

Submission to the Legislative Council Select Committee on the Tasmanian Forests Agreement Bill 2012

Warra Tall Eucalypt Supersite

Recommendation

The Warra Tall Eucalypt Supersite is one of Australia's most active and productive sites for ecological research. The knowledge gained from research at Warra is recognised as being globally significant and has helped shape some of the most progressive developments in ecological forestry.

The reserve proposals as put forward in the Tasmanian Forests Agreement would result in the majority of the State forest in the Warra Tall Eucalypt Supersite becoming part of the Tasmanian Wilderness World Heritage Area.

A decision under the TFA reserves proposal encapsulating that part of Warra currently on State forest should facilitate the current and planned research at the site: maintaining the current tenures achieves this.

The site could be formally recognised through the TFA Bill as a site of global scientific importance.

Warra Tall Eucalypt Supersite

The Warra Long-term Ecological Research (LTER) Site in the Southern Forests was formally established in 1995. It was Australia's first LTER site and its establishment catalysed the creation of Australia's initial network of LTER sites. This enabled Australia to become a member country of the International Long-term Ecological Research Network (www.ilternet.edu), which currently has networks from forty member countries (Figure 1). In 2011 Warra LTER site became the Warra Tall Eucalypt Supersite, one of ten member sites of the Australian Supersite Network (Figure 2) (www.tern-supersites.net.au) – a facility of the Terrestrial Ecosystem Research Network (www.tern.org.au).

Supersites are places to foster intensive, site-based research to advance knowledge about the ecology of key Australian biomes, which in the case of Warra is the tall, wet eucalypt forest biome. The research leads to a better understanding of how the biomes function, particularly in response to disturbance, both natural and human induced. The information is used to improve management and also to better predict how the biomes might respond to future climates. This research is critical to the nation's capacity to develop sound, evidence-based policy related to the management of its natural resources. Importantly, the knowledge gained from Supersites such as Warra facilitate the interpretation of data collected less intensively in the wider landscape, including remotely sensed measurements. This approach allows better monitoring of natural resources and provides reliable information that can be used to track progress in maintaining or improving condition through State of the Environment / State of the Forest reporting.

Member networks

Details of the LTER networks that are members of ILTER. Use the map below to select a member network, or choose from the list to the left. Green flags indicate networks which are members of ILTER (the International Long-Term Ecological Research Network). Red flags indicate network which are under development, and are not yet formal members of ILTER. [Members of ILTER with contributor rights can manage details of their network here. See the members area for details or contact the site manager using the contact form above]



Figure 1. Map showing member networks of the International Long-term Ecological Research Network (screen capture from <http://www.ilternet.edu/member-networks>). The Terrestrial Ecosystem Research Network is the Australian member of ILTER.

Australian Supersite Network

The Australian Supersite Network (ASN) seeks to understand how key ecosystems will respond to future environmental change by setting up a nationally consistent network of multidisciplinary and intensive ecosystem observatories.

Each Supersite is located in a significant Australian biome and the network spans a wide range of environmental conditions. The ASN collects detailed data sets on flora, fauna and biophysical processes from each Supersite.

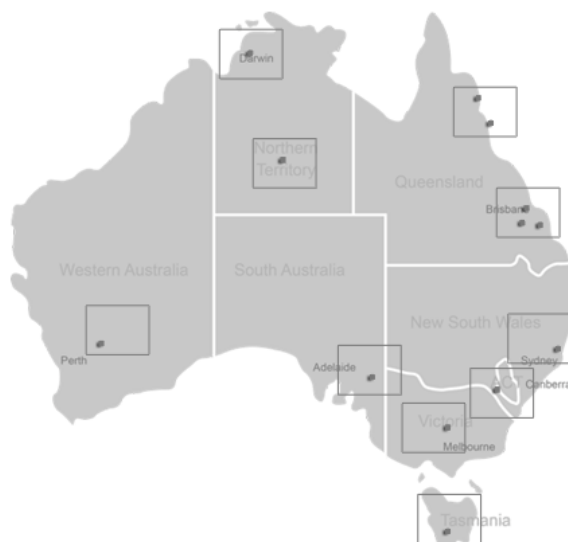


Figure 2. Map showing member sites of the Australian Supersites Network (screen capture from <http://www.tern-supersites.net.au>) – a facility of the Terrestrial Ecosystem Research Network.

The Warra Tall Eucalypt Supersite occupies an area of 15,500 ha between the Weld and Huon Rivers, with part on State forest and part in the Tasmanian Wilderness World Heritage Area (Figure 3). Warra also anchors the 112,000 ha Southern Forests Experimental Forest Landscape (SFEFL) that extends eastwards to the Huon Estuary. Most of the intensive, site-based research is done within the Supersite, largely on State forest (Figure 3). The SFEFL provides a place to do landscape-scale research into natural and human disturbance regimes.

While two land managers (Forestry Tasmania, Parks and Wildlife Service) host Warra, many agencies and institutions conduct or support research in Warra.

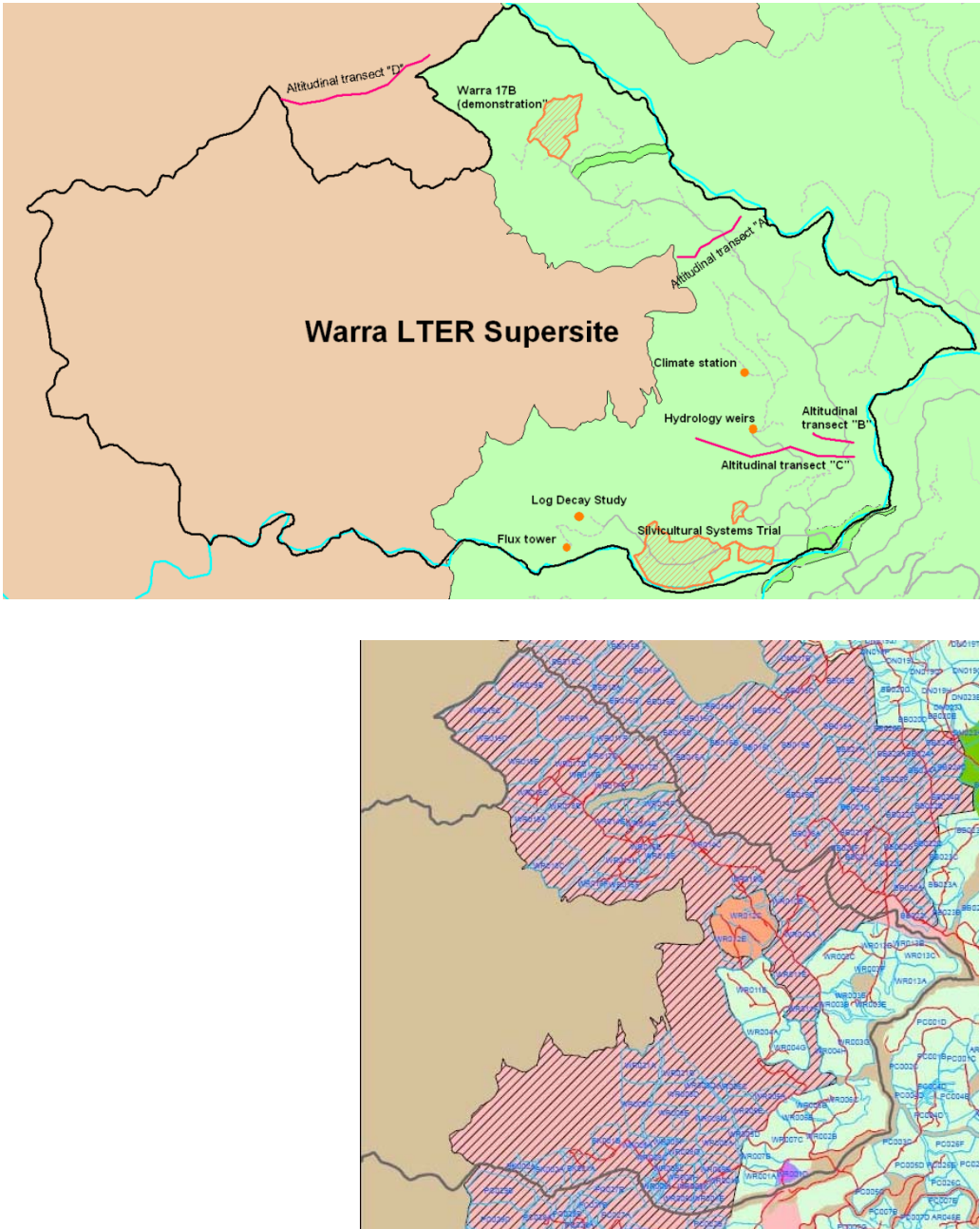


Figure 3. Maps showing the location of the Warra Tall Eucalypt Supersite with key infrastructure and Icon study sites shown (top), and the areas of State forest within Warra that are proposed for reservation (pink hatch and orange solid) and possible inclusion in the World Heritage Area (bottom).

There has been considerable investment in infrastructure to support long-term research at Warra. Physical infrastructure (Figure 4) includes:

- a Bureau of Meteorology Climate Station (Station number: 097024) measuring temperature, rainfall, humidity wind speed and direction every half hour;
- an 80-metre carbon flux tower that is part of the Ozflux network. When commissioned (in early 2013), this will continuously measures exchanges of carbon, energy and water between the forest and atmosphere enabling us, for example, to determine when the forests are storing carbon or losing carbon, particularly in response to extreme stress events such as drought or insect attack.
- gauged weirs on three pristine (or nearly so) catchments continuously measuring stream flow, temperature, pH, conductivity and turbidity.

This physical infrastructure is currently all sited on the State forest part of Warra. Under the TFA reserves proposal, all except the Climate Station would be transferred to reserve.

All data from these sites are transmitted automatically to computer servers for quality control, gap-filling and archiving in national repositories with the Bureau of Meteorology or Ozflux (CSIRO Marine and Atmospheric Research).

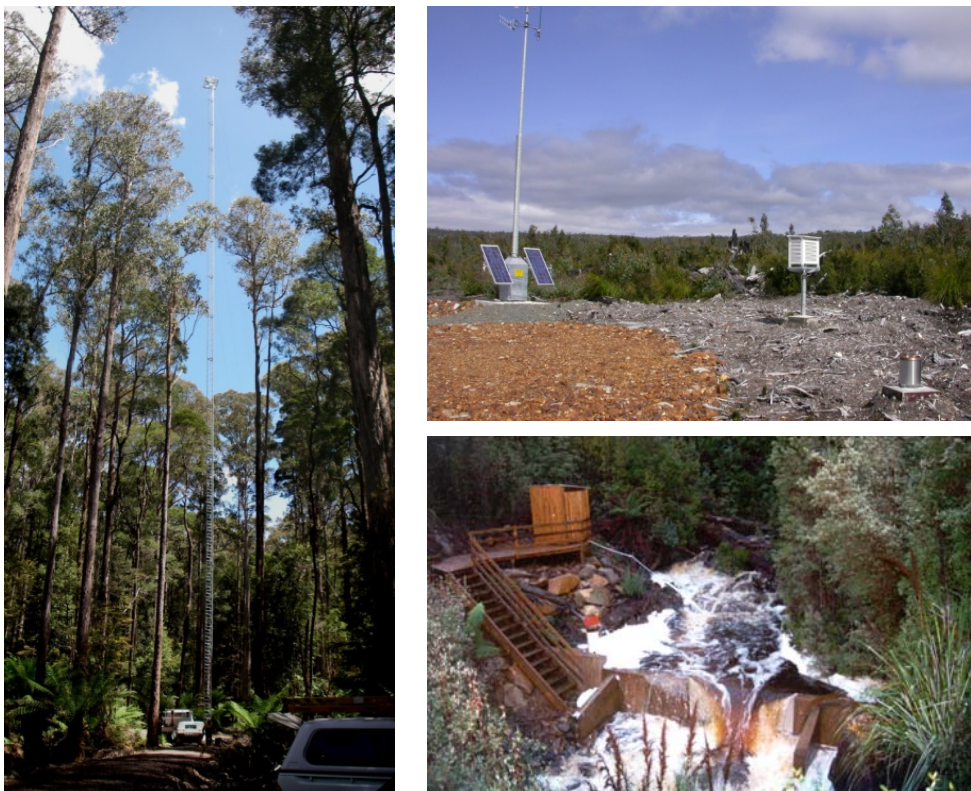


Figure 4. Physical infrastructure at Warra providing continuous automatic measurements: carbon flux tower (left); climate station (right top) and calibrated weirs (right bottom).

There has also been considerable intellectual investment in developing the research agenda at Warra. An part, this has been based on a gap analysis of the extent to which existing ecological knowledge addresses key aspects of a conceptual ecological model (Grove 2004). Critical science needs are provided through a network of permanent plots for long-term monitoring in

designed experiments or which capture climatic / ecological gradients. Together these represent the Warra Icon research projects. There are currently six Icon research projects:

- The Silvicultural Systems Trial for testing alternatives to clearfell, burn and sow silviculture for harvesting and regenerating tall, wet eucalypt forests (Figure 5);
- The long-term log decay study for comparing the invertebrate communities that establish in large (from mature trees) and small (from regrowth trees) diameter *Eucalyptus obliqua* logs as they decay (Figure 5).
- The Baseline Altitudinal Monitoring Plots that have been established every 100 metres along a 100-1300 metres altitudinal gradient to monitor shifts in the distribution of species and communities in response to long-term changes, particularly of climate;
- The Wildfire Chronosequence Plots that sample predominantly single-aged stands resulting from past wildfires to monitor changes as the forests age after disturbance;
- The Southern Forests Experimental Forest Landscape that samples a gradient of disturbance-intensity resulting from past wildfires and forestry / agricultural activities to monitor the landscape-scale effects of disturbance and land-use;
- A 1-hectare plot enclosing the carbon flux tower to monitor short and long-term forest responses to climate.

All six Icon studies are on State forest except for one of the four transects of the Baseline Altitudinal Monitoring Plots. Under the reserves proposal for Warra the SST, log decay, altitudinal transects and 1-hectare plot would be either fully or partially transferred into reserves.

Metadata, data and physical specimens (invertebrates) from these Icon studies have all been quality-controlled, curated and archived in databases. Insect specimens are housed in the Tasmanian Forest Insect Collection (www.tfic.net.au), assembled by Forestry Tasmania and now being progressively transferred to the Tasmanian Museum and Art Gallery. Access to the electronic data is progressively being transferred from Forestry Tasmania to the data portal of the Australian Supersite Network (www.tern-supersites.net.au).



Figure 5. Long-term Icon studies – the Silvicultural Systems Trial (left) and the long-term log decay study (right).

Outputs and outcomes from Warra

Since its inception, Warra has been a very active long-term research site attracting over 180 research projects (http://www.warra.com/warra/projects_search.html), including 54 undergraduate and post-graduate student projects from the University of Tasmania and other national or international universities. This research has been documented in over 300 reports and publications (<http://www.warra.com/warra/publications.html>). Five Linkage Grants from the Australian Research Council have been based at Warra. The research from Warra was showcased in 2008 at the international conference – “Old Forests, New Management” – held in Hobart. This conference was 9th recipient of a grant from the Department of Innovation, Industry, Science and Research under the prestigious Sir Mark Oliphant International Frontiers of Science series.

While any fundamental research is encouraged at Warra, many of the major research themes have been developed to address key policy and management priorities. The Silvicultural Systems Trial (SST) and the CAR reserves study in the Southern Forests Experimental Forest Landscape (SFEFL) were both established to address research priorities specifically identified in the Tasmanian Regional Forest Agreement: the SST to identify practical alternatives to clearfell harvesting for use in tall, wet eucalypt forests; the CAR reserves study to verify that the approach to biodiversity conservation underpinning the RFA was effective.

The comprehensive assessment of social, environmental and economic outcomes from the SST identified variable retention (VR), particularly the aggregated retention form of VR, as the most practical alternative to clearfelling. These findings were incorporated into the Tasmanian Community Forest Agreement, which set targets for adopting non-clearfell harvesting in oldgrowth forests. Of particular significance was the way in which research methods developed at the SST were translated into a system of management that could be used operationally. Scientists, planners and operational specialists worked together to refine systems and methods that worked operationally and achieved the ecological objectives that were developed from the Warra science. This work has placed Tasmania at the forefront of ecological forestry thinking and practice globally. The research done at the SST and in the demonstration site in Warra coupe 17B is particularly relevant to harvesting methods that allow the ongoing supply of special species timbers.

The CAR reserves study, recently completed in the SFEFL, has shown that a landscape approach to biodiversity conservation, such as that provided through the RFA, is effective in conserving forest biodiversity. These research results are globally significant as they empirically verify for the first time, the theoretical foundation of modern forest conservation science.

There has also been a concerted research effort at Warra to understand the coarse woody debris habitat – one of the most abundant and species-rich habitats in the tall, wet eucalypt forests. This research was predicated on proposals, which have yet to be realised, for fuelwood harvesting to generate power / produce biofuels as a way of helping to reduce smoke and greenhouse-gas emissions arising from regeneration burns. This research has highlighted the importance of large logs from mature eucalypts for dependent biodiversity and has enabled the development of a model to predict the abundance of coarse woody debris under different management regimes. This knowledge has underpinned the development of prescriptions to manage Tasmanian forests to sustain coarse woody debris habitat. These prescriptions, and the science underpinning them, place Tasmania at the forefront of coarse woody debris management globally.

While much of the deep ecological understanding of the tall, wet eucalypt forests of Warra was developed to answer questions in production forestry settings, it is also able to help understand

issues for management of forests in reserves. This is particularly relevant to climate-change science where Warra can provide knowledge based on real data to better inform predictions of the consequences of new climates that are associated with altered fire regimes and more extreme weather events.

Warra and the Tasmanian Forest Agreement

Most of the Warra Supersite currently on State forest has been proposed for reservation, specifically to be annexed to the World Heritage Area (WHA) on the basis of contributing to the integrity of the WHA. This assertion has not been tested by formal analysis in the case of State forest areas within Warra. Of note, the UNESCO Mission to Tasmania in 2008 recommended there was no need to change boundaries of the WHA to manage the impact of activities in production forests adjoining the WHA (Rao et al. 2008).

The Heritage Report commissioned by the Independent Verification Group (Hitchcock 2012) recognised the great value of Warra science and recommended the site be maintained as a focal point for research and ecosystem monitoring after transferring most of those parts on State forest into WHA. While part of Warra already sits within the WHA, the overwhelming majority of the research and research infrastructure is in those parts of Warra that are on State forest. There are several reasons for the concentration of research in Warra on State forest.

- Accessibility. Those parts of Warra within the WHA are difficult and costly to access. The small number of plots that have been installed within the WHA sections of Warra have required adherence to very strict guidelines (e.g. no construction of access tracks) that limits their accessibility for ongoing measurement.
- Management priority. Understanding the ecology of tall, wet eucalypt forest has been a much higher priority for informing management in wood production areas than it has for informing their management in reserves, where management by ‘benign neglect’ is the only practical option available. Rightly, the management priorities for the WHA direct research and monitoring investment towards more threatened ecosystems than the tall, wet eucalypt forests.
- Organisation commitment. This is intimately tied to management priority. Forestry Tasmania has been the major investor in Warra. Since its establishment, Forestry Tasmania has spent \$8.5 M directly on research, \$2.5 M of which was from science grants from external funding agencies. While a significant amount of that spending has been to establish the physical infrastructure and plot networks, the ongoing collection, processing and reporting of data still represents a significant recurrent cost. An organisation will only commit to such levels of investment when the focus of that investment is a high priority for that organisation.
- Capacity to conduct manipulative experiments. Manipulative experiments such as the SST are much more feasible on State forest which has well developed processes for evaluating and managing the impact of treatments through Forest Practices Plans, Forestry Tasmania’s Special Forest Activity Assessment process and Forestry Tasmania’s Forest Management System accredited under the ISO 14000 standard. There is also more flexibility to impose treatments that are consistent with the objectives of multiple-use management on State forest than in the WHA which has much narrower management objectives. This is most important in the case of the SST and “demonstration” areas such as Warra 17B (small group selection for special species harvesting) which have design requirements for ongoing periodic harvest in some treatments. The group selection harvesting treatments being evaluated are providing

critical silvicultural knowledge to inform management of suitable forest areas for the ongoing supply of special species sawlogs.

The transfer of most parts of the Warra LTER Supersite that are currently on State forest into the World Heritage Area could threaten its future as a site for long-term ecological research and severely limit the planned future research activities. The value of the science done within Warra benefits forest management well beyond the immediate local area, indeed some of that science is world-leading and of global significance for the further development of ecological forestry and landscape-level forest conservation. Critically, the knowledge generated from the research done at Warra is being used to refine ways we manage the remaining tall, wet eucalypt forests available for wood production in Tasmania.

Recommendation

The great scientific value Warra to the State, nation and globally be recognised.

Decisions on the reserve proposal relating to those parts of the Warra Supersite currently on State forest be made so as to facilitate current and planned research: maintaining their existing tenure is one way of doing this.

Consideration could be given to formally recognise the Warra Tall Eucalypt Supersite as a site of scientific significance.

References

Grove, S.J. (2004) Ecological research coverage at the Warra LTER Site, Tasmania: a gap analysis based on a conceptual ecological model. *Tasforests*, 15: 43-53.

Hitchcock, Peter (2012) Verification of the Heritage Value of ENGO-Proposed Reserves. IVG Forest Conservation Report 5A written for the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement 2011.

Rao, Kishore; Nikita Lopoukhine and Kevin Jones (2008) Tasmanian Wilderness (Australia), report of the reactive monitoring mission, 15 to 20 March, 2008) see <http://whc.unesco.org/en/list/181/documents/>

Signed:

Dr Tim Wardlaw
Project Leader, Warra Supersite
Molesworth, Tasmania

Dr Mark Neyland
Deputy Leader, Warra Supersite
Newtown, Tasmania