



NSW National Parks and Wildlife Service

Monitoring report 2017 to 2022

**Quarantine Station – Sydney Harbour
National Park
Integrated Monitoring Program**



Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

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Contents

1.	Introduction	1
1.1	Overview of the site	1
1.2	Purpose of the 2017 to 2022 monitoring report	1
1.3	Integrated Monitoring Program and Adaptive Management System (IMAMS)	1
1.4	Summary of monitoring results	2
2.	Predator and pest management	6
2.1	Foxes and cats	6
2.2	Rabbits	6
2.3	Black rats	7
3.	Preserving biodiversity	8
3.1	Long-nosed bandicoots	8
3.2	Sunshine wattle	10
3.3	Camfield's stringybark	12
3.4	Little penguins	12
4.	All other monitoring features	14
4.1	Lease breach notifications	14
4.2	QSCCC meetings	14
4.3	Fuel load in bushland areas	15
4.4	Aboriginal sites monitoring	15

List of tables

Table 1: Summary of Quarantine Station environmental performance 2017 to 2022	3
Table 2: PVA reports relating to monitoring years 2017 to 2022	9

List of figures

Figure 1 Quarantine Station site map	5
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1. Introduction

1.1 Overview of the site

The Quarantine Station (QS) (Figure 1) is located at North Head, Manly and within the Sydney Harbour National Park (SHNP). The 31-hectare site has cultural, environmental, and historical significance as a former quarantine station from 1828 to 1984.

QS is owned by the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) and managed by the NSW National Parks and Wildlife Service (NPWS). DCCEEW is the parent organisation of NPWS and regulates matters relating to the state's biodiversity, heritage, water resources and national parks.

Planning approval (MP08_0041) was granted in 2003 for the 'North Head Quarantine Station conservation and adaptive re-use proposal' with NPWS and Mawland Quarantine Station Pty Limited (Mawland) as co-proponents.

In 2006 the site was leased to Mawland for the use of the buildings and facilities on the site and the operation of a tourist facility, 'Q Station', providing accommodation, facilities for conferences, weddings and events and education tours.

On 11 May 2022 the lease was transferred to North Head Sydney Pty Limited (NHS) which now conducts the day-to-day activities of the site in accordance with the conditions of planning approval.

1.2 Purpose of the 2017 to 2022 monitoring report

This report has been prepared to meet the minister's conditions of planning approval (CoPA) 219 for the site under approval MP08_0041 and subsequent modification (MP08_0041 MOD 3).

It aligns with specific monitoring features that NPWS is responsible for as part of the 2006 Integrated Monitoring and Adaptive Management System (IMAMS).

The report includes an analysis of monitoring outcomes and trends as well as measures taken, or proposed to be undertaken, to respond to any adverse or unexpected impacts identified.

To the best of our knowledge, the information provided for collation in this report has been provided in good faith and is true and correct.

1.3 Integrated Monitoring Program and Adaptive Management System (IMAMS)

IMAMS was prepared in 2006 by the former QS lessee and site operator, Mawland, as required by CoPA to monitor site activities and adjust as necessary – as determined by the monitoring results – to conserve the significance of the site. It is both the responsibility of the Quarantine Station lessee/site operator and NPWS to monitor certain features identified in this system.

IMAMS includes 150 specific indicators, each with a pre-set benchmark, acceptable range (desirable performance), monitoring method and potential responses should the result be outside the acceptable range. These indicators have been clustered into headline indicators representing environmental, cultural, social and economic sustainability conditions.

The headline indicators NPWS is responsible for monitoring are:

- fox and cat abundance
- rabbit abundance
- black rat abundance
- long-nosed bandicoot abundance
- long-nosed bandicoot deaths attributable to vehicles
- fuel load in bushland areas
- sunshine wattle abundance
- Camfield's stringybark abundance
- little penguins
- lease breach notifications
- condition of midden in wharf precinct
- QSCCC meetings.

The 2006 IMAMS program anticipated that some indicators would be altered or replaced as their performance is reviewed (IMAMS 2006, page 9). IMAMS is currently under review and will be updated in 2023 by the co-proponents.

1.4 Summary of monitoring results

The performance of the QS in relation to the 2017 to 2022 monitoring report is summarised in Table 1.

The key to the performance trends used in Table 1 is as follows:











Within acceptable range: the monitoring feature continues to achieve the 2006 IMAMS defined benchmark.







Not within acceptable range: the monitoring feature has not met the 2006 IMAMS defined benchmark.

Table 1: Summary of Quarantine Station environmental performance 2017 to 2022

Annual report requirement	Section in this report	Environmental performance	Trend
Fox and cat abundance	Section 2.1	Fox and cat numbers were reported within the acceptable range of less than 3 cats and 1 fox per annum during the reporting period. NPWS responded to all detections and implemented ongoing predator management programs.	 Within acceptable range
Rabbit abundance	Section 2.2	Rabbit numbers have fluctuated throughout the reporting period and were above the acceptable range of 24 rabbits per annum. It is noted the number of rabbits at QS is comparable to the acceptable abundance rate for other open spaces across North Head. Following the end of a state-wide suspension in NPWS shooting operations in 2022, NPWS recommenced rabbit control and prevention programs including biological control at QS and across North Head.	 Not within acceptable range
Black rat abundance	Section 2.3	Black rat captures were reported within the acceptable range being equal to or less than 16% of total headland captures across North Head.	 Within acceptable range
Long-nosed bandicoot deaths attributable to vehicles	Section 3.1	The number of long-nosed bandicoot adult deaths attributed to vehicles was within the acceptable range for Trigger 2 which is less than 2 adult deaths for any 6-month period. Triggers 3 to 5 relating to this monitoring feature were not triggered during the reporting period.	 Within acceptable range
Long-nosed bandicoot abundance	Section 3.1	Long-nosed bandicoots maintained a greater than 60% persistence rate for the next 50 years.	 Within acceptable range
Sunshine wattle abundance	Section 3.2	Sunshine wattle were recorded within the acceptable range (greater than 12) in the 2018 to 2022 period. Monitoring was not undertaken in 2017.	 Within acceptable range
Camfield's stringybark abundance	Section 3.3	Camfield's stringybark numbers were recorded above the acceptable range (3 and above) in the 2019 to 2022 period. Monitoring was not undertaken in 2017 and 2018.	 Within acceptable range
Little penguin breeding burrows between Cannae Point and the southern end of Store Beach	Section 3.4	Little penguin burrows were within the acceptable range of greater than 6 burrows in 2017, 2018, 2019 and 2022. In 2020 and 2021 only 3 breeding burrows were recorded.	 Within acceptable range

Monitoring report 2017 to 2022

Annual report requirement	Section in this report	Environmental performance	Trend
		Nil breeding burrows recorded in QS.	
Lease breach notifications	Section 4.1	There were no formal lease breaches reported which is within the acceptable range of 0 to 3 notifications per year.	 Within acceptable range
QSCCC meetings	Section 4.2	Quarantine Station Community Consultative Committee meetings were within the acceptable range of 70 to 85% member attendance during the reporting period except for 2017. In this year only one meeting was held with an attendance rate of 67%.	 Within acceptable range
Fuel load in bushland areas	Section 4.3	Fuel loads in bushland areas on the edge of the QS lease area were within the acceptable range of less than 15 tonnes per hectare for years 2018, 2019, 2020 and 2022. Monitoring was not undertaken in 2017 and 2021.	 Within acceptable range
Aboriginal sites monitoring	Section 4.4	NPWS monitored all Aboriginal sites within QS including the wharf precinct on an annual basis in years 2018, 2019, 2020 and 2022. Monitoring was not undertaken in 2017 and 2021. Aboriginal sites remain protected and undisturbed by QS visitors, guests and site operations.	 Within acceptable range

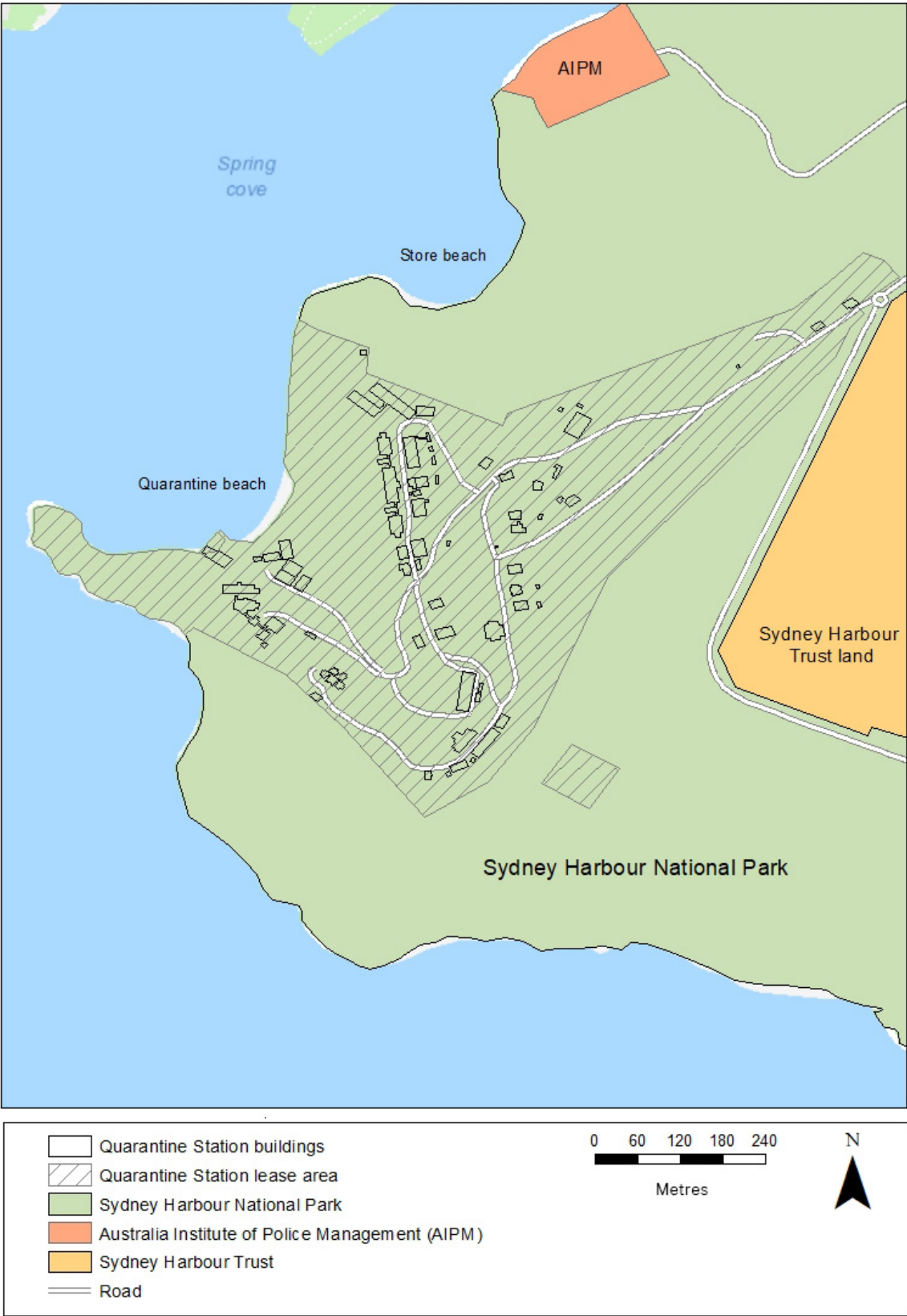


Figure 1 Quarantine Station site map

2. Predator and pest management

Pests and weeds have a significant impact on the ecosystems within Sydney Harbour National Park including QS. NPWS carries out risk assessments for new and emerging weeds as well as fox control to protect biodiversity in this park. NPWS has specific regional pest management strategies for the control of pest animals within the NSW national parks estate. Quarantine Station is included in the *Regional pest management strategy 2012–2017: Metro North East region*.

2.1 Foxes and cats

2.1.1 Monitoring results and trends

Fox and cat numbers remained steady during the reporting period and within the acceptable range of less than 3 cats and 1 fox during the 2017 to 2022 reporting years.

2.1.2 Performance and management measures

NPWS non-native predator monitoring and management programs have been effective and NPWS promptly responded to all detections of predators.

NPWS is alerted to detections via camera monitoring programs and from public and staff reporting of sightings and/or evidence of fox prints and scats. Response measures include enacting the Little Penguin Protection Plan (draft) measures involving intensive monitoring until the predator is controlled. NPWS first response includes increasing fauna camera monitoring and raking of beaches for prints and scats to locate the predator. NPWS also seeks penguin warden volunteers' assistance to conduct checks for any signs of predation at sunrise and sunset at beaches located in the Area of Outstanding Biodiversity Value (AOBV – formerly critical habitat) including Quarantine Beach.

NPWS implemented ongoing cyclic pest management programs (1080 baiting) and reactive pest management including soft-jaw trapping.

2.2 Rabbits

2.2.1 Monitoring results and trends

Rabbit numbers were above the acceptable range of 24 rabbits per annum.

2.2.2 Performance and management measures

NPWS is satisfied with current management programs which include a whole of headland approach to control rabbits across NPWS reserves and Sydney Harbour Federation Trust lands.

Rabbit numbers fluctuated throughout the reporting period and the numbers at QS were not lower or higher compared to other open spaces across North Head.

NPWS rabbit control program at QS included 29 shooting operations and 3 rabbit haemorrhagic disease virus (RDVH) releases.

Shooting operations were scaled back in 2019 as numbers were lower because of the 2017 to 2019 drought and bushfire seasons.

Shooting operations were suspended as part of a state-wide NPWS suspension of shooting activities that was in place from mid-September to November 2022. NPWS has now recommenced and scaled up operations in 2023.

2.3 Black rats

2.3.1 Monitoring results and trends

Black rat captures were reported within the acceptable range being equal to or less than 16% of total headland captures across North Head.

2.3.2 Performance and management measures

Overall, there has been a decline in black rat numbers across the headland including the QS precinct during the reporting period.

Black rats are monitored by NPWS as a bycatch of the long-nosed bandicoot monitoring program. The lessee is responsible for managing black rats within buildings to maintain good hygiene for guests as per the QS Predator and Pest Control Site Wide Management Plan. Black rats are not to be controlled outside the buildings and there are no further management requirements for NPWS.

3. Preserving biodiversity

QS is home to endangered plant and animal populations. Protecting these populations is key to upholding their viability and genetic diversity in the Sydney Harbour National Park and more widely across the state.

A wide range of ongoing population monitoring, management and conservation activities is undertaken across SHNP. NPWS collaborates with volunteers and other groups and agencies to ensure its native species are properly preserved.

3.1 Long-nosed bandicoots

3.1.1 Long-nosed bandicoot deaths attributable to vehicles

Monitoring results and trends

The number of long-nosed bandicoot (*Perameles nasuta*) adult deaths attributed to vehicles was within the acceptable range for Trigger 2 which is less than 2 adult deaths for any 6-month period.

Performance and management measures

Triggers 3 to 5 were not triggered during the 2017 to 2022 reporting period. Adaptive monitoring measures were not needed. NPWS is satisfied with current preventive measures to protect bandicoots from mortalities attributed to vehicles including staff/contractor induction training and restricting vehicle access in the lease area.

3.1.2 Long-nosed bandicoot abundance

Monitoring results and trends

Long-nosed bandicoots maintained a greater than 60% persistence rate for the next 50 years in last population viability analysis (2020) covering years 2017, 2018, 2019 and 2022. Monitoring was not undertaken in 2019 due to the unavailability of the principal investigator.

Performance and management measures

Long-nosed bandicoot monitoring and management forms part of the work program of the North Head Long-nosed Bandicoot Recovery team. NPWS and other stakeholders such as Australian Wildlife Conservancy monitor the population across the headland. This includes monitoring bandicoot numbers, health and breeding success and how they are responding to threats such as habitat loss, predation by dogs and foxes, inbreeding and disease.

During the reporting period adaptive management responses were not needed and no habitat reconstruction or rehabilitation works were deemed necessary.

A population viability analysis (PVA) for the long-nosed bandicoot is undertaken every 6 years. The last PVA report was completed in 2020 and an interim PVA will be reviewed in 2024. The PVA reporting periods do not align with those outlined in the CoPA or those used in preparing this report (see Table 2).

Table 2: PVA reports relating to monitoring years 2017 to 2022

PVA	Reporting years relevant to this report					
PVA 2020	2017	2018	2019	2020		
PVA 2023					2021	2022

Analysis relating to reporting years 2017 to 2020 covered in the 2020 PVA findings:

- Under current conditions, the North Head long-nosed bandicoot population has a 64% chance of persisting after 50 years (note: the 2014 PVA identified a 62% persistence rate).
- A reduction in the frequency and extent of predator incursions and wildfire remain key to increasing long-term population persistence as these factors lead to high rates of adult mortality.
- High levels of environmental variation in the carrying capacity are detrimental to population persistence.
- Lowering environmental variation has a greater benefit to population persistence than simply aiming to increase carrying capacity.
- Since 2016 the shift to a sex ratio that is higher in females than males has likely driven population growth.
- Maintaining a female-biased population and high proportions of females breeding within the population leads to increased chances of population persistence.

Recommendations for ongoing management:

- Maintain as a high priority the limiting of external factors that may increase adult mortality – for example, wildfire, traffic and predators such as foxes, dogs and cats.
- Address environmental variation in the carrying capacity of the headland by expanding areas of fertile foraging grounds close to adequate sheltering habitat.
- Apply techniques to revegetate and ‘drought-proof’ habitat – for example, water areas prone to drying out and mulch foraging areas to enhance invertebrate abundance.
- Maintain and expand existing habitat across the headland by ensuring access to undisturbed foraging resources associated with shrubs and dense bushy areas for shelter.
- Maintain annual monitoring to assess population size and sex ratio, and collect data necessary for PVA, such as mortality rates.



Long-nosed bandicoot at Quarantine Station. Stephanie Martin/NPWS

3.2 Sunshine wattle

3.2.3 Monitoring results and trends

Sunshine wattle (*Acacia terminalis*) individuals including seedlings were recorded within the acceptable range (greater than 12) in 2018, 2019, 2020, 2021 and 2022.

In 2019 a comprehensive survey conducted across the lease area identified new locations where the wattle is present. These locations have been incorporated in the ongoing monitoring program.

3.2.4 Performance and management measures

Previous QS management cleared one plant in 2019. NPWS investigated and the implemented action was to provide further education to the lessee's staff and contractors.

In 2021 Asset Protection Zone (APZ) maintenance impacted on several plants. As part of the subsequent investigation and treatment NPWS worked with the Saving our Species program to remediate the area and plant approximately 100 new seedlings through a community planting initiative incorporating a Back to Country event.

New QS management (from 2022) is actively working to protect sunshine wattle and has participated in flagging all plants to help with ongoing site management.



Back to Country event at Quarantine Station. Erica Mahon/DCCEEW



Sunshine wattle plantings at Back to Country event at Quarantine Station. Erica Mahon/DCCEEW

3.3 Camfield's stringybark

3.3.5 Monitoring outcomes

The number of Camfield's stringybark (*Eucalyptus camfieldii*) within the leased area was within the acceptable range (3 and above) in 2019, 2020, 2021 and 2022. Monitoring was not undertaken in 2017 and 2018.

3.3.6 Performance and management measures

All 3 Camfield's stringybark plants are in good health. The QS operations have not impacted or disturbed these plants.

3.4 Little penguins

3.4.7 Monitoring results and trends

Little penguin burrows between Cannae Point and the southern end of Store Beach were within the acceptable range of greater than 6 burrows in 2017, 2018, 2019 and 2022. In 2020 and 2021 only 3 breeding burrows were recorded.

NPWS cannot confirm if the QS activity had an impact on the breeding population during this reporting period.

The monitoring area for this feature extends outside the QS lease boundary and includes Store Beach. All breeding burrows were recorded at Store Beach during the reporting period with no breeding burrows recorded within QS.

3.4.8 Performance and management measures

There was no breeding activity detected during the 2017 to 2022 reporting period between Cannae Point and the northern end of Quarantine Beach. This includes the areas around the Quarantine Station boilerhouse which had historically been one of the most significant and consistent breeding areas in the North Harbour area. The loss of breeding at this site and another key site at North Head has had a significant impact on the breeding output of the Manly penguin population.

Penguin breeding numbers across the site are far below those at the time of the 2015 fox incursion that resulted in significant penguin deaths. Despite efforts since then to attract penguins their numbers have not increased in recent years.

In 2017 breeding success was impacted across the Manly peninsula. As the breeding disturbances were not isolated to a specific area, and there was no sign of any land-based cause, it is the opinion of threatened species experts this is likely due to an unidentified oceanic phenomenon.

In 2022 there was a small increase in breeding on the point between Quarantine Station and Store Beach with 10 breeding pairs identified. This is a positive sign following a period of decline in breeding activity. NPWS continues to monitor and manage the penguin populations as part of the NSW Government Threatened Species Recovery Program.



NPWS Discovery Ranger educational talk on Manly little penguins at Quarantine Beach. Rose Porter/NPWS)



Adult little penguin with early hatchings. Nicholas Carlile/DCCEEW

4. All other monitoring features

4.1 Lease breach notifications

4.1.1 Monitoring results and trends

There were no formal lease breaches reported, which is within the acceptable range of 0 to 3 notifications per year.

4.1.2 Performance and management measures

There were no formal lease breaches actioned during the reporting period.

4.2 QSCCC meetings

4.2.3 Monitoring results and trends

Quarantine Station Community Consultative Committee meetings were within the acceptable range of 70 to 85% attendance for meetings during the reporting period. In 2017 there was only one meeting with an attendance rate of 67%.

4.2.4 Performance and management measures

NPWS manages the QSCCC as required by the conditions of planning approval, conditions 56 to 60. Each committee serves a 4-year term.

The QSCCC provides a valuable function by providing a community channel between the community, NPWS and the QS lessee on matters relating to QS.

Further information including reports and copies of meeting minutes can be found online via the Q Station and NPWS websites.



Quarantine Station Community Consultative Committee 2019 to 2022. Rose Porter/NPWS

4.3 Fuel load in bushland areas

4.3.5 Monitoring results and trends

Fuel load in bushland areas on the edge of the QS lease area was within the acceptable range of less than 15 tonnes per hectare for years 2018, 2019, 2020 and 2022.

Monitoring was not undertaken in 2017 and 2021.

4.3.6 Performance and management measures

The monitoring has shown that fuel loads have been maintained within acceptable levels during the reporting years and there has been no requirement for additional fuel reduction management measures such as mechanical fuel removal or burning.

NPWS also has in place strategic programs for fire planning, hazard reduction and highly trained rapid response firefighting crews and community alerts.

4.4 Aboriginal sites monitoring

4.4.7 Monitoring results and trends

NPWS monitored all Aboriginal sites within QS on an annual basis in years 2018, 2019, 2020 and 2022, including the condition of the midden at the wharf precinct. Monitoring was not undertaken in 2017 and 2021.

4.4.8 Performance and management measures

NPWS is satisfied that Aboriginal sites are protected from and undisturbed by visitors and guests associated with QS operations and recreational activities.

Monitoring report 2017 to 2022

Some of the sites outside the wharf precinct have proven very difficult or impossible to access, or the site itself has become unrecognisable due to erosive and natural degradation.

Aboriginal culture is of great value to NPWS. The condition and management measures for Aboriginal sites are reviewed and upgraded as required in Sydney Harbour National Park and the QS Aboriginal heritage site management plan.