DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Review into the management of deceased whales in NSW

Final report

environment.nsw.gov.au

Cover photo: Humpback whale (*Megaptera novaeangliae*). Jonas Liebschner/DPIE

Published by:

Environment, Energy and Science
Department of Planning, Industry and Environment
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.environment.nsw.gov.au

ISBN 978-1-922317-12-4
EES 2019/0532
September 2019

Find out more about your environment at:

www.environment.nsw.gov.au

Contents

Introduction

Context

With humpback whale numbers in recovery, it is likely more deceased whales will require management each year. A common management response is burying deceased whales on the beach. However, there is growing public concern that whales buried on beaches attract sharks.

In response, the former Minister for the Environment asked the Chief Executive of the former Office of Environment and Heritage (now the Secretary, Department of Planning, Industry and Environment) to review how deceased whales are managed in New South Wales. The review's aim was to investigate public concerns, explore the science and suggest management responses to give the community greater confidence that land managers are making informed choices.

Engagement with the public is a significant part of successfully responding to a deceased whale. Community concerns about who is managing the stranding, when the matter will be resolved and whether there is an increased risk of using the beach from sharks are all critical issues.

Scope and objectives

The scope of the review was limited to deceased whales that wash ashore on the NSW coastline. Findings from this review may be relevant for the management of other marine wildlife such as dolphins.

The review's objectives were to:

- review whale carcass management approaches across different land managers
- investigate risks of whale carcasses attracting sharks and ensure they are addressed in the development of any new procedures
- recommend procedures to ensure whale carcasses are managed to minimise community and environmental impacts
- identify efficient, effective and consistent operational arrangements to manage whale carcasses along the NSW coast and across different land managers
- recommend protocols for community engagement when making management decisions.

Review process and engagement

The National Parks and Wildlife Service (NPWS) is responsible for protecting and managing marine mammals in New South Wales and has experience and expertise in dealing with beached and deceased whales. NPWS manages land adjoining 44% of the coast. The remaining coast is managed by local councils and agencies such as the Department of Planning, Industry and Environment (Crown land), Department of Planning, Industry and Environment (Water), Department of Defence, and the Department of Primary Industries. The relevant land manager is responsible for managing deceased whales on their land.

The Department consulted key stakeholders with responsibilities and expertise for dealing with deceased whales, including land managers, scientific experts, government agencies, local councils and marine mammal conservation groups (Appendix 2). The public was also able to provide feedback to the review via a dedicated email address. Consultation informed

the review's recommendations and helped identify key research areas to remedy knowledge gaps. A literature search was also conducted.

Summary of recommendations

The review recommends:

1. The National Parks and Wildlife Service (NPWS) provides a central advisory service for a one year trial period, to provide information and advice to land managers responding to deceased whales on their lands.
2. Land managers leave deceased whales in situ to decompose naturally, unless the carcass is in an urban or high visitation area. In urban and high visitation areas the preferred management option is to remove deceased whales except where:
    a. a beach is not accessible by the machinery needed to transport the carcass to landfill
    b. removal would pose a high health and safety risk to responders.
3. NPWS delivers best practice guidance documents for land managers and relevant government agencies, including:
    a. a response checklist and decision-making tool for land managers disposing of deceased whales
    b. work, health and safety guidance material
    c. a list of scientifically valuable whale species and procedures for collection of scientific data from these species including distribution of DNA kits to councils and a list of regional veterinarians who may be able to undertake necropsies.
4. NPWS publishes a new webpage to educate the community about deceased whale management decisions.
5. NPWS consults with Local Aboriginal Land Councils and Native Title Services, to develop a list of culturally significant whale species and contact details for relevant Aboriginal communities to help facilitate culturally appropriate management and disposal of whale carcasses.
6. NPWS develops an appropriate training module and commences training for vets to undertake euthanasia and obtain samples from deceased whales.
7. NPWS upgrades the Elements database to support collection of scientific data from land managers and key partners managing deceased whales.
8. NPWS coordinates and engages with the emergency management response framework (the Environmental Services Functional Area (EnvSFA) under the NSW Emergency Management arrangements) in managing deceased whales as appropriate.
9. NPWS considers funding options to cover sampling, analysis, identification and quantification of the deceased whale to assist data collection and assessing trends in threats to whales.
10. The Environment Protection Authority (EPA) seek approval from the Minister for Energy and Environment to commence a process to amend legislation to allow lawful exemption from the waste levy for land managers disposing of whale carcasses to landfill.
11. The EPA to inform land managers and waste facilities that the waste classification of whale carcasses is putrescible waste.
12. NPWS and the EPA investigate opportunities for biomass facilities to accept deceased whales to recover energy and/or generate fertiliser to help offset the costs of disposal and report back to the Minister for Energy and Environment.
13. The EPA publishes Geographic Information Systems (GIS) mapping that identifies landfill and biomass facilities that can accept deceased whales. Until published, NPWS will provide waste disposal information as required by land managers.

14. NPWS works with the Australian Museum to develop a list of priority species and data sought from whales.
15. The NSW Government continues to support and review research being undertaken to determine if whale leachate from buried whales attracts sharks and supports further research to test shark attraction to leachate from whales.

1. Governance Framework

Roles and responsibilities

A number of government agencies play a role in the management of deceased whales:

- The National Parks and Wildlife Service (NPWS) is responsible for the protection, conservation, and management of marine mammals, including whales under the *Biodiversity Conservation Act 2016*.
- The Department of Primary Industries (DPI) is responsible for managing sharks under the *Fisheries Management Act 1994*. DPI is also responsible for biosecurity matters.
- The Environment Protection Authority (EPA) is responsible for regulating waste in NSW, principally under the *Protection of the Environment Operations Act 1997.* EPA is also the lead agency for the Environmental Services Functional Area (EnvSFA) under the *State Emergency and Rescue Management Act 1989.*

Land managers are responsible for the management of deceased whales on their land and the associated costs. There are a number of coastal land managers including local councils, NPWS, Department of Planning, Industry and Environment (Crown land), Department of Planning, Industry and Environment (Water), Department of Primary Industries (Fisheries), Department of Defence and, sometimes, private owners.

Several government agencies play a role in coordinating operations and resourcing, including the EPA, NSW Police, and Roads and Maritime Services.

Several non-government organisations are central to a deceased whale response effort, including Surf Life Saving NSW, Marine Rescue, licensed rehabilitation organisations and the Organisation for the Rescue and Research of Cetaceans in Australia (ORRCA).

Need for a central advisory service

Local councils and government agencies both stated responding to deceased whale events requires a coordinated effort across government agencies and land managers. While NPWS has a legislative requirement under the *Biodiversity Conservation Act 2016* and provides operational expertise and knowledge of marine mammals. Land managers are assuming control of the carcass and managing the response without the level of knowledge or access to the expertise needed to make effective and efficient management decisions.

Land managers' responses can be further complicated when a whale washes ashore alive, or when the public may not know who to contact or understand how decisions are made. Councils raised concerns that the lack of clarity over responsibility can lead to delays in decision making.

During consultation, NSW government agencies and local councils noted management responses would benefit from a central advisory service delivering guidance to assist decision making, consistent public communications, monitoring and broader education opportunities.

Benefits of a central advisory service

Benefits of establishing a central advisory service include:

- single initial point of contact for land managers to access advice and expertise
- the capacity to simplify decision-making for land managers
- ensuring consistent and informed management decisions

- clear and accessible information for the public about who to contact and how management decisions will be made
- clarity on who has responsibility for providing best practice guidance to land managers and responders
- ability to compile and coordinate necropsy data to assist with monitoring the health of populations through a centralised database.

NPWS best placed to provide central advisory service

Land managers, agencies and other interest groups stated there is an expectation NPWS be engaged in the management response. NPWS has operational expertise, knowledge of marine mammals and is responsible under legislation for carrying out works and activities in relation to the conservation and protection of wildlife, including research and monitoring.

During this review, Department of Primary Industries (Fisheries) and the EPA were identified as other potential lead agencies. Both agencies have emergency management response frameworks for issues relevant to their legislative obligations, such as oil spills or biosecurity threats. However, these functions are not tailored to dealing specifically with whales.

Therefore, it is recommended that NPWS provide the central advisory service given its expertise, the expectation it will be engaged in deceased whale management and its remit to conduct research and monitoring.

Best practice guidance

Local councils also identified a need for strong guidance documents for managing deceased whales. As part of its central advisory role, NPWS will develop best practice guidance for land managers, communicate and facilitate preparedness days and provide initial guidance on operational response requirements, particularly in reporting and collection of scientific data.

As land managers' capabilities improve, NPWS resourcing of this work beyond one year would be subject to review.

Emergency management

NPWS, in its central advisory role, may need to liaise with the EnvSFA and the EPA as its lead agency. EnvSFA has the capacity to provide expert advice and support through the Disposal of Mass Animal Carcasses Working Group. EnvSFA can also utilise the Spatial Information and Mapping System to resolve demarcation issues, and coordinate NSW Emergency Management arrangements. In addition, should an event such as a mass stranding occur, it may be necessary to trigger an emergency management response under the State Emergency Management Plan and involve EnvSFA. The EPA also operates a 24-hour Duty Officer to support EnvSFA operations.

1.1 Recommendations

Recommendation 1 – The National Parks and Wildlife Service (NPWS) provides a central advisory service for a one year trial period, to provide information and advice to land managers responding to deceased whales on their lands.

Recommendation 3 – NPWS delivers best practice guidance documents for land managers and relevant government agencies, including:

- a response checklist and decision-making tool for land managers disposing of deceased whales
- work, health and safety guidance material
- a list of scientifically valuable whale species and procedures for collection of scientific data from these species including distribution of DNA kits to councils and a list of regional veterinarians who may be able to undertake necropsies.

Recommendation 8 – NPWS coordinates and engages with the emergency management response framework (the Environmental Services Functional Area (EnvSFA) under the NSW Emergency Management arrangements) in managing deceased whales as appropriate.

2. Community concerns

This review into the management of deceased whales was in response to growing community concern that whale carcasses buried on beaches attract sharks. These concerns have been highlighted in media reports.

In 2017, Port Macquarie-Hastings Council, in consultation with NPWS, made the initial decision to bury a whale carcass at Nobby's Beach due to access limitations, weather conditions and safety concerns. This raised community concerns that whale leachate would attract shark activity to the area and cause significant environmental issues [1]. In response to community concerns, the whale carcass was exhumed and transported to landfill [2].

This was followed by a similar event less than a month later at South Ballina on the NSW north coast. A baby humpback was temporarily buried behind the sand dunes at South Ballina Beach due to unfavourable tides and a lack of suitable machinery to remove it from the location. The decision to temporarily bury the whale was due to the potential for the carcass to refloat and washup further along the beach. The whale was removed once conditions were suitable and necessary equipment available[3].

In media reports, local community members have expressed negative views on the burial of deceased whales and the potential attraction of sharks. Media suggested a link between increased shark activity around floating whale carcasses. However, media has reported that there is a lack of evidence on whether sharks are attracted to deceased whales that are buried on shore. To help the community have confidence in how deceased whales are managed, land managers need to consider the community's concerns about the impact burying or leaving whales in situ may have on local businesses, recreational user groups and tourism.

[1] (https://www.theherald.com.au/story/4935994/beach-grave-for-dead-whale/).

[2] https://www.abc.net.au/news/2017-09-25/whale-exhumed-and-removed-from-port-macquarie-beach/8981356

[3] https://www.northernstar.com.au/news/dead-whale-buried-ballina-beach/3232880/)

3. Scientific evidence

Need for further scientific evidence on the impacts of beach-buried whale carcasses

This review found no completed scientific study on the impacts of carcass burial on beaches. In late 2016, the NSW Government partnered with Southern Cross University to fund a world-first, three-year study to examine the issue. The research is anticipated to be completed by late 2019.

This study included an initial literature review of management approaches, challenges, and research needs. This initial literature review has shown there is no domestic or international research regarding whether whale leachate attracts sharks. However, it did identify potential impacts could include groundwater contamination, shark attraction to the leachates and contamination from euthanasia and sedation drugs.

Preliminary results from the three-year study have been published,[4] which suggest that under certain burial conditions, it is unlikely that leachate from a whale carcass would reach the ocean. The research is anticipated to be completed in late 2019.

Scientific experts consulted during this review (Appendix 2) suggested examining shark movements in relation to known burial sites would need to be accompanied by further research focused on:

- the type and condition of oil and fat that would attract sharks
- the biogeochemical process of buried whale decomposition
- production and transport of leachate from buried whale carcasses in the dunal system
- analysing any differences linked to the species of shark and species of whale.

In addition, local councils recommended research on the frequency and causes of strandings, as well as alternative options to carcass disposal to landfill, such as using the carcass in the production of biofuels. This would enable robust, proactive and seasonally adaptive, and publicly acceptable management options to be developed.

3.1 Recommendation

Recommendation 15 – The NSW Government continues to support and review research being undertaken to determine if whale leachate from buried whales attracts sharks and supports further research to test shark attraction to leachate from whales.

[4] James P. Tucker, Isaac R. Santos, Kay L. Davis, Paul A. Butcher, Whale carcass leachate plumes in beach groundwater: A potential shark attractant to the surf? (Marine Pollution Bulletin Volume 140, March 2019), Pages 219-226

4. Management options

Management options used in other jurisdictions

The Department reviewed other jurisdiction's management of deceased whales (Appendix 3). Current management options include leaving a carcass to decompose in situ, transport to a waste management facility, and beach burial.

In Western Australia, removal to landfill or leaving carcasses in situ are the two management options used.

Victoria uses burial, removal to landfill and natural decomposition. Natural decomposition is noted as the fastest method but may not be appropriate in populated areas. Victoria recommends not towing out to sea.

Queensland uses towing out to sea, leaving to natural process, on-site burial, off-site burial, removal to waste disposal facilities, relocating for scavengers (e.g. Fraser Island dingos) and salvaging for necropsy.

In New Zealand around 90% of carcasses are left in situ.

NSW and Queensland have recently buried whales, and subsequently had them exhumed for transportation to waste management facilities. This has occurred due to community concerns.

Analysis of management options

The table below is an analysis of the benefits and operational barriers to current management responses. This was informed by discussions with government agencies and land managers.

Management option	Benefit	Operational barriers
Leaving in situ	Natural process Cost effective May be only option in remote inaccessible locations	Does not address public concerns about shark attraction, issues of sight and smell and contamination can arise
Beach burials	Cost effective and removes the sight and smell of a carcass	Does not address public concerns about shark attraction and contamination
Burial off beach (NPWS maintain specialist burial sites at Garigal National Park, Munmorah State Conservation Area and Pine Creek)	Historically used for carcasses deemed important to the Australian Museum or Taronga Zoo for scientific purposes and necropsy	Limited by the availability of appropriate sites Risk of site contamination
Transport to a waste management facility	Effectively addresses the community concerns of sharks and groundwater contamination	Transporting carcasses to a waste management facility is costly Removal of carcasses for transport to a waste management facility is dependent on accessibility and size of the carcass

Management option	Benefit	Operational barriers
		Removal can present significant safety issues for responders Not always culturally appropriate
Oceanic tows	Removes the sight and smell of a carcass	Risks to responders (as ropes and boats may not withstand the carcass's weight) Floating carcass presents boating navigation hazards Historically high likelihood of re-stranding on another location High operational costs to tow and monitor Risk carcass will break up

Location and accessibility has an influence on the appropriate management approach

In remote and inaccessible areas, where there is little to no public access, the most practical option is to leave the carcass in situ as it is a natural process and cost effective. This option is implemented by other Australian jurisdictions in remote areas where the carcass is unlikely to have negative impacts on members of the public (Appendix 3).

Due to current scientific uncertainty as to whether buried whale carcasses attract sharks, the precautionary approach is to remove the whale carcass, where possible, in areas of high visitation and public activity. In deciding about the suitable management options, land managers also need to consider the safety of staff and contractors. NPWS, in its role as the central advisory service, can provide advice to land managers in NSW on a case-by-case basis.

4.1 Recommendation

Recommendation 2 – Land managers leave deceased whales in situ to decompose naturally, unless the carcass is in an urban or high visitation area. In urban and high visitation areas the preferred management option is to remove deceased whales except where:

- a beach is not accessible by the machinery needed to transport the carcass to landfill
- removal would pose a high health and safety risk to responders.

5. Funding arrangements

Land manager responsibilities and requirements

Land managers are responsible for the costs of managing deceased whales. The costs associated with removal include machinery, skip bins, trucks for transport and landfill fees. These costs can vary significantly depending on size of whale, location and available resources.

The burial of a small carcass can cost between $2000 and $3000. This cost may include hiring heavy moving equipment to dig and move carcasses to burial location.

The cost of oceanic tows can vary, depending on the size and mass of whales and the availability of large-capacity vessels.

The cost of dissecting and taking a large whale to landfill is much higher than burying in situ. The cost of disposal of a large humpback at Nobby's Beach, Port Macquarie, in September 2017 was $65,000. The removal of a large sperm whale from a rockpool on the NSW Northern Beaches in 2015 cost $150,000.

Waste classification of whale carcasses

The review found that local councils were unclear on the waste classification of deceased whales, with disposal requirements and costs varying depending on the classification. The EPA advised deceased whales are classified as general solid waste (putrescible), regardless of whether they are euthanised. Land managers can only take whales carcasses to landfill that can lawfully receive this type of waste.

Waste and Environment Levy

Costs associated with taking carcasses to landfill include the EPA waste and environment levy, paid as part of the fees and charges for the waste management facility. In New South Wales, regulations require certain licensed waste facilities to pay a contribution for each tonne of waste received at the facility. This 'waste levy' aims to reduce the amount of waste being landfilled and promote recycling and resource recovery. Waste levy rates for 2018–19 was $141.20 per tonne in the Metropolitan Levy Area and $81.30 per tonne for the Regional Levy Area. In line with the Waste Regulation, the 2019–20 waste levy rates will again increase by Consumer Price Index (CPI) only.

Exemptions can be made under the Protection of the Environment Operations (Waste) Regulation 2014. To assist in reducing costs for land managers to take whale carcasses to landfill, the EPA should commence a process to lawfully exempt waste levy fees for land managers disposing of whale carcasses.

Councils would like funding assistance to dispose of deceased whales

Government agencies and local councils expressed a strong desire for a specific funding source to help manage deceased whales safely and effectively.

Based on the whale exhumed by Port Macquarie-Hastings Council and the average number of strandings per year (between 8-20), a funding base (upper bound) of $500,000 would be required.

Crown Reserves Improvement Fund

The Public Reserves Management Fund Program provided financial support to Port Macquarie-Hastings Council to transport a whale carcass to landfill. With the commencement of the *Crown Land Management Act 2016* on 1 July 2018, the Public Reserves Management Fund has been replaced by the Crown Reserves Improvement Fund Program (CRIFP). The CRIFP provides financial support for the development, maintenance and improvement of Crown reserves. The CRIFP is a self-sustaining program that is supported by income generated from loan repayments and interest, leases and licences on Crown Land. Use of the CRIFP is subject to the program's terms and conditions and the 2019–20 funding round is now closed. The current terms and procedures may, therefore, limit its applicability as a cost recovery mechanism for disposing of whale carcasses.

Transporting whales to biomass facilities

Another potential cost recovery opportunity identified by local councils, and solution for the lack of available landfill sites, is to transport deceased whales to biomass facilities for fertiliser production. This could be used to recover costs associated with carcass disposal, provide a recycling option and reduce waste.

The review considered international efforts and obligations under the Convention on International Trade in Endangered Species to avoid any exploitation from whales or whale products. The Commonwealth Government advised a deceased whale within Australia (except for the Commonwealth Marine Area and Commonwealth land) is subject to the relevant laws of each State.

The practicalities and suitability of this option requires further investigation, including the legal implications in New South Wales and to gauge public perceptions of the approach.

5.1 Recommendations

Recommendation 10 – The EPA seek approval from the Minister for Energy and Environment to commence a process to amend legislation to allow lawful exemption from the waste levy for land managers disposing of whale carcasses to landfill.

Recommendation 11 – The EPA to inform land managers and waste facilities that the waste classification of whale carcasses is putrescible waste.

Recommendation 12 – NPWS and the EPA investigate opportunities for biomass facilities to accept deceased whales to recover energy and/or generate fertiliser to help offset the costs of disposal and report back to the Minister for Energy and Environment.

Recommendation 13 – The EPA publishes Geographic Information Systems (GIS) mapping that identifies landfill and biomass facilities that can accept deceased whales. Until published, NPWS will provide waste disposal information as required by land managers.

6. Engagement

Improving public engagement

Government agencies identified that engagement with the public needs to be genuine, face-to-face and at the local level. As community concerns arise out of resource-use conflict and a lack of any evidence to determine whether whale leachate attracts sharks, there is a need for a strong and consistent message to be communicated to the public in the initial stages of a deceased whale incident.

Local councils noted a need for public guidance documents to help explain and support their management decisions.

Facilitating culturally appropriate management

Aboriginal communities expressed a desire to be contacted when a beached whale washes up. Local Aboriginal Land Councils and Native Title Services have a contact list of registered traditional owners, can assist with identifying culturally significant species and liaise with Aboriginal communities and land managers about harvesting any material in keeping with traditional practice.

6.1 Recommendations

Recommendation 4 – NPWS publishes a new webpage to educate the community about deceased whales management decisions.

Recommendation 5 – NPWS consults with Local Aboriginal Land Councils and Native Title Services, to develop a list of culturally significant whale species and contact details for relevant Aboriginal communities to help facilitate culturally appropriate management and disposal of whale carcasses.

7. Data collection and reporting

Importance of data collection

Stranding events or beached carcasses present a major and, in some cases, the only opportunity to collect information regarding: whale biology, behaviour, population and threats. This data is only sporadically collected from whale carcasses in New South Wales, yet such data has value in:

- establishing baseline information on populations
- contributing to the conservation of threatened species
- monitoring emerging diseases and epizootics
- identifying incidents of human interference and more indirect anthropogenic impacts, such as entanglement or ingestion of marine debris
- informing both public perception and adaptive management options.

Data collection

Monitoring requires a standardised assessment protocol for stranded whales and access to carcasses by trained staff. At a basic level, the collection of scientific data from stranded whale carcasses may include photographs, measurements and tissue and blubber samples. More intensive approaches include on-site or off-site necropsies, and the transport and storage of carcasses for bone retrieval.

Stakeholders, including NPWS, ORRCA, Taronga Zoo, and the Australian Museum, noted valuable opportunities for the collection of scientific data have been missed, due to:

- a need to remove deceased whales from sites as a matter of urgency, especially if the beached carcass is on a populated beach
- misidentification of species
- failure to identify unusual stranding events
- failure to notify relevant stakeholders and subsequently obtain data from the carcass before it is disposed.

Reporting

NPWS reports through ‘Elements’, a live information system supporting the management of NPWS incidents, events and the hazard reduction program. Elements has a Marine Wildlife Module where events can be recorded and managed, such as strandings, disentanglements and haul-outs. Elements aims to be a repository for all marine wildlife historical records and reporting. However, key stakeholders, such as ORRCA are unable to directly provide data to the Elements database. ORRCA uses an internally developed metadata sheet to gather information from whale carcasses that includes length, girth and descriptions of injuries. Data and samples are then analysed and reported to NPWS to upload into the Elements database.

The Marine Wildlife Module is currently undergoing changes as part of the Marine Estate Management Strategy aimed at improving use, navigation and access, particularly by key stakeholders. Consolidating effort and data into a share system is crucial in identifying and improving trends in threats to wildlife including vessel-strikes and marine wildlife disease outbreaks.

Opportunities to improve data collection and reporting

List of priority species

Stakeholder consultation suggested the process for data collection would benefit from the development of a list that prioritises when to collect data, to ensure a scientific response is triggered only when necessary. These events may be prioritised for response based on the following criteria:

- if the species is uncommon in NSW waters or of scientific interest
- whether the animal is alive or dead, and – if the latter – the condition of the carcass
- if the animal shows signs of disease, human interference, or death due to indirect anthropogenic activity e.g. ingestion or entanglement in marine debris.

Supporting the collection of samples

Taronga Wildlife Hospital, Dolphin Marine Conservation Park and Sea World as licensed rescue organisations with vets often conduct necropsies for NPWS on suitable whale carcasses. There is potential to formalise a larger network of local vets in a similar manner to expand the opportunities for collecting important data for conservation.

In addition, the collection of samples may be expedited using easily transportable DNA kits put together by the Australian Museum and distributed to pre-determined sites around the State, including instructions on how to best take and store samples.

Upgrading the Elements database

NPWS is also currently identifying opportunities to expand the Elements database to enable the following benefits:

- develop a front facing portal to the Marine Wildlife Module to allow non-governmental organisations (NGO), such as ORRCA to report marine wildlife events
- ensure data is analysed and proactively communicated to key internal and external stakeholders to assess trends to wildlife including vessel-strikes and marine wildlife disease outbreaks.

7.1 Recommendations

Recommendation 6 – NPWS develops an appropriate training module and commences training for vets to undertake euthanasia and obtain samples from deceased whales.

Recommendation 7 – NPWS upgrades the Elements database to support collection of scientific data from land managers and key partners managing deceased whales.

Recommendation 9 – NPWS considers funding options to cover sampling, analysis, identification and quantification of the deceased whale to assist data collection and assessing trends in threats to whales.

Recommendation 14 – NPWS works with the Australian Museum to develop a list of priority species and data sought from whales.

8. Conclusion

The review investigated how deceased whales are managed in New South Wales.

Current management options in Australian jurisdictions include leaving a carcass to decompose in situ, transport to a waste management facility, and beach burial.

Although beach burials are cost effective and remove the sight and smell of a carcass, they do not address community concerns that the burial of deceased whales may attract sharks.

An investigation of the potential risks of whale carcasses attracting sharks found no completed scientific study on the impacts of carcass burial on beaches. In the absence of scientific evidence, the review found community and environmental concerns can be best managed by no longer burying whales on beaches in high visitation areas, except in a limited number of circumstances. It also identified a need for further research to determine if beach-buried whales attract sharks.

It found management responses would benefit from a central advisory service and guidance to assist decision making, consistent public communications, monitoring and broader education opportunities.

The review recommends NPWS provides a central advisory service and develops best practice guidance for land managers. As land managers' capabilities improve, NPWS resourcing to this work beyond one year would be subject to review.

Appendix 1 Terms of Reference

1. Context

1.1 The National Parks and Wildlife Service (NPWS) is the lead agency for managing marine mammals. Management is guided by the NPWS Marine Wildlife Management Manual.

1.2 Whale carcass management is the responsibility of the relevant land manager – NPWS, local councils and other government agencies.

1.4 Whale numbers are increasing, with more carcasses requiring management each year.

2. Objectives

2.1 Review existing approaches to the management of whale carcasses across different land managers.

2.2 Investigate the potential risks of whale carcasses attracting sharks and ensure they are addressed in the development of any new procedures, including thorough consideration of research findings on the impact of carcass leachates.

2.3 Recommend potential new and consistent procedures across different agencies to ensure whale carcasses are dealt with promptly, safely and efficiently in the interest of minimising impacts on the people and environment of New South Wales.

2.4 Identify the operational arrangements required to implement whale carcass management efficiently, effectively and consistently along the entirety of the NSW coast and across different land managers.

2.5 Recommend potential new protocols for community engagement when making management decisions, if appropriate.

3. The review will be conducted by the Secretary, Department of Planning, Industry and Environment

3.1 The review will be conducted by the Secretary, Department of Planning, Industry and Environment and involve consultation with relevant agencies and stakeholders including the Marine Estate Management Authority, Department of Primary Industries, Local Government NSW, Department of Planning, Industry and Environment (Crown land), Department of Planning, Industry and Environment (Water), Aboriginal owners, and community and other user groups.

3.2 An interim report will be provided to the Minister for the Environment by 10 November 2017, with a final report to be provided by 8 December 2017.

Appendix 2 List of stakeholders consulted

Government agencies

- Department of Planning, Industry and Environment – Crown lands and Water
- Department of Primary Industries – Fisheries
- NSW Environment Protection Authority
- NSW Police
- National Parks and Wildlife Service
- Transport for NSW

Other jurisdictions

- Department of the Environment and Energy, Australian Government
- Department of Biodiversity, Conservation and Attractions – Parks and Wildlife Service, Western Australia
- Department of Environment, Land, Water and Planning, Victoria
- Department for Environment and Water, South Australia
- Department of Environment and Heritage Protection, Queensland
- Department of Conservation, New Zealand

Local councils

- Local Government NSW
- Ballina Shire Council
- Byron Shire Council
- Kiama Municipal Council
- Lake Macquarie City Council
- Northern Beaches Council
- Port Macquarie-Hastings Council
- Shellharbour City Council
- Tweed Shire Council

Scientific experts

- Australian Registry of Wildlife Health
- Organisation for the Rescue and Research of Cetaceans Australia (ORRCA)
- Surf Lifesaving NSW
- Taronga Wildlife Hospital
- The Australian Museum
- Dr Olaf Meynecke (Griffith University)
- Dr Vic Peddemors (Department of Primary Industries (Senior Research Scientist))
- James Tucker (Southern Cross University)

Aboriginal stakeholders were consulted on whale management during the exhibition process for the draft Marine Estate Management Strategy.

Appendix 3 Review of other jurisdiction's management of deceased whales

Jurisdiction	Responsible Agency	Management Options	Funding Availability	Community Engagement
Western Australia	• The Department of Biodiversity, Conservation and Attractions (DBCA) – Parks and Wildlife Service takes on advisory role to assist management. • The land manager is responsible for land management decisions and costs. DBCA is responsible for land adjacent to national parks and marine parks.	• Removal from beaches is the preferred option. • Beach burial not referred to as an option. • Capacity to leave in situ in some instances, reflecting the vast coastline and relatively uninhabited nature of some areas. • May be taken to landfill.	• The land manager is responsible for the costs in dealing with the deceased whale.	• WA has guidance material on its website relating to management of deceased whales. This includes a video describing removal of a deceased whale from a WA beach.
Victoria	• Department of Environment, Land, Water and Planning (DEWLP) is the lead agency (incident controller) for cetacean stranding, entanglements and vessel strike under the *Emergency Management Act 2013*. • It coordinates all responses to deceased whales, rather than leaving it to individual land managers.	• Options for disposal include natural decomposition, burial and disposal at landfills. Natural decomposition is the fastest method but may not be appropriate in populated areas. Towing out to sea is not recommended. • A range of risks (including attraction of sharks and proximity to areas used by the public) are considered.	• Victoria utilises Commonwealth and State emergency funds to support responses, regardless of who is the land manager.	• No specific website information on Victorian Government sites in relation to deceased whales. • The Victorian Cetacean Emergency Plan includes guidance on key communication issues, including the use of exclusion zones, managing volunteers and communications protocols.

	• DEWLP triggers appropriate responses, including the use of helicopters and roadblocks.	• Incident controller determines the need for euthanasia (shooting and implosion are endorsed methods).		• DEWLP have a Whale and Dolphin Emergency Hotline. • Indigenous groups may have interest in cetacean parts and are considered as part of the disposal process.
South Australia	• The Department for Environment and Water (DEW) is responsible for dealing with carcasses on its reserves. Councils are responsible for other areas.	• The method of disposal is determined on a case-by-case basis and must consider the location and public health and safety. • Any whale euthanised by injection must be removed from the shore or water and disposed of appropriately, to prevent toxicity and death to any scavengers.	• No specific funding source allocated to address deceased whales • In the case of a large-scale sperm whale event, DEW provided funding, in conjunction with in-kind support relating to provision of mining equipment to support management.	• DEW supports councils to address public facing elements of deceased whale response (crowd control, exclusion zones). • The Australian Marine Wildlife Research and Rescue Organisation (AMWRRO) supports public engagement and training.
Queensland	• Much of the coastline is within marine parks and managed by the Department of Environment and Science. In peri-urban areas, management is the responsibility of relevant councils.	• Depends on factors such as where it occurs; the size and species of the animal, and the method of euthanasia (if relevant). Methods of disposal have included towing out to sea; leaving to natural processes; on-site burial; off-site burial; burial at sea (e.g. SCP bycatch); removal to waste disposal facilities; relocating for scavengers (e.g. for Fraser Island dingos); salvaging for necropsy, and recovering the carcass/skeleton by	• The land manager is responsible for the costs in dealing with the deceased whale. No specific funds to assist have been identified for the review. Queensland has significant areas that are remote and may not warrant removal. Costs associated with removal may be lower than for NSW, based on anticipated lower disposal fees.	• No specific public facing information to support management options. Queensland has faced similar issues to NSW in relation to having to move previously buried whales to landfill sites. • Public directed to contact RSPCA Queensland to report stranded whales, alive or dead.

		the museum (e.g. beaked whales).		
New Zealand	• The Department of Conservation (DOC) is responsible in nearly all cases (in some locations territorial authorities may take responsibility; e.g. where council managed reserves meet the coast).	• Deceased whales are either left in situ (those in remote areas), buried on-site, or removed for burying elsewhere. What action is taken depends on the situation, notably public access/nuisance. While there are hundreds of deceased whales and dolphins in New Zealand each year, only a handful would be greater than 10 tonnes in weight. • Necropsies are not undertaken unless there is a need.	• DOC meets all costs for management unless a local council steps in. Given the proportion left in situ and because most strandings are of smaller cetaceans, this is generally not significant. Highest costs are associated with mass strandings (notably pilot whales) or large carcasses such as sperm whales and humpback whales.	• There is community engagement. This mostly relates to where the whale may be a public nuisance. Sharks are not an issue of significant concern in New Zealand. • Maori communities have first access to whale bone. There are local stranding plans which include Maori protocols for dealing with deceased animals including burial/disposal of carcasses. • Access for scientific research is permitted on a case-by-case basis. • DOC has an emergency hotline to report whale strandings.