North Head Site Story

Nature Conservation Council of NSW

Overview of North Head

North Head, a tied island formed approximately 90 million years ago, is the northern headland at the entrance to Sydney Harbour. Derived from Hawkesbury Sandstone and Newport formations, the headland is comprised of predominantly sandstone and shale, which support a mosaic of different vegetation types. This land is managed by National Parks and Wildlife Service, Sydney Harbour Federation Trust, Q Station, The Australian Institute of Police Management and the North Head Sewerage Treatment Plant, Northern Beaches Council and others. North Head is a national heritage site.

Flora at North Head

North Head is dominated by dense sclerophyllous vegetation, which comprises eight distinct vegetation communities, including Coastal Sandstone Plateau Heath, Coastal Rock-plate Heath, Coastal Sandstone Ridgetop Woodland and the endangered Eastern Suburbs Banksia Scrub (ESBS). Characteristic species of plants within these communities include the smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*), coastal tea tree (*Leptospermum laevigatum*), heath-leaved banksia (*Banksia ericifolia*) and the coastal banksia (*Banksia integrifolia*). A total of more than 460 plant species have been recorded within these communities so far, including the sunshine wattle (*Acacia terminalis terminalis*), Camfield's stringybark (*Eucalyptus camfieldii*), hairy geebung (*Persoonia hirsuta*) and the rice flower (*Pimelea curviflora var. curviflora*) which are threatened in the state and/or federally.

Fauna at North Head

In addition to threatened flora, seven, of the 146 species of fauna recorded at North Head, are listed as threatened under state or federal legislation. Threatened species recorded on North Head include the red-crowned toadlet (*Pseudophryne australis*), little eagle (*Hieraaetus morphnoides*), spotted harrier (*Circus assimilis*), powerful owl (*Ninox strenua*), barking owl (*Ninox connivens*), grey-headed flying fox (*Pteropus poliocephalus*) and the eastern bentwing bat (*Miniopterus schreibersii oceanensis*).Two notable, and somewhat iconic, species that occur at North Head are the long-nosed bandicoot (Perameles nasuta) and the little penguin (Eudyptula minor), with both listed as threatened populations.

Banksia aemula, a characteristic species of Eastern Suburbs Banksia Scrub (ESBS), with *Leptospermum laevigatum* dominated senescent ESBS in the background.

Several major threats to both flora and fauna occur at North Head. These include predation by domestic and feral animals, vehicle strike (particularly bandicoots), fragmentation and loss of habitat, weed infestation, inappropriate fire regimes and stormwater runoff (increasing nutrients and the spread of weeds).

Cultural Value of North Head

North Head has significance for both Aboriginal and European cultures. The Northern Beaches is the traditional home of the Guringai people of the Eora nation, with North Head being a special place of meeting and healing. Aboriginal use of the site has been recorded in over 35 locations with evidence of site usage including the presence of rock engravings, rock shelters, open camp sites, middens and burials. At least two edge-ground axes have been discovered, as well as stone flakes.

North Head is the first site in eastern Australia where Europeans witnessed and documented 'prescribed burns' by Aboriginal people. This occurred on the 28 May 1788.

North Head has also been an important navigational landmark since the arrival of the first fleet. It was the site of the North Head Quarantine Station, with the first recorded quarantine in 1828. During its operation, over 580 ships and 13 000 people were quarantined to guard Sydney's population from illnesses such as small pox and influenza. The barracks at North Head were constructed during the late 1930s and, during World War II, North Head was one of the most heavily fortified sites in Australian history.

Eastern Suburbs Banksia Scrub

Eastern Suburbs Banksia Scrub is an Endangered Ecological Community which typically forms a sclerophyllous heath or scrub community on ancient nutrient poor aeolian (wind-blown) dune sand. It is typically taller than coastal heath and is characterised by the following species:

- heath or lantern banksia *Banksia ericifolia*
- old man banksia *Banksia serrata*
- wallum banksia *Banksia aemula*
- wax flower *Eriostemon australasius*
- coastal tea tree *Leptospermum laevigatum*
- tree broom heath *Monotoca elliptica*
- austral bracken *Pteridium esculentum*
- wedding bush *Ricinocarpos pinifolius*
- grass tree *Xanthorrhoea resinifera*

Eriostemon australasius, with crab spider (*Thomisidae* sp.)

Once occupying over 5 000 ha of land between North Head and Botany Bay, it now occupies only 3% of its original distribution, with fragmented patches totalling approximately 146 ha. The area of ESBS at North Head totals approximately 69 ha, which is the largest remaining patch of ESBS.

The Role of Fire

Fire is an essential component of many ecological systems within Australia. When not too frequent, fire promotes regeneration, initiates recruitment of the next generation and maintains the health of the vegetation community. If fire is absent for too long, the health of the system will also suffer. Certain species may dominate and, with no fire to stimulate germination of the next generation, the vegetation will start to senesce. If, however, fire is too frequent, it can remove species from the community, as parent plants may not have had time to set seed and juveniles may not have matured and developed tolerance to fire.

Banksia serrata 'cone' post fire, showing seed still within the opened woody fruit.

Dominated by banksia species, appropriate fire regimes are particularly important in ESBS. Banksia plants contain their seeds in their characteristic banksia 'cones'. When fire passes, these cones open and release their seed into the nutritious ash bed that remains, thus stimulating the next generation of banksias. Without fire, many Banksia species will not release their seeds and the parent plants will eventually senesce, with few juvenile banksia plants recruited into the system. A lack of fire also allows other plants, such

as the tea tree, to dominate, producing dense thickets.

Whilst fire is necessary to ensure the persistence of healthy ESBS, re-introducing fire into areas close to the urban interface can be a challenging issue.

Restoration Project – fire and Eastern Suburbs Banksia Scrub

In June 2012, the North Head Sanctuary Foundation and the Australian Wildlife Conservancy began a comparative study of the use of fire and selective thinning as tools for the restoration and ecological management of senescent ESBS. The project also compared restoration in areas where rabbits were excluded with areas where rabbits were allowed.

Prior to burning or thinning, experimental sites had a dense cover of ESBS. These sites were typically a mixture of senescent and more vigorous communities, with the more vigorous core surrounded by senescent ESBS. In the senescent vegetation, coastal tea tree and broom-heath were dominant.

Within 12 months of the controlled burn or selective thinning, significant differences were found between treatments. Burning produced a larger and more diverse community than did thinning. Exclusion of rabbits resulted in greater regeneration. Controlled fire, at appropriate intervals and when used in a mosaic pattern, appears to be beneficial in maintaining the health and diversity of ESBS.

Third Quarantine Cemetery Site

Experimental plots were established on two sides of the third quarantine cemetery. To the right of the cemetery, fenced and unfenced plots were established after a burn was implanted in senescing ESBS. To the left of the cemetery, the site was thinned (with removal of coastal tea tree and *Monotocca elliptica*), but was not burnt.

ESBS burn treatment site, adjacent to third quarantine cemetery.

North Fort Site

Burning and thinning treatments were applied to ESBS plots at North Fort, along with either fenced or unfenced treatments. Fencing resulted in significantly more regeneration, compared to that in unfenced plots.

Fenced plot (right) compared to unfenced adjoining area.

Photos: View from North Head- David Finnigan, all other photos- Adrian Davis.

Fauna at North Head

Due to its geography and history, North Head is relatively isolated despite its proximity to Sydney. Together with active management this has allowed a number of wildlife species to persist in the area, which include an endangered population of long-nosed bandicoots and threatened species such as the eastern bentwing-bat, grey-headed flying-fox, powerful owl and barking owl. However, like the rest of Australia, North Head has suffered local extinction of a suite of species since European settlement, most notably brown antechinus (*Antechinus stuartii*), eastern pygmy possum (*Cercartetus nanus*), eastern and tiger quoll (*Dasyurus viverrinus* and *D. maculatus*), swamp wallaby (*Wallabia bicolor*) and the bush rat (*Rattus fuscipes).*

Native bush rat (*Rattus fuscipes)*

An important element in the ongoing restoration of North Head is the reintroduction of some of these locally extinct species. In 2014, the Australian Wildlife Conservancy, in partnership with NPWS, University of Sydney and Sydney Harbour Federation Trust, brought back the native bush rat to North Head Sanctuary. It was their hope that the native bush rats would be able to compete with, and eventually exclude, the abundant feral black rats. Recent surveys have revealed that the population of native bush rats is steadily increasing and rats are starting to disperse as the population grows. By contrast, ongoing removal of feral black rats has led to a reduction in their numbers at survey sites.

Also reintroduced to North Head Sanctuary is the eastern pygmy possum, with the release of seventeen of these small marsupials since December 2016. The possums, which are a threatened species in NSW, have been extinct at North Head for decades.

Both the native bush rat and eastern pygmy possum play an important ecological role, acting as pollinators for plants like *Banksia* and *Lambertia* which produce flowers with energy-rich nectar.

The long-nosed bandicoot (*Perameles nasuta*)

Another iconic species present on the headland is the long-nosed bandicoot. The population at North Head is listed as endangered under NSW legislation, with many former populations in Sydney now extinct. Regular monitoring of the long-nosed bandicoot on North Head shows a stable population of over 150 individuals. The AWC, in collaboration with the NSW NPWS, is investigating the effect of ecological burns on bandicoot activity as part of their research on the role of fire management in restoring and maintaining habitat quality in the endangered ESBS ecological community.

Feral Animal Control

The small, isolated population of long-nosed bandicoots on North Head is particularly susceptible to predation by cats and foxes and control of these species is conducted across the headland. Similarly, feral herbivores such as black rats and rabbits, present a major threat to the endangered vegetation on North Head. Intensive rabbit grazing has the potential to dramatically reduce post-fire regeneration and may result in long-term changes to ESBS species composition. Control measures, including baiting and shooting, are carried out by NSW NPWS and Harbour Trust. Furthermore, to reduce grazing pressures by feral rabbits, the AWC, in conjunction with the North Head Sanctuary Foundation, is researching the effectiveness of prescribed burning in combination with feral-proof fencing. So far, results have shown that fencing around newly burnt patches of ESBS can promote regeneration of vegetation and increase its structural and floristic diversity following fire.

Source Fauna Information: Australian Wildlife Conservancy.
Photos: Jennifer Anson (AWC).