is a two-phase process. The first phase involves an assessment of the key stresses to the conservation assets. Stresses are directly related to the key ecological attributes (refer step 2) and includes factors such as inappropriate fire regimes, reduced native species diversity, reduced water quality, habitat fragmentation, etc.

Stresses are ranked from very high to low based on:

1) the severity of damage where it occurs (i.e. destroys or eliminates the conservation asset, seriously degrades, moderately degrades or slightly impairs); and

2) the scope of the damage (i.e. very wide-spread, widespread; localised, very localised).
The second phase involves the identification and ranking of the source of stresses (i.e. the direct threats). For example, the source of stress for reduced species diversity is generally grazing pressure (stock, rabbits and wallabies) and the source of stress relating to inappropriate hydrological regimes may be excessive water extraction.

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Sources of stress are ranked from very high to low based on:

1) the contribution of the source to the stress (i.e. very large contributor, large contributor, moderate contributor, small contributor); and
2) the irreversibility of the stress caused by the source (not reversible, reversible but not practically affordable, reversible with reasonable commitment of resources, easily reversible at low cost).

Once the stresses and sources are ranked according to the above criteria, a summary rating for each threat is generated. This results in the threats summary table (refer to threats table opposite) that allocates a ranking for each threat from very high to low, both in terms of the threat to the individual conservation assets and to the collective impact of the threat across the landscape.

Identifying High Priority Threats

The landscapes of the north-east and the ecological processes which sustain them are threatened by a range of human activities. Some may be limited in distribution, but highly destructive; others may be broad ranging but with minimal impact. Identifying threats to the landscape and their relative impacts is critical to allow land managers to develop effective conservation strategies.

Threats	Tasmanian devil	Wet forests	Dry forests & heathlands	Grasslands	Shoreline systems	Coastal wetlands & estuaries	Riparian systems	Summary Threat Rating
Agriculture and viticulture	-	-	Medium	-	-	Medium	Medium	MEDIUM
Climate change	-	High	High	High	High	Very High	High	VERY HIGH
Coastal development	-	-	Medium	-	High	High	-	HIGH
Dam construction & water extraction	-	-	-	-	-	Medium	Medium	MEDIUM
Devil facial tumour disease	High	-	-	-	-	-	-	MEDIUM
Feral animals (cats, foxes, rabbits)	Low	Low	Medium	-	Medium	Low	-	MEDIUM
Feral aquatic species (inc. trout)	-	-	-	-	-	Low	Medium	LOW
Historical land clearing	High	High	High	High	High	High	-	VERY HIGH
Inappropriate fire management	-	Medium	Medium	Medium	-	-	-	MEDIUM
Incompatible recreational use	-	Low	Low	-	High	Low	Low	MEDIUM
Native forest logging	Medium	Medium	Medium	-	-	Medium	Medium	MEDIUM
Phytophthora	-	-	Medium	-	-	-	-	LOW
Plantation forestry	Medium	Medium	Medium	-	-	Medium	Medium	MEDIUM
Sea level rise	-	-	-	-	High	Very High	-	HIGH
Sheep and cattle grazing	-	-	Low	Medium	-	Low	Low	LOW
Water-borne pathogens	-	-	-	-	-	Medium	Low	LOW
Weeds	-	Medium	Medium	Medium	High	Medium	Medium	HIGH
Overall threat status	HIGH	HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH	HIGH	VERY HIGH

The fairy tern (Sterna nereis subsp. nereis) is listed as vulnerable and nests on sandy beaches where it is at risk from sea level rise and from human recreation, photo: © Valeria Ruoppolo and Eric Woehler, Birds Tasmania

Skyline Tier Restoration Project

Native bush is being restored on the site of a former pine plantation at Skyline Tier near Scamander.

The North East Bioregional Network is actively engaged in ecological restoration following harvesting of the pine plantation by removing pines that have regenerated from seed and those that have invaded adjacent native bush. A diverse variety of native flora is regenerating on the site, including several threatened species.

Remnant patches of two threatened forest types, blue gum forest and black gum forest, have benefited from weed control.

The project improves habitat for threatened fauna, catchment protection and landscape connectivity.

This site at Skyline Tier is being rehabilitated to native forest following the harvesting of a pine plantation planted in the 1960-70s, photo: Nick Fitzgerald

STEP 4: DEVELOPING CONSERVATION STRATEGIES

The next step of the planning process for the north-east should be to develop strategies that will protect and enhance landscape-scale ecological processes and, thereby, the landscape itself.

As the project advances, these strategies should be further fleshed out following the SMART model for Conservation Action Planning; that is, objectives should be Specific, Measurable, Actionable, Realistic and Time-bound. Specific actions should also be complemented by a formal monitoring and evaluation program, to ensure that when undertaken, actions are having the expected and desired effect.

There are many good documents and strategies written for this region which focus on the protection of specific species and ecosystems, or on the mitigation of individual threats (e.g. weeds). In considering conservation strategies for the north-east, we have focused on those actions which we believe will promote the maintenance of ecological processes across the landscape. As such, as we considered how threats would impinge on ecological processes for each focal conservation asset we have drawn out strategies which relate directly to local key ecological processes.

STRATEGIES FOR MAINTENANCE OF ECOLOGICAL PROCESSES IN THE N.E

Broad strategies

Strategy 1: Develop and implement catchment scale management plans which actively address ecological processes.

Effective catchment management planning can be a successful tool to address broad scale ecological processes.

Such plans should specifically address issues of landscape scale connectivity and associated ecological processes, especially in light of climate change issues.

Strategy 2: Frame planning legislation to actively address issues of landscape scale connectivity

The Linking Landscapes project identified a range of areas on public land which could be considered in future planning for landscape connectivity specifically for the north-east.

Planning schemes and associated legislation at a State and municipal level will need to reflect the current science being developed regarding biodiversity adaptation in response to climate change, including the importance of landscape scale connectivity.

Strongly interactive species

Strategy 3: Improved implementation of threatened species recovery plans for highly interactive species

Within the context of the north-east, these species could include Tasmanian devils, quolls, bettongs and birds of prey.

Developing Conservation Strategies and Objectives

Once threats to assets have been identified, specific strategies and objectives need to be developed to guide on-ground actions that will achieve real landscape-scale conservation outcomes.

Strategy 4: Research and implementation of measures to restore Tasmanian devil populations.

This may include disease control measures, establishment of fenced disease-free populations or reintroduction of the species to the north-east from insurance populations. Any such works should be done in consultation with and to support works already being undertaken by the Save the Tasmanian Devil Project.

Strategy 5: Pro-active management of feral trout populations

Trout should not be introduced to any new waterbodies within the area. Trials might also be undertaken to remove trout from sections of rivers where they impact upon native threatened fish species.

Strategy 6: Increased investment in the strategic management of feral terrestrial animal species

Species of particular concern include cats and foxes.

Strategy 7: Increased investment in the strategic management of weeds, and soil and water borne pathogens

-Funding for local environmental weed management officers has been obtained by many councils in the southern NRM region, who have had great success in controlling environmentally significant feral plant populations. A similar model of local weed management should be considered within this region.

-General works hygiene training programs to teach people how to prevent the spread of weeds and soil- and water-borne pathogens on dirty equipment have also been developed in the south, and might be extended to this region.

-Implement a set of regionally consistent on-the-job hygiene protocols, and resource their enforcement.

-No new tracks or roads should be permitted in areas identified as Phytophthora management areas.

-Tracks should be closed and rehabilitated in areas where they are no longer required, to prevent the spread of weeds, soil and water-borne diseases.

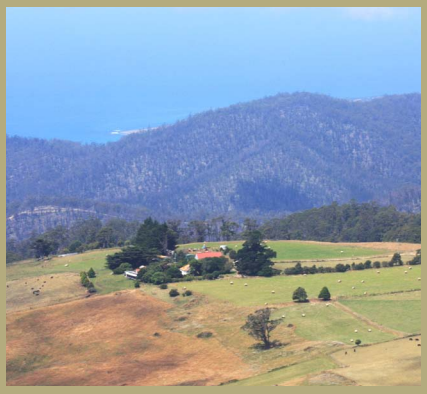
Hydroecology

Strategy 8: Develop and implement targeted restoration programs to normalize hydroecological processes

Aspects of such a program could include;
-targeted broad-scale restoration of riparian vegetation,

-strategic restoration of plantations, modeled on those already being trialled by the North East Bioregional Network at Skyline Tier near Scamander.

Any such programs should be complemented by a monitoring program charting the changing condition of local watercourses as the projects progress. Such monitoring programs could be modeled on successful local programs such as the Waterwatch-driven monitoring of condition of streams on the Blue Tier using aquatic macroinvertebrates and the SIGNAL system.



Farmland and protected bushland near St Marys overlooking the East Coast, photo: Nick Fitzgerald.

A guided walk provides interpretation of the natural heritage of forests on the slopes of the Blue Tier, photo: Nick Fitzgerald

North East Tasmania Land Trust

Many conservation values occur on private land. Purchasing land for conservation is an effective means of protecting biodiversity, particularly when it is done in a strategic manner to complement conservation on public land. The not-for-profit North East Land Trust works in partnership with the statewide Tasmanian Land Conservancy to protect valuable natural places in the north east by purchasing and managing land of ecological value.

www.netlandtrust.org.au
www.tasland.org.au

Long distance biological movement

Strategy 9: Develop and implement regional plans to actively promote long-distance biological movement

This could occur as part of the ecologically focused catchment management process and would probably best be driven at a local level. Examination of projects undertaken elsewhere in Tasmania to improve landscape connectivity (e.g.; the Biolinks project undertaken by Huon and Kingborough councils) may provide some guidance for development and implementation. Such a process should also incorporate research and planning tools being developed by the Tasmanian government regarding climate change, refugia and connectivity issues.

Strategy 10: Restore connectivity within riparian systems

This would involve;
-reducing anthropogenic barriers to longitudinal (e.g. dams and weirs) and lateral (e.g. river and floodplain) connectedness of riverine systems,

-actively managing for hydrological regimes that maintain ecological and physical processes,

-active management of riparian vegetation, in recognition of its importance in buffering, providing nutrients and habitat and influencing geomorphology of river systems

Strategy 11: Development and implementation of regional migratory birds protection programs

Any such programs should be developed in consultation with relevant expert bodies (e.g. Birds Tasmania, DPIPWE), and focus on local migratory species such as the swift parrot, and migratory shorebirds.

Swift parrot protection measures might include:

-targeted covenanting of mature eucalypt forests on private land, and reservation of it on public lands within the swift parrots' range to ensure nesting habitat remains available. Mature *Eucalyptus obliqua* and *Eucalyptus amygdalina* forests, although not threatened communities, are considered to provide a high percentage of nesting hollows for this purpose,

-targeted restoration of blue gum forest within the swift parrot's range.

Measures to improve the protection of migratory and resident coastal birds might include:

-active management to protect and improve condition of key estuarine, wetland and coastal habitats for migratory shorebirds and waterbirds,

-designation of 'no-go' zones on beaches and employment of enforcement officers to ensure that shorebirds are left undisturbed during mating and breeding season.

Pasture in the upper catchment of the Break O' Day River near St Marys with the Nicholas Range in the background, photo: Nick Fitzgerald

Ecologically appropriate disturbance regimes

Strategy 12: Develop a regional strategy to ensure planned burns are conducted to maintain ecological health

It is recognized that the primary focus of planned burning in asset protection zones will be for fuel reduction, however most of the project area does not require fuel reduction and therefore burning should be based entirely on ecological principles.
Where possible, such burns should be done on a tenure-blind basis, i.e. according to ecological need rather than land management authority, and should be coordinated by a group containing members representing all major landuses. This would allow local plans for burning to be integrated into a regional strategy.

Areas of high conservation value should be given priority when planning burns and may require detailed local-scale planning to ensure an appropriate variety of fire regimes (including maintaining unburnt areas) are implemented to maintain the full range of ecological values.

Climate change and variability

Strategy 13: Actively consider climate change issues in landscape-scale planning

The field of climate change research is complex and constantly evolving. There are many state and national strategies and plans which focus on these issues within a Tasmanian context. Within the north-east, strategies to better allow ecosystems to adapt to climate change might include:

-planning for landward retreat of coastal ecosystems,

-maintaining and restoring connectivity within the landscape, and protecting identified climate refugia to allow ecological migration in response to climate change,

-improving ecological resilience by targeted restoration and buffering of fragmented and degraded landscapes.

Land/coastal zone fluxes

Strategy 14: Development and implementation of a strategic coastal weed control program

Regional planning should be informed by statewide plans such as the Tasmanian Beach Weeds Strategy and the Strategy for the Management of Rice Grass (Spartina anglica) in Tasmania.

Special focus in this area might be given to ensuring that the areas where rice grass has been removed remain free of rice grass.. Also, monitoring and control of key transformer species, such as sea spurge, and in some sensitive locations, possibly marram grass, should also be undertaken.

Strategy 15: Explicit consideration of coastal zone fluxes to be considered in any future proposed coastal engineering.

Strategy 16: Restrict future coastal development to established urban envelopes.

This requires implementation through local government planning schemes and/or the State Coastal Policy.

Long-term, spatially extensive evolutionary processes

Strategy 17: Identify climate refugia within the landscape and provide them with formal protection

Strategy 18: Protect local eucalypt genetic diversity by actively managing gene-flow from exotic eucalypts

Mechanisms for achieving this may include:

-using local native tree species for plantations in preference to *Eucalyptus nitens*,

-ensuring adequate buffers to prevent gene flow between native eucalypts and E. nitens.

Productivity

Strategy 19: Regional conservation planning and associated incentives to achieve representation of vegetation communities across different land systems

Several Tasmanian projects are working on this area at present, and the results of these projects should be used to inform future planning activities.

Strategy 19: Restoration of native vegetation communities that have been extensively cleared or fragmented

Strategic restoration of native vegetation should target parts of the landscape that have been heavily modified, particularly on fertile soils, such as floodplains, riparian zones and areas surrounding estuaries.

www.northeastbioregionalnetwork.org.au
www.wilderness.org.au