NSW NATIONAL PARKS & WILDLIFE SERVICE

Marine Wildlife Management Manual 2021

Policies and procedures for marine wildlife management

environment.nsw.gov.au

Cover photo: Southern Right Whale, *Eubalaena australis.* Credit: Lachlan Hall/DPIE

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Abbreviations used

AASFA	Agriculture and Animal Services Functional Area
AIIMS	Australasian Inter-service Incident Management System
AM	Area Manager
AS	Australian Standard (also see ISO)
BDO	Branch Duty Officer
BOM	Bureau of Meteorology
BWU	Biodiversity and Wildlife Unit
CB	NPWS Conservation Branch
CITES	Convention on International Trade in Endangered Species
DPI	Department of Primary Industry
DO	duty officer (state, branch, region)
EES	Environment, Energy and Science
FPP	NPWS Filming and Photography Policy
FIMB	Fire and Incident Management Branch
FOU	Flight Operations Unit
JSA	job safety assessment
IAP	incident action plan
IC	incident controller
ICS	incident control system
ISO	International Organisation for Standardisation
IMS	incident management system (see AIIMS)
IMT	incident management team
IUCN	International Union for the Conservation of Nature
MWRWG	Marine Wildlife Response Working Group
MoU	memorandum of understanding
MEMA	Marine Estate Management Authority
MEMS	Marine Estate Management Strategy
NGO	non-government organisation
NM	nautical mile
NPWS	National Parks & Wildlife Service
OOA	out of area
PIT	passive integrated transponder
PPE	personal protective equipment
SCAR	Scientific Committee on Antarctic Research
QPWS	Queensland Parks and Wildlife Service

SCPO	Senior Conservation Planning Officer
SitReps	situation reports
SOP/s	standard operating procedure/s
SLSA	Surf Life Saving Association

Glossary

Area	Administrative district of NSW National Parks & Wildlife Service.
Baleen	Plates of keratin hanging from the inside of the upper jaw of baleen whales, used instead of teeth to capture prey.
Baleen whale	Whales of the suborder Mysticeti, characterised by jaws with baleen plates instead of teeth.
Beach-washed cetacean	Cetacean carcasses that have washed up ashore. The condition of these carcasses will vary depending on how long the animals have been dead and how long the carcass has been at sea prior to becoming beached.
Beak	Forward-projecting jaws of a cetacean, resembling a bird's beak. Prominent in many species of dolphins and beaked whales.
Beaked whale	Whales of the family Ziphiidae (males typically have a prominent beak and protruding teeth from the lower jaw). Beaked whales have a single pair of throat grooves.
Blow	The spout of water vapour exhaled by whales.
Blowhole	The single or double nostrils of a cetacean, located on top of the head. Baleen whales have two nostrils, while toothed whales have only one.
Blubber	The thick insulating layer of fat found beneath the skin of most marine mammals.
Bow-riding	Riding on the pressure wave at the bow of a ship. A common behaviour among many species of dolphins.
Branch	Administrative branch of NSW National Parks & Wildlife Service, comprising several areas (Refer to Appendix 16 NPWS area office contact list for contact details).
Breaching	Leaping completely or almost completely out of the water and landing with a splash.
Calf young	A cetacean or sirenian still being nursed by its mother.
Callosities	Areas of roughened skin on the heads of right whales, to which whale lice and barnacles attach.
Cetacean	Marine mammals of the order Cetacea, comprising whales, dolphins and porpoises.
Coccidiosis	A parasitic disease of the intestinal tract caused by microscopic organisms called coccidian.
Conspecific	Individuals of the same species.
Continental sea	Waters of the continental shelf, between the coast and the continental slope.
Continental shelf	Area of seafloor adjacent to a continent, sloping gently to a depth of about 200 m.
Continental slope	Area of steep drop in the seafloor just beyond the continental shelf.
Dolphins	Small cetaceans of certain families of the suborder Odontoceti, especially the family Delphinidae. Distinguished from porpoises by their pointed teeth and typically pronounced beak.
Dorsal fin	The fin on the back of most cetaceans.
Eared seal	Seals of the family Otariidae, characterised by the presence of external ear flaps. Includes all fur seals and sea lions.

Earless seal	Seals of the family Phocidae, which have no external ear flaps (although they do have ears). Includes all seals that are not fur seals or sea lions.
Echolocation	Sending out sounds and using the returning echoes to locate objects. Believed to be a general feature of toothed whales, but unproven for any baleen whales or other marine mammals.
Entanglement	Accidental confinement or encumbrance of a free-swimming cetacean or seal in netting, line or other debris of human origin.
Entrapment	Accidental confinement of free-swimming cetaceans in situations from which the animal is unable to extricate itself and return to the open sea (e.g. a land-locked inlet, upstream or in a channel between sandbars). These situations may occur where changing tide or weather conditions cause an obstruction between a waterway and access to the ocean. They may be temporary.
Event	Any circumstance requiring a NPWS response to marine wildlife. This term is used in this manual to avoid confusion with the term 'incident' that is defined under industrial awards.
Fibropapillo-matosis	A medical condition in cetaceans characterised by the presence of fibropapillomas, neoplasms consisting of both the epidermal and dermal skin layers.
Flipper	Flattened fore- or hind-limb of a marine mammal. Seals have all four limbs modified as flippers while cetaceans and sirenians have only the forelimbs as flippers (and no external hind limbs).
Flukes	Horizontally flattened tail of cetaceans and sirenians.
Fur seal	Seals of the genera *Arctocephalus* and *Callorhinus*. Distinguished from sea lions, which are the other members of the family Otariidae, by their denser underfur and more pointed snouts.
Grounding	Cetacean floundering in shallow water, prior to stranding.
Haul out	When a seal or turtle comes ashore, possibly for an extended period (e.g. to give birth, moult (phocids only), rest, avoid predators and/or to thermoregulate).
Hazing	This is the process whereby wildlife may be deterred from a site by the use of scaring techniques.
Incident Controller	Person responsible for the overall control of the response under the incident control system.
Incident Control System	The standard national system for managing incidents. Applies to managing multiple strandings and other marine mammal incidents.
Marine mammal	A diverse group of 120 species of mammals that have become adapted to life in a marine environment and are primarily ocean dwelling or dependent on oceans for food. Includes, among others, cetaceans, pinnipeds (seals, sea lions and walrus) and sirenians (the manatee and dugong).
Multiple stranding	Two or more animals (excluding mother−calf pairs) stranding together. Typically, many animals are involved in the stranding and they come ashore alive. Multiple strandings can comprise multiple animals from one species or a mixture of species.
Mysticetes	Any whale of the suborder Mysticeti, such as humpback whales, characterised by a symmetrical skull, paired blowholes and rows of baleen plates used for feeding on plankton.
Necropsy	The examination of a body after death; autopsy.
Nystagmus	Congenital or acquired persistent, rapid, involuntary and oscillatory movement of the eyeball, usually from side to side.
Oceanic	Ocean regions beyond the continental shelf (usually deeper than 200 m).
Odontocete	Any whale of the suborder Odontoceti, such as dolphins, killer whales and sperm whales, characterised by an asymmetrical skull, a single blowhole and rows of teeth. They feed primarily on fish, squid and crustaceans.
Pathogens	Any disease-producing agents such as a bacteria and viruses.

Pingers	A sound emitter that is attached to fishing nets to repel cetaceans.
Pinniped	A marine mammal of the suborder Pinnipedia, comprising seals, sea lions and walruses (sometimes classified as an order). In this manual, the term seal is used to generically refer to all pinnipeds.
Pod	A coordinated group of cetaceans.
Pup	A young seal.
Porpoise	Small cetaceans of the family Phocoenidae. Distinguished from dolphins by their spade-shaped teeth and the absence of a beak.
Rescue mat	A sheet of strong material with multiple carrying points along the side. A standard item of equipment used at cetacean strandings.
Response	The collective actions required to locate, assess and determine a course of action following reports of stranded cetaceans. A response may range from returning a phone call to the person who initially reported the incident, to an immediate dispatch of personnel and equipment.
Rorqual	Whales of the family Balaenopteridae, characterised by their many throat grooves.
Sea krait	Sea snakes from the genus *Laticauda*.
Sea lion	Seals of several genera of the family Otariidae, distinguished from fur seals by their sparser underfur and more rounded snouts.
Single stranding	Stranding involving only one or two animals, the latter usually a mother-calf pair.
Sirenian	Aquatic mammal of the order Sirenia, comprising dugongs and manatees.
State waters	State waters extend to 3 nautical miles from the shore.
Stranding	A situation where one or more cetaceans are aground and unable to alter their position. This may include animals that are: immobilised by grounding in shallow water; within the wave zone, yet unable to return to sea; or left high and dry when the tide recedes.
Tail stock	Heavily muscled rear third of a cetacean's body, which drives the flukes.
Thermo-regulation	The ability of an animal to maintain a constant body temperature to adapt to its surrounding environment. On hot days, fur seals and sea lions keep cool by holding aloft in the air one or more of their flippers. An elephant seal may flick either sand ('sand flippering') or pebbles up over its back to keep cool.
Toothed whale	Cetaceans of the suborder Odontoceti, characterised by having jaws with teeth rather than baleen plates.
True seal	A seal of the family Phocidae. Also known as earless seals because they lack external ear flaps, unlike otariids (fur seal and sea lions).
Whale lice	Parasitic crustaceans of the family Cyamidae which live on some species of whales. The presence of large numbers of whale lice on an animal can be an indicator of poor health.
Zoonosis	An infectious disease that is transferable from animals to humans, usually through a vector that is parasitic in the host animal. An example of a zoonotic disease involving seals is 'seal finger' which is a painful infection of the fingers in people who have handled seals or seal skins. It is thought to be caused by a mycoplasma entering human skin through breaks on the skin surface.

Commonly referenced legislation

AR Act	*Animal Research Act 1985*
BC Act	*Biodiversity Conservation Act 2016*
EAP Act	*Exhibited Animals Protection Act 1986*
EPA Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MS Act	*Maritime Safety Act 1998*
MEM Act	*Marine Estate Management Act 2014*
NPW Act	*National Parks and Wildlife Act 1974*
PCA Act	*Prevention of Cruelty to Animals Act 1979*
VS Act	*Veterinary Surgeons Act 1986*
WH&S Act	*Work Health and Safety Act 2011*

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Introduction

The NSW National Parks and Wildlife Service (NPWS) has statutory responsibility for the protection, conservation and management of native wildlife, both on and off park, in NSW under the *National Parks and Wildlife Act 1974* and the *Biodiversity Conservation Act 2016.* This comprises all marine mammals, reptiles and birds in NSW waters which extend to 3 nautical miles (5.6 km) offshore. It includes marine mammals, such as cetaceans (whales, dolphins and porpoises) pinnipeds (seals and sea lions) and marine reptiles (such as sea turtles and sea snakes) that inhabit marine, estuarine and riverine habitats.

Under the NPW Act, NPWS has specific responsibilities for protecting and recovering wildlife across NSW, including marine wildlife. This functional responsibility means that NPWS has a role in managing marine wildlife events in NSW, including providing functional support for NSW Department of Primary Industries who is the combat agency for oiled wildlife incidents. In addition to protections under State legislation, all cetaceans, pinnipeds and marine reptiles are protected in Australian waters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Beyond 3 nautical miles lie the waters of the Australian Exclusive Economic Zone (to 200 nautical miles offshore). Commonwealth legislation applies in these waters, so legal responsibility for marine wildlife rests with the Commonwealth. However, as the Commonwealth does not have the capability to respond to entangled whales, NPWS retains responsibility for this in all waters off NSW.

NPWS responds to many marine wildlife events. The NPWS Marine Wildlife Management Manual guides NPWS response to events including:

- live and dead strandings
- entrapments of live whales, dolphins and dugongs
- haul outs of pinnipeds and sea turtles
- oiled wildlife
- entanglements

Marine wildlife events elicit a public expectation that every effort will be made to rescue and rehabilitate the animals and return them to the sea. For marine wildlife, optimal safety and effective incident and conservation management depend on developing and maintaining a high level of expertise within NPWS, as well as improving the service's understanding of species behaviour and ecology.

Forty-five species of marine mammals and 17 species of marine reptiles have been recorded in NSW waters. The marine mammals belong to three separate mammalian orders and comprise 37 cetaceans (whales and dolphins), seven pinnipeds (seals and sea lions) and one sirenian (dugong). There are currently eight species of cetacean (five baleen whales and three toothed whales) listed on the schedules of the *Biodiversity Conservation Act 2016* (BC Act). The most frequently recorded species in the NSW Bionet Atlas of wildlife are the humpback whale, leopard seal, Australian fur seal, bottlenose dolphin and false killer whale. None of the marine wildlife species found in NSW are restricted to state waters. Most species have a wide distribution in Australian and international waters. Some are migratory.

Most marine wildlife species are highly mobile. They may cover large ranges of both coastal and oceanic waters and some undertake extensive annual migrations. This results in an overlapping responsibility between the wildlife management agencies of NSW, Victoria, Queensland and the Commonwealth for animals that range across jurisdictions.

Managing marine wildlife events requires specialist equipment and trained personnel. Marine wildlife requires specialised care. Frequently they are not readily accessible, easily transported or able to be held temporarily. Large carcasses are not disposed of easily.

There is an expectation and need for NPWS to be the lead agency in managing these events. Consequently NPWS has an ongoing commitment to providing resources and maintaining staff training and equipment, as well as responding to events.

As well as minimising human impacts and ensuring effective incident management, conserving and managing marine wildlife depends on developing and improving our understanding of species biology and ecology. Doing so helps improve management decisions and also provides the public with appropriate educational information to enhance and develop positive attitudes towards marine wildlife conservation.

This manual details the policies and procedures for all marine wildlife management planning and operations. It will be reviewed on an ongoing basis under guidance from the NPWS Marine Wildlife Response Working Group, with updates in process, policy and procedures given effect via Marine Wildlife Management Circulars issued jointly by the Directors of FIMB and CB.

About the marine wildlife management manual

1. This Marine Wildlife Management Manual ('the manual') brings together the policy and procedural information necessary for NPWS to achieve its marine wildlife management objectives. The manual provides guidelines for staff and also strengthens the organisation's ability to work cooperatively with other authorities and the community.

   This manual replaces the 2013-14 Marine Wildlife Management Manual.

2. The manual:
   - is the basis for consistently applying marine wildlife management legislation, policy and procedures across NSW
   - is an integral component of a range of measures established to ensure marine wildlife is conserved
   - outlines operational procedures to ensure marine wildlife is appropriately managed
   - ensures staff, the public and stakeholders are protected from the risks posed by marine wildlife.

3. Recognising an integrated approach to marine wildlife management is needed, the manual addresses the full spectrum of marine wildlife-related activities, including:
   - management framework: objectives, risk management, WH&S, governance and performance
   - agency policy and planning, including partnering with other organisations
   - leading or supporting actions of the Marine Estate Management Strategy
   - preparedness measures to ensure an appropriate response to marine wildlife events
   - quick guides and procedures to respond to marine wildlife events in a safe and efficient manner
   - the recovery phase of events, including debriefings and follow-up communications.
   - The manual applies as follows:
   - the policies and procedures apply to all NPWS operations relating to marine wildlife within NSW

- relevant operational procedures apply to all contractors and agents working on behalf of NPWS, and to all NPWS staff and volunteers assisting with marine wildlife management.

4. The manual is prepared with reference to relevant NSW and federal legislation:
   - Under the *National Parks and Wildlife Act 1974* (NPW Act) the Deputy Secretary of NPWS is responsible for the protection and care of all native wildlife in NSW.
   - The Biodiversity Conservation Regulation 2017 (Biodiversity Regulation) prescribes minimum approach distances to marine mammals by vessels, swimmers and aircraft.
   - Statutory responsibility for protecting and conserving marine mammals in Commonwealth waters (from 3 nautical miles (5.6 km)) and the Australian Exclusive Economic Zone (to 200 nautical miles offshore) lies with the federal Department of Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
   - NPWS has specific responsibilities for protecting and recovering threatened species listed in the schedules of the *Biodiversity Conservation Act 2016* (BC Act), including conserving and managing vulnerable or threatened populations and species.
   - The *Marine Estate Management Act 2014* (MEM Act) sets the framework for the establishment and management of marine parks in NSW. The Department of Primary Industries (Fisheries) are responsible for the day to day management of marine parks. Aquatic vegetation and fish are protected under the *Fisheries Management Act 1994* and marine mammals, birds and reptiles are protected under the BC Act.
   - NPWS must ensure the *Work Health and Safety Act 2011* (WH&S Act) is adhered to in the workplace, which includes the site of any marine wildlife event.
   - The *Prevention of Cruelty to Animals Act 1979* (PCA Act) must be adequately applied when making decisions on the fate and treatment of all animals.
   - Coastal and marine development must adhere to the *Environmental Planning and Assessment Act 1979* (EPA Act), as well as the *Coastal Management Act 2016* and *State Environmental Planning Policy (Coastal Management) 2018.* Direct and indirect impacts on marine wildlife habitat (including food stocks) need to be addressed during the environmental assessment process.
   - The *Exhibited Animals Protection Act 1986* (EAP Act) deals with holding animals, including cetaceans, in captivity. It is administered by NSW Agriculture, which is responsible for preparing and implementing guidelines for holding facilities and husbandry regimes for captive animals.
   - The *Veterinary Practice Act 2003* (VP Act) contains the responsibilities of veterinary surgeons. The Australian Veterinarian Association's policy on cetaceans guides its members in their care and treatment as well as veterinary responsibilities at strandings.
   - The *Animal Research Act 1985* covers research involving the use of animals and outlines approval of research techniques by animal ethics committees, including the OEH Animal Ethics Committee.
   - The Commonwealth *Biosecurity Act 2015* and NSW *Biosecurity Act 2015* provide for the management, control and response to biosecurity threats to plant, animal and human health at a National and State level respectively.

5. The manual is prepared with reference to relevant NPWS policies:

- *NPWS Rehabilitation of Protected Fauna Policy (July 2010)* applies to all licensed organisations and individuals that assist in rehabilitating wildlife and includes rehabilitating marine wildlife, where appropriate.
- The *Filming and Photography Policy i*n NPWS areas deals with proposals for these activities on-park and for animals off-park. The policy provides guidelines and limits the number of licences available to film cetaceans within any one season and in certain geographic areas.
- *NPWS Firearms Management Manual 2019* addresses firearms use by NPWS staff, according to the Firearms *Act 1996*, which may be applicable during marine wildlife response.
- The *Volunteer Policy and Procedures 2019* provide for clear arrangements and agreements for the implementation and operation of volunteer projects. They also make clear the key issues staff need to address to manage volunteers with NPWS.
- Read the manual in conjunction with other policies, staff circulars and procedure manuals, including park management policies, the WH&S risk-management system and hazard-specific policies and guidelines. These are referenced throughout.

6. The manual is reviewed regularly by Conservation Branch and Fire and Incident Management Branch with input from Coastal Operational branches and other subject matter experts:
   - The Marine Wildlife Response Working Group reviews and recommends policy amendments.
   - NPWS continues to seek input and advice from relevant stakeholders and the community to ensure policies and procedures benefit the community and do not compromise primary conservation outcomes.

7. This manual will be reviewed according to a schedule set annually by the Marine Wildlife Response Working Group. The reviews will embrace a continuous improvement approach, to capture improved knowledge and procedures, and to ensure the scope includes all marine wildlife related events. An issues log will be maintained on CM9 (DOC19/438217) for staff to identify issues and improvements with the Manual on a continual basis.

8. Access to the manual is as follows:
   - A control copy of the manual is kept on NPWS intranet and corporate record management system (HPE Content Manager / CM9). NPWS staff will be advised through Marine Wildlife Management Circulars when updates or changes are made.

1. Marine wildlife management framework

1.1 Marine wildlife event management objectives

9. NPWS is one of many organisations involved in managing the NSW marine estate. The Marine Estate Management Strategy 2018 - 2028 (MEMS) provides a coordinated approach to management of marine estate across relevant NSW Government agencies, local government, industry, stakeholders and communities.

10. MEMS identifies nine initiatives, each of which are supported by management actions. As part of Environment, Energy and Science (EES) within the Department of Planning, Industry and Environment, NPWS has a support role across many of the initiatives and leads Initiative 5: *Reducing impacts on threatened and protected species.* NPWS also delivers Actions 5.1-5.4, 5.6 and 5.7.

11. The overarching aim of this manual is to facilitate strategic, appropriate and effective management by NPWS of marine wildlife, primarily in relation to operational responses to marine wildlife events and mitigating human activities likely to have an effect or impact on marine wildlife. NPWS priorities are for the welfare of individual animals and to promote conservation or recovery of marine wildlife species. This is part of delivering broader objectives of improving understanding and mitigation of threats to threatened and protected species within the NSW marine estate.

12. NPWS' objectives for marine wildlife management are:

    a) to ensure consistent, appropriate, efficient and effective management of all marine wildlife events (strandings, haul outs, entrapments, disentanglements, nest management, oiled wildlife) according to all relevant NSW legislation and to:
        - ensure personnel and public safety is not compromised
        - treat all animals involved expeditiously and humanely to minimise their suffering, wherever possible
        - return to the sea or estuary as many fit and healthy stranded animals as possible and prevent, where possible, further strandings or re-strandings
        - prevent incidental damage to the environment during marine wildlife event management activities
        - manage public relations during an event, including developing and providing educational information to the community on priority issues in incident management, and veterinary and scientific activities essential for effective and humane treatment.

    b) to minimise harm and distress caused directly or indirectly to marine wildlife by human activities

    c) to improve scientific knowledge of marine species and marine wildlife events by ensuring appropriate data and samples are collected, investigations are carried out and accurate records are maintained and accessible

    d) to work effectively with other managers of coastal, estuarine and marine environments including local councils, other state government agencies (such as Department of Primary Industries (DPI) and Crown Lands) and other entities or organisations

e) to facilitate and support the involvement of key stakeholder groups (e.g. volunteer organisations, Aboriginal communities, rehabilitation and research facilities) and manage and meet community expectations through good public affairs

f) to protect important marine, estuarine and freshwater habitat and food stocks

g) to promote public awareness, knowledge, concern for and positive behavioural change towards marine wildlife and gain support for NPWS' management strategies and policies

h) to interact with other government and non-government agencies in developing, disseminating and managing information on marine wildlife as well as managing events

i) to promote the ability of NPWS officers to interact effectively with other government departments and agencies in managing marine wildlife events and sharing information about such events

j) to gather evidence for compliance actions.

1.2 Risk management

13. NPWS confronts an array of risks related to marine wildlife management. They can be divided into five major areas of responsibility.

- **People**: ensuring the health, safety and welfare of anyone involved in marine wildlife management (both NPWS staff and others), particularly in response operations for strandings and large whale disentanglement.
- **Environment and heritage**: (including animal welfare): conserving natural and cultural heritage values.
- **Community**: ensuring effective relationships with the public, stakeholders, media, local councils, NSW Government, regulatory authorities and other marine wildlife management authorities.
- **Administration and finance**: using resources cost effectively and ensuring financial accountability in its marine wildlife management activities.
- **Compliance**: ensuring marine wildlife management and response activities comply with all statutory and contractual obligations.

14. NPWS adopts a risk-management approach throughout its marine wildlife operations. Preparing this manual and related policies and plans followed this approach, which is based on the Australian Standard on Risk Management (AS/NZS ISO 31000:2018). Applying a risk-management approach to marine wildlife management is intended to minimise the potential negative impacts of marine wildlife events. This risk management approach underpins the policy approaches in this manual.

    Successful risk management requires a structured approach and needs to be considered at all levels of an organisation. NPWS has adopted an WH&S management system and has committed itself to the use of risk management throughout the organisation. All marine wildlife management activities are conducted in a manner consistent with this approach.

15. The risk NPWS faces regarding the health and safety of staff and visitors is the potential for injury (physical or psychological) or even death. Control mechanisms are used to mitigate these risks. These include planning and procedural documents which outline how to prevent, prepare for, respond to and recover from events involving marine wildlife. The procedures detailed in this manual are to be followed during decision making for marine wildlife events.

16. Risk controls relating to safety include using assessed and approved equipment, the Australasian Inter-service Incident Management System (AIIMS), preparing and complying with individual incident action plans for large-scale response operations, appropriate training and competencies for all personnel involved in marine wildlife events, and incident debriefing and counselling.

17. Individual staff members are responsible for the safety of themselves and those around them during all marine wildlife management activities. In addition to the diligence carried out during the planning and procedural stages of marine wildlife management, each staff member's own decisions must also ensure personal safety of themselves and others in all aspects of their conduct.

18. All supervisors have additional responsibilities above those of an individual. To effectively undertake a supervisory role, they must be trained and experienced in the role of a team leader.

19. Marine wildlife response operations must be undertaken in a manner that ensures the health, safety and welfare of all people:
    - staff will be appropriately trained, equipped and experienced to undertake the functions or roles required of them in marine wildlife management
    - the safety of park visitors, neighbouring communities, contractors and other marine wildlife responders involved in cooperative marine wildlife management operations will be ensured.

20. The conservation of natural and cultural values are part of the statutory objects of the NPW Act as well as the BC Act and the MEM Act. Protecting and conserving natural and cultural values, are key functions for NPWS.

21. The risk NPWS faces in relation to marine wildlife management in the context of natural and cultural heritage conservation is from the unintended consequences of response operations (e.g. heavy machinery on beaches) and the importance of marine wildlife to Aboriginal culture. Operational responses have potential to cause the loss of, or an impact on, natural or cultural heritage values. To manage this risk, NPWS engages with local Aboriginal communities about appropriate protocols and for all large-scale marine wildlife events prepares incident action plans that identify critical natural and cultural values along with strategies to minimise or avoid impacts.

22. The risk NPWS faces in relation to animal welfare is from the unintended impact of response operations on animal welfare outcomes. This may cause unnecessary suffering to an already distressed animal in a stranding, disentanglement or oiled wildlife operation. To manage this risk, NPWS engages appropriately trained veterinarians to provide expert advice on animal welfare, including recommendations on euthanasia where appropriate.

23. The risk NPWS faces in relation to the community is a loss of confidence in NPWS management objectives.

24. NPWS aims to ensure continued support for all aspects of its marine wildlife management by working collaboratively with a range of partner organisations engaged in marine estate management, seeking public and stakeholder input, by meeting regulatory requirements and by complying with NSW Government statutory requirements.

25. The risk NPWS faces in relation to administration and finance is excessive expenditure on response activities, except for oiled wildlife incidents where DPI policy applies and claims are submitted through the relevant combat agency. This issue is managed at two levels:

- marine wildlife management operations follow the procedures established in the *Finance Manual*
- at a marine wildlife event the incident controller has authority and responsibility, within delegation limits, for all aspects of managing the marine wildlife event and also has financial accountability for any expenditure associated with the marine wildlife event.

26. Placing financial accountability in the hands of the incident controllers is aimed at providing controllers with the incentive to manage their resources in a cost-effective manner.

1.3 WH&S (safety and welfare)

1.3.1 General

27. NPWS and its employees are responsible for maintaining a safe workplace and safe work practices:
    - The safety of staff including workers from other organisations, contractors and volunteers is the primary consideration during marine wildlife operations.
    - NPWS deploys its employees, and works collaboratively with participants from other organisations, in marine wildlife management activities according to their training, fitness and experience.

28. NPWS and all staff must take all practical measures to ensure the safety, health and welfare of all personnel involved in marine wildlife management activities according to the WH&S management system, hazard specific policies and guidelines and park management policies.

29. Only competent, safely equipped marine wildlife response staff may engage in marine wildlife management activities.

30. NPWS will, at all levels, meet its obligations under the WH&S legislation

31. NPWS recognises the importance of fatigue management for both response and incident management team personnel in maintaining a safe workplace.

32. NPWS will initiate critical incident support processes as soon as any critical incident is reported.

33. Safety and protecting human life is the first priority in marine wildlife operations and the primary consideration at all times, followed by protection of community and heritage assets and animal welfare. These priorities form the basis for determining marine wildlife event objectives, strategies and tactics:
    - Objectives, strategies and tactics must be adopted only after assessing their safety and risk implications.
    - The incident controller has overall responsibility for the safety of response personnel, but all officers in a supervisory capacity are responsible for those under their supervision.
    - All personnel responding to a marine wildlife event are responsible for ensuring their own safety and their actions do not place others at risk.

34. Adopt all safe work practices and standard operating procedures when planning and conducting marine wildlife responses.

35. All NPWS workplaces must implement the processes of hazard identification, risk assessment and control by following the procedures set out in the WH&S management system.

36. Report all safety incidents during marine wildlife management activities to the immediate supervisor and incident controller as outlined in the DPIE WHS Incident Reporting Flowchart (Figure 1) and the WH&S management system. This includes safety incidents involving aircraft operations.

37. The incident controller reports all safety incidents to the Area Manager and as outlined in the DPIE WHS Incident Reporting Flowchart (see Figure 1 and Figure 2); and records the incident in CAMMS. All safety incidents will be investigated and corrective actions applied as soon as possible.

38. The incident controller or senior NPWS officer reports serious injuries, fatalities and property damage immediately to the area manager, branch director and executive director of NPWS. The incident controller also notifies Fire and Incident Management Branch and Public Affairs Branch via the duty officer system as appropriate.

39. During inter-agency or out-of-area activities, report safety incidents to the incident controller and the workers employer.

40. The manager WH&S notifies Safework NSW in the case of notifiable incidents.

41. The manager of the Flight Operations Unit is responsible for reporting safety incidents involving aircraft operations to the relevant authorities and initiating an investigation as per the NPWS Aviation Safety Policy.

42. NPWS will communicate safety incident-investigation outcomes to relevant staff as a soon as practical. This includes any incidents occurring during interagency operations where NPWS is not the primary investigator.

43. Specific safety management of staff and volunteers during marine wildlife response operations is included in 4. Response.

44. Personal protective equipment is to be worn consistent with the NPWS Uniform Policy and the Personal Protective Equipment Policy.

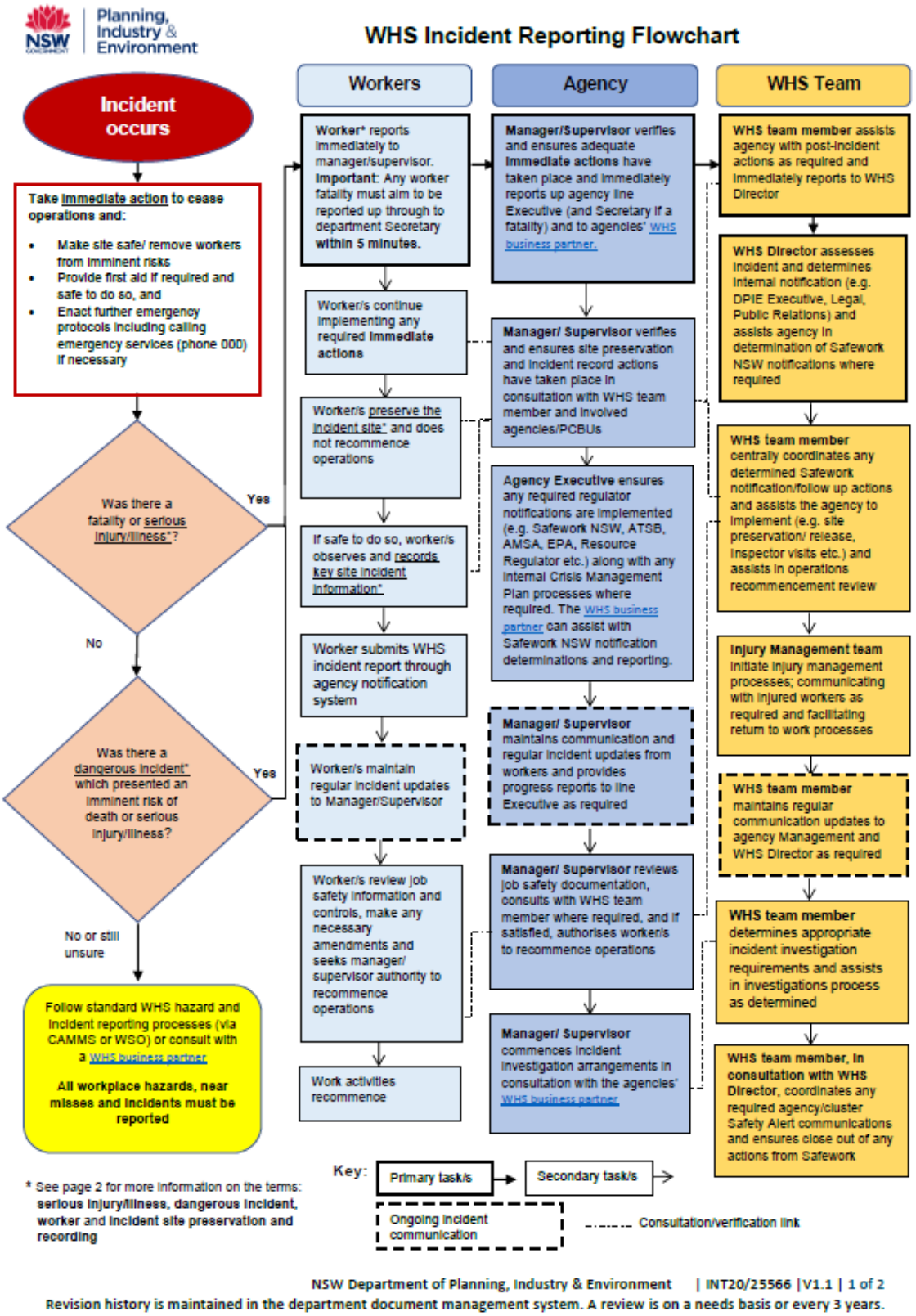


Figure 1 DPIE WHS Incident Reporting Flowchart

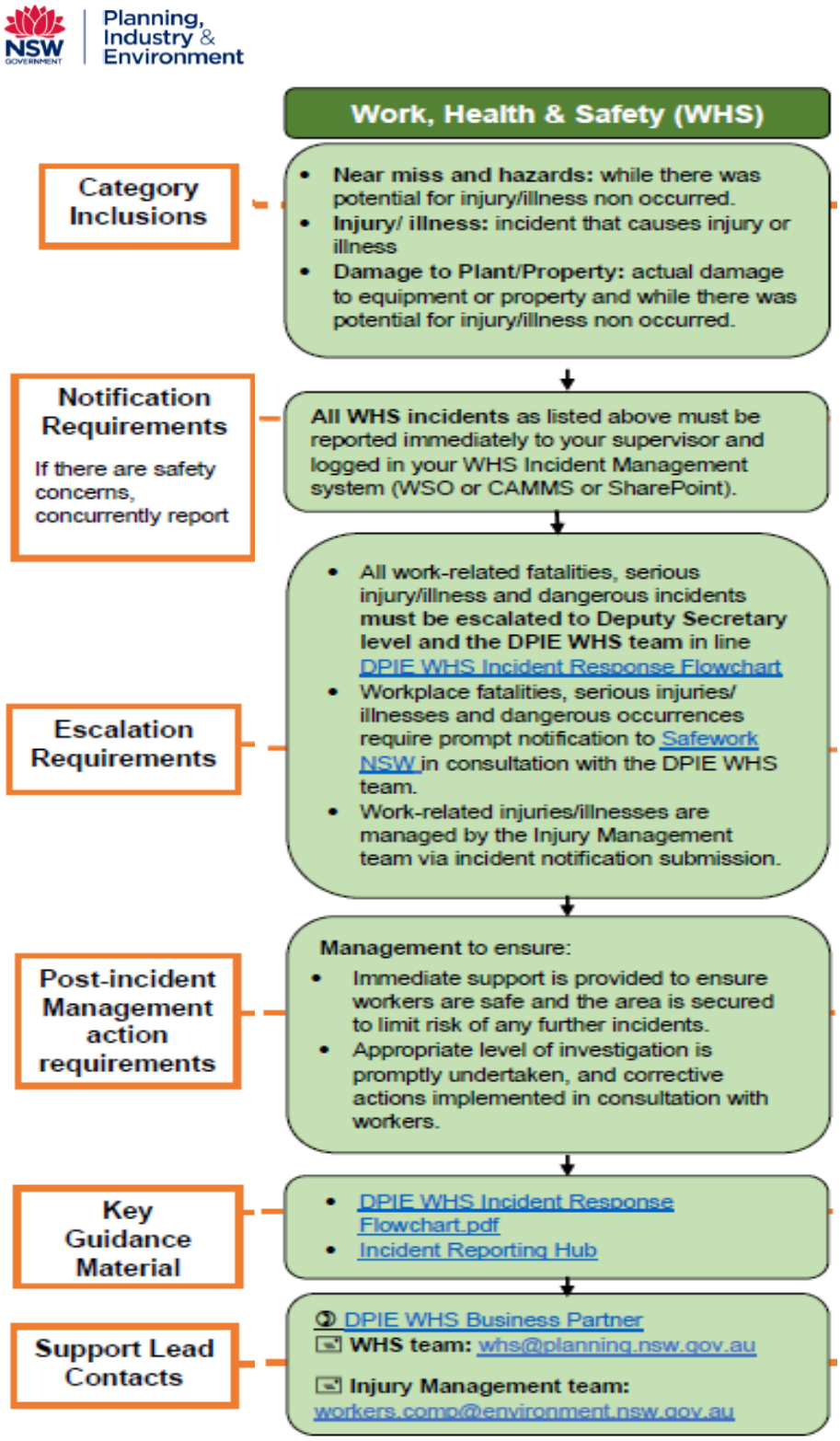


Figure 2 DPIE Incident Management – key process information

1.3.2 Marine wildlife general safety considerations

45. General marine wildlife event safety considerations:
    - do not at any time during a stranding response place animal safety above human safety
    - never initiate an action that has not been thoroughly thought through
    - never be pressured into action by weather, failing light, the media, onlookers or the urge to do something
    - all personnel involved in the response must be fit for work and have appropriate personal protective equipment, qualifications and experience
    - ensure personnel have adequate water, food and rest breaks
    - rotate any crews operating in the water, and search and aerial observers as appropriate for the conditions
    - keep lines of communication open at all times and report as specified in this manual regularly
    - all on-water operations must conform with the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 and associated 2013 Regulation, as well as Australian Maritime Safety Authority (AMSA) requirements.
    - do not launch vessels if the seas have more than a 1.5 m swell and 1 m wave height or if the wind is over 15 knots unless a risk assessment has been undertaken, including a vessel capability assessment
    - only personnel able to swim may undertake tasks requiring them to enter the water
    - regularly rotate event personnel between different tasks
    - only personnel who have had a tetanus booster within the last 10 years may handle cetaceans
    - pregnant or immune-compromised people should not enter the water with cetaceans to minimise the spread of zoonoses;
    - approach and treat all marine wildlife with caution, particularly an animal in a stressed condition as its behaviour can be unpredictable and potentially harmful
    - personnel must not put themselves between the animal's escape route and the water
    - apply the Civil Aviation Safety Authority's requirement that all aircraft be a minimum of 91.44 m (300 ft) above ground level when operating above water unless specially equipped
    - fully brief all event personnel, including volunteers, on the potential hazards and mitigation measures associated with the role they will be undertaking.

46. Staff and volunteers involved in cetacean strandings and other marine mammal incidents face the risk of physical injury from animals or the working environment (rough seas, slippery rocks, hypothermia). They must take sensible precautions at all times to prevent injury, always wear appropriate footwear during event responses and, where appropriate, use self-inflating life vests when working near water. Staff must never assist with a stranding response barefoot. This is not only unsafe, it is contrary to the NPWS uniform policy and presents an unprofessional image of staff to any public or media present at strandings.

1.3.3 Marine wildlife biological safety considerations

47. Make wildlife rescuers, researchers, onlookers and others aware that marine mammals can transmit infectious agents to people. This includes contact and airborne transmission.

48. Marine wildlife harbour a variety of bacteria, fungi and viruses, including organisms that can cause diseases in humans (zoonoses), although examples of transmission of disease from live marine mammals or carcasses are rare. When dealing with marine wildlife, ensure handlers are aware of these risks and take measures to reduce the likelihood of infection. Table 1 is a list of known zoonoses from marine wildlife worldwide and recommended preventative measures.

49. A hygiene protocol and basic principles for cleaning and disinfection are included in Appendix 1 hygiene protocol for handling marine wildlife. The risk of disease is low for healthy people free of disease conditions who are not taking medications that lower resistance to infection. Take these precautions to further reduce the risk:
    - wear latex or nitrile gloves when handling animals, carcasses, tissues or fluids
    - wear appropriate footwear at all times during an event response to minimise the risk of zoonoses, cuts and abrasions or slipping and falling when working on wet, slippery surfaces
    - wear waterproof outerwear or disposable overalls to protect clothing from contamination
    - cover surface wounds with protective dressings before handling animals
    - wash exposed skin and clothing after handling animals, before eating or drinking and at the end of an operation
    - seek medical attention for any bites, cuts or other injuries
    - wash hands routinely, using soap or sanitiser where available
    - pregnant or immune-compromised people must not handle cetaceans
    - immediately report any illness that develops, following exposure to cetaceans, to your supervisor and a medical doctor (tell them you have recently handled or worked in close proximity to marine wildlife so the possibility of zoonoses is not overlooked). Safety and Business Performance must be alerted to ensure any notifiable incidents are reported to the WHS regulator.
    - follow NSW Health's hand hygiene procedures.

50. The risk of disease is low for healthy people who are free of disease conditions and do not take medications that lower their resistance to infection. Wildlife Health Australia regularly issues fact sheets on wildlife disease risks. Relevant sheets for marine wildlife include:
    - Australian seals and influenza viruses
    - Australian marine mammals and biotoxins
    - Australian marine mammals and brucella
    - Australian seals and leptospirosis
    - Australian seals and morbiliviruses
    - Australian marine mammals and pollutants
    - Australian seals and tuberculosis
    - Cetacean morbilliviruses in Australian whales and dolphins
    - Australian marine mammals and zoonoses.

1.3.4 Safety in coastal environments

51. Personnel (both staff and volunteers) involved in marine wildlife events face the risk of physical injury from animals or from the working environment (rough seas, slippery rocks, hypothermia). They must always take sensible precautions to prevent injury, and wear appropriate personal protective equipment at all times during an event response, including appropriate personal floatation device when working near or in water. Further information is provided in 4. Response.

1.3.5 Transporting marine wildlife

52. Stranded marine animals can be difficult to transport and may be hazardous due to their size, location and the possibility of infection.

53. NSW legislation requires infectious materials to be safely transported. There are infection risks to people travelling in the rescue vehicle and also to any onlookers from biological material in fluids or vaporised in the air. As most NPWS officers are not able to determine if a material is infectious, they need to take precautions for all animals and samples transported by road. While no legislation covers maritime transport, exercise due care to minimise the risks of infection during all stages of transport by vessel.

Table 1 Common zoonoses involving marine wildlife.

Common zoonoses involving marine wildlife.

Disease and causative organism	Animals involved in transmission	Method of transfer	Animal signs	Human symptoms	Possible method to reduce risk	Diagnosis and treatment
Erysipelod *Erysipelothrix rhusiopathae* Bacteria	Marine mammals, dolphins, whales, seals, fish, malleefowl, tawny frog-mouth, emu	Skin contact with infected animals or via mouth, ticks and mites	Fever, exhaustion, inflammation of eyelids, vomiting, joint pain	Enlarged red or purple skin eruptions, local joint pain, septicaemia, fever, headache	Avoid skin contact with infected animals or carcass, disinfect equipment and cages, wash hands after contact	Antibiotics
Myobacteriosis /Myocardis *Mycobacterium bovis, M. avium, M. marinum, M. pinnipedii* Bacteria	Marine mammals, marsupials, fish, reptiles, birds	Aerosol or skin contact with infected animal or carcass, abrasions when swimming, faecal exposure	Cyst, abscesses, ulcer, weight loss, coughing, loss of appetite	Cough, chest pain, chills, fever, fatigue, ulcers, abscesses on hands and fingers	Strict personal hygiene, avoid skin contact with infected animal or carcass, disinfect equipment and cages, wash hands after contact, use of disposable face masks recommended for people in contact with marine mammals	Blood test, skin test, oral drugs. Antibiotics (Rifampicin, Ethambutol, Streptomycin)
Brucellosis *Brucella abortis*	Seals	Secretion from wounds, urine and other body fluids into open wounds and grazes on skin	Animals do not normally show signs (abortion)	Fever, weakness, sweats, muscle and joint aches and pains (flu-like)	Strict personal hygiene, avoid skin contact with infected animal or excretions, wear protective clothing, wash hands after contact	Antibiotics (Doxycyclin, Streptomycin)

54. A carcass is classified as a dangerous good if the animal has been injected with the euthanasing drug pentabarbitone.

55. If the animal has been injected with pentabarbitone:

- Carry the safety data sheet (Appendix 8) in an obvious place inside the vehicle.
- Mark the animal to signify it is potentially dangerous to others (this could be with appropriate flagging tape or by writing ‘biohazard’ on something attached to the animal).
- Ensure disposal is at an appropriate pre-arranged site and the recipient landowner understands the risks associated with a dead marine animal.

1.4 Governance

56. Policy is produced at several levels within the agency. This section of the manual outlines the relationships between the different working groups and structures within NPWS and the role they play in this process.

57. Organised working groups with defined terms of reference are critical to the process of decision making and marine wildlife policy development. The Marine Wildlife Response Working Group is part of the NPWS governance framework for operational responses including as it relates to delivery of MEMS initiatives and actions.

58. NPWS continues to engage staff from a wide range of technical backgrounds and geographic locations in formulating marine wildlife policy.

59. Reviewing policies and procedures is an ongoing process to ensure marine wildlife management practice is consistent with legislation, MEMS and other NPWS policies:
    - NPWS reports on marine wildlife management performance annually and makes recommendations on the currency of policies and procedures within the manual.
    - Conservation Branch and the Fire and Incident Management Branch share responsibility the coordination, preparation and review of marine wildlife management policies and procedures in consultation with NPWS operational and programs branches and other agencies.
    - NPWS operations branches compile and review marine wildlife debriefing recommendations and comments from staff at the strategic level and consider them for inclusion in the manual.
    - The Working Group provides comment on the manual.
    - Updates to the manual relating to changes of policy are made periodically with input from the Working Group. Changes may also be made on an as needs basis in response to other circumstances, such as coronial findings or changes to legislation or veterinary codes of practice.
    - The NPWS executive consider (and, where appropriate, endorse) any recommendations for changes to marine wildlife management policy and procedures.

60. Interim marine wildlife management policies developed between reviews of the manual may be established through NPWS marine wildlife management circulars. Any circulars issued will remain current until the manual is reviewed, with circulars incorporated into the manual as policy.

1.5 Measuring performance

61. There are no standard key performance indicators (KPIs) for assessing marine wildlife management performance. Developing performance measures will rely on best practice research and technology from within Australia and overseas to establish benchmarks.

62. Interim KPIs to quantitatively and qualitatively assess the degree to which NPWS marine wildlife management objectives have been achieved are:

Key performance indicator	Indicator values
Annual preparedness days undertaken consistent with this manual	Disentanglement team preparedness days conducted by each team each year
Appropriate response initiated within two hours of receiving reports of stranded marine wildlife, entangled marine wildlife or oiled marine wildlife	IMT/duty officer logs confirm response within two hours
Annual report detailing cetacean events involving a NPWS response provided to the Commonwealth Government for the International Whaling Commission	Report provided to meet Commonwealth timelines

2. Policy and planning

2.1 Marine wildlife conservation policy

2.1.1 Overview

63. NPWS has statutory responsibility for protecting, conserving and managing native wildlife, both on and off park in NSW, under the NPW Act and the BC Act. This includes all marine mammals, reptiles and birds in NSW. NSW includes Coastal Waters which is the waters to 3 nautical miles (5.6 km) offshore. Wildlife includes marine mammals such as cetaceans (whales, dolphins and porpoises), pinnipeds (seals and sea lions) and marine reptiles (turtles, sea snakes and sea kraits) that inhabit marine, estuarine and riverine habitats.

64. NPWS has specific responsibilities for protecting and recovering marine wildlife. This includes being having functional responsibility for marine wildlife in NSW and includes NPWS' support role to NSW Department of Primary Industries who are the combat agency for oiled wildlife incidents in NSW.

65. Under the Commonwealth EPBC Act, all cetaceans, pinnipeds and marine reptiles are protected in Australia. Commonwealth waters extend from 3 nm to 200 nm offshore.

66. Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments is listed as a key threatening process on Schedule 1 of the BC Act. Anthropogenic debris in marine and estuarine environments (usually known as marine debris) is defined in the Scientific Committee determination as pollution by human-generated objects. Marine debris mostly consists of fishing gear, packaging materials, convenience items and raw plastics.

67. Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris is listed as a key threatening process under the EPBC Act.

68. NPWS ensures people comply with minimum approach distances outlined in the BC Regulations, wherever possible and endeavours to provide appropriate educational information to the public on the regulations and guidelines for activity around cetaceans.

2.1.2 Cetaceans

69. Together with other NSW government agencies, NPWS endeavours to conserve viable populations of cetaceans known to occur in NSW throughout their range by:
    - treating seriously any breach of the BC Act
    - minimising or eliminating the impact of various human activities including coastal development, fishery practices, ecotourism, exploration, mining, defence activities, pollution and other threats and potential disturbances on cetacean populations, habitat and general behaviour
    - efficiently and effectively managing marine wildlife events with an interest in returning as many fit and healthy stranded animals to sea as possible
    - collecting scientific information, including samples and specimens, that will improve scientific knowledge on species biology and ecology and stranding phenomena

- liaising with other state, Commonwealth and international government wildlife agencies, scientific experts and other key stakeholders on the conservation status of cetaceans and on effective management techniques
- identifying and managing areas of special interest for conserving and managing cetaceans
- regularly reviewing the status of cetaceans in NSW, including the number of individuals taken accidentally during fisheries activities
- collecting and storing accurate and detailed records of marine wildlife events and sightings, and establishing information sharing strategies with other organisations and agencies holding similar information
- encouraging sound, ethical, coordinated and humane research and inventory programs likely to contribute to our understanding of cetaceans and requirements for their conservation and management
- fostering greater community understanding of cetaceans and their conservation.

70. Conservation and management of marine wildlife by NPWS focuses on five critical areas:
    - human impacts
    - incident management
    - special-interest areas
    - scientific knowledge
    - community education.

71. NPWS will investigate all attempts of harm to marine wildlife or possession of specimens and will continue to call for public assistance in these matters to secure the necessary evidence to pursue a breach of the BC Act.

72. NPWS will, wherever possible, monitor human activities that might potentially impact cetaceans.

73. NPWS encourages and supports, wherever possible, government and non-government initiatives to protect cetaceans and their habitats from the potential impact of anthropogenic debris.

74. NPWS is responsible for managing ecotourism activities − such as whale- and dolphin-watching − that may impact on cetacean conservation or breach the BC Act.

75. Land-based observation is NPWS' preferred approach to whale and dolphin watching in NSW as it has the least impact on the animals and often provides a better viewing platform.

76. NPWS does not advocate using private property, including Aboriginal lands, for whale- and dolphin-watching, unless the owner's permission has been granted.

77. Where land-based observations occur on NPWS estate, NPWS will:
    - manage the negative impacts on coastal land formation and vegetation
    - provide appropriate public advice and interpretation.

78. NPWS recognises the need for more research to evaluate the nature and degree of the impacts of vessels, aircraft and in-water observation activities on different species in different habitats over time. It will review the current regulations as required.

79. NPWS does not support commercial activities that include swimming, snorkelling or diving with cetaceans in the wild and will not license such activities without baseline

data on relevant cetacean populations and an established ongoing program to monitor the impacts.

80. The BC Reg prohibits the feeding of marine wildlife (this includes throwing food or rubbish in water near marine wildlife). Feeding wildlife in nature negatively impacts on both wildlife and people.

81. NPWS is committed to working collaboratively with DPI and other organisations to identify, monitor, reduce and, where possible, eliminate the incidental take of cetaceans in all fisheries activities in NSW waters. These include, but are not limited to, trapping, drop- and long-lining, shark netting and aquaculture.

82. NPWS will liaise with DPI as required to identify and implement methods to mitigate incidental cetacean capture and monitor the effectiveness of the methods used.

83. Although priority is given to human safety and animal welfare considerations, NPWS attempts, wherever possible, to minimise damage to fisheries gear that has become involved in an event. NPWS will liaise with DPI and industry representatives to ensure all parties are aware neither NPWS, nor any officer of NPWS, nor any person or organisation assisting NPWS, are liable for any compensation claims for any damage or loss of equipment that occurs as a result of a disentanglement attempt.

84. NPWS will work with DPI to prevent or minimise the impacts of aquaculture and fishing activity on cetacean habitat and food stocks.

85. Section 2.7 of the BC Act restricts issuing any licences to authorise a person to harm or obtain cetaceans for exhibition or other purposes. Any such permit will preclude the public display of the animal.

86. Permits to capture and hold cetaceans for rehabilitation are only granted to approved institutions where resources and appropriate facilities that meet standards set under the EAP Act are available.

87. Where a facility holds an appropriate licence from NPWS for rescuing and rehabilitating cetaceans and takes a cetacean into care for rehabilitation, the NPWS Rehabilitation of Protected Fauna Policy 2010 applies.

88. NPWS considers, on its merits, any application from a zoo or fauna park licensed under the EAP Act to retain in captivity any animal which has been rescued and rehabilitated, yet is considered unsuitable for release.

2.1.3 Seals

89. The environment protection provisions established under the *Antarctic Treaty System* and the *Convention for the Conservation of Antarctic Marine Living Resources* apply to Australia, which is a signatory nation of these treaties. In 1994, the Scientific Committee on Antarctic Research (SCAR) passed a recommendation discouraging the practice of reintroducing rehabilitated seals of Antarctic or subantarctic origin back into the wild to prevent potential disease or pathogen transmission from rehabilitated seals to wild seals and possibly to other Antarctic wildlife.

90. In NSW, releasing rehabilitated Antarctic or subantarctic seals back into the wild is prohibited. Examples are leopard seals, subantarctic fur seals, southern elephant seals, crabeater seals and Weddell seals. Such seals captured in NSW must either be euthanased or taken into permanent care in an approved care facility. Even precautionary decisions to capture seals of Antarctic or subantarctic origin must, therefore, consider the availability of long-term housing for the animal. They should be

made only where the welfare of the animal and/or the safety of the public overwhelmingly warrant such action.

2.1.4 Marine reptiles

91. All marine reptiles are protected under the BC Act.

92. Marine reptiles (sea snakes and turtles) sometimes require rescue, care, rehabilitation and release. NPWS issues licences for rehabilitating marine reptiles to organisations or carer groups that can demonstrate they have the appropriate facilities and expertise and care prescribed in a code of practice.

2.2 Legislation and compliance

2.2.5 General

93. All marine mammals are protected fauna in NSW. Section 2.1 of the BC Act prohibits unauthorised people from harming protected animals.

94. Marine mammals are also subject to the special provisions of Section 2.7 of the BC Act. This section prohibits unauthorised people from interfering with marine mammals or approaching them closer than the distances prescribed in the regulations. The definition of 'interfering with' includes harass, chase, herd, tag, mark and brand.

95. Further information is contained in Division 2.1 of the Biodiversity Conservation Regulation 2017 which includes approaching marine mammals.

2.2.6 Approach distances

96. While the prohibition on interfering with marine mammals applies to all species, the current minimum approach distances, as set out in Biodiversity Conservation Regulation 2017, apply to whales, dolphins and seals. The regulation does not apply to sick, injured or stranded animals.

97. There are special provisions in the legislation that apply conditions on vessels approaching marine wildlife. The prescribed minimum approach distances in accordance with section 2.7 of the BC Act and Division 2.1 of the BC Reg are:

- 300 m if the person is approaching a whale, dolphin or dugong and is on, or using, a prohibited vessel. If being approached by a whale, dolphin or dugong must move away at a constant slow speed so that the vessel maintains a distance of a least 300m (clause 2.4 BC Reg)
- 100 m if the person is approaching a whale and is on, or using, a vessel other than a prohibited vessel (additional restrictions apply within the 300m caution zone)
- 50 m if the person is approaching a dolphin or dugong and is on, or using, a vessel other than a prohibited vessel (additional restrictions apply within the 150m caution zone)
- 30 m if the person is approaching a whale, dolphin or dugong and is swimming. If the animal comes within 30 m, the person must move slowly to avoid startling it and must not touch it or move towards it.
- A person must not enter water within 100m of a whale or within 50 m of a dolphin or dugong

- a height lower than 100 m within a horizontal radius of 100 m if the person is operating a remotely piloted aircraft
- a height lower than 300 m within a horizontal radius of 300 m if the person is operating an aircraft (other than a helicopter, gyrocopter or remotely piloted aircraft)
- a height lower than 500 m within a horizontal radius of 500 m if the person is operating a helicopter or gyrocopter
- if it is for the purpose of observing a marine mammal, aircraft must not approach a marine mammal from head on, must not hover over a marine mammal and must not land on water
- 10 m if the person is approaching a seal or sea lion (other than a pup) that is in the water and the person is in, or on, a vessel
- 10 m if the person is approaching a seal or sea lion (other than a pup) that is in the water and the person is in, or on, a vessel or is swimming or is a pedestrian
- 40 m if the person is approaching a seal or sea lion (other than a pup) that is hauled out on land and the person is swimming, operating a vessel or vehicle or is a pedestrian
- 80 m if the person is approaching a pup.

98. There are additional approach restrictions for any whale, dolphin or dugong that is predominantly white in colour and is approached by a person operating a vessel or an aircraft. Must not be within or at:
    - 500 m if the person is operating a vessel
    - a height lower than 610 m within a horizontal radius of 610 m if the person is operating an aircraft (other than a remotely piloted aircraft)
    - a height lower than 100 m within a horizontal radius of 100 m if the person is operating a remotely piloted aircraft

99. A special protection approach distance for a marine mammal may be declared as necessary, including for a marine mammal that is:
    - a dugong or other rarely sighted species of marine mammal
    - a morphological or colour-variant marine mammal
    - a female marine mammal that has recently given, or is about to give, birth, or
    - a calf separated from a mother or group of marine mammals
    - a sick or injured marine mammal
    - at risk of harassment, injury or death.

100. Within caution zones, vessels (that are not a prohibited vessel) must
    - Operate the vessel at a constant slow speed and minimise noise
    - Ensure the vessel does not drift closer than prescribed distances
    - Ensure there is no more than three vessels within the caution zone (must not enter the caution zone if there are more than 2 vessels in the caution zone)
    - Immediately withdraw from the caution zone at a constant slow speed if the animal shows signs of being disturbed (signs include regular changes in direction or speed of swimming, hasty dives, changes in breathing patterns, changes in acoustic behaviour or aggressive behaviour such as tail slashing or trumpet blows)
    - Be greater than 30 degrees from the observed direction of travel
    - Ensure the whale, dolphin or dugong is not pursued
    - Remain outside the caution zone if one or more animals is a calf.

- If a calf enters the caution zone must immediately stop the vessel **and** turn off engines or disengage gears or withdraw at a constant slow speed.
- If a whale approaches closer than 100m, the person operating the vessel must disengage the vessel's gears and let the whale approach or reduce the speed of the vessel and continue on a course away from the whale
- If a dolphin or dugong (other than a calf) approaches the vessel or comes closer than 50m the vessel must not suddenly change the course or the speed of the vessel.

101. A person who approaches a marine mammal any closer than the distances prescribed above is guilty of an offence under s.2.7 of the BC Act. The BC Reg provides for penalty notices to be issued ($6,600 by a corporation or $1,320 for an individual). The BC Reg also identifies a maximum penalty as a Tier 2 monetary penalty ($660,000 for corporations or $132,000 for individuals.) as well as a further daily penalty for each day the offence continues and further penalty for each animal the offence relates to. .

102. The minimum approach distances apply in NSW waters up to 3 nautical miles (5.6 km) offshore (see Figure 3). Beyond this, in the waters of the Australian Exclusive Economic Zone (up to 200 nautical miles offshore), Commonwealth legislation applies. The approach distances are the same under Commonwealth legislation.

2.2.7 Powers to stop people approaching marine wildlife

103. Under s.11.31 (1) of the BC Act, an NPWS officer may direct a person to stop any activity that is causing, or is likely to cause, distress to protected animals. All marine wildlife are 'protected animals' for the purposes of the BC Act.

104. A direction given under s.11.31 (1) has effect for the period specified by the officer at the time the direction is given (maximum 28 days; s.11.33 (2b). Section 11.36 makes it an offence to fail to comply with a direction given under s.11.31 (1).

105. In circumstances where a person approaching a stranded marine animal is causing or is likely to cause distress to the animal, an NPWS officer may give an s.11.31 (1) direction to that person to stop approaching the animal.

106. Authorised officers may also establish a safety cordon around the animal, with the assistance of the police. This is to prevent potential harm to both the animal and any members of the public coming into contact with an animal. When an animal is on public land that is not owned or controlled by NPWS, the safety cordon is established by officers from the relevant public authority that has control over the land, with the assistance of the police.

107. This approach does not rely on any power provided under the BC Act. It is also considered appropriate to involve the police who have relevant powers of arrest if an offence is being committed and also have various powers to give directions in public spaces. However, if by entering the safety cordon a person is likely to cause harm to the animal, it may be appropriate to issue a direction under s.11.31 (1) to stop the person.

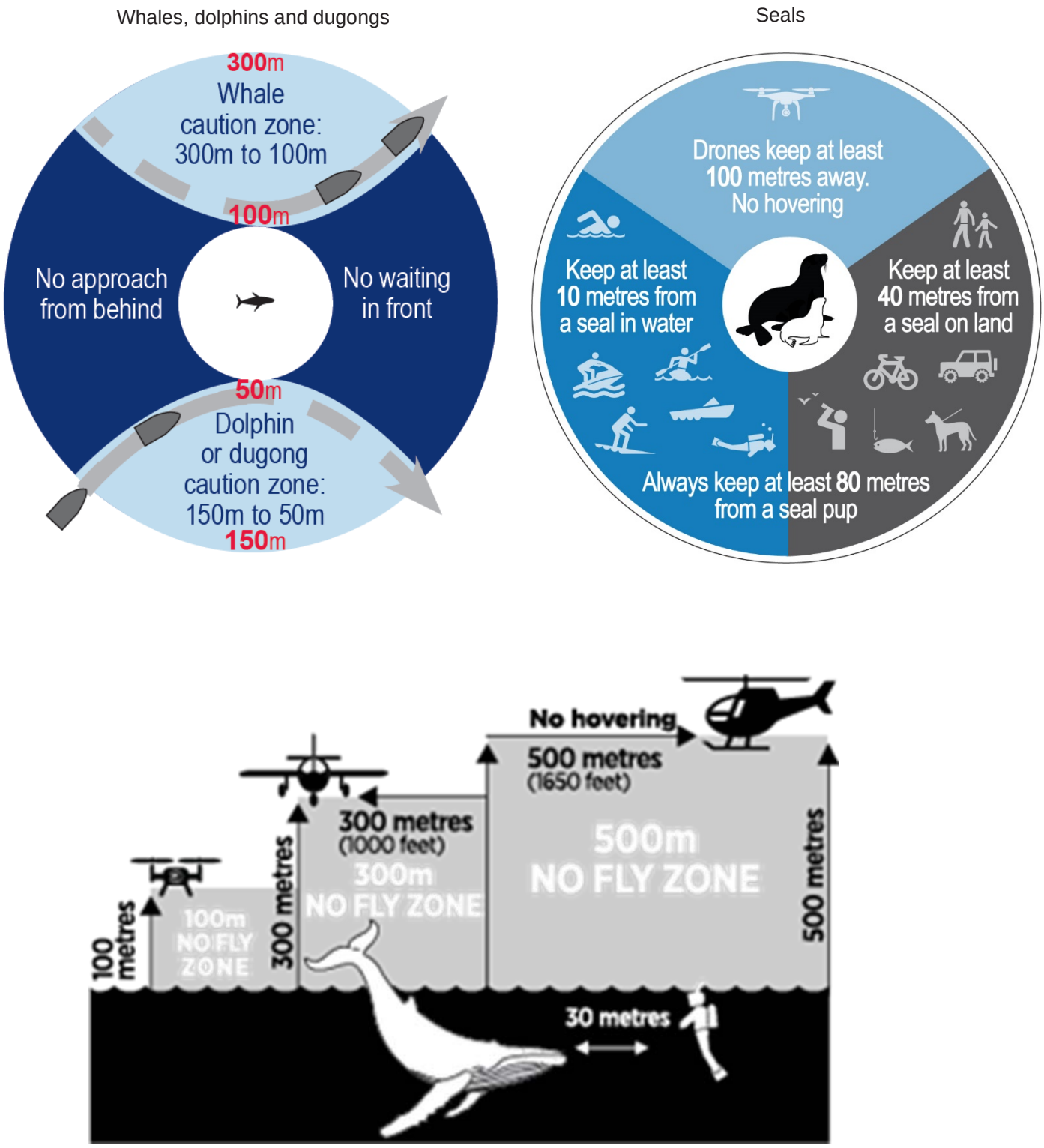


Figure 3 Approach distances for marine wildlife in NSW waters.

2.2.4 Ambergris

108. Ambergris is a substance secreted in the intestine of a sperm whale and then excreted or regurgitated. It may sometimes wash up on to the beach as a solid, waxy material. It is a substance which has historically been used in the perfume and medical industries and is still valuable as a perfume fixative. Refer to whale and dolphin permits – ambergris for details.

109. The EPBC Act regulates the possession and movement of ambergris within the Commonwealth marine area, as well as its export and import. There are no other relevant offence provisions under the BC Act relating to the possession, control or trade of ambergris in NSW.

110. Legal advice regarding holding or selling ambergris in NSW is as follows:

- Sperm whales are listed as a vulnerable species under Part 3 of Schedule 1 to the BC Act.
- Under s.2.5 of the BC Act (offence of 'dealing in animals or plants makes it an offence to buy, sell or have in possession or control any plants or animals that are threatened or protected. 'Animal' is defined in s1.6 of the BC Act as 'any animal … and in any stage of biological development, but does not include humans or fish'. Therefore, whales would be included within the definition of 'animal'.
- NPWS takes the view that the offence in s.2.5 only applies to the animal itself; not to matter excreted from the animal. Therefore, that section would not regulate trading ambergris.

2.3 Research and records

2.3.1 General

111. NPWS will identify priority research areas relevant to conserving and managing cetaceans and facilitate research into these areas wherever possible.

112. NPWS assesses all applications for scientific licences to undertake research on cetaceans in NSW waters after consulting appropriate regional staff, experienced individuals and scientific experts to ensure consideration of national, statewide and regional initiatives and concerns, scientific integrity and potential impacts.

113. NPWS seeks and considers advice from the relevant authority where a research application involves a threatened species. This includes any relevant recovery plan or priority action statement recommendations.

114. The DPIE Animal Ethics Committee must consider all scientific research conducted or managed by NPWS or carried out on behalf of NPWS. This is required under the *Animal Research Act 1985*.

115. NPWS has requirements for reporting priority data by researchers it has licensed, organisations licensed to assist NPWS in cetacean event management, and other relevant government agencies. Access to data held by NPWS may be made available to individuals for research. Applicants supplying information to NPWS will retain their intellectual property rights.

116. NPWS encourages and facilitates, wherever possible, research into the potential impacts of human activities on cetaceans.

2.3.2 Marine event database - Elements

117. NPWS maintains a central record for all information on marine wildlife events and sightings throughout NSW in the Marine Wildlife module of Elements. Elements shall be maintained to make accurate and detailed information available for assessing cetacean conservation and management issues, such as determining conservation status of vulnerable species, identifying key cetacean habitats and evaluating potential threats along the NSW coast.

118. NPWS has established information exchange procedures for collating sightings, strandings and interaction data between NPWS and other government and non-government agencies and organisations. These include:

- Fishing and Aquaculture (NSW DPI)
- Marine Parks Authority
- Australian Museum
- Zoological Parks Authority
- Victorian Department of Natural Resources and the Environment
- Queensland Parks and Wildlife Service
- Queensland Department of Agriculture and Fisheries
- Commonwealth Government
- Organisation for the Rescue and Research of Cetaceans in Australia (ORRCA)
- RSPCA
- Australian Seabird Rescue
- Sea World
- Dolphin Marine Conservation Park
- SEA LIFE Sydney Aquarium
- Surf Life Saving Association
- Volunteer Coastal Patrol
- interested individuals.

119. Information exchange procedures can include direct access to the Marine Wildlife module of Elements.

120. Improving coordination for marine wildlife events across key stakeholders has been identified as an action under the Marine Estate Management Strategy. NPWS will progress this initiative from 2020 with direct Elements access to ORRCA, Dolphin Marine Conservation Park, Sea Life Sydney Aquarium and Sea World, with further direct access to be considered on a case by case basis.

121. NPWS seeks voluntary sighting records to the NSW BioNet Atlas of free-swimming marine wildlife.

2.3.3 Satellite and radio tracking transmitters

122. NPWS is investigating use of various satellite tracking options to assist in tracking and relocating marine wildlife, particularly entangled whales. Any findings will be included in future updates of the Manual or via a circular. Interim advice can be obtained from Senior Conservation Planning Officers in Operations Branches or from Conservation Branch.

123. Trackers are for use by disentanglement crews. They can attach them to entangled large cetaceans (wherever possible) if they think the current disentanglement shift may not be able to free the animal and it will need to be located at another time

2.3.4 Necropsy

124. Necropsy (post-mortem pathology, histology and morphology assessment) may help to inform marine wildlife management. It improves knowledge of the causes of death and disease, population health and life history.

Refer to 4.12 Collecting information and samples, necropsy, and record keeping.

2.4 Marine wildlife risk reduction

125. NPWS works with NSW DPI, Transport for NSW and other key stakeholders to reduce the risks to marine wildlife. This may include:

- joint initiatives to reduce cetacean interactions with fishing and shark netting equipment
- litter-reduction campaigns to reduce the prevalence of microplastics and their sources in marine ecosystems as marine wildlife ingest them
- reviews of marine environmental assessments to further reduce risk to marine wildlife from development activities.
- actions under the Marine Estate Management Strategy.

2.5 Volunteers

126. Expert organisations assist NPWS to manage marine wildlife events, including licensed wildlife care groups and individual volunteers.

127. Volunteers make a valuable contribution to managing such events. Using them can decrease the resource burden on NPWS. Consider the most appropriate use and involvement of volunteers, along with other management options.

128. Volunteers (both organisations and individuals) must act and be treated according to the guidelines in Volunteer Operational Policy and Procedures and any existing memorandum of understanding (MOU) between NPWS and an organisation. An MOU may be jointly developed with a volunteer (or other) organisation that routinely provides assistance during incidents to proactively clarify roles, responsibilities and actions.

2.6 Partner response organisations

129. NPWS partners with other organisations to respond to marine wildlife events, including:
    - other government agencies with water-based capabilities (e.g. Water Police, Maritime, DPI Fisheries, EPA and local councils
    - volunteer rescue organisations such as Marine Rescue and Surf Life Saving Australia
    - Aboriginal communities, including Local Aboriginal Land Councils and native title holders and claimants.

130. These organisations are not directly responsible for protecting marine wildlife, but they assist NPWS to effectively manage marine wildlife events and achieve their broader objectives such as public safety, conserving natural and cultural values; responsible use of, and operations within, coastal, estuarine and marine environments – for commercial, recreational and cultural purposes.

131. The operational capabilities and resources of other organisations can make a valuable contribution to marine wildlife response. Many of these organisations have an active presence on the water as part of their normal operations and may also receive or report initial wildlife events (such as whale entanglements, strandings, seals) to NPWS.

132. In some cases, partner organisations have fit for purpose vessels, well qualified and experienced crew and support staff, and complementary skillsets to NPWS personnel.

133. Partnering with other organisations enables NPWS to improve its coverage of coverage of the NSW coastline, and these organisations are able to assist in a range of events, from keeping public at a safe distance, direct assistance in animal first aid where trained and locating and tracking entangled whales.

134. Partnering with these organisations can decrease the resource burden on NPWS and maximise the utility of existing government and community resources. In partnering with other organisations, NPWS will consider the most appropriate use and involvement of those partner organisations, along with other management options.

135. NPWS is committed to effectively managing the potential health and safety risks associated with marine wildlife events. It determines the specific roles and tasks other organisations may undertake during a marine wildlife event with a view to minimising the risk of injury or sickness. This requires considering the details of the event, the species involved and levels of individual training and experience.

136. The primary functions of partner organisations and safety of personnel must not be compromised by assisting NPWS during marine wildlife events. It is the responsibility of the partner organisation to determine whether and how it is appropriate for them to assist NPWS in any particular situation. The triggers and procedure for suspending operations, including where the partner organisation must respond to its functional responsibilities, are to be included in operational briefings.

137. Under AMSA regulations, NPWS rigid inflatable boats (IRBs or RIBs) must operate with a ‘mothership’ vessel, unless using the approved exemption to operate independently within 800m of the shore. NPWS 2019 AMSA determination allows the mothership to include a vessel owned or operated by other organisations. Safety and operational inductions and briefings must occur prior to commencement of operations and NPWS safety management system must be provided to the partner organisation for inclusion in the mothership vessel Safety Management System. The requirements

are outlined in the NPWS boating policy and AMSA determinations, and operations must be consistent with requirements in those documents. This is particularly relevant to large whale disentanglement activities, however may also be relevant to other uses of IRBs.

138. Partner organisations must act and be treated according to the Marine Wildlife Management Manual and any existing memorandum of understanding (MOU) between NPWS and that organisation.

139. MOU may be jointly developed with organisations that partner with NPWS in marine wildlife response to clarify roles, responsibilities and actions. These MOUs may be established between local branches or state-wide. A state-wide MOU may make provision for differences in local arrangements to reflect different circumstances and resource capability across the state.

2.7.1 Interstate partners

140. NPWS works closely with other states to cooperatively manage responses across jurisdictions

141. As required, communication and management strategies will be developed between NSW and adjacent states to address situations where an entangled or injured animal is free swimming and enters another state jurisdiction.

3. Preparedness

3.1 Preparedness planning

142. Preparedness is essential for effectively managing marine wildlife events. It allows cooperative arrangements to help establish a coordinated marine wildlife response. It also ensures trained staff are readily available and equipment has already been deployed to areas that will facilitate a rapid response.

143. NPWS must maintain a level of preparedness for marine wildlife events sufficient to allow appropriate responses to be staged, given the nature of the event and prevailing weather and sea conditions

144. Coastal operational branches and areas must annually review and maintain their organisational competency and capacity to respond to and manage marine wildlife events.

145. Coastal operational branches and areas must:

- maintain updated incident procedures to ensure an appropriate response to any marine wildlife event
- conduct marine wildlife preparedness days as required
- undertake exercises within NPWS to test equipment, undertake an annual physical check of personal protection equipment and review all parts of detection and response (in some circumstances this will be done in conjunction with other government agencies such as Water Police, Maritime, DPI (including Marine Parks) as well as local councils, volunteer organisations such as Marine Rescue, ORRCA and other key stakeholders such as Aboriginal communities)
- maintain all communications systems in branch.

During periods of anticipated high marine wildlife activity (as determined by NPWS branches, e.g. whale migration), a duty officer system may be activated to coordinate the response to a marine wildlife event. Once notified of such an event, the internal notification pathway illustrated in Figure 4 applies to ensure all appropriate staff are informed.

146. Base preparedness activities for disentanglement and stranding teams are:

Disentanglement teams	
Mandatory annual preparedness days to cover key competencies: • fitness and swimming (ex-SLSA standard of 200 m in six minutes, once a year, noting the SLSA standard has changed) • operate IRB • simulated entanglement exercise • person-overboard exercise • cut-free exercise • operate pole cam • sea safety and survival refresher • review any relevant changes to legislation, policies and procedures • debriefing.	All teams
Stranding teams	
Preparedness days involving NPWS staff and other local organisations (including relevant NGOs, government agencies and local vets) with a desktop or simulated stranding exercise. Frequency and scale to be determined by the NPWS branch.	All staff who may be involved in response or in support roles

3.2 Communications equipment

3.2.1 Background

147. Using communications equipment is essential to marine wildlife operations. Control and coordination relies on the timely flow of information between all personnel and between those in the field and the control centre. Effective communication is essential to the safety of personnel during all marine wildlife operations.

148. Communications systems include radio networks, telephone equipment, computer networks and mobile telephone systems.

149. NPWS operates very-high-frequency system (VHF) in eastern NSW that may be augmented with portable repeaters during incidents.

150. Information and operating procedures for the NPWS mid-band VHF network are contained in the VHF radio operations guide.

151. UHF CB radios (including marine radios) are used by some NPWS areas. Use these only for short-range tactical communications. The NPWS VHF system is the primary communications system for command and strategic purposes during marine wildlife operations. The NPWS radio profile has simplex radio frequencies that can be used for line of sight secure communications, Channels 31-37. Using UHF radios in NSW is regulated by the Australian Communications and Media Authority (ACMA) and

covered under the Radiocommunications (Citizen Band Radio Stations) Class Licence 2002. UHF CB radios must comply with the standard Specification for UHF Radio Equipment Employed in the Citizen Band Radio Communication Service (Postal and Telecommunications Department 1978).

3.2.2 Communications equipment policies

152. NPWS maintains effective radio communication systems to facilitate efficient and safe marine wildlife operations. Each branch will:
    - maintain communications equipment required for implementing efficient and safe marine wildlife operations
    - maintain incident-management facilities equipped with the communications technology required for implementing efficient and safe marine wildlife operations.

153. Each branch will periodically assess the effectiveness of mobile telephone coverage across coastal areas and consider options for effective communication during marine wildlife operations.

154. Each branch will supply designated command vehicles and communications units with mobile phones to ensure effective communication during marine wildlife operations.

3.3 Weather and tide information

155. Meteorological information is used to plan and implement marine wildlife response operations. Up-to-date weather and tide information and forecasts are essential for developing and implementing response strategies.

156. The Bureau of Meteorology (BOM) is the main provider of meteorological information. Most weather information is available on the internet, either on publicly accessible sites or through subscription services. The most pertinent to marine wildlife operations can be accessed through a BOM-registered users web page provided for NPWS.

157. Access weather information as follows:
    - each branch, and area office will maintain access to BOM weather data
    - Fire and Incident Management Branch will conduct annual negotiations with BOM on the services and information available on the internet through the BOM-registered users web page
    - access to internet and weather services will be established as soon as an incident control centre is established
    - branches will implement appropriate on-site weather monitoring equipment where deemed necessary.

158. Incident control centres and assembly areas will display weather forecasts and update them on a regular basis.

3.4 Equipment standards

159. Coastal branches maintain a list of marine wildlife response equipment and its location for each branch. Standard equipment lists for strandings and disentanglement teams are included at Appendix 3 Recommended standard equipment lists.

160. Each coastal branch should establish a central coordination point for tracking and monitoring of equipment. This role may be assigned to a relevant position in the branch such as the Senior Conservation Planning Officer or Administrative / Support Officer; or delegated to an appropriate position within each Area such as Ranger, Senior Field Supervisor, Senior / Field Officer or Administrative Officer. The designated coordination point/s should be communicated to relevant staff e.g. at annual branch Preparation Days.

3.4.1 Disentanglement equipment for cetaceans

161. Equipment development and experimentation is a continuous process as all entanglement incidents present new challenges. Consequently there is an ongoing process of refining specialist equipment to deal with a broad spectrum of entanglements.

162. The response team ensures the following equipment is available, able to be safely stored on board the response vessel and ready for deployment:
- grapple hook with biodegradable manila trace
- working line with loops/snap hooks at regular intervals
- small end-of-line buoy
- appropriate knives
- cutting instrument on poles
- underwater pole cam, periscope or sea-view scope.

163. One full set of this equipment will be maintained at each strategic location along the coast where branch officers may need to respond to an entanglement and where staff trained in disentanglement techniques are available.

164. The grapple hook with biodegradable manila trace is connected to a 10m throwing line, which is then connected to the available snap hook of the main line. The working line should be spooled so that it feeds out in three sections: an initial 10m line, followed by 2 x 30m sections, all pre-connected and identifiable by pink flagging tape.

165. The end of line buoy must be readily accessible for attachment to the end of the working line before it is deployed. The float clearly identifies the line's end.

166. Make sure the support vessel has several large buoys and a dedicated inflation device attached to a standard scuba tank. Inflate the buoys so they are ready to deploy and hand them over to the response vessel as needed.

167. When acquiring new equipment for branch use, acquisition and use information is to be shared among all, branches and interstate experts to keep up-to-date with current best practice.

3.4.2 Disentanglement equipment for seals

168. Ensure the response team has the following equipment available and ready for deployment:
- disentanglement knives capable of being fitted to long or short poles, or diving knives
- seal-capable capture net
- chemical restraint (if required, veterinary support is essential)
- herding boards.

3.4.3 Disentanglement vessels

169. When dealing with large whale entanglements, at least two vessels are required to facilitate a safe rescue operation:
    - the response vessel – a small inflatable vessel. This is the main operational platform for carrying out the assessment, monitoring activities and disentanglement attempt (use two response vessels where available)
    - the support vessel – a larger vessel. This carries necessary personnel and equipment (including first aid) and maintains a multiple communications-support system.

170. Carry only disentanglement staff and essential equipment on the response vessel. The support vessel can carry additional equipment and personnel.

171. Depending on the situation, a helmsman skippers the response vessel, with one specialist crew member at the bow and another to ensure trailing lines are clear of the engine leg as well as assist the crew at the bow.

172. Keep the response vessel clear and free of loose objects and any other materials or equipment which could interfere with safely deploying running lines during the rescue phase.

173. The support vessel must comply with NSW legislation for commercial vessels. It must also carry human first-aid and resuscitation equipment, along with qualified staff who can deal with possible emergencies.

174. There must always be effective communication between the support and response vessels.

175. The support vessel remains in the vicinity of the event and is available to provide assistance, supply additional equipment and rotate personnel with the response crew when needed.

3.5 Training standards

176. NPWS recognises the value of integrated training with key stakeholders and will encourage and facilitate such opportunities wherever it is possible to do so.

177. Each coastal branch should establish a central coordination point for tracking and monitoring of training. This role may be assigned to a relevant position in the branch such as the Senior Conservation Planning Officer or Administrative / Support Officer; or delegated to an appropriate position within each Area. The designated coordination point/s should be communicated to relevant staff e.g. at annual branch Preparation Days.

3.5.1 Stranding and haul-out training

178. Key staff are trained in stranding and haul-out techniques including identifying, rescuing and rehabilitating cetaceans, seals and marine reptiles, as well as how to use specialised equipment.

179. *This paragraph has been left intentionally blank*

180. The following skills and competency requirements apply:

Skill/competency	Target staff	Renewal requirements
Marine mammal rescue and rehabilitation course as applicable (i.e. ORRCA Marine Mammal Rehabilitation Training or equivalent course)	All personnel who may be involved in marine mammal strandings and haul-outs	Attendance at annual preparedness days
Turtle nesting awareness	Recommended for all personnel who may be involved in turtle nest management	Recommended every two years – subject to availability
Incident management – Introduction to AIIMS 1-hour online course - free on MyCareer	Recommended for all staff involved, where possible	–
Incident management – AIIMs Principles 2-day NPWS course or equivalent	Staff likely to be involved on an IMT	Attendance at annual preparedness days
Senior first aid	All personnel who may be involved	Every three years
Preparedness days with content that applies to rescue of cetaceans, seals and marine reptiles and carcass disposal	All personnel who may be involved	Annually

3.5.2 Disentanglement training

181. Response teams are trained in large whale disentanglement techniques and how to use specialised equipment.

182. As a minimum, team leaders must have completed the nationally accredited large whale disentanglement training. Additional staff will be trained as resources allow.

183. All team members need to take part in preparedness sessions at least once each year, preferably before the whale migration season.

184. Team leaders or staff with identified skills and experience who have attended the national large whale disentanglement training course may lead internal training and annual preparedness days.

185. The following skills and competency requirements apply:

Skill/competency	Target staff	Renewal requirements
Statement of attainment in large whale disentanglement (national accreditation ACMSS00021 – Large	Team leaders Other team members as resources allow	No formal requirements.

Skill/competency	Target staff	Renewal requirements
Whale Disentanglement Skill Set)		
NPWS LWD training that includes course content equivalent to national accreditation ACMSS00021*	Where possible, all team members as resources allow	Recommended every five years
Boating requirements under national standards for support vessel captain and crew	Support vessel captain and crew (may be from other agencies)	Must be current
Boat licence	All team members	Must hold current licence
Incident management – Introduction to AIIMS 1-hour online course – free on MyCareer	Recommended for all staff involved in LWD operations, where possible	–
Incident management – AIIMs Principles 2-day NPWS course or equivalent	Staff likely to be involved on an IMT	Attendance at annual preparedness days
Senior first aid	All team members	Every three years
Mandatory annual preparedness sessions to cover key competencies: • fitness and swimming (ex-SLSA standard of 200 m in six minutes) • operate IRB • simulated entanglement exercise • person-overboard exercise • cut-free exercise • sea safety and survival refresher • review any relevant changes to legislation, policies and procedures • debriefing.	All team members	Annually, preferably before the start of whale season

* NPWS is working towards adding this course to its scope as a Registered Training Organisation in 2022 and delivering the course as nationally accredited training

186. Following annual preparedness days, the team leader or an appropriate branch staff member maintains a list of appropriately skilled team members who can be deployed during the disentanglement season.

187. Only staff with appropriate training who have demonstrated skills and capability can be part of a response team, on the response vessel.

3.5.3 Oil-spill training

188. NPWS is a support agency to NSW Department of Primary Industries (DPI) in any marine wildlife response relating to oil or chemical spills.

189. NPWS works cooperatively with nominated combat agencies to maintain an appropriate level of preparedness. NPWS may participate in oil-spill exercises conducted by combat agencies.

190. NSW Maritime coordinates training for oil/chemical-spill responses (shoreline assessment). DPI coordinates training for oiled wildlife responses (oiled wildlife rescue and rehabilitation). Records of staff completing these competencies are maintained in the NPWS training database.

4. Response

4.1 General marine wildlife response considerations

4.1.1 Quick response guide

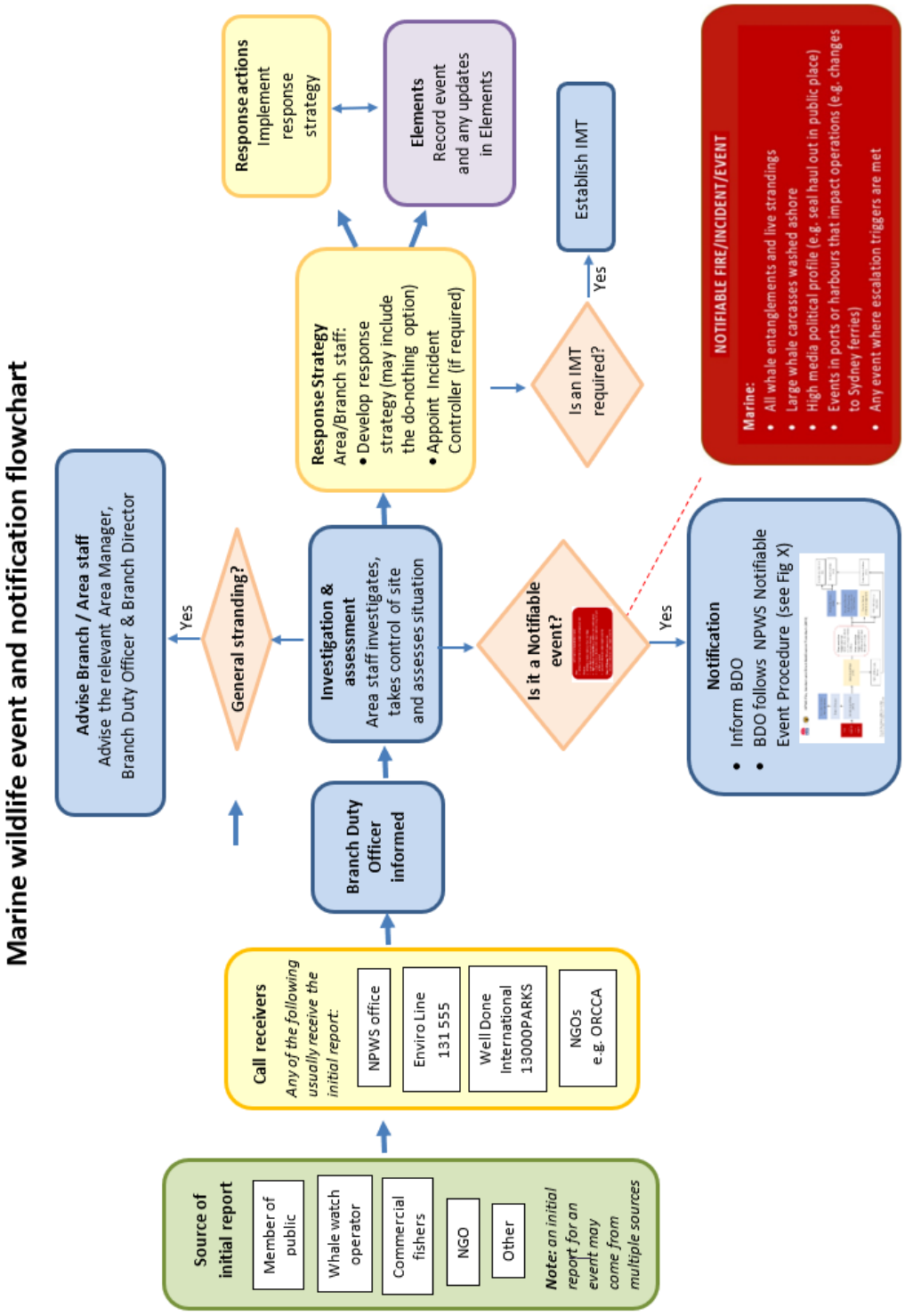


Figure 4 General marine wildlife event and notification response flow

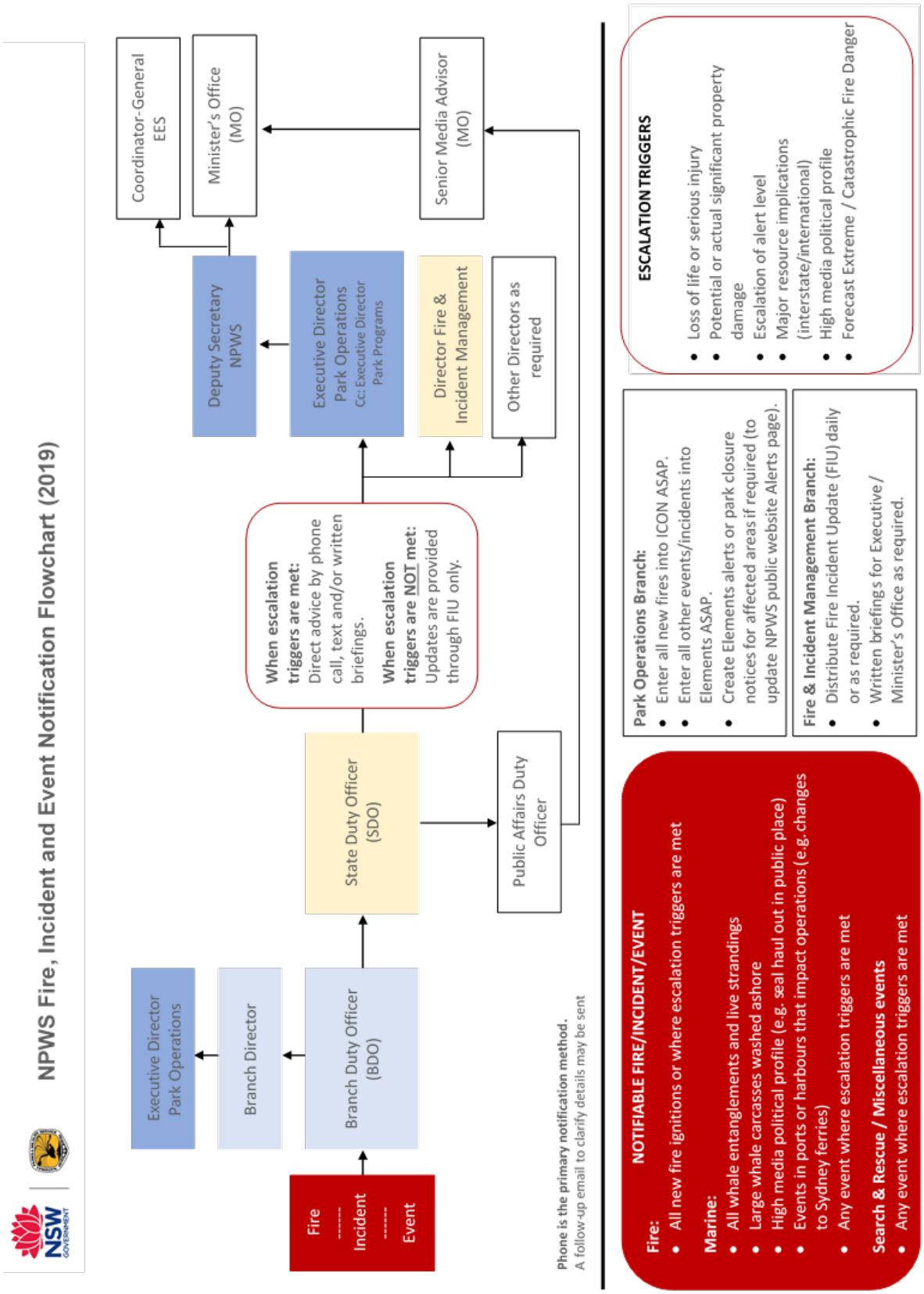


Figure 5 Notifiable event requirements for marine wildlife events

4.1.2 Policy

191. NPWS will respond to all marine wildlife events as soon as practicable after receiving a report.

192. NPWS is prepared to respond to marine wildlife events safely, efficiently and effectively by maintaining access to trained staff or external skilled individuals and specialist equipment

193. The response taken depends on the nature of the call, logistics and available resources. A higher priority is given to live strandings and entanglements as an urgent and rapid response may have a fundamental bearing on the success of an ongoing event.

194. Each response event is assessed on a case-by-case basis. Resources are allocated accordingly, taking into account competing needs, event location, public expectation, species conservation status, availability of partner organisations or volunteer assistance, logistics and other operational considerations. Initial responses during the hours of darkness may be limited due to safety.

195. Response to marine wildlife events is consistent with the Incident Control System (ICS) which is based on the Australian Inter-Service Incident Management System (AIIMS). An NPWS officer acts as the incident controller (IC) who scales-up as the event requires. Figure 6 shows the nominal ICS structure for marine wildlife events.

196. Generally, responses occur at the NPWS area or branch level and scale up as the event requires. NPWS often works with other organisations (as outlined in 2.6 Partner response organisations) to achieve appropriate outcomes for marine wildlife events.

4.1.3 Initial report

4.1.3.1 Source of initial reports

197. Reports of marine wildlife events are received through a wide range of sources. Most initial reports of marine wildlife events requiring an NPWS response are generated from staff, members of the public, commercial fishers or whale-watch operators and are received by NPWS via the EES Environment Line, Well Done International (13000PARKS) or ORCCA. Some reports are made to NGOs who forward the reported information to NPWS and volunteer organisations; or by NPWS staff to the relevant branch.

198. **When receiving an initial report** of a marine wildlife event, ask for the following information:

- the date and time
- the name of the caller and their contact details
- the type of marine animal/s
- details about the animal/s – number, species (or detailed description), size
- the location of the reported event: GPS or map location, if known, or the closest street/beach/town; best access point
- the type of event (stranding, haul out, entanglement, entrapment etc)
- visible evidence of entanglement or injury
- the animal's general activity level
- as much detail as possible on the animal's location at last sighting, swimming speed and direction (for entanglements or entrapments)

- if the caller can stay with the animal.

4.1.3.2 Informing the Branch Duty Officer

199. Provide the information from the initial report to the relevant branch duty officer – this applies to any staff member receiving a report for an event outside their branch

200. After receiving the initial report, the Branch Duty Officer should follow the standard marine wildlife event response flow (Figure 4) and the relevant Branch Incident Procedures. These processes ensure consistent management of incoming reports of marine wildlife that require assessment / appropriate response and that all appropriate staff are informed of the event.

4.1.3.3 Investigating the initial report

201. The Branch Duty Officer contacts NPWS area staff to investigate and validate the report –confirm the location, the number of animals involved, whether they are dead or alive, and (in the case of strandings) whether there are any animals close to the shore so actions to prevent further strandings may be initiated.

202. Where the initial report has been made by a member of the public or a contractor, it is vital for NPWS to verify the report.

4.1.4 Notifications

203. The responding NPWS staff must follow the standard marine wildlife event response and notification requirements shown in Figure 4 and ensure that the Branch Duty Officer, Area Manager and Branch Director are advised of the event confirmation. The Branch Duty Officer must report Notifiable marine events in accordance with the NPWS Incident Notification Procedures flowchart (Figure 5).

4.1.5 Site control and assessment

204. The responding NPWS staff takes control of the site and commences a response, including securing the site to minimise risk of injury to people and marine animal/s in the vicinity where relevant and assessing the situation

4.1.6 Response actions

205. If the investigating officer confirms a response action is needed, the branch / area may appoint an Incident Controller (IC). In many cases this is not the formal IC role under the relevant industrial awards. Marine events are not usually an ‘emergency ’under the NSW Emergency Management legislative framework, but they are managed in a similar way.

206. The responding officer / IC must follow the relevant branch incident plan and coordinate a response according to the plan, using Incident Control System procedures.

207. The responding officer / IC determines a management strategy, including the level of response by NPWS and, where appropriate, other organisations. This includes a decision not to respond, which is appropriate when the event is not life-threatening to the animal, or the circumstances make it unsafe for staff to attempt a response.

208. The responding officer / IC reports to the NPWS Branch Director (often via the AM, BDO and SCPO), who is responsible for approving the management strategy and for

any decision to declare the event operation an incident under the relevant industrial awards.

209. The response strategy is developed on a case-by-case basis, taking into account the context of statutory obligations, personnel welfare and logistical and operational constraints along with the best available information on the species and its management. While taking precautions, they must also consider the conservation impacts, competing resource needs and community expectations.

210. The responding officer / IC ensures steps are taken to minimise harm and interference by private viewing craft and to ensure the safety of onlookers and spectator vessels.

211. If required, the responding officer / IC makes sure commercial shipping aware of marine wildlife response operations by liaising with NSW Maritime and any other relevant organisations.

212. It may be appropriate to broadcast notices to mariners to locate a reported injured / entangled animal. To initiate a broadcast notice, branches need to contact the local Marine Rescue NSW unit or Port Authority and request a local notice to mariners.

213. The responding officer / IC ensures marine wildlife response operations are cost effective. An early and quick response is required to both minimise costs and reduce suffering to the animal.

214. NPWS has specialist resources available to provide expert marine wildlife advice to incident management teams.

> **See the list of specialists maintained on the Marine Wildlife Sharepoint site and CM9** (DOC20/579674).

215. NPWS seeks and considers the best available advice from veterinarians, marine wildlife biologists, other responding organisations and experienced personnel to determine its management options.

216. The responding officer / IC ensures reports on all marine wildlife response operations are completed in Elements Marine Wildlife Module as soon as practicable to ensure real time incident information is available to all relevant NPWS staff and is incorporated into the state-wide dataset.

4.1.7 Span of control and establishing an IMT

217. In accordance with AIIMS and IMS, the span of control for marine response will not exceed 1:5, that is, no more than 5 people reporting to a single person. This span of control applies to both field-based operations and IMT though some variation is expected especially for whale crews where the ratio may be higher (i.e. 6 crew members to report to 1 crew leader) due to lifting requirements.

218. In consideration of the span of control, the IC should identify and resource key IMT positions **if required** to effectively manage the response – see

219. Where required, incident controllers should give special consideration to resourcing the following positions:

- **Safety advisor**: to monitor response safety
- **Technical specialists**: to provide advice to the planning officer

- **Liaison officer**: to undertake interagency liaison for large responses involving multiple agencies
- **Media liaison officer**: to develop a media and community information strategy
- **Strategic planning officer**: to be located in the situation unit, to provide long-term strategies and tactics and resourcing predictions for strategic forward planning
- **Resource officer**: to develop a resourcing plan with a 3 day minimum outlook
- **Staging area manager**: to record and coordinate resource and crew arrivals (for deployment) and departures (stood down) and to establish essential amenities including toilets, refuelling areas etc. for large responses
- **Operations support**: dedicated to managing crew changeovers
- **Operations support**: dedicated to providing local knowledge, e.g. road access, beach conditions, safety issues, community issues, other natural and cultural heritage issues, etc.

220. For large stranding responses crews will be needed for collection of scientific and veterinary information, necropsy, carcass management and disposal.

4.1.8 Incident action plans

221. Develop an incident action plan (IAP) for all response operations where either multiple shifts or large staff/volunteer numbers warrant one. The incident controller must approve all IAPs and any subsequent amendments.

222. The type of IAP depends on the size and complexity of the event. It will include:
    - operation objectives
    - strategies
    - tactics and tasks
    - an appropriately scaled event map
    - resources and organisational structure.

223. An Incident action plan can be prepared in Elements by creating / opening a marine wildlife event and then selecting the ‘Operations’ and then ‘Create New IAP’ tabs in the top menus.

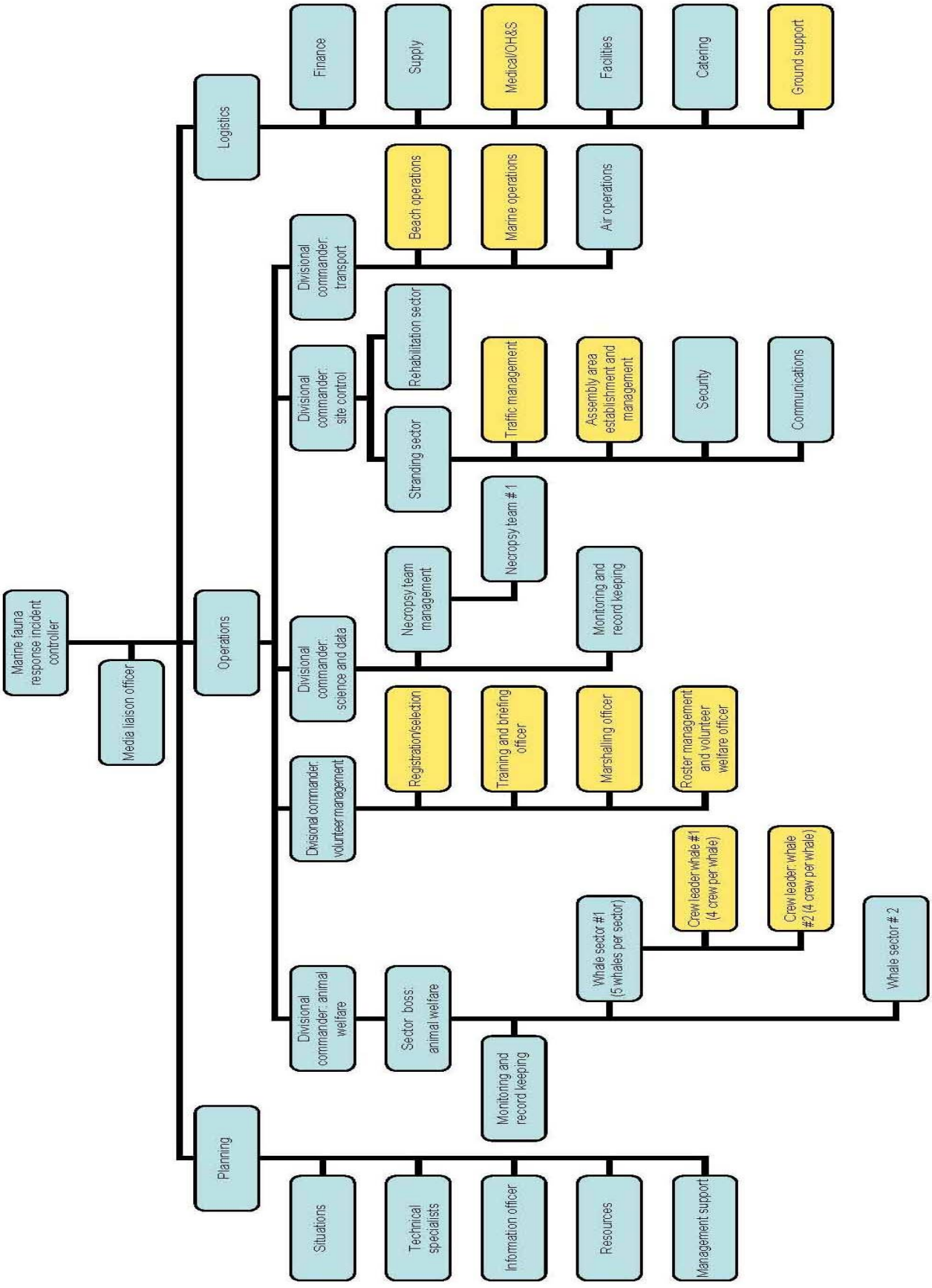


Figure 6 Nominal Incident Control System structure for marine events.

4.1.9 Situation reporting and records

224. Use the Marine Wildlife module of Elements for reporting. Complete for all living and dead animals and add all event information, including photographs and post event information (e.g. necropsy information).

225. Where the response is of substantial duration (over several days), involves multiple animals or large numbers of staff it may be beneficial to complete regular Incident Action Plans during the event in Elements, as well as logging in Elements:
    - details for each animal
    - photographs of the animal, including any identifying features such as the dorsal fin or flukes, and any entangling gear if relevant.

226. See 4.1.5 for initial reporting procedures.

227. Throughout the event, provide regular updates to duty officers and area managers, and enter information directly into Elements. Situation reports can be created in Elements by using the 'Create new situation report' tab

228. On conclusion of the event, complete any further information in Elements for all marine animals, dead or alive This is important to ensure NPWS maintains accurate data on marine wildlife events in NSW.

229. Where animals are to be rehabilitated off site, the facility receiving an animal for rehabilitation is to be identified in Elements. Give the facility a copy of the form to complete and forward to NPWS once the fate of the animal is known.

4.1.10 Euthanasia

230. Occasionally an animal requires euthanasia. NPWS recognises such decisions are difficult and must be made based on welfare considerations of each individual animal.

231. Where an on-site veterinarian has limited experience with the animals concerned, NPWS encourages – and facilitates – consultation with more experienced colleagues in Australia.

232. The delegated NPWS officer must approve the decision to euthanase any animal before euthanasia is carried out. Delegations are held by branch directors for cetaceans and seals, and by authorised officers for marine reptiles. Follow the notifications detailed in Figure 4.

233. Only a veterinarian or an authorised NPWS officer can undertake euthanasia.

234. Where a decision is made to euthanase an animal, either a veterinarian must carry it out or an appropriately trained or experienced person in consultation with a veterinarian.

235. In certain situations, delaying euthanasia would unnecessarily prolong an animal's suffering. In these cases, euthanasia may be carried out as soon as practicable by an appropriately trained NPWS staff member:
    - where there is obvious evidence of severe or debilitating injury
    - in circumstances where attempted rescue is precluded by the remoteness or inherent danger of the stranding location.

In all other instances, where possible, consult a veterinarian or marine wildlife biologist on the proposal to euthanase and which method to employ. (Criteria for when to consider euthanasia and appropriate methods are provided in the relevant sections).

236. Whichever euthanasia method is chosen, the site must be screened from public view. Inform any people in the vicinity about the process and clear them away from the area before carrying out euthanasia.

237. Dispose of all carcasses in a manner that minimises the risk of disease transmission, potential toxicity to humans, domestic animals or wildlife, and public nuisance (refer to 4.12 Carcass disposal). NPWS or the relevant land holder undertakes this activity according to regional plans, logistics and resource constraints.

4.1.11 Volunteer management

238. Large numbers of volunteers may be required at marine wildlife events to assist with first aid and rescuing and rehabilitating animals.

239. NPWS may be assisted at marine wildlife events (with the exception of oiled wildlife events) by members of the local community and volunteers from a number of NGOs.

240. NPWS is committed to effectively managing the potential health and safety risks associated with marine wildlife events. It determines the specific roles and tasks volunteers may undertake with a view to minimising the risk of injury or sickness. This requires considering the details of the event, the species involved and levels of individual training and experience.

241. Always manage volunteers at marine wildlife responses according to the EES Volunteer Policy. Volunteers 16 years of age or under who participate in a NPWS - approved volunteer project require parental or guardian consent. All marine wildlife event activities involving volunteers must comply with the DPIE Child Safe Policy.

242. The IC appoints a volunteer coordinator to work within the operations unit. The coordinator registers, trains and briefs/inducts volunteers, then assigns and allocates their tasks. Refer to Appendix 4 Volunteer induction checklist.

243. Establish a staging area where volunteers can be registered, assessed, and briefed for deployment. The volunteer coordinator undertakes volunteer briefings.

244. All volunteers must register with NPWS for insurance purposes as outlined by NPWS risk-management principles. Prominently display signs at the site explaining why all volunteers need to register. Give registered volunteers proof of registration and an identification badge or similar. Volunteer registration can be completed online using the EES Volunteer Information Portal at the event if users have a device with mobile coverage.

245. Brief and train volunteers on site in any procedures relevant to their tasks before they are assigned to teams and rostered for designated shifts.

246. Base the roles assigned to each volunteer on risk assessment. Consider their age, physical condition or access to personal protective equipment. Depending on the type of event, volunteers will typically be required to fill positions within:

- rescue crews
- transport crews
- triage/first-aid crews
- rehabilitation crews.

247. Give onshore tasks to volunteers who are unable to swim. Engage only those volunteers with appropriate personal protective equipment in response procedures. Table 2 summarises the deployment options for land-based volunteers at marine wildlife incidents.

Table 2 Deployment options for volunteers at a marine wildlife stranding.

Report/assessment phase	Trained volunteers may undertake assessment and site control before NPWS officers arrive
	Assess site safety
	Help manage crowds
	Help manage vessel traffic
	Provide first aid to people
	Provide vessel support
	Manage the site and provide local knowledge
Response phase	Maintain site safety
	Help manage crowds
	Help manage vessel traffic
	Provide first aid to people
	Provide logistical support (vessels, quad bikes etc)
	Provide and/or coordinate other volunteers
	Site management
Recovery phase	Maintain site safety
	Help manage crowds
	Help manage vessel traffic
	Provide first aid to people
	Provide vessel support
	Site management

4.1.12 Public affairs and media

248. Marine wildlife events can generate intense and continuing interest from the public, the media and other interest groups. Consistent with notification procedures, notify Public Affairs Branch (PAB) of marine wildlife events and responses as soon as possible via the 24/7 duty media line (02 999 55 347). PAB will assist by assessing media response requirements, preparing media updates and releases and answering key questions related to the event. Depending on circumstances, a media liaison officer may be assigned to assist with on-site media management.

249. A communications plan may be required to inform and communicate the NPWS key messages, information management and the methods of dissemination.

250. In conjunction with the PAB the incident controller develops the communications plans for all response operations where significant public interest is likely to be generated, including:
    - multiple cetacean strandings
    - single strandings on popular beaches
    - cetacean carcasses on popular beaches
    - seal haul outs on popular beaches.
    - cetacean events in popular waterways (eg whale visiting Sydney Harbour)

251. Media considerations should not unduly influence operations to the detriment of the primary management objectives.

252. The media must be continually provided with accurate, up-to-date information. Preferably via on-site public affairs officer.

253. Social media is an increasingly significant component of marine wildlife incident management. This includes information generated by EES as well as content, positive and negative, generated by others on and off site. IC and PA must give consideration to managing social media opportunities and responses to user generated content during and post incident.

254. If no public affairs officer can be present at the site, the IC or Area Manager must nominate an onsite liaison officer. The liaison officer may provide updates to the media only with the approval of Public Affairs Branch. On site liaison officer also must be responsible for coordinating collection of social media content eg: images; audio/video of incident progress for dissemination.

4.1.12.1 Corporate messages

255. Overarching messages that establish the position for all NPWS activity and which will provide the foundation for any subsequent messaging are:
    - all actions are being/will be taken in the interests of the animal/s' welfare
    - any decision will be based on best available information and advice from marine mammal/wildlife experts, including veterinarians
    - any actions or activities to intervene or assist injured or stranded marine mammals/wildlife will only be undertaken where the safety of those involved (including volunteers) can be assured.

256. All staff involved in marine wildlife management must understand and appreciate these three messages as a fundamental corporate position. All staff are encouraged to share these messages.

4.1.12.2 Species specific messages

257. **Seal haul outs key messages:**
    - seals often haul out (come ashore) in NSW and in most cases they will leave of their own accord within a day or two
    - seals are capable of recovering from serious injuries but need time ashore free from interference
    - seals have the potential to inflict serious injury to people and their pets. Keep a minimum of 40m from an adult and 80m from a pup
    - NPWS works with numerous NGOs and marine experienced veterinarians to monitor and where necessary provide care and treatment to sick and injured seals.

258. **Marine turtle haul outs key messages:**

- Marine turtles often haul out (come ashore) in NSW.
- Marine turtles are capable of recovering from serious injuries
- NPWS works with numerous NGOs and marine experienced veterinarians to monitor and where necessary provide care and treatment to sick and injured marine turtles.

259. **Cetacean stranding key messages:**

- Marine mammals are important for biodiversity.
- Marine mammals are part of our invaluable wildlife heritage
- Stranding (single/mass) is not a threatening process. It has no effect on population viability. NPWS doesn't want to see animals suffer unnecessary. Important information can be gained from these events.

260. At wildlife events/responses NPWS will take the lead role in managing public affairs. Media statements by supporting agencies and NGOs must be approved by the public affairs liaison officer.

261. Marine wildlife events/responses offer NPWS an opportunity to promote general public awareness, knowledge and welfare of marine wildlife. They also offer the opportunity to promote our role and achievements in relation to marine wildlife conservation and management.

262. It is important to deliver on corporate branding to foster public support for the roles NPWS plays in marine wildlife conservation by maintaining good public relations during marine wildlife events and responses. Relevant community education material on marine wildlife should be made available for distribution at events/responses.

4.2 Strandings – cetacean and dugong

263. In this manual, the term ‘strandings’ refers to live cetaceans and dugongs only. Seals, turtles and snakes are covered in sections on haul outs. Refer to Haul outs – marine turtles and Haul outs – sea snakes.

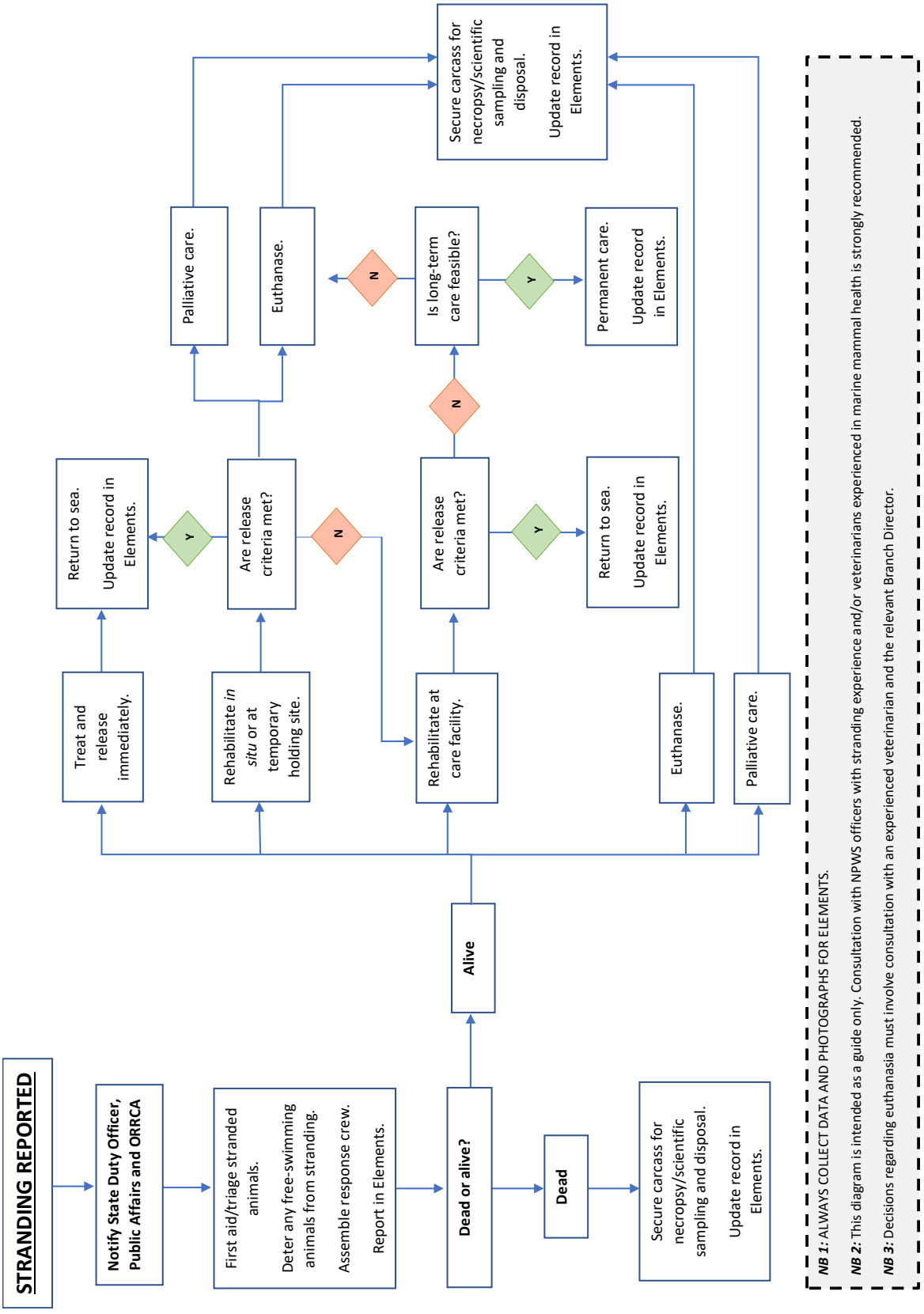


Figure 7 Decision flow-diagram for determining most appropriate course of action in the event of a cetacean or dugong stranding.

4.2.1 Quick response guide

- **Take control of the site.** Once the live stranding has been confirmed, ensure NPWS branch and state duty officers, Public Affairs Branch, ORRCA and the appropriate local council have been notified of the situation (where necessary) and the actions expected to be undertaken by all parties in managing it. Take photographs to circulate with notifications and upload to Elements Marine Wildlife module as soon as practicable. On non-NPWS estate, NPWS staff have limited authorities to issue or enforce directions to the public about interactions with cetaceans. NPWS staff can advise and request members of the public to keep clear of the stranded animals, however may need to enlist the help of NSW police and local council to direct the public and to enforce cordons.
- **Assess and stabilise animals.** Take note of the position of each animal and the terrain in which it has stranded. If an animal is listing to one side, on a rocky surface or in the surf zone, correct the animal's position if it is safe to do so. This may mean moving it onto the beach or placing it on a foam mattress. This is to prevent further injury and/or water from entering its blowhole. **Never** undertake to move a large animal in the surf zone if you are alone.
- **Manage volunteers present on the beach.** After registering volunteers, form stranding crews to hold the animal/s upright and move them up onto the beach and out of the surf zone. For small cetaceans (those under 4 m) use rescue mats. If animals are too large to move out of the surf zone using rescue mats, crews will need to manage the animals in the water. In these circumstances, appoint a safety advisor (or crew leader) to watch the wave action so they can warn the crew of impending waves.
- **Assess the animal/s status and body condition.** Note whether alive, dead, entangled, injured (along with the extent of their injuries) or if the animal/s appear healthy.
- **Record all relevant information.** This includes, where possible:
  - exact location, time and date of the stranding
  - presence of other cetaceans in the surf zone or on the other side of headlands
  - size and age class of the animal/s
  - species and gender
  - overall body condition and status.

  Note as much information as possible when assessing the animal's condition and take photographs − filming the animal may also assist.
- **Cordon-off the site around the animal/s.** Keep people and dogs out of the exclusion zone. If a carcass has been handled by members of the public, advise them to thoroughly wash their hands with disinfectant soap as soon as possible for their own hygiene and anyone else that they may come into contact with.
- **Undertake veterinary assessment and formulate an incident action plan.** Monitor the stabilised animal/s.
- **Complete Elements event.** Check that the information in Elements is complete, including outcomes of the animal/s. Send hourly updates to the duty officer whilst the event is running.
- **After an event.** Organise a post-response debriefing and reports.

4.2.2 Policy

264. NPWS responds to strandings for the following reasons:
    - conserving protected species

- animal welfare concerns
- managing public expectations.

265. NPWS' response to and management of stranding events must:
    - ensure the safety of all personnel assisting in the event response as the top priority
    - as far as possible, treat stranded animals humanely to minimise their pain and distress
    - ensure the safety of members of the public and spectator vessels during stranding response operations.

266. NPWS does not support rehabilitating stranded or unaccompanied baleen whale calves. Stranded or unaccompanied odontocete (toothed whale) calves may be candidates for temporary captive care and release, depending on species. There must be clear justification for causing the animal the additional stress of rehabilitation. The NPWS Executive Director or above will make the decision to take an animal into captive care after consulting with the IC, veterinary advisors and NPWS Conservation Branch.

267. Hand-rearing stranded or unaccompanied calves is also not a feasible option. Too little is known about the nutritional make-up of cetacean milk and there is little accurate information available on the long-term success of hand-rearing cetacean calves, or their chances of survival if they are released back into the wild after being hand-reared in captivity. The financial cost of rehabilitating cetaceans in captivity is also prohibitive, making this option unfeasible.

268. NPWS supports scientific investigation into quantifying cetacean strandings in Australian waters and provides this information to the Commonwealth Government.

269. Various NGOs have licences to rehabilitate marine wildlife. Licences specify species and areas covered. Current licence information is available from NPWS Conservation Branch.

4.2.3 Background

270. A cetacean or dugong is regarded as stranded when it is aground and unable to return to the water unaided. Strandings can be single or multiple. Single strandings involve one or two animals (usually a mother and calf). Multiple strandings involve several animals (which may involve many animals of the same or different species) and are rare in NSW. Most reported single strandings involve animals that died at sea and were washed ashore.

271. Where strandings involve live animals, it may be possible to return the animals to the sea. In such cases, returning the animals to the water, once it is safe for the animal and rescuers to do so, is the primary objective.

272. Taking biological samples from live animals may be done only where the animal's welfare and survival are not further compromised by such activities.

273. A primary management objective for beach-washed carcasses, or animals that die after stranding, is to increase scientific knowledge of the species through necropsy and scientific sampling. Studying stranded animals can provide useful information on pollutant levels in tissue, parasite loads, possible disease outbreaks and general information about physiology. Try to take samples from stranded dead animals for further scientific testing. Contact the relevant persons on the NPWS Marine Wildlife

Contacts list (DOC20/579674 on CM9) for details of specific samples required and methods of storage.

4.2.4 Initial report

274. For initial reporting procedures refer to 4.1.3 Initial reporting.

4.2.5 Take control of the site

275. NPWS is the nominated combat agency for marine wildlife strandings in NSW (with the exception of strandings resulting from an oil or chemical spill, for which NPWS is a supporting agency to NSW DPI). Attending officers need to ensure the public and other authorities understand the role of NPWS.

276. Notify the duty officer and any relevant landowners of the stranding. Let them know what actions they can expect NPWS to take.

277. For the safety of the public and the animal/s, establish a cordon around stranded animal/s. When establishing the cordon:
- treat animals with caution at all times and do not approach them closely
- cordon-off an area around the animal/s making sure people and dogs do not enter the exclusion zone
- ensure appropriate warning and information signs are erected, taking into account incoming tides to ensure signage is not washed away.

278. Ensure there are no dogs or small children anywhere near the stranded animals or at the site. If necessary, request the help of local council rangers, the RSPCA or animal wardens to remove stray or unaccompanied dogs from the site. Police can assist with people control.

279. Manage volunteers present on the beach. Organise registration and assign tasks. (Refer to 4.1.11 Volunteer management and EES Volunteer Policy).

4.2.6 Assessment

4.2.6.1 Assessing the site

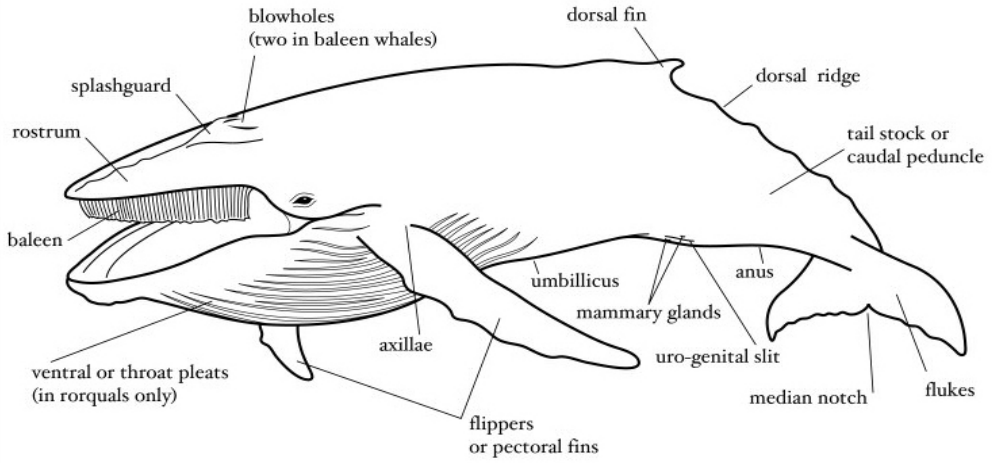
280. When assessing the stranding site, note:
- threats to personnel, public or property
- threats to stranded animals – these include uncontrolled crowds, dogs and noisy children which will add to the animals' stress
- which species they are − use an identification guide (e.g. Mark Carwardine, 2000)
- how many animals there are
- the animal/s estimated size
- the animal/s condition (including wounds)
- the animal/s behaviour and location (e.g. stranded on rocks, struggling in the surf zone)
- if other animals are nearby and likely to strand. Check the surf zone or on the other side of headlands.
- current and forecast weather conditions
- sea conditions and tide information

- time of day and available daylight remaining
- resources required
- ability to secure the site
- presence of natural or cultural heritage values that may place other constraints on operational activities
- what type of access is available, is it direct or close to the stranding site.

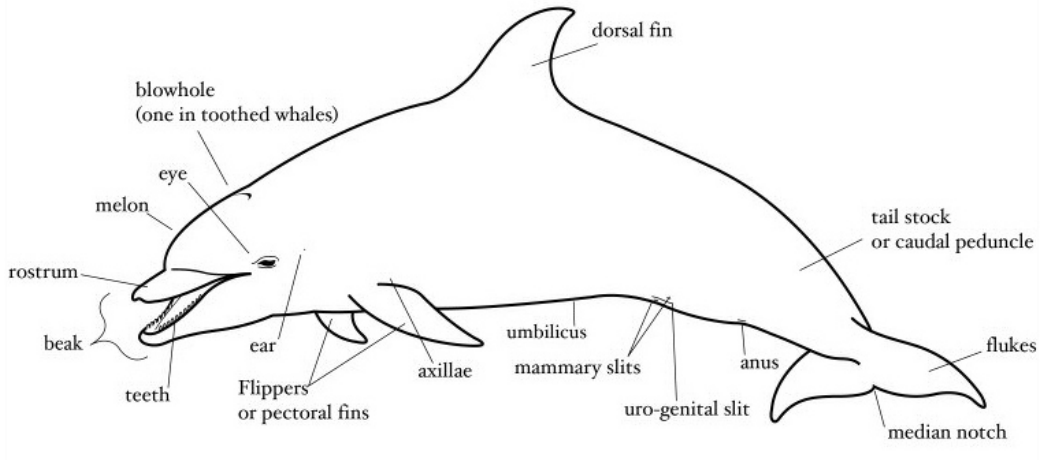
4.2.6.2 Distinguishing between baleen and toothed whales

Table 3 Distinguishing between baleen and toothed whales (Images by Uko Gorter; used with permission)

Baleen whales (Mysticetes)	
• have plates of baleen instead of teeth	• no melon (bulbous tissue area on the forehead)
• two blowholes	• large jaws
• generally very large in size	• females larger than males (reverse sexual dimorphism)



Toothed whales (Odontocetes)	
• have teeth	• presence of melon (bulbous tissue area on the forehead)
• single blowhole	• smaller, more streamlined jaws
• variable size but generally smaller than baleen whales	• variable sexual dimorphism (differences in body size between males and females).



4.2.6.3 Assessing the animal/s status and body condition

281. The initial task for staff is to identify the species using an identification guide (e.g. Mark Carwardine, 2000). Refer to 4.2.6.2 to help distinguish between baleen and toothed whales. Also ask experienced staff or researchers to help correctly identify the species. Pictures taken on mobile phones are particularly useful – upload these to the Elements event and/or send these to the Marine Wildlife Team in the Biodiversity and Wildlife Unit to identify the species (for contact details refer to NPWS marine wildlife contact list - see DOC20/579674 on CM9). Members of the public should upload pictures for identification to wildaboutwhales.com.au. Note that there may be more than one species stranded at the same event. Do not assume that all the stranded individuals are the same species.

282. When evaluating response options, wherever possible, have the animals assessed by a veterinarian, biologist or animal keeper with experience in cetacean or dugong health (refer to NPWS marine wildlife contact list - DOC20/579674 on CM9). If the animal/s cannot be assessed by an expert in situ, seek expert advice by phone.

283. Carefully check for signs of life. Watch for respiration − some stranded animals may hold their breath for a prolonged period (30 minutes or more). Look for eye movements and/or focusing (although many stranded cetaceans will keep eyes firmly shut, especially if they have had sand washed or blown into them during stranding or handling). If no breathing or movement is observed, to confirm whether the animal is alive or dead, check for reflexes:
    - Touch anywhere on the animal's body, and look for reflexive skin movements.
    - If there is no response, gently rub around the blowhole (1 to 2 cm away from it) and look for responsive skin movements.
    - If there is no response, gently rub the skin around (1 to 2 cm from) the eye.
    - If there is still no response, gently touch the eye itself.
    - Jaw tone, tongue retraction and blood refill in gums may also be used to check for signs of life, but these parts must be approached cautiously as proximity to mouth and teeth may present risks to the examiner.
    - A protruding penis in a stranded male cetacean is indicative of death.
    - If the animal is dead, secure the carcass and make arrangements for scientific examination, necropsy and sampling before disposal.
    - If the animal is alive, commence first aid as soon as possible.

284. Arrange for expert assessment of the animal/s before deciding on further response actions; in the meantime ensure stranded animals are kept as calm and comfortable as possible at all times and any possible escape directions are not impeded. Refer to Appendix 6 Physiological effects of strandings.

4.2.7 Response actions

4.2.7.1 Deterring free-swimming animals from stranding

285. Where there are free-swimming animals of the same species off the beach (behind the line of breakers) which are in danger of stranding, consider using hazing techniques. One way is by creating a noise barrier by striking metal objects or rocks against rocks, held under water. Small boats or jet skis, revving engines and slapping hands against hulls can also effectively deter animals from stranding.

286. The success of such actions will depend on many factors. These include why, and the extent to which, animals are attracted to the area, and the availability of resources to sustain an extended hazing effort. Do not start hazing if resources are insufficient to maintain the operation long enough to ensure all loitering animals have dispersed and moved out to sea.

287. If enough trained and experienced people are present, a human chain can be used to herd the animals out to open sea. For safety reasons, only attempt this technique with smaller species of cetaceans, such as dolphins, and only in suitable sea conditions when occupational health and safety requirements can be met.

4.2.7.2 Triage

288. A triage process is used at strandings to assign a health category to each animal to determine the appropriate response action. Triage is based on clinical assessment. Animals will be placed in one of these four groups and tagged with an appropriate coloured tag:
    - green − healthy
    - yellow − minor incapacity (requires treatment)
    - red − major incapacity (may require euthanasia)
    - black − deceased.

289. Designate each individual animal's health category by tying a coloured ribbon around its tail stock. Rescue operations are often protracted, so an animal may be re-categorised in terms of health status during the course of operations.

290. The purpose of triage is to concentrate efforts on the group designated as green or 'healthy'. Generally these animals will be first to be either refloated at the event site or transported to a release site. They will also be the first to receive rehabilitative treatments.

291. Animals designated as yellow (minor incapacity) should still be considered releasable whereas those designated red (major incapacity) are un-releasable. Consider palliative care or euthanasia for animals classified as red ('major incapacity') as soon as it is feasible.

4.2.7.3 First aid

292. The priority for first-aid procedures is to concentrate efforts on those animals assessed as having the best chance of survival as determined by the triage process.

293. Everyone present must keep calm and minimise noise near the animals throughout the handling procedure.

294. Keep animals cool by pouring water on the body but ensure the water does not enter the blowhole (see Figure 8 and Figure 9 for examples).

295. Shade the animals and/or cover them with wet cloths. Ideally, use light-coloured cloths to reflect sunlight and help keep the animal/s cool. To protect the animal's sensitive skin, ensure the cloths are not made of rough material. Do NOT cover the animal's blowhole, eyes, fins or flukes.

296. Dig shallow holes under the animal's fins and tips of flukes to relieve these appendages from pressure and provide drainage channels for water pouring off the animal. Always ensure caution when near fins and flukes.

4.2.7.4 Local release

297. It may be possible to immediately release animals grounded in the shallows by moving them into deeper water. Do so only if the sea and weather conditions do not compromise the crew's safety. Never enter water deeper than mid-thigh level when there is heavy surf present. No one should attempt to hold and move animals longer than 3 to 4 m, especially when there are not enough people to assist.

298. Rather than returning them immediately to sea, hold stranded cetaceans or dugongs for a period of rehabilitation in the water before their release. This allows their condition to be monitored and treated. It may be possible to hold them at the stranding site (i.e. in a small, calm, enclosable inlet or specially constructed rehabilitation pool using earth-moving equipment) or they may need to be transported to a more suitable site.

299. If there are no suitable holding sites where the animals strand, it may be necessary to move them to an ex situ temporary holding site or enclosure for rehabilitation. Surf conditions will probably make an ocean beach unsuitable but there might be calmer waters in an adjacent estuary. An inflatable pontoon and a spray unit may be necessary. Refer to Appendix 7 The pontoon rescue system.

300. Given the costs and complex animal ethics issues involved, ideally the temporary holding site needs to be easily accessible from the stranding site. Suitable sites are identified in branch incident plans. Deciding which site to use will involve balancing the advantages of the site against the difficulties and stress of transporting the animal there.

301. The choice of rehabilitation site may be influenced by the animal welfare risks associated with transporting the animals and the costs and/or logistics (e.g. severe weather, excessive distance or difficulty accessing a more suitable site, fading daylight etc).

302. Trucks or trailers are usually used to transport animals to a holding site. Section 4.2.9 Lifting, moving and transporting cetaceans and dugongs describes techniques for lifting, loading and transporting the animals. Alternative transport modes are pontoon, sled and amphibious vehicle or helicopter.

303. For beached animals, approach them calmly and quietly from the front, avoiding sudden movements. Animals are unlikely to be aggressive but bites and panic reactions are possible. Always practice caution around fins and flukes. The reaction of the animal to being approached is an important indicator of its health status and eventual prognosis.

304. Stabilise beached animals to minimise stress and risk of further injury. This is especially important if the animals are stranded on rocky substrate or in shallows where their blowholes are in danger of being inundated with water, or if they are positioned in a way that puts them at risk of further injuries and stress.

305. Keep noise levels to an absolute minimum and limit the number of people around each animal so they are not further stressed.

306. Ensure all animals are shaded and protected from exposure to sun and wind as these will dry out their delicate skin, causing them to dehydrate further. Keep them covered with wet sheets made of lightweight material in light, reflective colours. Do not use dark colours or material that is thick and/or abrasive.

307. Keep an animal upright by digging a shallow trench parallel to its belly. Gently position the animal into the trench if it is safe and viable to do so. Dig a very shallow moat

around the pectoral fins and fluke so they rest in a natural position and are not bearing any pressure.

308. It is vital the animals do not overheat. Ensure the blowhole, dorsal fin and flukes remain uncovered. This allows the animal's natural heat-exchange mechanism, which occurs principally through its fins and flukes, to be unhindered. Keep impaired animals wet at all times by gently pouring water over them, making sure none enters the blowhole.

Stay clear of flukes at all times.

309. For animals in the shallows, form whale crews to hold animals upright and move them onto the beach and out of the surf zone. For cetaceans less than 4 m, use one or more whale rescue mats. If an animal is too large to move out of the surf zone using mats, crews will have to manage the animals in the water. In these circumstances, appoint a safety officer (or crew leader) to watch wave action to warn the whale crew of impending waves.

310. If possible, and safe to do so:

- Hold the animal in the shallows as water provides much better body support for whales and will minimise the pressure-related impacts of being on land.
- Push or lift animals to maintain them in an upright position. If there are free-swimming animals around, ensure the head of a stranded animal is pointed towards land to deter communication with any animals still in the water or they may also strand.
- Move an animal away from sharp rocks and other objects or place padding under and around its body (ensure that padding is not made of rough material to avoid causing skin damage to the animals). When re-positioning animals, make sure the fins are held flat against the body to prevent them from being crushed or broken.

311. Keep the animals perpendicular to the waves to prevent rolling.

312. Ensure the blowhole is above the water level and clear of seaweed, sand and other obstructions.

313. Organise enough response crews to provide safe and appropriate care for each animal. When human resources are limited, invest time in the animals judged to have the greatest chance of survival. Rescuing live cetaceans carries the risk of injury − this risk increases with the size of the animal. Thrashing animals in shallow water pose a particular risk and only experienced personnel should approach the animal, keeping well clear of the flukes, fins and mouth. When restraining an animal in the shallows, attempt to control it by its thoracic region only and do not, under any circumstances, grasp it by the fins or flukes. Keep clear of the tail-stock area.

4.2.7.5 Moving and re-floating animals

314. Only move animals using a rescue mat or stretcher. If the animal is too large, wait for the incoming tide or use a pontoon. Support the animal at waist depth with hands, towels (using them as slings under the animal) or a pontoon. Refer to Appendix 7 The pontoon rescue system.

315. Rescue mats come in two standard sizes. One, at 2.5-m long, is for use predominantly with dolphin species and juveniles of some larger species, (suited for use by up to 8 or 10 adult people, and able to carry animals up to around 200 to 300 kg). Another 4.5-m-long version is suited for use with pilot, false killer whales and large oceanic bottlenose

dolphins. This size may allow 16 to 20 people to help carry the animal and can support animals weighing up to 600 kg.

316. Capacity to carry manually is based on a maximum load of around 20 to 30 kg per person.

317. The length of the mat corresponds relatively closely to the maximum size of animals it is possible to carry, based on average length-to-weight ratios.

318. Some rescue mats also have built-in lifting lugs. These can be used to connect to spreader bars, slings and a cradle for use with mechanical lifting devices (tractor, excavator, crane etc). They are suitable for larger animals − up to about 5 to 7 m long.

319. Pontoons may also be used to refloat stranded cetaceans. A rescue pontoon is an inflatable device designed to refloat small whales/dugongs weighing up to 2 tonnes. However, by interlocking two or more sets of pontoons together, larger animals may be successfully refloated. Correctly assembled, the pontoon system will float a full-grown pilot whale in knee-deep water. It is important at least one person in the group assembling this device has prior training. Incorrectly assembled parts risk the entire system becoming unstable and losing the animal either prior to, or during, towing. The assembled unit consists of two pontoons (cylindrical-shaped tubes) and one lifting mat (a spare mat is also supplied with the kit).

Refer to Appendix 7 for a full description, deployment and correct installation of the pontoon rescue system.

320. Cetaceans and dugongs have difficulty regaining their balance when they strand so their equilibrium needs to be restored. Loss of equilibrium may cause them to swim in circles or swim only on their sides, making breathing difficult. Gentle rocking can help animals regain their balance, relieve muscle stiffness and restore circulation.

321. When the water depth is suitable, take advantage of the animal's neutral buoyancy and gently rock it from side to side (keep the blowhole above the water at all times). This can take from 30 minutes to several hours. Continue rocking until the animal swims in an upright position without support. Take care not to venture into water over armpit depth. It is difficult and unsafe to manoeuvre the whale once your feet are off the bottom.

322. During re-floatation, pay careful attention to other aspects of the animal's behaviour and its response to being in the water. This is important as a beach assessment is complicated by the generally passive nature of cetaceans and dugongs when they strand. Opportunities to observe the animal's behaviour in the water before stranding are rare.

323. Abnormal behaviour in the water includes uncoordinated movements − twitching and tremors – and pronounced flexion (curving) of the body. Initial disorientation, listing and an inability to swim are not necessarily poor signs, as these can take several hours to correct, especially if the animal is stranded for several hours before it is returned to the water.

324. At multiple stranding events, identify each individual animal (including carcasses) by attaching a temporary cotton tag marked with the date, time and animal number. The standard numbering system used conveys information on the stranding site, date and animal number. Using this information means data can be collated for each animal and every sample taken from it.

325. Keeping an accurate and systematic record of every stranding is a vital part of the overall stranding response process. The following unique identification numbers must be used on every form and sample that is collected during a stranding.

The format is:

- **YYMMDD_Species Code_#** (as outlined below)
- **YY** = year (e.g. 2012 = 12)
- **MM** = month (e.g. Jan = 01)
- **DD** = day (27th = 27)
- **Species code** = first three letters of genus and first two letters of species (scientific name) e.g. sperm whale, Physeter macrocephalus = PHYMA. For scientific name, refer to a field guide (e.g. Mark Carwardine, 2000)
- # = stranding number for the day (only use if there is more than one independent stranding of the same species at different sites in one day). In most cases, it is unlikely this numerical identifier will be needed.
- Therefore, if there were two sperm whale strandings on 15 February 2012, the stranding IDs would be:
- **20120215_PHYMA_001** and
- **20120215_PHYMA_002.**

4.2.7.6 First aid and rehabilitation

Figure 8 A bottlenose dolphin receives first aid. The rescue operation involved NPWS, ORRCA and Sea World. Note the hand of a volunteer protecting the animal's

blowhole while water is poured onto sheets for cooling: Photo: NPWS.

Figure 9 A humpback whale (*Megaptera novaeangliae*) receiving immediate first aid on the beach. Photo: NPWS.

Figure 10 Following relocation from the rock platform to the beach, a shade tent was erected to provide protection from sunburn for this stranded whale. Photo: NPWS.

Figure 11 (a and b) In the above two photos a neonatal humpback whale stranded in shallows is held upright and refloated using towels fashioned into slings. Note the volunteers staying clear of the tail fluke. Photos: I Hanson.

4.2.7.7 Releasing rehabilitated animals

326. Water temperatures in NSW are generally too cold for dugongs south of about Sydney, and throughout the State in winter. Animals that strand when water temperatures are too low may

have a better chance of survival if relocated to the warmer waters of Queensland. This depends on the animal's condition. Assess proposals for relocation on a case-by-case basis. Decisions to release cetaceans and dugongs interstate require approval from the NPWS Executive Director or Deputy Secretary and the Queensland authorities. Approval to release cetaceans in NSW waters require approval from the relevant NPWS Branch Director or above. Consultation with a veterinarian experienced in marine mammal health is also highly recommended.

327. Return rehabilitated cetaceans to the sea as soon as they are considered capable of survival. Seek advice from experts with particular knowledge of the species involved.

328. A cetacean ready for release should ideally:

- be alert (responsive to external stimuli such as touch and wave action)
- have less than 30% skin damage
- be able to breathe and swim
- demonstrate normal buoyancy (i.e. does not sink or list to one side)
- have a respiratory rate and body temperature within normal ranges
- have all the measured body reflexes, and
- have no other evidence of major injury or disease.

Also consider dependence issues.

329. Return species belonging to a highly localised population to their capture site. Releasing other species at or near their original stranding site is preferable but not essential.

330. For multiple strandings, it is preferable to release animals to the sea simultaneously.

331. Mark all animals being returned to the sea before their release so they can be identified if they re-strand or are re-sighted.

Using freeze branding for marking marine mammals is not supported by NPWS.

332. There are only a few methods available for tagging cetaceans. These include spaghetti tags (thin, coloured/numbered plastic tags inserted into the skin) or passive integrated transponder (PIT) tags. PIT tags are tiny tags encoded with a 10-place alphanumeric code, which are inserted under the skin. They are activated and read using an electromagnetic hand-wand scanner. These tags provide a permanent and reliable means of identifying individual animals. However, they cannot be read from a distance (those currently available can only be read from distances of up to 15 cm) and the receivers are not waterproof. Insert the tags into the left-hand dorsal surface 0.5 m posterior and 20 cm left of the midline on the animal's body to facilitate relocation.

333. Improper tagging methods can result in tissue damage and/or infection, so training and experience are required to apply these techniques.

334. Undertake radio tracking to gain more information on the fate of animals after release. This involves attaching either a satellite transmitter or a VHF transmitter. In the latter case, the animal would have to be tracked by a vessel or aircraft after release. Satellite tracking is more feasible for long-term, wide-range monitoring. The transmitter may be mounted on a moulded plastic saddle which is bolted through the dorsal fin. Alternatively, tags can by inserted into the skin/blubber layer through a small incision. Only experienced staff or marine mammal specialists should undertake this technique. Consult the NPWS marine wildlife contact list - DOC20/579674 on CM9.

335. Photographic or video records of stranded animals made before their release can be useful for recording distinctive natural features such as unusual fin or fluke shapes, scars, markings or colour patterns. This is especially important when attending beaked whale strandings and monitoring the movement of some animals where a description of the animal needs to be passed from one NPWS area office to another.

336. Animals that are released from a stranding often strand again, sometimes immediately or perhaps days or weeks later. The success of most rescue operations is largely unknown. Ideally satellite tracking devices or tags would be attached to some individuals but satellite devices are costly and usually have quite a limited time of successful deployment. Immediately after release, discreetly observe the behaviour and movements of the rescued group for as long as practical using suitable vessels or aircraft. Take care not to stress the animals.

337. Information on the fate of released animals will be analysed and published to guide future release and treatment strategies.

Figure 12 (a, b and c) Three photos showing NPWS staff laying nets to herd and capture three bottlenose dolphins (*Tursiops aduncus*) entrapped in a coastal lake. Photos: NPWS.

Figure 13 (a and b) The same dolphins are recovered and successfully released in nearby Richmond River in May 2009. Photos: NPWS.

Figure 14 (a and b above) Following their capture, NPWS staff and volunteers move dolphins from the water using rescue mats. Photos: NPWS.

Figure 14c All three dolphins were released at the mouth of an adjacent river. Photo: NPWS.

4.2.7.8 Rehabilitation at a care facility

338. Some animals may require more intensive or longer-term treatment that can only be provided at a care facility with the appropriate permits/licences and resources, (e.g. Taronga Zoo for cetaceans or Sydney Aquarium for dugongs).

339. Where professional advice advocates temporary rehabilitation at a facility, make arrangements through the Executive Director or above and the CEO of the relevant care facility.

4.2.7.9 Euthanasia

340. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

341. Whether an animal is suitable for release is determined by clinical assessment and applying the criteria listed in 4.2.7.7 Releasing rehabilitated animals. If the animal is irretrievably compromised, persistent attempts to save it will only prolong its suffering. Whether to perform euthanasia or allow animals to die naturally will depend on the circumstances of the stranding, the size of the animal and the expertise of personnel performing the procedure. Animals should only be euthanased by a veterinarian or an authorised NPWS officer with relevant experience.

342. In the case of single stranding events, the size of the animal will help determine whether or not the animal can be euthanased. Large whales (those over 8 m long) are very difficult to euthanase by acceptably humane methods. It is often better to apply palliative care rather than make repeated attempts at euthanasia. Unless these larger animals are moribund they can also pose a significant safety risk.

343. In the context of a mass stranding, the timing of euthanasia and the method employed can be critical. Cetaceans judged to be unsuitable for release and still alive on the beach when others are herded out to sea may affect the success of this operation. These animals can communicate with their conspecifics and it may be possible for animals to re-strand if ‘called back to shore’ by those animals still stranded. In such scenarios, it may be better to perform euthanasia on any such individuals before releasing the others is attempted.

344. At all times during a stranding event, the welfare of the stranded animals and the safety of all personnel assisting at the site are paramount.

4.2.7.10 Criteria for euthanasia

345. Stranded cetaceans and dugongs may only be euthanased on approval of the Branch Director. Decisions to euthanase must be based on the advice of the incident controller, who must consult with an experienced veterinarian, biologist or NPWS staff experienced in strandings and biology.

346. There are key decision-making tools to help decide whether or not an animal should be euthanised. An animal that meets the following criteria should be euthanased immediately:

- disabling physical injuries (e.g. dislocated or broken tailstock, wounds penetrating the thorax or abdomen, extensive deep lacerations to the body surface) or poor body condition
- copious haemorrhaging from the mouth, blowhole, genital opening or anus
- a rectal temperature of 42°C or above

- severe blistering and sloughing or skin disease covering a large portion of the body surface
- loss of reflexes (e.g. blowhole, eyelids, corneal, genital and tongue withdrawal)
- loss of jaw tone
- protruding penis in males
- spasms or severe shock
- abandoned calf (baleen or large odontocete) or socially dependent animal
- physical size of the animal (euthanasia should only be attempted where it can be achieved humanely); animals over 5 m long are problematic to euthanase.

347. The decision to euthanase should be made within the first hour following initial assessment if an animal meets any of the above criteria. Euthanasia is also appropriate for an animal that cannot be rescued with the available resources. For more information refer to 4.1.10 Euthanasia.

4.2.7.11 Methods of euthanasia

Intravascular injection

348. Intravascular injection of barbiturates or other lethal agents is usually the best way to achieve humane euthanasia in dugongs and cetaceans up to 8 m long. Attempts to euthanase large whales by injection of lethal agents into peripheral vessels such as those found in pectoral fins or flukes may be effective although in moribund animals or under very cold conditions it may be difficult to locate suitable blood vessels.

349. Human safety issues are a major concern when working around the tail of a large cetacean. In some cases it is reasonable to allow the animal to die naturally. However, if the animal can be safely approached and vascular access obtained, it may be beneficial to administer 200 to 300 ml of pentobarbitone intravenously to attempt to induce anaesthesia and hasten death. Before injecting, clear all non-essential personnel away from the animal and move away quickly once it is completed in case flurry behaviour is induced.

350. Pentobarbitone may also be given intracardiacally. The required dose for most species will range between 50 to 100 mg per kilogram of body weight and about 25 to 35 ml per metre of body length of a 325 mg per millilitre solution. A pentobarbitone dose as low as 10 mg per kilogram will induce deep anaesthesia and allow the animal to die naturally and without further suffering. Intraperitoneal injection of pentobarbitone should not be administered. For safety information, refer to Appendix 8 safety data sheet for pentobarbitone.

351. At the point of death or just before, the tail may begin to stroke violently in a swimming motion known as the flurry. Although this does not necessarily mean the animal is experiencing distress it can be very upsetting as well as potentially dangerous for surrounding personnel. To reduce the risk of this behaviour NPWS recommends animals are sedated before administering lethal agents.

352. A useful sedating agent is the benzodiazepine, midazolam, which can be given at 15 mg per metre of body length by intramuscular injection (IM). Other agents that have been used for this purpose are diazepam at 0.1 mg per kilogram of body weight and IM cepromazine at 100 mg per metre of body length IM. Always allow sedatives adequate time to take effect before proceeding with euthanasia. Regardless of whether or not the animal has been sedated, it is wise to warn personnel about the possibility of flurry behaviour. If public are in the area, move them away prior to euthanasia of the animal and/or screen the animal from their view.

353. After heavy sedation or an initial intravenous dose of pentobarbitone, intracardiac injection can be used to achieve euthanasia. Only veterinarians with the appropriate expertise and equipment may use these methods. An alternative lethal agent is a saturated solution of potassium chloride. It results in immediate cardiac arrest. It must, however, only be used once the animal is heavily sedated or anaesthetised after an intravenous dose of pentobarbitone. It is best administered intracardiac. The dose following sedation is 60 mg per kilogram of body weight by intravascular injection only.

354. A cetacean's heart can be reached by directing the needle from a point just behind the origin of the flipper to the same point on the opposite side of the body. Alternatively, it can be reached by inserting the needle either side of the sternum, at a point just posterior to a line joining the base of the pectoral flippers. The needle length needs to be up to half the diameter of the chest of the animal.

355. Dispose of carcasses of animals that have been euthanased by chemical means in a manner that prevents scavenging by other animals (refer to 4.13 Carcass disposal). Refer to expert advice.

Shooting

356. Euthanasia of dugongs by shooting is an acceptable alternative to lethal injection (which is the preferred method). Using a firearm of a calibre such as a .303 (fully jacketed), a frontal shot is placed slightly behind the eyes of the midline of the dorsal surface. Alternatively, a temporal shot would be effective. Where shooting is prescribed, liaison with the police and RSPCA is required beforehand.

357. Euthanasing cetaceans by brain shooting is based on anatomical knowledge of the cetacean skull, the tissues surrounding the cranium and external landmarks of the head. Rifles of various calibres are used, depending on the size of the animal. Small calibres, such as .223 and .243, are appropriate for smaller species like dolphins, whereas heavier calibres, such as .308, .375 and .458, are required for medium-sized species (to about 8 to 9 m long) such as pilot whales. For medium-sized species, fully jacketed projectiles are required because they have maximum capacity to pass through blubber, fibrous tissue and bone. Soft-nosed bullets, especially when travelling at high muzzle velocities of between 850 and 1,000 m per second must NOT be used because they distort or fragment. This results in an uncertain trajectory through body tissues so they may not reach or penetrate the cranium and are prone to deflection on low-angle contact with bone.

358. The trajectory of the aim may be directed through the blowhole, angled backwards to an imaginary mid-point on a line between the pectoral flippers. Alternatively, a lateral aim can be directed midway between the eye and the ear aperture. Consider using a shotgun for euthanasing small cetaceans (up to about 5 m long) in situations where using a rifle may pose a greater risk to the public as there is potential ricochet danger. The appropriate cartridge is a 28 gm solid slug or buckshot (nine lead pellets weighing in total 28 gm). These loads have been tested on the heads of cadavers of several species of small cetaceans. The results indicated live subjects would have been killed instantly by a laterally aimed shot.

359. In very large animals (longer than 5 m), such as sperm whales and the larger baleen whales, their thick cranial bone and overlying tissues are generally considered to render brain shooting uncertain or ineffective. Euthanasing large whales by brain shooting is therefore not recommended. In any species of cetacean, euthanasia by heart shooting is not recommended because death is caused by internal haemorrhaging and animals do not die instantaneously.

Whichever euthanasia method is selected, screen the site from public view and notify Public Affairs. Inform people in the vicinity about what is being done and why, and clear them away from the cordoned area as quickly and quietly as possible. The welfare of the animal(s) being euthanased and the safety of personnel involved in the procedure are of primary importance.

360. Where firearms are chosen as the preferred method, establish a cordon of 500 m (where possible). During the discharge of the firearm, there should only be the shooter and one support officer within this area.

361. Refer to the JSA for euthanasia.

4.2.7.12 Palliative care

362. In some circumstances, due to a dangerous location or situation, or the difficultly of euthanasia, leaving the animal to natural processes may be the most appropriate course of action.

363. Animals considered unsuitable for release (refer to Section 4.2.7.4 for release criteria) may be candidates for palliative care.

364. Following triage/first aid principles make animals as comfortable as possible. NPWS staff need to explain to members of the public present at the site what is being done and why. Allowing a stranded cetacean or dugong to die naturally is likely to provoke strong public and media response. NPWS must ensure good communication and public relations are maintained at all times. Seek discussions with the RSPCA and a veterinarian experienced in cetacean or dugong strandings before taking this course of action. Always notify Public Affairs, who will assist with communication with the public.

4.2.7.13 Stranded or unaccompanied calves

365. In the absence of their mothers, nursing calves of baleen whales and large odontocete species are not suitable candidates for release. The only humane options are palliative care or euthanasia. However, consult an experienced veterinarian before making any decision regarding the intended fate of such animals. Nursing calves of smaller odontocete species such as bottlenose dolphins may be considered for rehabilitation in an appropriately licensed venue (e.g. Dolphin Marine Conservation Park) if the Branch Director grants approval to do so. An export permit is required if the calf is going to be rehabilitated interstate, such as at Seaworld. Calves must not be intended for display or permanent captivity.

366. In the absence of empirical data on the survivability of calves, no odontocete which is nutritionally dependent at the time of stranding should be released unless it can be released with its mother, or back to its pod. These animals probably have not yet developed:

- skills necessary to find and capture food in the wild
- social skills required to successfully integrate into social groups
- knowledge of their home range or migratory routes

- predator recognition and avoidance skills.

In addition, extensive contact during care-giving may result in familiarity with humans leading to undesirable post-release human contact. There is still little information available on the survivability of rehabilitated mysticete calves.

4.2.8 Dead cetaceans and dugongs

367. The priorities when dealing with dead cetaceans or dugongs are to secure the area and the carcass as soon as possible after being notified of the stranding and to prevent people and dogs from interfering with the carcass. It is an offence under for anyone without a permit to be in possession of protected fauna or parts of protected fauna, including all cetacean species.

368. Beach-washed cetaceans and dugongs provide excellent opportunities for collecting scientific information, which would not otherwise be possible. Hence NPWS endeavours to collect scientific samples while managing dead cetacean or dugong incidents. For more information on sampling, refer to 4.13 Carcass disposal.

- Standard notification arrangements apply. Follow standard notification arrangements (see **Figure 4** and Figure 5) and inform the Branch Duty Officer, Area Manager and Branch Director of the event.
- Take control of the site. Cordon-off an area around the carcass, making sure people and dogs are kept out of the exclusion zone. If the carcass has been handled by members of the public, advise them to wash their hands with disinfectant soap as soon as possible for their own hygiene and anyone else that they may come into contact with.
- Check if any part of the carcass is required for research by contacting the Marine Wildlife Team in the Biodiversity and Wildlife Unit (refer to NPWS marine wildlife contact list - DOC20/579674 on CM9).
- Arrange transport if the carcass is required for necropsy and scientific sampling, and/or, burial. For carcass sampling, necropsy and disposal procedures, refer to 4.12 Collecting information and samples, necropsy, and record keeping and 4.13 Carcass disposal.
- Inform any members of the public at the scene about the purpose of collecting the carcass.
- Record, where possible:
  - the location, time and date of the stranding
  - approximate size and age class of the animal
  - species and gender.

Note as much information as possible when assessing the condition of the carcass, especially for species rarely seen in NSW, or if the animal is in an unusual location or far out of its usual range. Take photographs or film the carcass. This may help in assessing its condition. Enter all information into Elements Marine Wildlife module as soon as practicable.

4.2.9 Lifting, moving and transporting cetaceans and dugongs

369. Moving cetaceans and dugongs can be problematic and can potentially injure animals or people. The following methods are useful for moving small whales and dolphins.

370. Lift the animal onto a rescue mat or tarpaulin. If it is too large to lift, fold a portion of the mat against its belly, roll the animal gently onto the opposite side and pull the folds

clear. Once on the mat or tarpaulin, the animal can be moved − see Figure 15, Figure 16, Figure 17 and Figure 18 for examples of techniques for lifting and moving stranded cetaceans using mats and tarpaulins. The least-harmful method of carrying an animal on a rescue mat is to lift it with equal numbers of people on either side. This provides firm support along the animal's entire body.

371. When lifting is impossible, dragging a tarpaulin with an animal on it is acceptable as long as the ground surface is relatively smooth. When lifting an animal, avoid excessively flexing its body as this may obstruct its airways and place unnatural pressure on internal organs.

372. Slings positioned under the body and behind the fins can be used to drag an animal a short distance on a smooth surface. First remove all obstacles from the path. Never drag an animal by its tail stock or use bare ropes as slings. The difficulty in placing appropriate slings on large, beached whales normally precludes these animals from being moved around. However, it may be possible if they can first be refloated in a shallow pool.

373. Heavy machinery can be used to lift animals. Never move live animals within the bucket or on the forks of the machinery. Instead, position the animal on rescue mats by creating a sling. Apply the lift to ropes attached to strong poles threaded through the handles on either side of the mat. This creates a sling that will support the animal's body evenly along its length. If a cargo net is used, a bed of firm padding is necessary to protect the animal from abrasion and to avoid bending its body. Also use spreader bars to prevent the net from compressing the animal's body.

374. Use guide ropes that let the handlers hold the sling steady.

375. When lifting animals by hand, ensure enough personnel are present to reduce the load.

376. Transporting cetaceans (greater than 2m) in vehicles or trailers requires serious consideration. There are significant health and safety risks to staff, volunteers, community members and the animals. Undertake this only after fully assessing the risks by using the NPWS risk assessment process.

377. A common means of transporting animals is on a standard trailer, flatbed truck or specialised whale trailer. First make sure the platform the animal will be carried on can support its weight and accommodate the length of its entire body. If necessary, lengthen truck trays or trailers with boards, planks, old doors etc.

378. Place the animal on foam padding or a similar protective material. If nothing better is available, use a layer of sand covered with a sheet. Carefully position the animal upright to protect its eyes, blowhole, flukes and fins. Avoid using rough or gritty material which may cause skin abrasion. Ensure the animal is well buffered against sudden jolts.

379. Staff should only accompany transported animals in close confinement when risks to their safety are assessed as low. Notify the local police if planning to travel on public roads. They may be able to provide an escort if one is required.

380. Ensure conditions are as stress-free as possible for the animal. Drive slowly to lessen the risk of injury and stress. Monitor its condition during transport. Protect it from the sun, heat, wind and exhaust fumes, and keep it cool and wet. Stop regularly to allow rescuers to wet the animal using backpack sprayers, water buckets etc. Alternatively, auto spraying systems may be used to pump a fine spray of water from the vehicle − ensure the water is clean and free of additives.

381. Use disentanglement cameras for video contact between the vehicle passengers and the animal to monitor its condition during transport in a trailer.

382. Alternative modes of transport are:

- placing the animal on a pontoon (refer to Appendix 7 The pontoon rescue system) and towing it by boat or between two jet skis to the holding site or to a vehicle pick-up point
- placing the animal on a sled and towing it by hand or four-wheel drive vehicle along the beach to a better site for loading onto a truck or trailer − use sleds only on sand or mud substrate.

383. Wherever possible, avoid lifting and transporting the animal by helicopter. When doing so is critical to the success of the operation, lift the animal clear using a long-line slinging method to avoid problems caused by rotor downdraft. Do this only if the animal has been assessed as having a good prognosis for survival and all other options have been exhausted. On sandy beaches, long lines are essential because of the risk of sand blasting which can cause damage to the animal's skin and eyes. For more information see NPWS helicopter sling load standard operating procedures and resources.

Figure 15 (a, b and c) Captured bottlenose dolphins (*T.aduncus*) are placed onto rescue mats and carried to a rescue trailer. When using stretchers or rescue mats to move live cetaceans, ensure their flippers are positioned flat against their bodies and minimise noise levels. Photos: NPWS.

Figure 16 (a and b) Rescued bottlenose dolphins (*T aduncus*) being lifted onto a trailer. The trailer floor is lined with soft, waterproof mats. Wet sheets kept the animals cool. Photos: NPWS.

Figure 17 A 4.3-m juvenile humpback whale (*Megaptera novaeanglia*) being moved from a dangerous rocky location to a safe beach site using recue mat. It is important when moving heavy animals to ensure enough people are available to assist. Photo: NPWS.

Figure 18 A 2.6-m pygmy killer whale (*Feresa attenuata*) carcass being moved by NPWS staff after it beach-washed. Photo: M Jarman/NPWS.

4.2.10 Sampling and necropsy

384. Marine wildlife strandings play a vital role in the study of marine wildlife. For many species these incidents can provide a source of information on aspects of marine wildlife biology that cannot be obtained in any other way. It is therefore essential to maximise the opportunity to collect scientific data from event responses.

385. NPWS encourages necropsies being carried out on carcasses whenever possible. Necropsies can help determine the cause of death and responders should maximise the opportunity of collecting scientific data and samples from carcasses.

386. For sampling and necropsy procedures, refer to 4.12 Collecting information and samples, necropsy, and record keeping.

4.2.11 Carcass disposal

387. For carcass disposal procedures, refer to 4.13 Carcass disposal.

4.2.12 Follow up

388. For record keeping, refer to 4.1.9 Situation reporting and records and 4.1.3 Initial reporting.

4.2.13 Debriefing

389. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.3 Entrapment in coastal lakes or rivers

4.3.1 Quick response guide

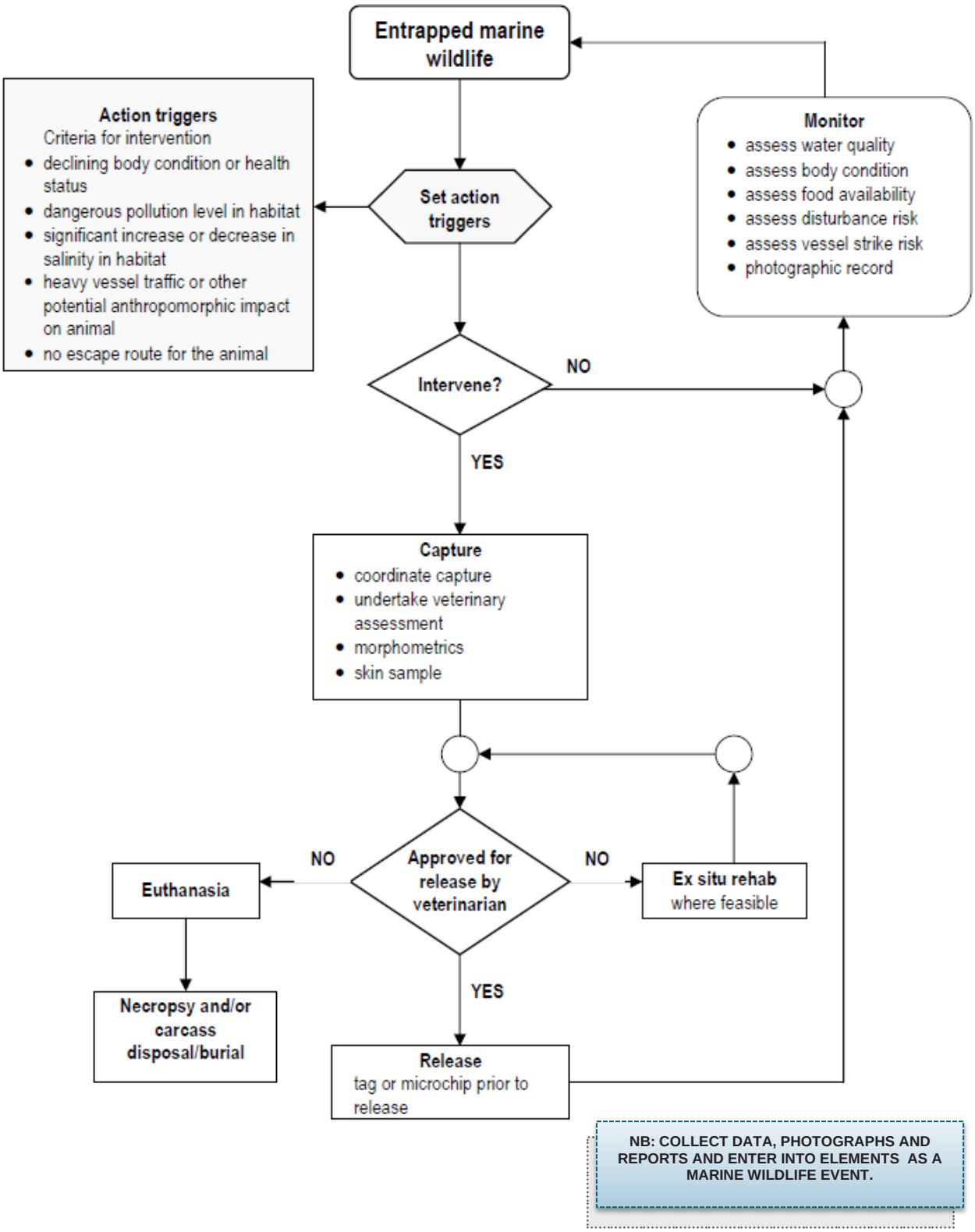


Figure 19 Decision flow-diagram for determining the most appropriate response in the event of marine wildlife becoming entrapped in a coastal lake or river.

4.3.2 Policy

390. The presence of cetaceans, dugongs, pinnipeds or marine reptiles in rivers or lakes does not warrant intervention unless the animal's welfare is threatened by factors such as:
    - declining body condition or health status
    - heavy vessel traffic
    - dangerous pollution levels
    - changes in salinity or other environmental factors.

391. Where any of these criteria are met, NPWS will undertake response actions to return the animal to sea.

4.3.3 Background

392. Some cetaceans such, as Bryde's whale and dolphins, commonly enter rivers. Many marine turtle species inhabit coastal lakes without consequence. However, sometimes cetaceans or marine reptiles become trapped in a coastal lake or a river. If their welfare is compromised, NPWS may consider intervening to capture and/or herd and return them to the sea as quickly and humanely as possible.

393. Carefully assess each situation to determine the course of action that will provide the best outcome for the animals' welfare (see Figure 19).

4.3.4 Initial report

394. Where a report is received regarding a possible entrapment, seek advice from departmental specialists, wildlife veterinarians and marine mammal/reptile specialists before intervening.

395. For initial reporting procedures refer to 4.1.3 Initial reporting.

396. After receiving the initial report, standard notification arrangements apply (see **Figure 4**).

4.3.5 Assessment

397. Undertake a full review of the situation, including surveillance, and record any sightings. Determine and set effective triggers that will invoke response actions.

4.3.6 Response actions

398. Within the incident action plan, establish a set of decision-making criteria (triggers) that will initiate a response. These triggers are based on changes within the animal's environment (e.g. monitor the water salinity in a coastal lake where a dolphin pod may be entrapped – if changing salinity is detrimental to the dolphin's welfare then begin a response).

399. Monitor any animal's behaviour and body condition (consider using community volunteers and take advantage of public education opportunities)

400. Undertake water-quality monitoring: salinity, pH, turbidity etc.

401. Review the animals' feeding capability (e.g. are there enough fish to support an entrapped dolphin pod until the lake mouth is reopened?)

402. Implement mitigation measures for human disturbance (i.e. reduced vessel speeds (undertaken through NSW Maritime); stop the public from feeding the entrapped animals.

403. Herd the animals back to sea by using a flotilla of boats to make an underwater 'wall' of noise. Experiment with other techniques to repel or attract the animal, such as barriers made of weighted strips of material or streams of bubbles, commercial whale pingers or underwater speakers playing appropriate cetacean vocalisations.

404. Capture the animals with nets by forcing them to strand, then treat the response as a stranding (refer to 4.2 Strandings – cetaceans and dugongs)

405. Further encourage the animal to leave by dredging or excavating a narrow or shallow point in the river or lake mouth.

4.3.7 Follow up

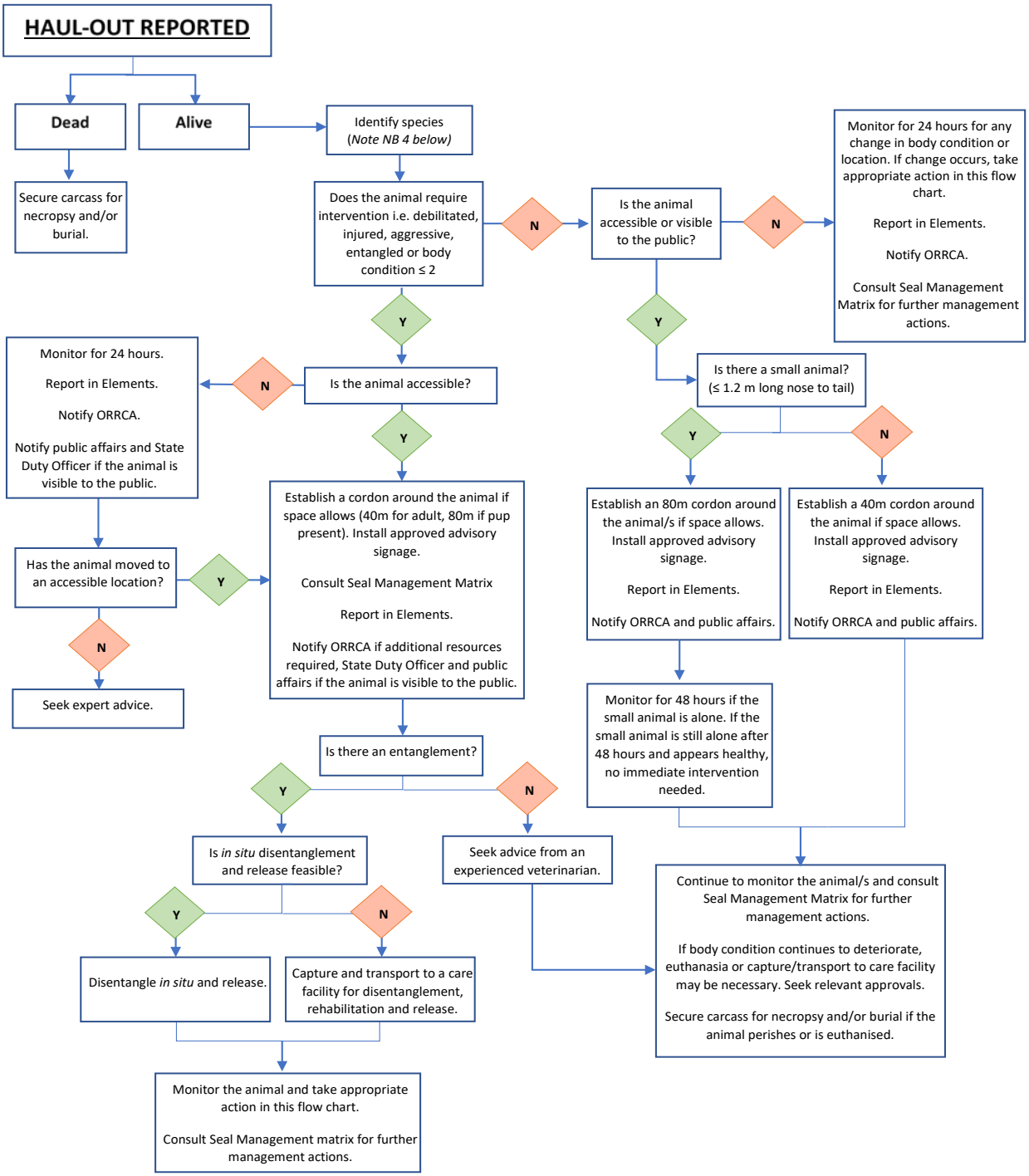
406. Include photographic records and descriptions of the released animal in the Elements marine wildlife event

407. Mark released animals. Use titanium tags for marine turtles and microchip, plastic spaghetti tags or non-toxic paint to mark released animals to facilitate post-release monitoring.

408. When practical, monitor the condition of a released animal following intervention.

409. For record keeping, refer to 4.1.9 Situation reporting and records and 4.1.3 Initial reporting.

4.4 Haul-outs – seals



NB 1: ALWAYS COLLECT DATA AND PHOTOGRAPHS FOR ELEMENTS.

NB 2: This diagram is intended as a guide only. Consultation with NPWS officers with pinniped experience and/or veterinarians experienced in marine mammal health is strongly recommended.

NB 3: Decisions regarding euthanasia of hauled out pinnipeds must involve consultation with an experienced veterinarian and the relevant Branch Director.

NB 4: Once Antarctic or sub-Antarctic species are taken into care, they cannot be released back into the wild. The only management options are permanent care in an approved care facility or euthanasia.

Figure 20 Decision flow-diagram for determining the most appropriate course of action in the event of a seal haul-out.

4.4.1 Quick response guide

ANTARCTIC SPECIES

- **There are only two management options for captured Antarctic or subantarctic seals in NSW** (including Antarctic and subantarctic fur seals, leopard seals, weddell seals, crabeater seals, and southern elephant seals): either permanent care in an approved care facility or euthanasia. If it is likely a hauled-out seal could be an Antarctic or subantarctic species, before intervening, consider the availability of long-term housing for the animal. Intervene only where the animal's welfare and/or public safety overwhelmingly warrant such action.

HAUL-OUTS

- Take control of the site. Notify the Branch Duty, Officer Area Manager and Branch Director of the situation. Ensure any actions expected to be taken by NPWS in managing the event commence as soon as possible after it has been confirmed by NPWS officers or volunteers from an accredited marine mammal rescue and rehabilitation organisation such as ORRCA.
- Establish a safety cordon of at least 40 m (80 m if a pup is present) around the animal/s ensuring people and dogs do not enter the exclusion zone at any time. Post seal haul-out warning notices (timing with the tides to ensure any signs and barriers do not get washed away or block the animal's access to the water at any time).
- Establish the animal's overall condition: alive, dead, entangled or injured. If injured, note the extent of injuries and whether the animal otherwise appears healthy (refer to 4.4.6.5 Evaluating the animal's condition).
- Entangled seals require urgent intervention. Report entanglements to the NPWS regional DO immediately with details of the animal's exact location and degree of entanglement.
- Record the location, time and date of the haul-out; the approximate size and age class of the animal; species and gender where possible (refer to Appendix 9 Seal species identification). Record overall body condition and status. Take photographs of the animal (filming may be useful in assessing its condition). Note as much information as possible, especially for species rarely seen in NSW or if the animal is in an unusual location/far out of its usual range.
- Complete and submit a marine wildlife event in Elements with the information recorded in the last step and; send regular updates to the DO.
- Monitor the animal over a period of at least 24 hours (48 hours for pups) if the animal's body condition score is ≥ 2 (refer to 4.4.6.5 Evaluating the animal's condition). If body condition is ≤ 2, consult with experienced NPWS officers and/or an experienced veterinarian or marine mammal biologist to determine the next course of action. Volunteers from an accredited marine mammal rescue and rehabilitation organisation (i.e. ORRCA) may be assigned to monitor the animal.
- Ensure to update the record in Elements during and after any wildlife event, including the final outcome and the animal status.

DEAD SEALS

- Cordon-off an area around the carcass and make sure no people or dogs enter this exclusion zone. If the carcass has been handled by members of the public, advise them to wash their hands with disinfectant soap as soon as possible for their own hygiene and for anyone else or pets that they may come into contact with.
- Assess the condition of the carcass noting as much information as possible and prepare a marine wildlife event in Elements. Check if any part of the carcass is required for research use (refer to the NPWS Marine Wildlife Contacts list (DOC20/579674 on CM9)
- Arrange transport if the carcass is required for necropsy and scientific sampling and/or burial.
- Inform any members of public present at scene of the situation and the purpose of collecting the carcass.

4.4.2 General seal haul-out policies

410. NPWS responds to reports from the community regarding sick or dead seals by providing relevant information and investigating where necessary.

411. All NPWS staff and volunteers follow standard handling, hygiene and reporting protocols during a seal haul out or where a dead seal has washed ashore.

412. NPWS works closely with volunteer organisations, local councils and NGOs to help disseminate information relevant to seal haul-outs.

413. NPWS efficiently and effectively manages seal incidents with an interest in monitoring healthy hauled-out animals and collecting scientific information, including samples and specimens, which will improve scientific knowledge on species biology and ecology and haul-out phenomena.

414. NPWS collects and stores accurate and detailed records of seal incidents and sightings and establishes information-sharing strategies with other organisations and agencies holding similar information.

415. The environment protection provisions established under the Antarctic Treaty System and the Convention for the Conservation of Antarctic Marine Living Resources also apply to Australia, which is a signatory nation of these treaties. In 1994, the Scientific Committee on Antarctic Research (SCAR) passed a recommendation discouraging the practice of reintroducing rehabilitated seals of Antarctic or subantarctic origin back into the wild to prevent potential disease or pathogen transmission from rehabilitated seals to wild seals and possibly also to other Antarctic wildlife.

416. **It is prohibited in NSW to release rehabilitated Antarctic or subantarctic seals (e.g. leopard seals, southern elephant seals, subantarctic fur seals, crabeater seals and weddell seals) back into the wild**. Seals of Antarctic origin captured in NSW must either be euthanased or taken into permanent care in an approved care facility. Even precautionary decisions to capture seals of Antarctic or subantarctic origin must, therefore, consider the availability of long-term housing for the animal. Make them only where the animal's welfare and/or the safety of the public overwhelmingly warrant such action.

4.4.2.1 Policies regarding euthanasia of seals

417. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

418. If a hauled-out seal is severely incapacitated and unlikely to survive, or if rehabilitation is not viable, the animal should be euthanased.

419. The delegated officer must first approve a decision to euthanase an animal. This decision will be based on advice provided by a suitably experienced veterinarian or other expert individuals and the attending NPWS officer. Refer to 4.1.10 Euthanasia for details.

420. When euthanasia is required, carry it out as soon as possible to avoid prolonging the animal's suffering. However, the decision to euthanase should be based on advice from marine mammal experts or a suitably experienced veterinarian.

4.4.3 Background

421. When a seal comes ashore temporarily (e.g. to give birth, rest, avoid predators or thermoregulate) this is known as hauling out. In most cases, the animals will depart of their own accord within a day or two.

422. Sometimes seals coming ashore will be seriously incapacitated. Depending on their haul-out location, this may warrant intervention such as rehabilitation or euthanasia. Assess such situations and carefully plan before deciding to intervene. Seals have remarkable recuperative powers and can recover from what appear to be severe injuries.

423. Monitor seals that come ashore at busy sites to prevent interference from people and dogs, and to prevent people from being bitten if they approach a seal too closely. Seals are capable of inflicting severe injuries and can be surprisingly aggressive and agile when frightened. Moreover, seals harbour a range of pathogens which can cause diseases in humans (zoonoses), posing additional risks that must be managed effectively.

424. Hauling-out is a natural behaviour and contributes to the overall survival and wellbeing of seals. Except where a hauled-out seal is entangled and requires intervention, the most appropriate action is to minimise disturbance to the animal and observe it for at least 24-hours before deciding whether further action is required. The underpinning philosophy behind NPWS's haul-out management is **'observation before intervention'**.

4.4.4 Initial report

425. For initial reporting procedures refer to 4.1.3 Initial reporting.

426. When completing the initial report refer to Appendix 9 Seal species identification to help identify the seal species involved.

4.4.5 Take control of the site

427. The public and the relevant land manager are responsible for managing risks from the natural environment, including risks associated with interactions with wild animals. Attending officers need to ensure the public and other authorities understand this.

Ensure NPWS duty officers (DO and any relevant land owners) have been notified of the haul-out and the actions expected to be taken by NPWS in managing it once the haul-out has been confirmed by NPWS or an accredited marine mammal rescue and rehabilitation organisation.

428. It is important to gather and disseminate information such as the following to help determine the initial actions to take. Find out:

- the species of the reported animal, ,(refer to Appendix 9 Seal species identification), number of animals and where they are (suburb, beach name etc.);
- estimated size of the animal/s (to determine ages class – pup, juvenile or adult);
- condition (including wounds and any obvious entanglement);
- behaviour and location of the animal/s (e.g. on rockwall, on a public beach, aggressive, weather conditions and other details).

429. When assessing the haul-out, ascertain the following:

- threats to personnel, public or property
- threats to hauled out animals
- any other animals likely to haul-out (determine if other animals are nearby)
- weather – current and forecast
- sea conditions and tide information
- time of day
- resources available
- access and ability to secure the site
- presence of public and/or other vehicles or vessels
- the presence of natural or cultural heritage values which may place limitations on operational activities.

430. Once a haul-out has been reported and confirmed, inform the appropriate land manager (e.g. the local council) and ORRCA. Any attending NPWS officers/land manager needs to establish a cordon around the animal/s for animal and public safety. This should be 40 m for an adult seal and 80 m if a pup is present.

431. When establishing a cordon:

- treat the animal/s with caution at all times and do not approach it closely without training
- cordon-off an area around the animal/s, making sure people and dogs do not enter the exclusion zone
- ensure signs, people and vehicles on site do not block the animal/s access to the water at any time.

432. If the minimum exclusion zone cannot be established due to spatial factors (i.e. if there is less than 40 m of available beach), an exclusion zone using the maximum allowable space should be established, while still maintaining that signs, people and vehicles do not block the animal/s access to the water at any time.

433. Refer to the seal management risk matrix to assist in determining the appropriate response based on risk.

RISK LEVEL			
LOW	*MODERATE*	*HIGH*	*EXTREME*
Isolated beach or location with low visitation. Seal/s not wary of humans - will undertake normal activities and not be influenced by the presence or number of humans. Interaction between humans and animals is uncommon (will result in the animal retreating/moving away quickly).	Regular observation of a non-aggressive seal/s at a highly frequented site with high level of public interest.	Aggressive seal/s. Inflicted injury to the public or domestic pets, regardless of whether penetration of skin or bruising has occurred.	Highly aggressive seal/s. Fatal attack to a person.
Regular observation of a non-aggressive vagrant seal/s in an inaccessible location, undertaking normal activities.	Lone pup at a highly frequented site with high level of public interest.	Aggressive seal/s. Displaying threatening behaviour to people or domestic pets when unprovoked. Lunging, yawning, barking or chasing	
Single observation of a non-aggressive seal in an inaccessible location, undertaking normal activities.	Single observation of a non-aggressive seal at a highly frequented site with high level of public interest.	Seal/s soliciting food. Deliberately approaching humans to be hand fed or stealing fish catch.	
Leopard seal/s at an inaccessible location.	Leopard seal/s at a location with low visitation.	Leopard seal/s at a location with high visitation.	
Entangled, injured, diseased or emaciated seal/s at an inaccessible location.	Entangled, injured, diseased or emaciated seal/s at a location with low visitation.	Entangled, injured, diseased or emaciated seal/s at a highly frequented site with high level of public interest .	

Figure 21 Seal Management Matrix – a guide to determine appropriate response level.

Table 4: Management response options for seal haul outs based on location and risk.

Location	Animal condition	Management response
Beach	Healthy	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved signage • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor animal for any change in condition.
	Emaciated/injured	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor the animal for any change in condition. • Relocation to a quieter site and/or euthanasia may be necessary if body condition deteriorates. Seek advice from an experienced veterinarian or marine mammal specialist.
	Entangled	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Log a marine incident in Elements. • Disentangle and release animal in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release.
Park or other busy public space	Healthy	• Set up an exclusion zone (40 m for adults, 80 m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements and notify public affairs. • Engage ORRCA volunteers if additional resources are required. • Monitor animal for any change in condition.
	Emaciated/injured	• Set up an exclusion zone (40 m for adults, 80 m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements and notify public affairs. • Engage ORRCA volunteers if additional resources are required. • Monitor the animal for any change in condition. • Relocation to a quieter site and/or euthanasia may be necessary if body condition deteriorates. Seek advice from an experienced veterinarian or marine mammal specialist.

	Entangled	• Set up an exclusion zone (40 m for adults, 80 m if pup present). • Log a marine incident in Elements and notify public affairs. • Disentangle and release animal in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release.
Rock wall/headland (or other inaccessible place)	Healthy	• Monitor the animal for any change in condition. • Install approved Departmental signage. if there is a walkway or other public viewing site nearby. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required.
	Emaciated/injured	• Monitor the animal for any change in condition and to see if it moves to an accessible location. • Install approved Departmental signage. if there is a walkway or other public viewing site nearby. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • If the animal moves, relocation to a quieter site and/or euthanasia may be necessary if body condition deteriorates. Seek advice from an experienced veterinarian or marine mammal specialist.
	Entangled	• Monitor the animal to see if it moves to an accessible location. • Log a marine incident in Elements. • If the animal moves, disentangle and release it in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release. • If the animal doesn't move, seek advice from an experienced veterinarian or marine mammal specialist.
Jetty/wharf	Healthy	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor animal for any change in condition.
	Emaciated/injured	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved Departmental signage.. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor the animal for any change in condition.

		• Relocation to a quieter site and/or euthanasia may be necessary if body condition deteriorates. Seek advice from an experienced veterinarian or marine mammal specialist.
	Entangled	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Log a marine incident in Elements. • Disentangle and release animal in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release.
Fish cleaning table	Healthy	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor animal for any change in condition. • Ensure people do not deliberately feed the seal. • Consider options to relocate the table.
	Emaciated/injured	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Install approved Departmental signage. • Log a marine incident in Elements. • Engage ORRCA volunteers if additional resources are required. • Monitor the animal for any change in condition. • Relocation to a quieter site and/or euthanasia may be necessary if body condition deteriorates. Seek advice from an experienced veterinarian or marine mammal specialist.
	Entangled	• Set up an exclusion zone (40 m for adults, 80m if pup present). • Log a marine incident in Elements. • Disentangle and release animal in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release.
In water	Healthy	• Keep people and vessels 10m away from adults and 80 m away from pups. • Monitor animal. • Log a marine incident in Elements. • If the animal is off a popular swimming beach or high vessel traffic area, notify relevant authority (e.g. local council, SLS) and ORRCA if likely to continue to attract community attention
	Emaciated/injured	• Keep people and vessels 10m away from adults and 80 m away from pups. • Monitor animal. • Log a marine incident in Elements.

		• If the animal is off a popular swimming beach or high vessel traffic area, notify relevant authority (e.g. local council, SLS) and ORRCA • If the animal comes to shore, refer to the relevant section in this table to determine course of action.
	Entangled	• Disentangle and release animal in situ if feasible. If unfeasible, capture and transport to a care facility for disentanglement, rehabilitation and release.

4.4.6 Assessment

4.4.6.1 Quick guide to identifying seals

434. Pinniped (meaning 'fin-footed' in Latin) includes all seals, sea lions and walrus. These animals live in the ocean but can come on land for long periods of time). Pinnipeds are separated into three sub-groups – otariids (eared seals), phocids (earless seals or true seals) and walruses. Walruses are native to the Northern Hemisphere and therefore do not occur in Australia. Refer to

435. Table 4 and **Figure 22** for the key morphological differences between otariids and phocids. Refer also to **Appendix 9 Seal species identification.**

Otariids (eared seals)	**Phocids (earless seals)**
• all fur seals and sea lions	• all earless seals
• external ear flaps (pinnae)	• have no external ear flaps
• four teats	• have two teats
• larger fore-flippers	• smaller fore-flippers (except leopard seals)
• smaller hind-flippers (which can be rotated forwards under the body) are used to assist with locomotion on land	• larger hind-flippers (cannot be rotated forwards under body)
• on land, appear to walk and 'climb' using all four flippers	• on land, move like caterpillars
• otariids found in Australia include Australian and New Zealand fur seals (also known as long-nosed fur seals), Australian sea lions and subantarctic fur seals	• phocids found in Australia include leopard seals, southern elephant seals, crabeater seals and weddell seals

Table 4 Key morphological differences between otariids and phocids.

Otariids (eared seals)	Phocids (earless seals)
• all fur seals and sea lions	• all earless seals
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• on land, appear to walk and 'climb' using all four flippers	• on land, move like caterpillars
• otariids found in Australia include Australian and New Zealand fur seals (also known as long-nosed fur seals), Australian sea lions and subantarctic fur seals	• phocids found in Australia include leopard seals, southern elephant seals, crabeater seals and weddell seals

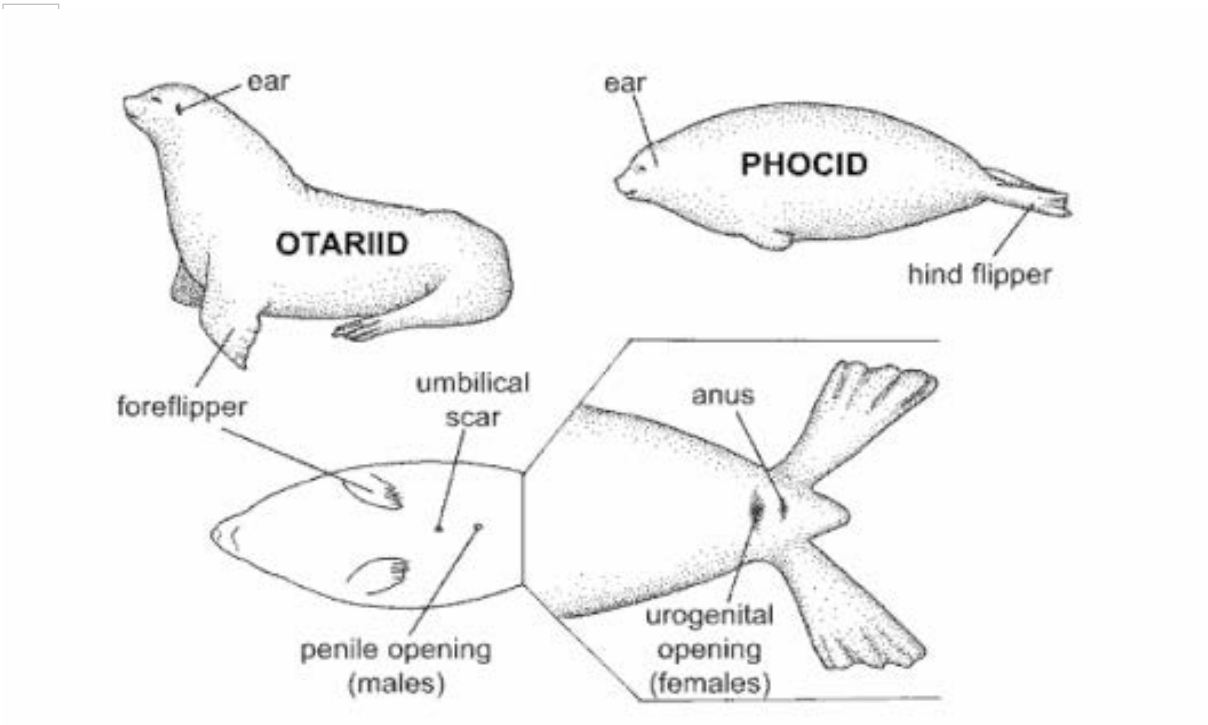

Figure 22 Key morphological differences between otariid and phocid seals (source: Geraci & Lounsbury 2005)

4.4.6.2 When not to intervene

Healthy animals without entanglement

436. There is no need to intervene when the seal appears healthy, is not entangled, and there is no threat to either public safety or the animal's welfare. Common, natural seal behaviours are often misinterpreted as signs of injuries or distress. These behaviours are outlined in Section 4.4.6.6.

Pups (otariids only)

437. It is not unusual for otariid pups to be alone (and in unusual locations) over extended periods while their mothers are away feeding at.

438. Pups found alone and/or in poor condition may be undergoing weaning (when their mother stops nursing them completely) and do not usually require intervention. Many pups learn the necessary skills to survive on their own. However, there are almost always some pups that do not survive weaning. Such post-weaning mortality is a natural part of the seal life cycle.

439. Unless a hauled-out pup is entangled or severely injured and in need of immediate intervention, the only action required is to cordon-off an area around the pup and monitor it carefully over a 48-hour period. Ensure there are no off-leash or stray dogs on site while the seal is hauled out. Consult with marine biologists, veterinarians with marine mammal care experience, or the Marine Wildlife Team in the Biodiversity and Wildlife Unit, before intervening.

4.4.6.3 When to monitor

440. In some situations, it will not be obvious whether a hauled-out seal requires intervention. In such cases the best course of action is to monitor the animal over a period of at least 24 hours. Take detailed notes on the animal's overall condition and behaviour and discuss these with a marine mammal specialist and/or a veterinarian with experience in marine mammal health. Next, reassess the animal's overall condition before determining whether intervention is appropriate.

441. Hauling out is a natural behaviour for seals. They have excellent recuperative abilities and, sometimes, intervention may cause more harm than good.

4.4.6.4 When to intervene

442. Intervention (such as euthanasia, capture or rehabilitation) requires appropriate approvals.

443. Any decision to euthanase a seal must be made by a delegated officer. Refer to 4.4.8.7. Euthanasing seals and 4.1.10 Euthanasia for more information.

444. A decision to capture and rehabilitate a seal requires approval from the relevant Branch Director.

445. The following information is intended as a guide only. In some cases (e.g. suspected advanced emaciation/body condition score ≤2 – refer to 4.4.6.5 Evaluating the animal's condition), the attending NPWS officers will need to consult marine mammal specialists or an experienced veterinarian to further assess the animal. Refer to the marine wildlife incident and information contact list for useful contacts.

446. Intervention is warranted for animal welfare or where one or a combination of the following are indicated:

Entanglement
• in any form of marine debris e.g. fishing net or line, plastic or nylon rope, other plastic/synthetic debris
Covered in oil
• if the animal is extensively covered in oil − intervening when only light oiling is present may cause more harm than good; consult with experienced NPWS staff and/or a veterinarian to determine if the extent of the oiling on the animal warrants intervention
Debilitating injuries
• animal unable to move • limb or jaw fracture • sharp objects such as fishing hooks, stingray barbs or any other objects lodged in the mouth
Advanced emaciation
• prominent ribs, spine, hip bones and thin neck making the head appear disproportionately large, and • unresponsive, weak
Serious illness
• bloated or swollen abdomen in emaciated animal • unresponsive, weak • head shaking, tremors or head tilt • body tremors or convulsions • vomiting (e.g. more than five times per hour) • obvious swellings • pus-filled and/or bloodied discharge from nostrils, eyes, genital openings and/or anus • eye (or eyes) opaque and/or excessively swollen and tearing (in conjunction with poor body condition, and not to be confused with the natural function of eye lubrication which may appear tearing) • laboured, rapid, shallow, open-mouthed breathing • excessive cooling behaviour such as flipping sand over itself, fanning flippers − these may indicate the animal is overheated (this is a natural behaviour; however it may be a sign of a more serious condition if it is observed in conjunction with any of the above).

4.4.6.5 Evaluating the animal's condition

447. Use Figure 23, Table 5 and Table 6 together with the information and photos in this section to assess the body condition of hauled-out animals. If unsure, consult experienced NPWS officers and/or a veterinarian with experience in marine mammal health. Refer to the NPWS Marine Wildlife Contacts list (DOC20/579674 on CM9)

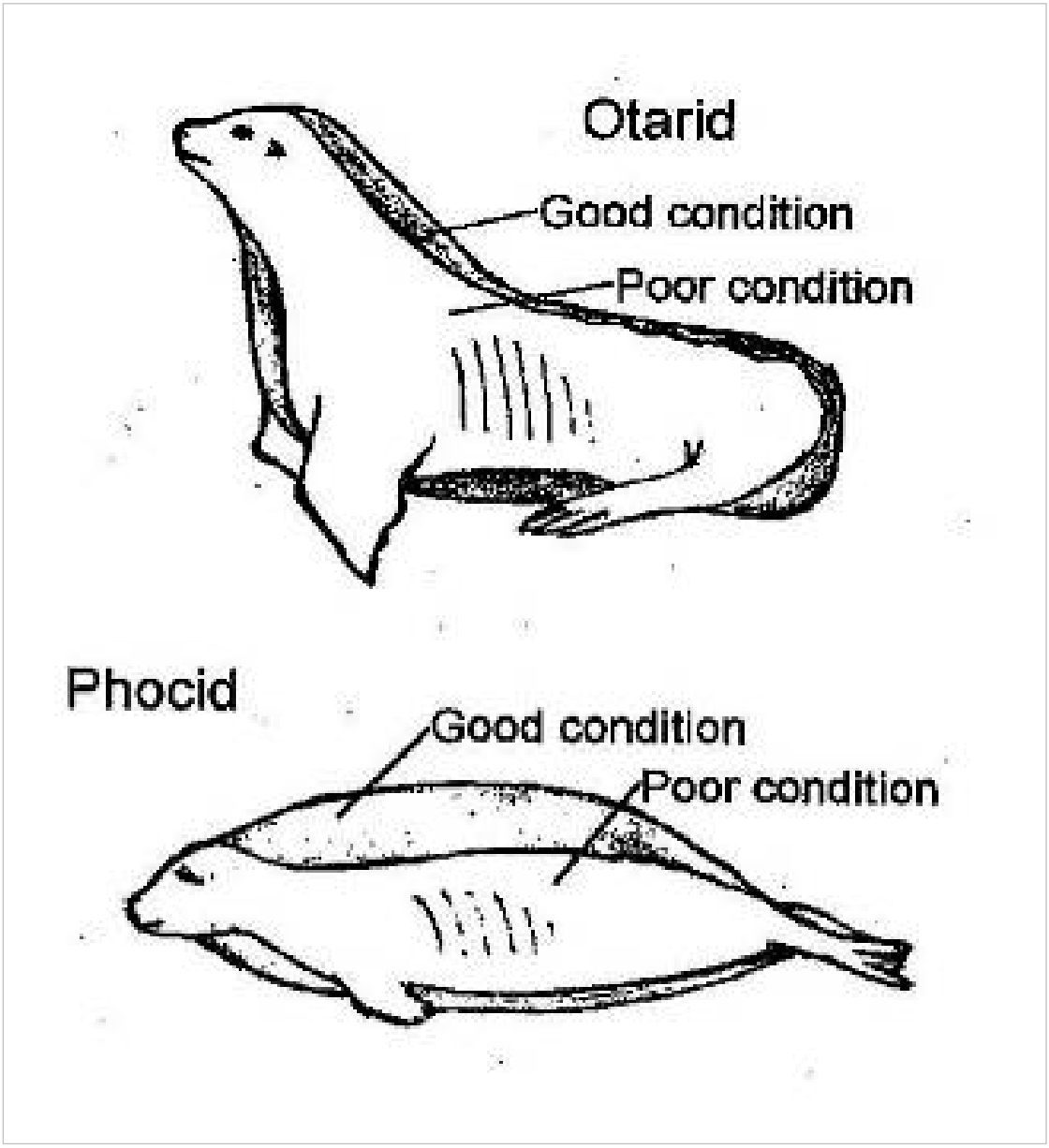

Figure 23 Two extreme body conditions for otariids (eared seals) and phocids (earless seals). The key features to observe when assessing body condition include the neckline, pelvic bones and concavity of abdomen, ribs and lumbar vertebrae. When the neckline is very thin, the abdomen is very concave/sunken and the ribs, lumbar vertebrae and pelvic bones are very prominent, the animal is in poor condition. Where these features are not visible and the animal obviously has a lot of muscle, the animal is in good condition.

Score	Condition	Description
5	Excellent	Healthy looking animal. Neckline not present with little to no distinction between head and body. Abdomen is convex and may be bulging. Body is rounded and plump.
4	Good	Neckline slightly concave. Abdomen/waist is flat to slightly rounded. Loss of hourglass shape to waist. Pelvic bones not visible.  A leopard seal with a body condition score of 4 (Photo: Dr Tracey Rogers)
3	Fair	Neckline still present but less distinction between head and body. Abdomen/waist slightly concave. Smooth hourglass shape to waist. Ribs and lumbar vertebrae not visible. Pelvic bones just visible.  A leopard seal with a body condition score of 3 (Photo: Dr Tracey Rogers)
2	Poor	Obvious neckline. Abdomen/waist slightly sunken/concave. Marked hourglass shape to waist. Ribs, lumbar vertebrae and pelvic bones visible.  A leopard seal with a body condition score of 2 (Photo: Shona Lorigan)
1	Emaciated	Very obvious neckline making the head distinct from the body. Abdomen/waist distinctly sunken/concave. Accentuated severe hourglass shape to waist. Ribs, lumbar vertebrae, pelvic bones and other bony structures obvious and prominent. Obvious loss of muscle.

		 A southern elephant seal with a body condition score of 1 (Photo: Wayne Reynolds)

Table 5 Body condition scoring for phocids (earless seals) (source: Larry Vogelnest, Taronga Conservation Society Australia 2009).

Score	Condition	Description
5	Excellent	Neck thick, rounded and bulging (especially in males). Abdomen is convex and may be bulging. Body is rounded and plump.  An adult male Australian seal lion (left) (Photo: Dr Ben Pitcher) and an adult male New Zealand fur seal (right) (Photo: John Gibbens) with body condition scores of 5
4	Good	Neck not distinct and slightly thickened. Abdomen/waist is flat to slightly rounded. Loss of hourglass shape to waist. Pelvic bones not visible.  A New Zealand fur seal with body condition score of 4 (Photo: Shona Lorigan)
3	Fair	Neck less distinct. Abdomen/waist slightly concave. Smooth hourglass shape to waist. Pelvic bones just visible. Ribs and lumbar vertebrae not visible.  A New Zealand fur seal with body condition score of 3 (Photo: Shona Lorigan)
2	Poor	Neck obvious. Abdomen/waist sunken/concave. Marked hourglass shape to waist. Pelvic bones visible. Ribs, lumbar vertebrae visible.

		 A New Zealand fur seal with body condition score of 2 (Photo: Shona Lorigan)
1	Emaciated	Neck thin and obvious. Abdomen/waist markedly sunken. Accentuated, severe hourglass shape to waist. Pelvic bones obvious and prominent as are ribs, lumbar vertebrae and other bony structures. Obvious loss of muscle.  An adult female Australian sea lion with body condition score of 1 (Photo: Aaron Machado)

Table 6 Body condition scoring for otariids (eared seals) (source: Dr Larry Vogelnest, Taronga Conservation Society Australia 2009).

448. Animals **with body condition score 3 to 5** − unless indicated there is no need to intervene as the animal may simply be resting. However, if it is in a public place or acting aggressively, erect a barrier. Have NPWS officers or volunteers from an accredited wildlife rescue or rehabilitation group such as ORRCA attend it to reduce the risk to the public and disturbance to the animal. Ensure people and dogs are always kept out of the cordoned-off area. Otherwise, healthy seals may be 'moved on' with the use of herding boards. Consider this action as a last resort − undertake it only when the animal's welfare or public safety warrants it.

449. **Animals with body condition score 1 to 2** − ideally; a veterinarian with marine mammal experience should assess any animals with a body condition score of 1 to 2. Unless the vet determines intervention is necessary, there is no need to take further action beyond cordoning off an area around the seal and monitoring it. Ensure people and dogs are kept out of the cordoned-off area at all times.

Figure 24 An Australian fur seal pup (*A. pusillus doriferus*) with a body condition score of 1 to 2. After weaning their pups, female fur seals usually depart for sea, leaving the pups to fend for themselves. Many pups learn to swim, dive and catch prey by themselves but some pups do not survive the post-weaning stage. Such mortality is a natural part of the seal life-cycle. Unless pups with a body condition score of 1 to 2 are entangled (and thus in need of immediate intervention), the only management option is monitoring them for 48 hours before determining whether further action is required. Photo: John Gibbens/sealimages.com.

450. **Moulting seals** − only earless seals (phocids) undergo annual moults; eared seals (otariids) renew their coats gradually throughout the year. Moulting in elephant seals (see Figure 25) lasts from four to six weeks, commencing around the eyes and flippers. It is a dramatic moult, with sheets of skin coming off. This gives animals the appearance of being in poor condition, so one may be reported as sick or distressed. They do not feed during this period and lose a significant amount of weight. Similarly, the presence of extensive amounts of nasal discharge is normal and exacerbated by the animal's reluctance to enter the water. Unless veterinary assessment determines intervention is necessary, there is no need to disturb the animal.

451. If a moulting seal is in a public place, cordon-off an area around the animal. The animal may need to be relocated by NPWS staff; however, relocation is a last resort. Always be mindful that seals of Antarctic origin captured in NSW must either be euthanased or taken into permanent care in an approved care facility. Even precautionary decisions to capture seals of Antarctic or subantarctic origin must consider the availability of long-term housing. Make them only where the animal's welfare and/or the safety of the public overwhelmingly warrant such action.

Figure 25 A juvenile southern elephant seal (*M. leonina*) undergoing a moult. Its body condition score is 3 to 5, so no intervention is required. (Photo: Kathryn Wheatley).

452. **Injuries** − seals with injuries have excellent recuperative abilities and may not require further intervention apart from erecting a cordon to prevent public access to it (for the safety of the public and the seal) and regular monitoring. Ensure there are no dogs on site while the seal remains hauled out.

453. Unless the injury penetrates the body cavity or exposes bone or joints and the seal is responsive when approached, it is not likely to require intervention beyond cordoning-off an area around it and monitoring over a 24-hour period. Ensure any people and dogs are kept out of the cordoned-off area at all times.

454. **Large bite wounds** − bite wounds on an otherwise healthy seal do not require any intervention. However, action may be required if the seal's wounds are extensive:

- if the wound penetrates a body cavity (chest or abdomen);
- the area affected is very large or appears to be severely infected;
- penetrates a joint; or
- has a fractured bone protruding.

Figure 26 An Australian fur seal (*A. pusillus doriferus*) carcass with open wounds (non-anthropogenic and non-fatal − it does not require intervention). Most seals can recover from what may appear to be extremely severe wounds (inflicted by sharks or, sometimes other seals). (Photo: John Gibbens/sealimages.com).

455. **Cookiecutter shark wounds** − Cookiecutter sharks (genus *Isistius*) have cigar-shaped bodies, conical snouts and two low, spineless dorsal fins. They grow up to 50 cm long (see Figure 27). These sharks have very large triangular shaped teeth on the lower jaw and a row of piercing teeth on the upper jaw. Cookiecutter sharks live at depths of 3,500 m but come up to the water's surface at night to feed. They do so by attaching themselves to prey using their suctorial lips and biting into the flesh while twisting their lower body around to remove plugs of flesh. As a result, cookiecutter sharks leave characteristic circular or oval-shaped wounds on their prey, which include seals and cetaceans (see Figure 28).

Figure 27 (a and b) Left: A largetooth cookiecutter shark (*Isistius plutodus*). Right: A closeup of the mouth. (Photos: C Bento/Australian Museum).

Figure 28 Cookie cutter shark wounds: The top two photos show a fur seal while the bottom two are of a leopard seal (*Hydrurga leptonyx*). The body condition score for both seals is 3 to 5, and therefore intervention is not necessary. (Photos: NPWS).

456. Cookie cutter shark wounds are not directly fatal. However, their presence on a hauled-out seal may indicate suboptimal health if they occur in conjunction with other factors, such as a body condition score of 1 to 2. Seals with cookie cutter shark wounds and with a body condition score of 3 to 5 generally do not require intervention. Sometimes the wound sites mean the animal's health may become compromised if left untreated − e.g. wounds resulting in eye injuries or loss of an affected eye, or wounds penetrating a joint. In such cases, monitor the animal over a 24-hour period and seek advice from an experienced veterinarian.

457. **Gunshot wounds** – gunshot wounds in seals generally do not leave characteristic exit or entry wounds and can be very difficult to identify. Radiographs are often the best way to confirm gunshot wounds. However, unless an animal suspected of having gunshot wounds also has a body condition score of 1 to 2, the recommended course of action is to monitor the animal over a period of at least 24 hours and seek advice from an experienced veterinarian.

458. **Apparent wounds** − several, naturally occurring features of seals are often mistaken for wounds by those unfamiliar with seal biology and physiology. It is vital that hauled-out seals are not disturbed because apparent wounds have been mistaken for actual injuries. Females have mammary glands on the belly in front of the rear flippers. These are commonly mistaken for wounds. In addition, seals continuously secrete tears to lubricate the eyes, which can also look like a wound (see Figure 29). Urogenital openings (see Figure 33) are also sometimes mistaken for wounds.

Figure 29 A New Zealand fur seal (*A. forsteri*). The dark patch around its eye is caused by eye secretions and is normal. Intervention is not necessary. (Photo: Geoff Ross/NPWS).

459. Parted fur may show the undercoat and skin; the colouring often appears to resemble wounds (see Figure 30). In such cases, there is no need to intervene.

Figure 30 A thermoregulating juvenile subantarctic fur seal (*Arctocephalus tropicalis*). Note the pinkish red areas − these are partings in the fur and are not injuries. No intervention is required. (Photo: Geoff Ross/NPWS).

460. **Eye injuries** – seals forage at depth where there is low light and do not rely heavily on eyesight. Injuries to their eyes do not necessarily mean affected animals can no longer forage, feed, navigate or avoid predators well. This is because they will use their vibrissae (whiskers) and acoustic senses to a greater extent to navigate, locate prey and perform other functions. When monitoring seals with eye injuries, note whether the injury is fresh or healing, and the animal's overall body condition. See Figure 31 and Figure 32 for examples of seals with eye problems that did not require intervention due to their overall good condition.

461. Elephant seals have large prominent eyes that are often naturally red-rimmed (the conjunctiva). This redness may sometimes be reported as a problem. However, the combination of a snotty nose and red eyes is normal for a healthy elephant seal and intervention is not necessary.

Figure 31 This Australian fur seal (*A. pusillus doriferus*) has an eye problem but otherwise appears to be in good condition (body condition score 3 to 5). Intervention is unlikely to be necessary, however consult an experienced veterinarian or a marine mammal biologist for advice. (Photo: John Gibbens/sealimages.com).

Figure 32 An Australian sea lion (*N. cinerea*) with an eye injury. In such cases, if the animal appears to be otherwise in good condition, intervention is unlikely to be necessary. **Consult an**

experienced veterinarian or marine mammal biologist for advice. (Photo: **Dr** Benjamin Pitcher**)**.

4.4.6.6 Common seal behaviours

462. In addition to hauling out, there are several other behaviours which are normal and natural for seals and there is no need to disturb the animal unless it is severely injured or entangled. This section may be useful for NPWS officers attending a seal haul-out, especially when communicating general seal biology and behaviour to the public.

463. **Thermoregulating** – thermoregulation is an animal's ability to maintain a constant body temperature to adapt to its surrounding environment. On hot days, fur seals and sea lions keep cool by holding one or more of their flippers in the air (Figure 33). An elephant seal may be observed flicking either sand ('sand flippering') or pebbles over its back to keep cool. Thermoregulating is a normal, natural behaviour but it is one of the most common behaviours mistaken as distress.

464. **Jugging** - this is another example of thermoregulatory behaviour in fur seals and sea lions. This behaviour is easily recognised as the seal curves its body so that its rear and front flippers are touching (see Figure 35). Unless they have severe injuries and/or are entangled, there is no need to disturb seals that are thermoregulating.

Figure 33 A thermoregulating male Australian fur seal (*A. pusillus doriferus*). This is a normal behaviour and unless there is entanglement, no intervention is required. Note the urogenital opening, which is only visible in males. It is sometimes mistaken for a wound. (Photo: John Gibbens/sealimages.com).

Figure 34 A New Zealand fur seal (*A. forsteri*) thermoregulating in the water. Intervention is not required. (Photo: Sarah Dwyer).

Figure 35 A New Zealand fur seal (*A. forsteri*) displaying the thermoregulating behaviour known as 'jugging'. Intervention is not required. (Photo: Sean Emmett/WA DEC).

465. **Grooming** – grooming includes fur placement and scratching.

466. **Torpedoing** – when in the water, seals sometimes move by seeming to skim along the water surface, spinning quickly, diving and foraging.

467. **Yawning** – seals sometimes appear to be yawning but this is usually a threat display. Leopard seals commonly show this behaviour. Keep well back and ensure the exclusion zone is kept clear of people and dogs at all times.

4.4.7 Haul-out location

468. Seals are commonly found on beaches or rocky coasts but sometimes they appear in different locations, such as roads, piers and other areas typically used by humans (see Figure 36 and Figure 37). Where the animal presents a risk to the public or its welfare is at risk, it may need to be relocated. This should be regarded as a last resort. It must only be carried out by, or with advice from, experienced NPWS staff. Minimise the animal's stress as much as possible.

Figure 36 A fur seal pup resting on the steps of an oil-refinery wharf. This animal was relocated because its location put its own safety, and that of the refinery workers, at risk. (Photo: Geoff Ross/NPWS).

Figure 37 A leopard seal (*Hydrurga leptonyx*) hauled out at Bondi Beach. Although the animal attracted much attention, the public's safety and the animal's welfare were ensured throughout the event. Efficient crowd-control techniques were used and information about seal behaviour and biology was disseminated to the public (Photo: Libby Shields/NPWS).

4.4.8 Response actions

469. If the animal is dead, secure the carcass and arrange for its necropsy, scientific sampling and carcass disposal.

470. If the animal is alive, monitor from a distance to avoid frightening it into the water. Record the time, date, location, species, age group and its overall body condition. Unless there are obvious reasons for immediate action such as an entanglement, carefully assess the animal's condition before concluding intervention is warranted. If the animal appears distressed, arrange for it to be assessed by an experienced staff member, veterinarian, or marine mammal specialist before proceeding further.

471. The presence of one or more seals in obvious distress or unwell at the same time may be a sign of a toxic event or the outbreak of an infectious disease. Until the former can be confirmed, assume it is the latter and take measures to prevent unnecessary exposure to pathogens.

472. NPWS and land managers response actions for seal haul-outs, in order of preference, are:

- **Monitoring:** Occasional checks are sufficient if the seal appears healthy and is in a location where disturbance is likely to be minimal. More regular monitoring is needed if the seal is likely to interact with people and dogs, and to take advantage of the opportunity for public education.
- **Relocation:** Do not attempt to force the animal back to sea or relocate it to another site unless absolutely necessary (i.e. where the danger to the public or the seal is such that relocation is essential).
- **Capture and treatment/disentanglement:** It may be possible to capture and treat the animal on site and release it immediately, especially animals that are entangled but otherwise uninjured. Other disabilities that warrant intervention usually require treatment and rehabilitation at an approved a care facility.
- **Euthanasia:** If the animal is severely incapacitated and cannot be rescued, it needs to be euthanased. For more information refer to 4.1.10 Euthanasia and 4.4.8.7. Euthanasing seals.

473. Immune compromised or pregnant people should never approach or handle a seal due to the risk of contracting zoonoses.

4.4.8.1 Herding seals

474. In some situations, it may be necessary to encourage a seal to move to another site by herding it back into the water. This is always a last resort as it can be detrimental to the animal if it has come ashore to rest or escape a predator. Herding is a dangerous and often ineffective procedure because the animal may haul-out again in a different location. Also, it may result in poor public relations for NPWS. Wherever possible, it is preferable to leave the seal where it is and to manage the haul-out in situ.

475. If an attempt must be made to herd the animal back to sea, ensure all onlookers remain outside the exclusion zone. Keep the route to the water completely clear and request nearby vessels to leave the area.

476. Approach the seal with at least four or five people spread out in a semi-circle on the landward side. The more people involved, the more likely the animal is to move toward the water. Making noise (e.g. by 'drumming' on the back of the herding boards) may also help but be careful not to make the animal panic.

477. The herders should include at least some personnel experienced in seal handling.

478. Be aware of the possible danger of the animal reacting aggressively. Provide everyone involved with large, sturdy herding boards (wooden is ideal) as protective shields. Suitable dimensions for herding boards are 120 × 80 cm. The boards should have good handles for easy manoeuvring.

479. Once in the water, the seal may swim away or it may turn around and come back to shore, either immediately or some hours later. Repeated attempts at herding may be detrimental to the animal and should be avoided.

480. If herding does not work, it may be that the seal is incapable of remaining at sea, although some individuals can be extremely difficult to shift, even when healthy.

481. Methods such as pushing the animal with a vehicle or using an electric cattle-prodder must not be used under any circumstances.

482. If relocation is essential because of the danger to the public and/or to the seal, and the animal cannot be herded back to the water, it may have to be captured and transported to another site.

4.4.8.2 Capturing seals

483. Safe, effective capture and handling of seals requires training, experience, special equipment and careful planning. Everyone involved in a seal-capture operation should be familiar with the equipment used and fully briefed on the incident action plan. Have a media liaison officer brief the public and media about the process.

484. Carefully assess the situation before deciding on the capture plan. Seek advice and assistance from experienced marine mammal handlers, marine mammal biologists or veterinarians. Factors to consider include:

- **Location:** Capture can be dangerous and impractical if the seal is in the water or on rocks. Do not attempt to net an animal if it is in the water (because of the risk of it drowning and the added safety risks to personnel involved in the capture). If the seal is on a busy beach, cordon-off the area to allow plenty of room for the capture.
- **Species of seal:** Different techniques and equipment are used for phocid seals (earless seals) versus otariid seals (eared seals) – see below.

- **Size and age of seal:** Larger animals require different equipment and are more difficult to handle because their size, weight and agility may cause serious injury. A rough guide to the number of people needed is:

Size of animal	People required
10−30 kg	2
30−100 kg	4
100−200 kg	6

- **Health of the seal:** If the seal is only mildly incapacitated, it may prove too agile for safe and effective capture. If it is considerably distressed or weakened, assess how a capture method might affect the animal before choosing which one to use. Seek veterinary advice.
- **Personnel and volunteer safety:** The safety of those involved in the capture is paramount.

485. Equipment required for capturing and transporting or relocating a hauled-out seal include:
    - seal nets
    - jute bags
    - blankets
    - herding boards (three or more)
    - heavy gloves (e.g. welder's gloves)
    - cage or transport pet pack
    - pole noose
    - rope
    - water sprayers.

486. Several types of nets and methods may be used when capturing a seal on land, including:
    - **A hoop net**: When attached to a long pole, this may be used to capture smaller seals up to the size of adult fur seals. The net should be large enough to cover three-quarters of the animal. The end of the net must be carefully designed to prevent damage to the eyes and allow unrestricted breathing. When attempting capture using a hoop net, approach the fleeing animal from behind, holding the net in front so the animal runs into it.
    - **Cargo-type sling nets or custom-built circular throw net**: These may be used to capture and restrain seals of various sizes, depending on the dimensions, strength and mesh size of the net.
    - **Sausage-shaped net**: These are often used for phocid seals whose method of locomotion on land is such that they can be totally encapsulated within the net. (Figure 38 (a, b and c) show the capture of a leopard seal using this method). All Coastal Branch regions have a sausage-shaped net.
    - **Stretcher net**: This is a square or rectangular net attached to two poles, like a stretcher. Stretcher nets may be constructed in different sizes and net strengths for use with seals up to the size of a large leopard seal.

- **Pole noose**: This is a pole with a noose at the end, which can be slipped over the animal's neck and drawn tight. This method is not suitable for lively animals but is useful if the animal is in a tight spot. Once the noose has been drawn tight, secure the animal with a hoop (or other suitable) net and release the snare as quickly as possible to avoid choking the animal. Only experienced NPWS officers should use this method as there is high risk of injuries from seal bites, and a risk of choking the animal.

487. Equipment used for dead or sick pinnipeds should only be used for that purpose. After use, thoroughly clean and disinfect it before re-use to prevent potential disease transmission to other animals. Store it in suitable bags or containers to prevent any potential contamination through exposure.

Figure 38 (a, b and c) A leopard seal (*Hydrurga leptonyx*) captured using a sausage-shaped net and physical restraint. A cloth hood was used to cover the animal's head to minimise stress during transport to the rehabilitation facility. (Photos: NPWS).

4.4.8.3 Transporting seals

488. Never transport seals wrapped in closed woven material because they may overheat. Seals are highly prone to overheating because of their blubber layer. Transport crates are the preferred method for transporting seals over long distances. Crates should be:

- large enough to allow the animal to stretch to its full length and raise its head
- sturdy enough to prevent the animal from breaking free
- well ventilated to prevent overheating and ease of breathing
- provided with openings large enough to keep the animal under observation and easy to keep it wet during transport (but not so large that it can push its jaws or flippers through)
- free of sharp projections that may injure the animal
- well-secured to the vehicle
- preferably equipped with drop doors at both ends.

During transport:

- place the crate in a dark, well-ventilated location to help calm the animal
- keep the animal under observation
- keep the animal wet to prevent overheating
- protect the animal from sun, heat, wind and exhaust fumes
- keep noise and commotion to a minimum
- on long trips, provide drinking water during layovers (easiest done using a hose).

489. Seals may be transported for short distances wrapped in netting but take care to prevent injury from the net through abrasion or tightening.

4.4.8.4 Relocating seals

490. In some situations, a hauled-out seal may have to be relocated a short distance to ensure public safety or for the animal's own safety. Always regard relocation as a last resort and move the animal the shortest distance possible. Assess the situation thoroughly and prior to intervening, consult with experienced NPWS officers, marine mammal experts and/or a veterinarian with experience in marine mammal health.

4.4.8.5 Marking seals

491. Before their release, mark all seals that are going to be returned to the sea so they can be identified if they haul-out again and/or are resighted.

492. Mark the seal's pelt by applying a small patch of hair dye or non-toxic paint. This marking will eventually grow out.

493. Permanent marking using microchips is supported by NPWS. Seal branding is not supported in NSW. Always consult Marine Wildlife Team in the Biodiversity and Wildlife Unit prior to microchipping, tagging or tracking any seal.

4.4.8.6 Releasing seals

494. Only release fully recovered seals after rehabilitation to prevent transmitting pathogens that may be harmful to other seals and/or other wildlife. Return rehabilitated seals to the sea when they are considered capable of survival. Seek advice from marine mammal experts with particular knowledge of the species involved.

495. Release the animal at or near the original capture site. Proposals to release rehabilitated seals away from the capture site will be considered on their merits. Special consideration may be given if significant scientific information would be obtained from such a release (e.g. telemetry studies) and the risk of adverse impacts of such a release on the animal and on the environment is assessed as minimal.

496. Depending on the species, the release may have to be timed to synchronise with migration patterns.

497. Seals held in captivity should not be released at breeding colonies or regular haul-out sites. There is danger they may be carrying transmissible diseases picked up in captivity.

4.4.8.7 Euthanasing seals

498. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

499. If a hauled-out seal is severely incapacitated and unlikely to survive, or if rehabilitation is not a viable option, the best option is to euthanase the animal.

500. The decision to euthanase a hauled-out seal is made by the relevant Branch Director on advice from the incident controller, who may consult with the Marine Wildlife Team in the Biodiversity and Wildlife Unit.

501. When euthanasia is required, carry it out as soon as possible to avoid prolonging the animal's suffering. Always base the decision to euthanase on advice from marine mammal experts or a suitably experienced veterinarian.

502. Euthanasing seals is usually accomplished by lethal injection of barbiturates or other agents used to euthanase domestic animals. The injections must be administered by a veterinarian or someone under their direction.

503. Shooting is an alternative method of euthanasia, especially for large seals − providing it is safe to do so. Before any shooting, refer to current shooting plans and job safety assessment protocols (refer to Appendix 10 Examples of job safety analyses for marine wildlife events). Seals should be shot with firearms of a calibre greater than .223. Otariids can be shot 2.5 cm above the ear and at right angles to the body (see Figure 39). Phocids can be shot at this same point or down through the cranium at the widest point of the head.

504. Assign this task to selected NPWS officers trained in shooting techniques and animal euthanasia. These officers will have the appropriate animal welfare endorsements on their firearms permits.

505. Whichever euthanasia method is chosen, the site must be screened from public view. Inform people in the vicinity of the process and clear them from the area before euthanasia is performed. Follow necessary notification protocols including notification of Public Affairs.

4.7.8.8 Recommendations for shot placement

506. The suggested cartridge calibres and bullet weights are minimums.

507. The brain of a seal is not as deeply embedded in the head structure as with other marine mammals. A frontal shot placed slightly behind the line of the eyes, a poll shot (from the rear of the skull) or a temporal shot (from the side of the skull) would be effective at euthanasing a seal.

508. Suggested cartridges and bullet weights:

- 7.62 × 39 − 125 gn
- .308 Win − 150 gn
- .22 Magnum – 40 gn.

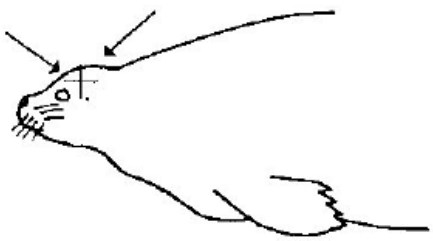

Figure 39 Suggested shot placement for euthanasing seals using firearms.

4.4.7.8 Sampling and necropsy

509. Examine all dead or euthanased seals prior to necropsy (where this is being undertaken). Make notes and observations on:
    - any lacerations or scarring around the neck (around the circumference)
    - the number of fractured or worn teeth
    - any nasal discharge
    - any discharge from the eyes (conjunctival discharge)
    - any corneal opacity or loss of eye
    - the number of cookie cutter shark wounds
    - gunshot, spear wounds or other lesions (examine the carcass fully for these).

510. NPWS encourages carrying out necropsies on seal carcasses whenever possible. Necropsies seek to determine the cause of death. NPWS should maximise the advantage of having a carcass available and use it to collect scientific data and samples.

511. The minimum measurements required for reporting and guidelines on necropsy procedures are outlined in 4.12 Collecting information and samples, necropsy, and record keeping.

4.4.8.9 Carcass disposal

512. The preferred method of seal carcass disposal is by burial at sites where the skeletal material can be retrieved later, if required or at a licensed waste facility.

513. For carcass disposal procedures, refer to 4.13 Carcass disposal.

4.4.9 Follow up

514. Include photographic records, details of the incident and a description of the fate of the animal including necropsy reports and carcass disposal location (if relevant) in the Elements marine wildlife module.

515. Non-toxic paint or other impermanent methods of marking may be used to mark released animals to facilitate post-release monitoring.

516. When practical, monitor the condition of a released animal following intervention.

517. For record keeping, refer to 4.1.9 Situation reporting and records and 4.1.3 Initial reporting.

4.4.10 Debriefing

518. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.5 Haul outs - marine turtles

4.5.1 Quick-response guide

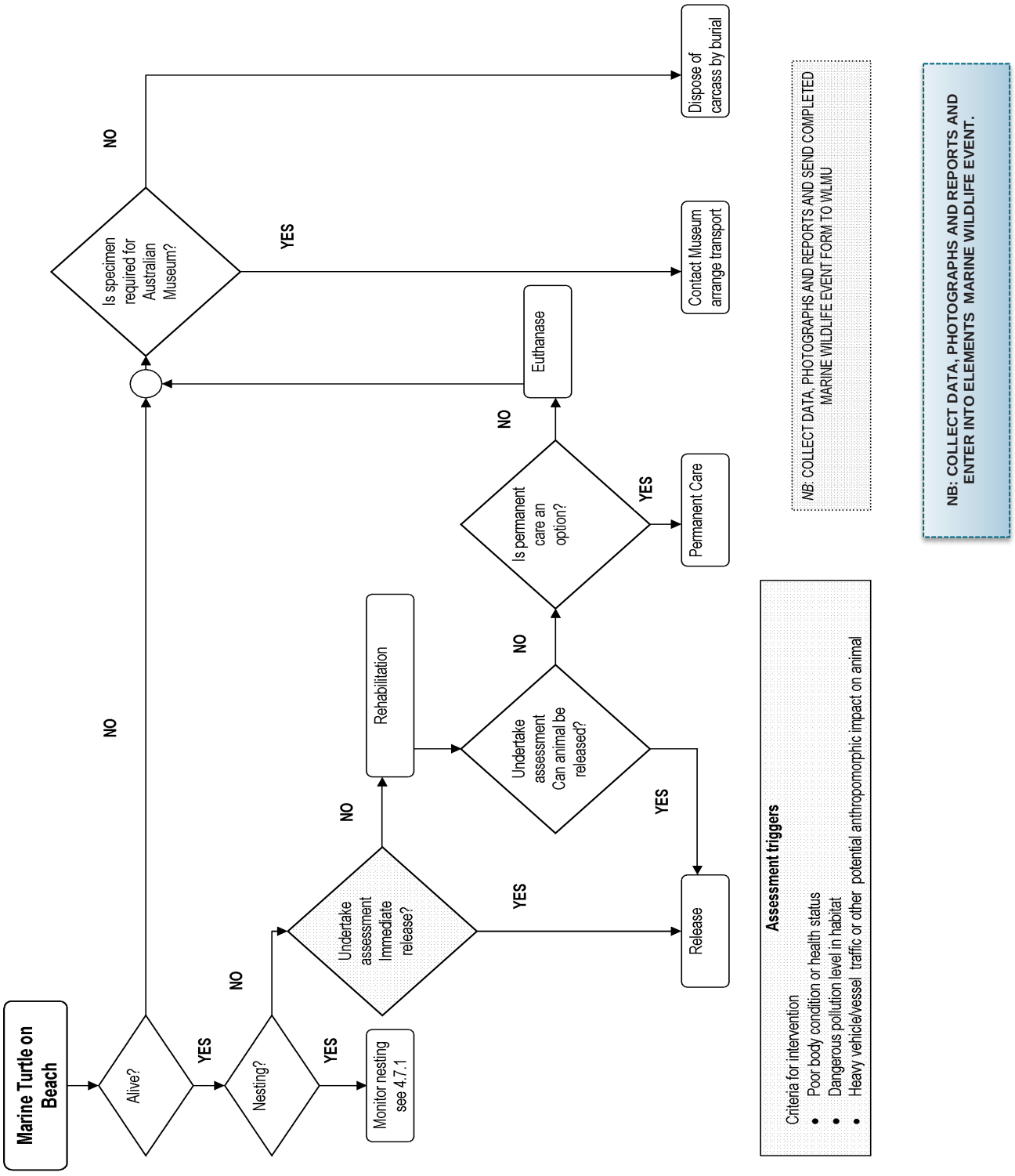

Figure 40 Decision flow-diagram to determine most appropriate course of action to take in the event of a turtle haul out.

4.5.2 Background

519. The size and status of populations of loggerhead and green turtles in NSW are not known. Nesting events have been recorded, mostly in northern NSW but many of these have been unsuccessful due to naturally occurring factors such as low sand temperatures and inundation. The success and gender ratio of marine turtle nest hatchlings are temperature dependent. Green and loggerhead turtle nesting events make a small but significant contribution to the core breeding stock of turtles, which is centred in eastern and north-east Queensland. Leatherback turtles are an oceanic species that visit NSW waters and very occasionally nest. Australia has no known breeding populations of this species and mortality events in NSW are generally uncommon.

520. The Commonwealth recovery plan for marine turtles does not identify any sites in NSW that are critical to the survival of marine turtle species or recommend any ex situ captive breeding and translocation program.

521. Marine turtle management in NSW has generally been directed towards rescuing and rehabilitating hauled-out animals, usually adults. Intervention by removal and captive management of eggs or individuals is a management technique generally used when isolated populations are continuing to decline or subject to ongoing threats. This is not the case in NSW.

Table 7 Marine turtle species recorded in NSW and their conservation status.

Common name	Species name	NSW conservation status	Commonwealth conservation status
Loggerhead turtle	*Caretta caretta*	Endangered	Endangered
Green turtle	*Chelonia mydas*	Vulnerable	Vulnerable
Hawksbill turtle	*Eretmochelys imbricata*	Protected	Vulnerable
Leatherback turtle	*Dermochelys coriacea*	Endangered	Endangered
Flatback turtle	*Natator depressus*	Protected	Vulnerable

522. Marine turtles face a variety of threats. These include marine pollution, habitat loss, entanglement in fishing gear, predation of eggs and hatchlings by foxes, feral pigs, dogs and goannas, and over-harvesting of turtle eggs by humans. It is therefore critical to gather information where possible on population parameters and threatening processes to improve our understanding and management of these species. Rescuing and rehabilitating animals and collecting information on these activities can play a vital role in developing and assessing management strategies.

523. Marine turtles come ashore for a variety of reasons, including nesting, to bask on the sand or because they have been caught on a sandbank or beach after a large tide or storm. Under these conditions, animals are likely to return to sea at the next high water, if not sooner. However, in most instances when marine turtles are found ashore in NSW, they are likely to be suffering from stress, cold water-stunning, injury, disease or entanglement.

4.5.3 Initial report

524. For initial reporting procedures refer to 4.1.3 Initial reporting.

4.5.4 Take control of site

525. Visit the site as soon as possible or direct another authorised organisation to attend – one which has proper capture, restraining and transport equipment

526. The responding local NPWS officer needs to consider the following questions before attempting to rescue a marine turtle:
- Is there a need for intervention (veterinary assessment, treatment, rehabilitation or relocation)?
- Can it be rehabilitated?
- Are facilities available for rehabilitation?
- Is euthanasia the best welfare option?

527. In some instances there may be an extended period of time between finding a turtle ashore and the arrival of an authorised authority.

528. Actions the public can undertake before an NPWS or rehabilitation and rescue group arrive are:
- erect shade over the animal if it is a warm day
- cover the turtle's head and carapace with damp towels, being careful not to obstruct the nose and mouth
- minimise unnecessary movement around the head of the animal
- observe the animal for signs of breathing and movement (respiration may be slow and irregular).

4.5.5 Assessment

529. To identify the turtle, refer to Appendix 11 Marine turtle identification.

530. The decision to intervene at a turtle haul out can often be made on specific physical and behavioural characteristics the animal exhibits. A marine turtle requires intervention when:
- bleeding from the mouth, nose or vent
- it exhibits symptoms of lethargy − a healthy turtle will vigorously try to move away from an observer, juveniles especially will slap their flippers against their carapace when approached
- there is an absence of a corneal reflex – simply touch corner of the eye, a healthy response results in a retraction of the eyeball touched

- there is no sign of breathing – breathing is detected as intermittent movement in the area of the throat, or the head is slightly raised with each breath (note that there can be long pauses between observable breaths e.g. if turtle resting after nesting)
- there is an absence of movement or body/limb reflex when prodded (gently) − the back of the neck, forward of the carapace is a sensitive area for turtles. Gently touching this site should cause the turtle to lift and/or retract its head
- the turtle shows signs of emaciation – exhibited by sunken flesh around the base of the flippers, neck or plastron (belly plates); loss of stream-lined shape; sunken eye sockets (often indicates dehydration)
- trauma is present – head injury, loss of limbs, lacerations or damage to the carapace caused by vessel strike, propeller cuts or wounds caused by predators
- the turtle is densely covered in external parasites − barnacles, copepods, marine leeches and algae can all be found on healthy turtles, but when found in excessive numbers these organisms may indicate that the turtle is severely debilitated or has been inactive for long periods
- the turtle is suffering from fibropapillomatosis (FP) – these are wart-like growths, ranging in size from 0.1 to more than 30 cm in diameter may be found anywhere on the skin, carapace or plastron. While these growths may not be a direct cause of ill health, intervention is required due to their potentially infectious character. FP is more common in green turtles than other species.
- entangled in fishing lines, rope or other debris embedded in skin or around the carapace
- ingestion of marine debris or fishing gear is evident – indicated by foreign materials extending from either the cloaca or mouth
- there are large, open ulcers on the flippers or head or other part of the body
- it is overheated from being ashore for an extended period in warm air temperatures without water or shade
- it cannot swim freely or dive for prolonged periods.

4.5.6 Swim-test

531. Healthy turtles are active and can swim and dive freely. Turtles that become beach-washed or are having trouble diving may have health issues. To determine whether a turtle is sick and/or injured, a simple swim test may help establish obvious problems. Place the turtle back into the shallow water where you can observe its behaviour and recapture it if necessary. If the animal shows any of the following symptoms re-capture it immediately and seek veterinary advice.
    - lack of coordination or swimming in circles, listing to one side − this may indicate a central nervous system injury. The chance of a recovery to full health with this disorder is rare.
    - if the animal cannot swim freely or dive and continually returns to the surface after short dives
    - moves only feebly or appears to have trouble lifting its head to breathe.

532. If the turtle is found in a remote location and assessment and rehabilitation is not an option, then releasing the animal back into the water is acceptable. The preference is to tag the animal prior to release.

533. If the animal displays none of the above conditions and swims away rapidly in a fairly straight line, dives and stays submerged for several minutes, it can be considered ‘healthy’.

534. Animals suffering from serious injuries or diseases may require euthanasia or intensive care and a long rehabilitation period prior to release. An authorised officer may approve the euthanasia of a turtle following consultation with a vet or marine turtle specialist.

535. Where specialist veterinary assistance is required NPWS staff should consult the NPWS marine wildlife contact list - DOC20/579674 on CM9 for contact details of specialists. Approval must be sought from the Marine Wildlife Team in the Biodiversity and Wildlife Unit prior to transporting marine turtles to the Veterinary and Quarantine Centre (at Taronga Zoo), or any other rehabilitation centre for rehabilitation. Record the reason for the recommendation to rehabilitate the turtle Elements marine wildlife event.

4.5.7 Response actions

4.5.7.1 Catching and retrieving stranded marine turtles

536. Marine turtles range enormously in size and weight and catching and retrieving injured animals can involve anything from a relatively simple operation to a major exercise requiring additional personnel and special equipment.

537. When dealing with marine turtles (appropriate licensed authorities):

- assess the potential danger to rescuers, such as environmental conditions, or handling large or aggressive animals (e.g. be aware of slapping flippers and biting, cuts from scutes and shells on carapace and back strain when lifting)
- ask bystanders to stand back and remain quiet – explain what is happening
- place a light towel or cloth over the turtle's head to obscure its vision – this will reduce avoidance movements and minimise the risk of biting – do not block its mouth or nostrils
- be aware the ventral surface (plastron) can be easily damaged if moved across a rough or hard surface. If the turtle cannot be lifted, place it on foam or soft material and a tarpaulin or strip of carpet, and then drag it. This method minimises damage to its plastron
- carry small animals (up to 10 kg) using the carapace as a hand-hold. Grasp the carapace at the base of the neck with one hand, and the other at the rear of the carapace above the tail. Hold the animal away from your body to prevent flapping flippers from loosening your hold
- carry larger animal (up to 100 kg) with at least four people. A wheelbarrow, figure-8 rope sling, net stretcher or special-purpose turtle rescue mat can be used
- for an even larger animal, mechanical equipment may be needed to lift it, such as a cargo net. Ensure the flippers do not become entangled. A turtle near the water's edge may be returned to the water and floated onto a boat trailer adapted to carry an animal, rather than lifting it directly off the sand
- avoid unnecessary handling and be wary of causing further injury.

4.5.7.2 Transport

538. Transport and handle marine turtles in ways that minimise stress. Make an effort to minimise transport time. If extended trips are unavoidable, check the animal on a regular basis.

539. When transporting marine turtles, irrespective of the type of transport used:

- Always transport turtles in an upright position − with the dorsal surface (carapace) uppermost.
- Where possible, lift and secure the turtle in a turtle rescue mat (Figure 41) during transport.
- Keep turtles out of direct sunlight and never leave them in vehicles in the sun. Keep them well away from any direct heat sources (e.g. vehicle engine, exhaust or heater, hot floors of travelling vehicles). Most species are only able to maintain their deep body temperature to within about 3°C above the ambient temperature, so they are vulnerable to overheating.
- Small animals can be put in a carry-box, such as a six-pack cooler or a similar, properly secured and ventilated container with damp foam material in the base to protect the animal's plastron.
- Where turtle mats are unavailable, larger animals can be transported within a woolpack or suitable crate, in any suitable vehicle that allows the animal to lay on its ventral surface. Protect the plastron with a wet blanket or foam. Any movement is to be restrained as much as possible. Use airflow or air-conditioning to prevent overheating.
- If the animal cannot be moved out of direct sunlight, keep it cool by covering it with a cloth and keeping this moist.
- Turtles will always move toward light, so it helps to cover the transport box/crate with a dark cloth.
- Loggerheads and hawksbills can become aggressive (and bite) when confined with other turtles, so separation is recommended. Green turtles are not usually aggressive to other turtles.

Figure 41 Deploying a marine turtle rescue mat.

4.5.7.3 Euthanasia

540. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

541. There are several indications a marine turtle has a low survival probability and may require euthanasia:

- compacted contents in the gut/digestive tract, which may be associated with extensive gassing in the abdominal cavity
- fishing tackle or lengths of fishing line in the digestive tract below the stomach, which can result in a constricted bowel
- severed intestine
- lung damage, indicated by visible ruptured lung tissue or a rasping/leaking noise from a hole in the carapace caused by a spear head or other projectile
- a cracked or missing section of the carapace (e.g. boat strike, propeller damage) involving damage to the lungs, spine or extensive bleeding
- severe infection (e.g. fibropapillomatosis).
- nervous dysfunction – indicated by head tilt, persistent movement of the eyeball from side to side (nystagmus) and circling or other navigational failures while swimming. Animals with suspected systemic coccidiosis are known to display these symptoms

542. Where euthanasia is the appropriate course of action, it must only be performed by a veterinarian or other suitably qualified individual as it can be difficult to locate appropriate injection sites in turtles. Acceptable methods of euthanasia include lethal injection and gunshot (follow the guidelines of the firearms manual). Pentobarbitone administered at an approximate dose rate of 1 ml per 5 kg of body weight is a reported successful method for euthanasia of marine turtles. An effective dose is indicated within a few minutes by spontaneous urination and loss of corneal reflex. If this method of euthanasia is considered unsuitable, consult a veterinarian or other marine turtle specialist for an appropriate alternative. Refer to Appendix 8 Material data safety sheet for penotobarbitone.

543. When deciding to euthanase an animal, the responding NPWS officer must record the following details on the Elements marine wildlife module :

- the animal's condition
- the process used to decide euthanasia
- attending veterinarian
- method used and the administering individual
- measurements, tissue sample collection and necropsy details if applicable

4.5.7.4 Disposal

544. Contact the Australian Museum to see if the carcass of any dead marine turtle is required for the collection. If museum personnel cannot attend immediately it is preferable to freeze or bury the entire animal until they can collect it.

545. If the animal(s) were euthanased or died from suspected disease-like symptoms, contact the Marine Wildlife Team in the Biodiversity and Wildlife Unit to see if additional tissue samples are required.

4.5.7.5 Rehabilitation

546. The NPWS does not undertake ex situ rehabilitation of marine turtles. For further information regarding the ex situ rehabilitation of marine turtles contact one of the wildlife carer organisations listed at Appendix 12 Rehabilitation organisations.

4.5.7.6 Options for non-releasable marine turtles

547. Refer to the NPWS rehabilitation of protected fauna policy.

548. There are three options for managers to consider when assessing the future of turtles in rehabilitation that cannot be released.

Option 1: Euthanasia. This is the acceptable method for any turtle suffering from chronic illness.

Option 2: Permanent retention by a licenced facility that holds a current approval to exhibit from the NSW Department of Primary Industries. This option is appropriate where a veterinarian or specialist has advised that the animal is unreleasable due to its health, behavioural abnormality, or is a potential disease risk to wild stocks. Such advice must be in writing. Permanently retaining an animal also requires authorisation by the NPWS Wildlife Licencing Team. All matters of permanent retention must be referred to the Biodiversity and Wildlife Unit in Conservation Branch. This option will only be considered where the potential licenced facility meets the EAP Act's minimum standards for the species and the facility can provide an acceptable quality of life.

Option 3*:* A marine turtle can be permanently held by an NPWS-licensed individual or organisation.

4.5.7.7 Relocating marine turtles

549. Healthy marine turtles must only be relocated when local conditions represent a potential threat to the individual animal's welfare. NPWS must be notified by any organisation/individual where a proposal to relocate a marine turtle is being considered. A Clerk Grade 9/10 (including Team Leader Ranger, Senior Field Supervisor, Senior Conservation Planning Officer or Area Manager) will decide whether to pursue relocation following site evaluation. If the proposed release site is in another NPWS area, local staff from this area must be consulted and given the option to attend.

4.5.8 Follow up

550. It is critical for marine turtle conservation that accurate information is recorded on each sighting or event. These records prove invaluable when assessing population parameters such as range, distribution, abundance and general ecology of marine turtles in NSW.

551. Responding NPWS officers should make every effort to record relevant information. This will include details in Elements marine wildlife module when handing turtles to rehabilitation groups or when responding to reports from fishers etc. Detail any event attended by an NPWS officer (including confirmed reports via phone) in the Elements marine wildlife module . The tables below can assist to identify an appropriate life stage and sex.

Table 8 Maturity and age classes of turtles.

Turtle species	Life history stage	Approx. curved carapace length (CCL)
Green (*Chelonia mydas*)	Hatchling	< 5.5 cm
	Immature	> 5.5 cm
	Adult	> 90 cm
Hawksbill (*Eretmochelys imbricata*)	Hatchling	< 5 cm
	Immature	> 5 cm
	Adult	> 80 cm
Leatherback (*Dermochelys coriacea*)	Hatchling	n/a
	Immature	n/a
	Adult	150.5 – 174.5 cm
Flatback (*Natator depressus*)	Hatchling	< 5.5 cm
	Immature	> 5.5 cm
	Adult	> 90 cm
Loggerhead (*Caretta caretta*)	Hatchling	< 5.5 cm
	Immature	> 5.5 cm
	Adult	> 90 cm

Table 9 Tail length and age class of green turtles.

Sex	Maturity	Tail length
Male	Adult	> 25 cm
	Sub adult	> 16 cm
Female	Adult	< 16 cm
	Sub adult	2−16 cm

The Australian Museum has a number of desired specimens for addition to its collection. Priority species include:

Species	Age class
Leatherback	Any
Hawksbill	Adult > 80 cm curved carapace length
Flatback	Any
Olive ridley	Adult > 63 cm curved carapace length

552. Where practicable, the responding NPWS officer should notify the Australian Museum and offer them the carcass of a dead marine turtle. If the museum is unable to respond, take samples before disposing of the carcass. To take a skin sample for genetic studies:
    - wear gloves to ensure the sample is not contaminated with human DNA
    - use forceps, pull the loose skin away from the body between the neck and shoulder region and collect a small piece of tissue the size of a match-head
    - using forceps place the skin sample into a ziplock bag and place this in a freezer
    - take photographs of each flipper, the top and side of the head, the carapace and plastron and forward these along with the skin sample to the Australian Museum in a separate ziplock bag together with a copy of the information logged in the Elements marine wildlife module

553. Where two or more marine turtles are beachwashed in the same event, contact the Coordinator Marine Fauna Program to seek advice on additional sampling that may be required. All leatherback or flatback marine turtles should undergo rigorous examination and necropsy.

554. For record keeping, refer to 4.1.9 Situation reporting and records.

4.5.9 Debriefing

555. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.6 Haul outs – sea snakes

4.6.1 Quick-response guide

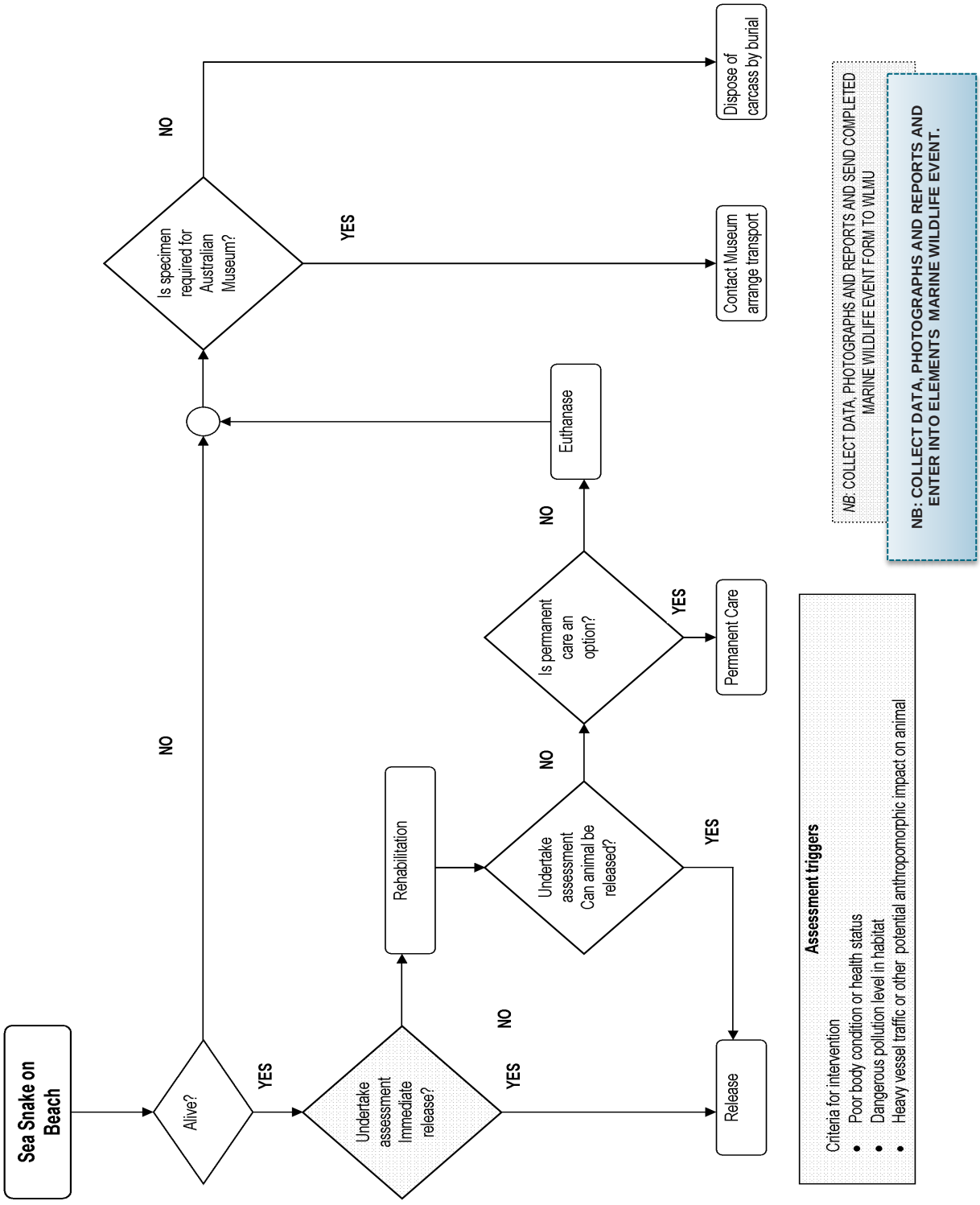

Figure 42 Decision flow-diagram for determining the most appropriate course of action in the event of a sea snake haul out.

4.6.2 Policy

556. All sea snake species found in NSW are protected under the NPW Act.

4.6.3 Background

557. Sea snakes are readily recognisable by their small heads, thick bodies and paddle-shaped tails. As records of sea-snake occurrence in NSW are limited, it is important to record accurate information on species and sighting location as an Elements marine wildlife module and enter the sighting on the NPWS BioNet Atlas. Wherever possible, take photographs of the animals to confirm identification, record injuries and any other relevant details.

558. Most sea snakes are entirely marine and do not leave the aquatic habitat. Sea kraits are an exception. They may come ashore to lay eggs, rest or digest a meal. Thus, any sea snake found on a beach is likely to be dead, debilitated or exhausted. Members of the public who find a live sea snake should note its location and condition and contact the local NPWS office as soon as possible.

All sea snakes are highly venomous with a potentially fatal bite, and the venom remains active in a dead animal.

Safe, effective capture and handling of sea snakes requires training, experience and special equipment. Only NPWS staff or licenced snake rehabilitators or handlers with appropriate training should attempt to capture or handle a sea snake

4.6.4 Initial report

559. For initial reporting procedures refer to 4.1.3 Initial reporting.

4.6.5 Take control of the site

560. Members of the public must not attempt to handle, capture or transport a sea snake. Staff from NPWS, a wildlife rehabilitation group or other approved organisation need to attend the site as soon as possible, particularly where public safety is a concern.

561. If a person is bitten, apply compression to the bite area immediately to confine the venom. Follow the first-aid procedures for a snake bite. Contact emergency services and ensure anti-venom is available to be administered as soon as possible.

562. If a live marine sea snake is found on a NSW beach and requires intervention it may be captured using snake tongs and a hoop bag or bucket (lined with moist foam and covered with a tight fitting lid with ventilation holes) and transported to a local veterinarian or specialist. If further advice is required consult the NPWS marine wildlife contact list - DOC20/579674 on CM9 for additional contacts. If the animal is seriously injured, immediate euthanasia by a veterinarian may be the most humane option.

563. Taronga Zoo, Manly Oceanworld and the Sydney Aquarium operate rescue, rehabilitation and release programs for sea snakes found in the Sydney area. Outside this location seek local veterinary advice. Contact details for facilities in NSW capable of holding rehabilitating and releasing sea snakes can be found on the NPWS marine wildlife contact list - DOC20/579674 on CM9.

4.6.6 Assessment

564. Sea snakes rely on water temperature and cannot maintain a body temperature above that of their surroundings. Exposure to sudden decline in sea temperature may temporarily impair a sea snake, making it lethargic and unresponsive. Removing it from the beach and warming it up will sometimes result in the animal's recovery following which it can be released back at the capture site. If the animal does not recover quickly or requires ex situ attention seek advice as per above.

565. Long-term care as a management option should be undertaken when a sea snake is likely to improve in health and able to be rehabilitated for release back to the wild.

566. Sea snakes are to be housed in appropriate enclosures by individuals or organisations licensed by NPWS for such activity.

567. The yellow-bellied sea snake *Pelamis platyurus* is endemic to NSW waters and must be released at the capture site.

568. The decision to intervene can often be made on specific physical and behavioural characteristics the animal exhibits. A sea snake requires intervention when:

- bleeding from the mouth, nose or vent
- it exhibits symptoms of lethargy − a healthy sea snake will vigorously try to move away from an observer
- there is an absence of a corneal reflex – touch the corner of the eye, a healthy response results in a retraction of the eyeball touched
- there is no sign of breathing – breathing is detected as intermittent movement in the area of the throat
- the sea snake shows signs of emaciation (this often indicates dehydration)
- trauma is present – head injury, lacerations or damage to the skin caused by vessel strike, propeller cuts or wounds caused by predators
- entangled in fishing lines, rope or other debris
- ingestion of marine debris or fishing gear is evident
- there are large, open ulcers on the head or part of the body
- overheating from being ashore for an extended period in warm air temperatures without water or shade
- it cannot swim freely or dive for prolonged periods.

4.6.6.1 Euthanasia

569. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

A decision to euthanase an animal must be made by an experienced veterinarian or authorised NPWS officer Refer to 4.1.10 Euthanasia.

570. In the Elements marine wildlife module , record all information regarding the haul out, including the animal assessment, the decision process followed, the euthanasia method used and the administering individual. Carry out measurements, tissue sample collection and necropsy wherever possible. Prior to disposal, contact the Australian Museum to find out if they want the carcass.

4.6.6.2 Pre-release considerations for rehabilitated sea snakes

571. Where a sea snake has undergone rehabilitation and has been assessed by a veterinarian and/or a sea snake specialist as ready for re-release contact NPWS and provide the following documentation:
    - record of pre-release assessments
    - record of the release site and environmental factors at the site such as water temperature and feeding habitat
    - consideration of other factors at the release site
    - photographic record of existing markings; whether they are temporary or permanent. Where a microchip is used to tag the snake, a record of the microchip number should be recorded in the Elements marine wildlife module ,

572. There are three considerations to the re-release assessment for any sea snake:
    - While conspecifics need not be present at release sites, it is preferable to release the animal in a habitat from which the same species of sea snake has previously been recorded (consult the NPWS BioNet Atlas for suitable sites).
    - NPWS Rehabilitation of Protected Fauna Policy (July 2010) states; 'in the interests of genetic integrity of native animal populations, a rehabilitated or hand-raised animal should be returned to a suitable natural environment at the locality of the original encounter'. An animal must not be transported to a release point across a geographic or physical barrier it would not normally cross. Given that most species of sea snakes are vagrants to NSW re-release may involve transport back to the known geographic range of the species.
    - In some instances it may be necessary to release rehabilitated sea snakes away from the site of capture, or to relocate them to avoid re-stranding or exposure to anthropogenic threats. These may include relocating away from power station water intakes, high vessel traffic areas, trawler operations or pollution incidents.

573. Prior to release, sea snakes may be permanently marked by micro chipping. Only an appropriately trained person may tag in this way. Take photographs of all sea snakes prior to their release, as it may be possible to identify individuals by their markings.

4.6.6.3 Options for non-releasable sea snakes

574. Refer to the NPWS Rehabilitation of Protected Fauna Policy.

575. The following three options are available to managers when assessing the future of a sea snake that cannot be released:

    Option 1: Euthanasia – acceptable for any suffering animal in irreversibly poor condition.

    Option 2: Permanent retention by licenced facility that holds a current approval to exhibit from the NSW Department of Primary Industries. This is the appropriate option for animals where there is written advice from a veterinarian and/or specialist that the animal(s) are unreleasable due, for example, to health or behavioural status, or are a potential disease risk to wild stocks. Permanently retaining an animal also requires authorisation by the NPWS Wildlife Licencing Team. All matters of permanent retention must be referred to the Biodiversity and Wildlife Unit in Conservation Branch. This option will only be considered where the potential licenced facility meets the EAP Act minimum standards for the species involved and the facility can provide an acceptable quality of life physically and nutritionally.

    Option 3: Permanent retention by an NPWS licensed individual or organisation.

4.6.6.4 Relocating sea snakes

576. Healthy sea snakes must only be relocated when local conditions present a potential threat to the individual animal's welfare. NPWS must be notified by any organisation/individual where a proposal to relocate a sea snake is being considered. The Team Leader Ranger or Area Manager will decide whether to relocate the animal following site evaluation. If the proposed release site is in another NPWS area, local staff from this area must be consulted and given the option to assist.

577. Make all capture and transport arrangements in consultation with veterinary or reptile specialists. Releasing stranded and/or rehabilitated sea snakes does not trigger the requirement for a translocation proposal.

4.6.7 Follow up

578. There are few records of sea snakes found in NSW waters. It is vital to accurately report and record information from sightings to improve both our understanding of these species' distribution in NSW waters and their ongoing management.

579. NPWS officers encourage individuals or organisations involved in sea snake response to collect and provide relevant data. For this purpose, a marine wildlife event report form has been supplied for distribution by NPWS area officers to local rehabilitation groups, veterinarians, aquaria or other individuals such as anglers who may encounter sea snakes. Completed forms must be sent to the local NPWS office and information entered into Elements or forwarded directly to the Conservation Branch.

580. NPWS officers who respond to sea-snake incidents must ensure the relevant data is recorded in an Elements marine wildlife event .

581. The following information must be collected by NPWS staff for each sea-snake sighting or response (live or dead):
- location of sighting/event (as accurately as possible)
- date and time
- species identification
- number of animals
- evidence of human interaction (photograph)
- record of existing or applied temporary or permanent tags or markings and
- total length of the animal.

582. For follow-up situation reports or updates to the Elements marine wildlife event following a re-release, record the following;
- if returned to sea, record the release site, environmental conditions and any post-release monitoring strategy adopted
- record of handling/management strategies
- record of veterinary assistance.

583. Where practicable, NPWS will notify and offer a carcass to the herpetological section of the Australian Museum. If the museum is unable to respond before disposing of the carcass, collect or record the following:
- location details of the site
- a tissue and scale sample (refer to 4.12) to be used for genetic studies. Lodge the sample with the Australian Museum's Evolutionary Biology Unit.

584. The NPWS marine wildlife contact list - DOC20/579674 on CM9 includes a list of organisations currently approved in NSW to rescue, hold and rehabilitate marine reptiles and/or receive tissue samples.

585. For record keeping, refer to 4.1.9 Situation reporting and records.

4.6.8 Debriefing

586. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.7 Nest management – turtles

4.7.1 Quick-response guide

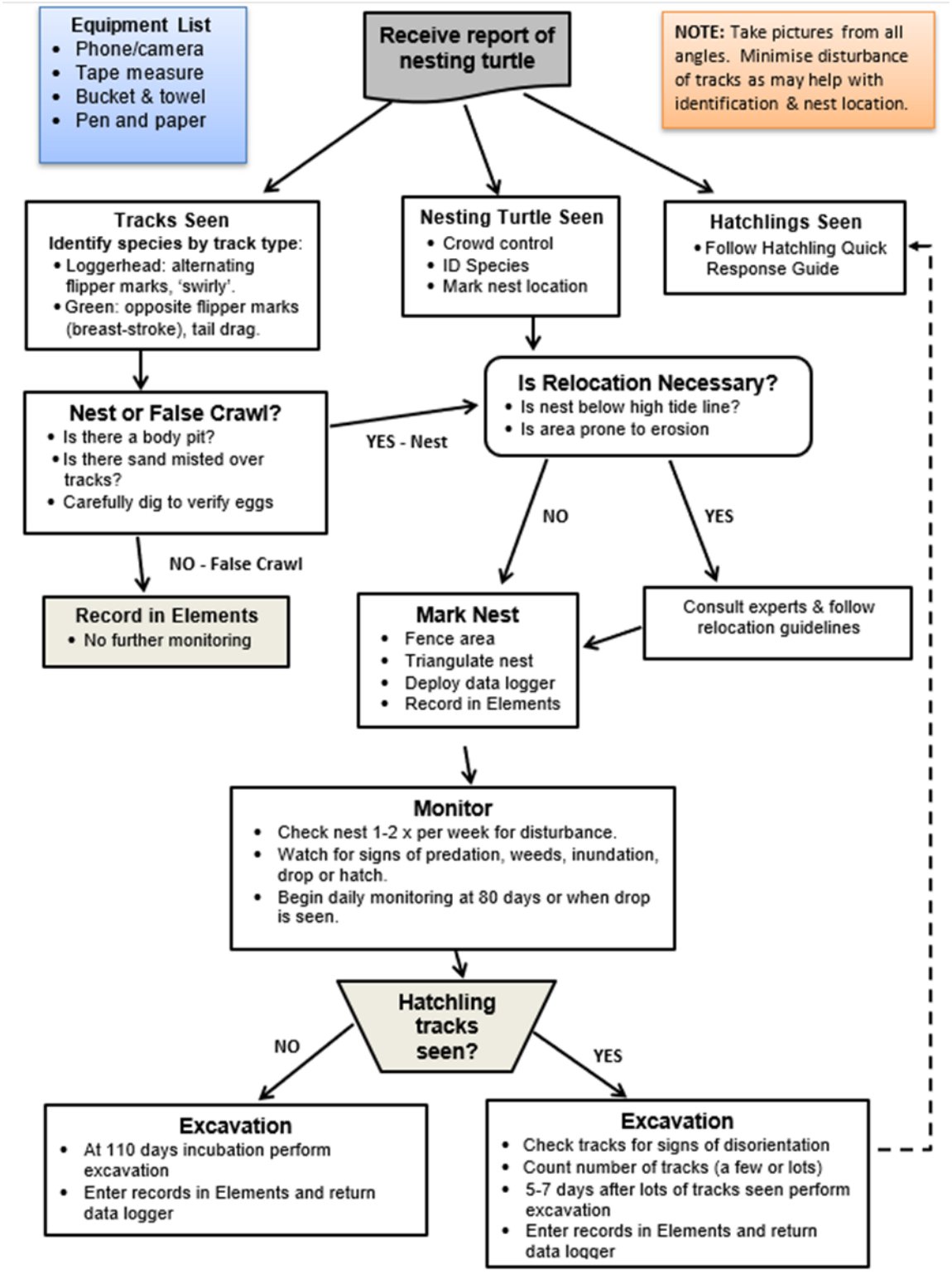

Figure 43 Decision flow-diagram for determining the most appropriate course of action to take in the event of a marine turtle nest being reported.

Quick response guide when hatchlings are seen

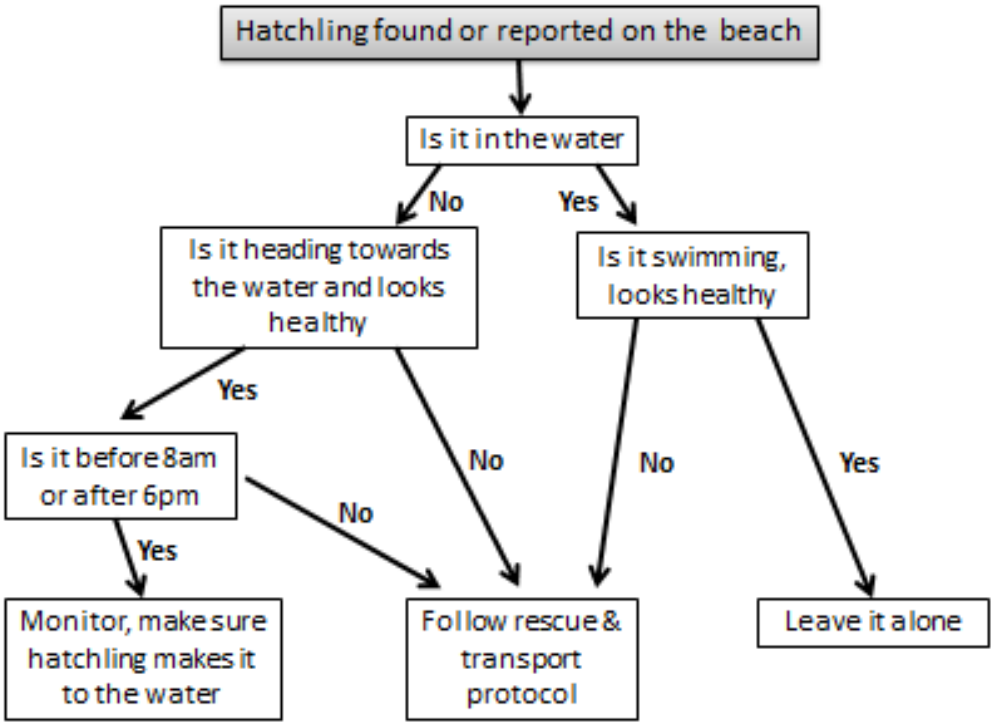

Figure 44 Decision flow-diagram when a hatchling is sighted.

4.7.2 Relevant Policies

587. There is currently no explicit guidance on turtle nest management from a Commonwealth and NSW recovery planning perspective. The Commonwealth recovery plan for marine turtles does not identify any sites in NSW critical to the survival of marine turtle species, nor does it recommend any ex situ captive breeding or translocation programs. Also, the processes threatening marine turtle survival in NSW are more likely to impact adults as nesting events are relatively uncommon.

4.7.3 Background

588. Rising global temperatures are having deleterious effects on threatened marine turtles world-wide by impacting on sex bias and nest viability. Many nesting attempts are unsuccessful due to naturally occurring factors such as low sand temperatures and inundation. The success and gender ratio of marine turtle nest hatchlings are temperature dependent

589. NSW appears to be an increasingly important nesting region for green turtles (southern Great Barrier Reef population) and loggerhead turtles (south-west Pacific population) and may prove vital to buffer populations from the effects of increasing temperatures in other parts of the species' range. NSW is particularly important to loggerhead turtles as

the population is highly threatened and most of the post-hatchling population appears to move through NSW waters during their dispersal into pelagic waters.

590. NPWS records indicate nesting events in NSW are becoming more frequent, suggesting NSW beaches may play an increasingly important role as climate refugia. As such, NSW beaches are likely to support any 'adaptive capacity' of marine turtles to mitigate the impacts of increased sand temperatures on nest viability and sex bias. NSW beaches also offer refuge from other anthropogenic threats to marine turtles that are often associated with areas of high human population density and development (e.g. light pollution, disturbance), because nesting habitat in northern NSW coincides with relatively unpopulated parts of the east coast.

591. The nesting season in NSW can begin in early November through to May, with hatchlings starting to emerge in January. Incubation times in NSW tend to be longer due to the cooler temperatures. Ongoing research into the relation between sand temperatures and incubation times will assist in refining future nest management. Current trends suggest incubation times are between 65 to 84 days

4.7.4 Initial report

592. Follow the general procedures in 4.1.3 Initial reporting.

593. **Report of nesting turtle on beach** – If a NPWS Officer receives a call from a member of the public reporting a nesting turtle on the beach, provide the following advice:
- Do not approach the turtle
- Take photos, with no flash
- Stay behind the turtle's head (out of line of sight) and stay low to the ground
- If the turtle is not laying eggs, it can still easily be disturbed and abandon nest
- Refer to the Turtle Watching Code of Conduct (Figure 47) for more information.

594. **Report of nesting turtle tracks** – If an NPWS officer or experienced volunteer is not able to investigate ASAP, ask the reporter to minimise disturbance to tracks, place a marker on top of dune, and take as many photos of the tracks as possible (see notes on photographing tracks in 4.7.6.1).

595. **Report of hatchlings** – see 4.7.8.2

4.7.5 Take control of the site

596. The NPWS office nearest to the site investigates all reports of nesting. Any reports of turtle tracks or nests should be investigated ASAP whilst tracks and the potential nest site are fresh and easier to identify.

597. **Nesting turtle on beach** – any NPWS staff or experienced volunteer present during a nesting event should try to apply / collect the following information:
- The Turtle Watching Code of Conduct (see Figure 47)
- Approach from behind but do not continue until turtle has been seen laying about 20 eggs. Once turtle is laying they go into a trance state and data can be collected
- Check both front flippers for tags (Figure 45). Record details and forward to BWU
- Take turtle measurements shown in Figure 46, if possible
- Mark egg chamber by placing a marker (such as a stick or peg) 50cm behind where the egg chamber is, then a second marker another 50cm behind in a direct line from

where the egg chamber is located. This allows you to find the location of the chamber after the turtle has covered the eggs. Once the turtle has left the beach and the nest has been triangulated these markers can then be removed.

- Allow turtle to return to the water uninterrupted.

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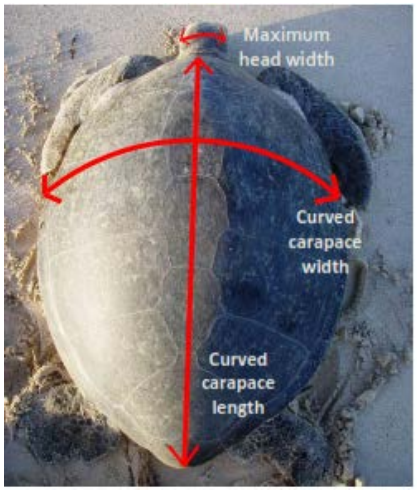


Figure 45 Location of flipper tags

Figure 46 Standard measurements used for marine turtles (Source: NTP Turtle Monitoring Guide).

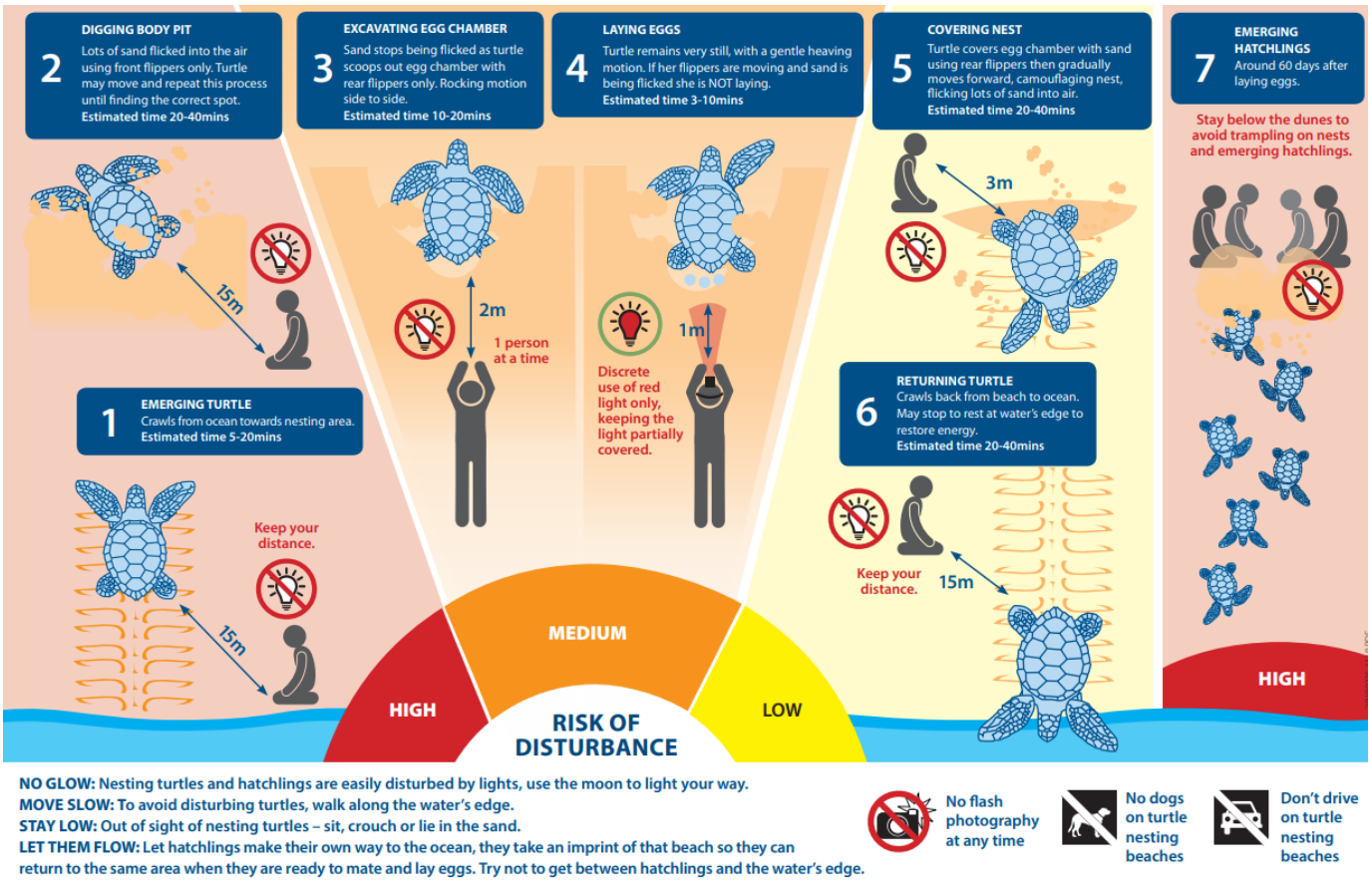


Figure 47 Turtle watching code of conduct (source: WA Department of Biodiversity, Conservation and Attractions and the WA Parks and Wildlife Service)

4.7.6 Assessment

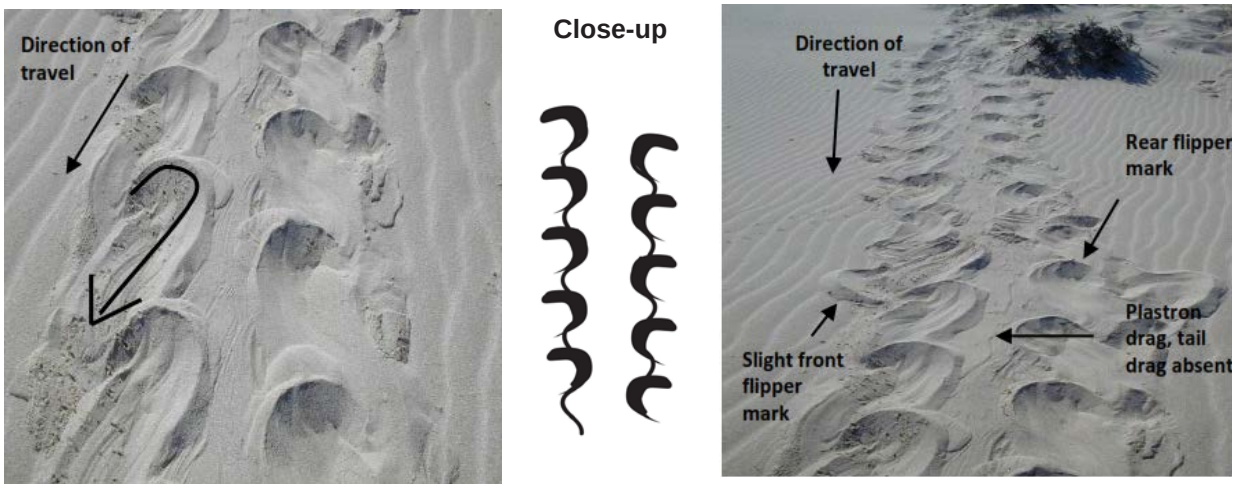
4.7.6.1 Identifying tracks

598. If visual observation of a nesting female is not possible, the configuration of tracks left on a beach can help identify a species of marine turtle.

599. **Identify the incoming and returning tracks** – as a turtle crawls, it pushes sand backward with each flipper stroke:
   - If one track is shorter, it may be an incoming track, depending on recent tides
   - If tracks overlap, the returning track will be on top.

600. Identify species by track types – As a rule of thumb, loggerhead turtles have an alternating gait on the up and down track. The track is approximately 1 m to 1.2 m wide. Green turtles have a breast-stroke style gait (the flipper marks are even on both sides) which is approximately 1.2 m to 1.5 m wide. Leatherback turtles also have a breast-stroke gait, approximately 2.5 m wide.

Loggerhead Turtle Track	
• Alternating flipper marks • No tail drag	• Tracks 1-1.2 metres wide • Tracks appear ‘swirly’, rear flipper indent • Smooth wide plastron drag down the centre



Green Turtle Track	
• Opposite flipper marks (breast-stroke) • Tail drag in centre (solid or broken line with distinctive dots where tail has poked into the sand)	• Tracks 1.2-1.5 metres wide • • Both rear and front flipper marks are obvious • Tyre track type appearance

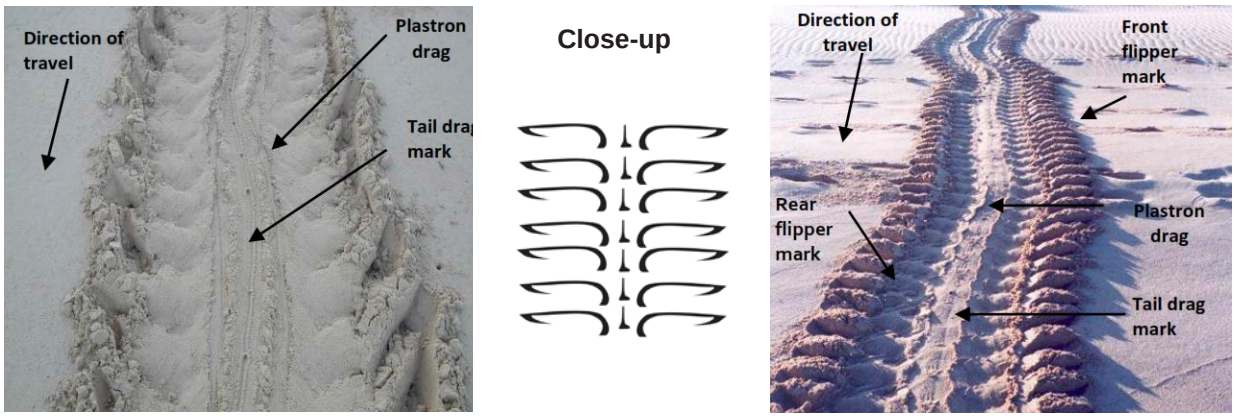


Figure 48 Loggerhead and Green turtle tracks (Source: Florida Fish & Wildlife Conservation Commission; Sea Turtle Conservation Guide, Ningaloo Turtle Program Field Guide).

601. **Adult Disorientation** – Take note of any strange adult tracks. Adult turtles could be disorientated by light pollution, human disturbance (look for footprints that would disrupt turtle tracks) or obstructions (e.g. beach furniture, marine debris, wall or escarpment) and these should be reported so that they can be addressed.

602. **Photographing tracks** – when photographing turtle tracks:
    - Choose the best part of the track for a clear photograph

- Take photo with back to the sea and facing landward
- Take photos of beach profile including any distinguishing features
- take many photos from different angles (of tracks and nest) as it is always hard to identify species and nest vs false crawl from one/limited photos.

4.7.6.2 Nesting Crawl vs False crawl

603. **False Crawls** – occur when the female turtle emerges from the water to nest but returns to the water without laying eggs. This can happen naturally if the turtle does not approve of the beach conditions, or when it is disturbed by noise, people or artificial lighting or obstructions.

604. After identifying the incoming track, follow the return track of the turtle first, looking for the following characteristics:
    - Very little or no sand disturbed other than tracks
    - U-shaped or simple arc with no digging
    - Considerable amount of sand disturbed from a digging effort, appearing as a deep (and usually more conical-shaped) pit, sometimes with the start of an attempted egg chamber in the centre. It will appear as a pit and a mound of sand next to it, with the absence of any escarpment or secondary body pit. There may be more than one abandoned digging effort within one false crawl track.

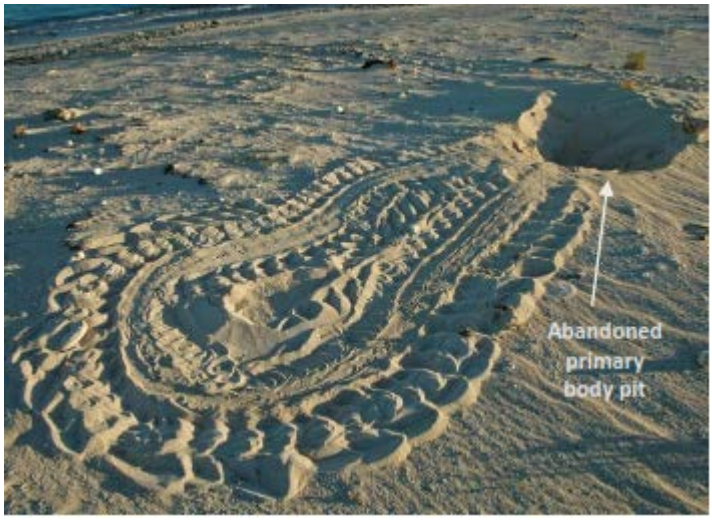


Figure 49 False crawl with abandoned body pit (Source: NTP Turtle Monitoring Guide)

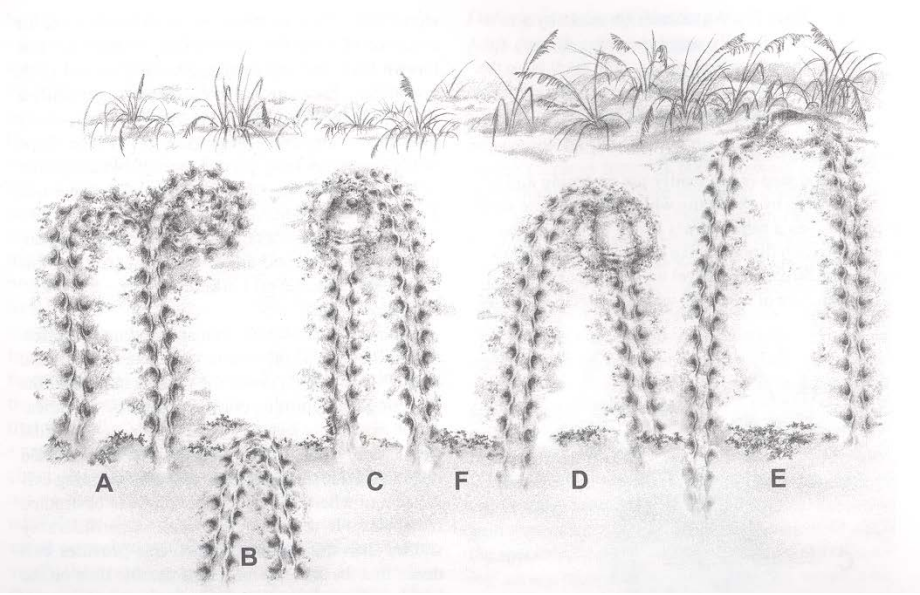


Figure 50 Examples of false crawls (non-nesting attempts) made by loggerhead turtles including: (A) extensive wandering with no body pitting or digging; (B) U-shaped crawl to the high tide line; (C) considerable sand disturbance, evidence of body pitting and digging with a smooth-walled egg chamber and no evidence of covering; (D) considerable sand disturbance and evidence of body pitting and digging and no evidence of covering; (E) marks the site of a crawl where the relative lengths of the emerging and returning crawls are the same; (F) marks the high tide line. (Source: IUCN/SSC Marine Turtle Specialist Group. Research and Management Techniques for the Conservation of Sea Turtles.)

605. **Successful nesting crawl** – when nesting, a female turtle slowly crawls up the beach, selects a nesting site and then digs a body pit using all four flippers. After creating the pit, the female digs a vertical egg chamber, which is shaped roughly like a tear drop and is usually tilted slightly. The turtle then lays the eggs and returns to the water. They may abandon a site if they hit an obstacle or the sand is not moist enough.

606. **Identifying a successful nest** – After identifying the incoming track, follow the return track of the turtle first, looking for the following characteristics:
    - low profile nest mound (large area of soft/disturbed sand)
    - presence of an escarpment (the rim around the nest mound)
    - sand misted/thrown backwards over incoming track
    - shallow secondary body pit.

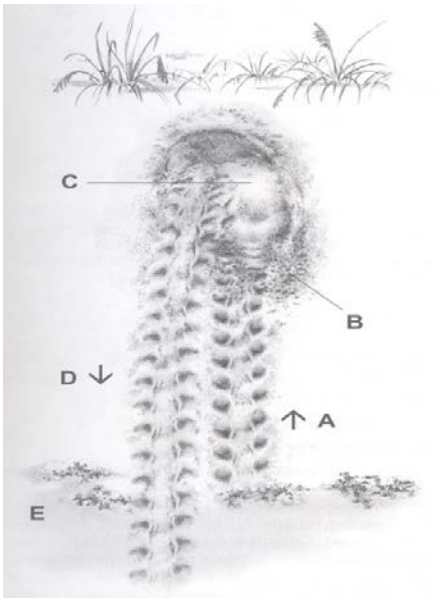
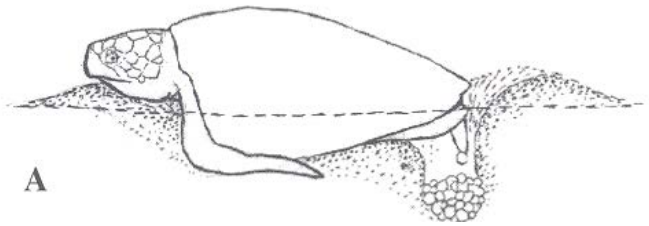


Figure 51 True loggerhead turtle nest with (A) incoming track; (B) sand misted or thrown of incoming crawl; (C) a secondary body pit, nest mound and escarpment, with sand thrown in the vicinity; and (D) returning crawl. (E) marks the high tide line. (Source: IUCN/SSC Marine Turtle Specialist Group. Research and Management Techniques for the Conservation of Sea Turtles.)

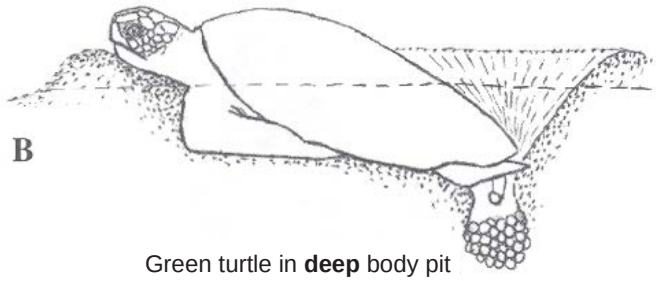
Figure 52 Photograph of successful loggerhead turtle nest (Source: NTP Turtle Monitoring Guide)

607. Although the two turtle species that nest on beaches in NSW share similar nesting habits, there are generally differences in nest sizes:
    - Green turtles dig a large, deep body pit (Figure 53a) and can have a nest mound several metres long
    - Loggerhead turtles dig a medium-sized, shallower body pit (Figure 53b).



Loggerhead turtle in **shallow** body pit

A. Loggerhead turtle has medium sized, shallower body pit approx. 50cm deep.



Green turtle in **deep** body pit

B. Green turtle has large, deep body pit and can have a nest mound approx. 60cm deep and several metres long.

Figure 53 Typical nesting positions and depth of body pit for Loggerhead and Green turtles (Source: adapted from IUCN/SSC Marine Turtle Specialist Group. Research and Management Techniques for the Conservation of Sea Turtles.)

4.7.6.3 Verifying the egg chamber

608. Send photos of the tracks and nest to NPWS turtle specialists to verify the status of nest. NPWS staff may choose to verify a nest status if:
    - a nest cannot be verified as a false crawl from the images
    - there is / likely to be community or public interest and the potential for volunteers to be involved in ongoing monitoring
    - the site is likely to require active management.

609. Apply the following steps to verify the egg chamber:
    1. Approach the nest site in the direction the turtle did, walk along the return track without stepping on it
    2. Examine the direction of the thrown, powdery sand
    3. Kneel at the start of the sand spray on the emerging track, measure approximately 60cm forward along the centre, eggs should be around this location
    4. An experienced person can often verify a nest fairly accurately, without the need for physical intervention (i.e. digging) and potentially disturbing it. If a nest can be verified using this approach, then proceed to step 9.
    5. If uncertain about nest verification in step 4, steps 6-8 can be undertaken by an experienced person only
    6. Using gloves, gently probe 10-20 cm either side of track to identify any softer sand
    7. Gently dig with hands to a depth of 60cm. Carefully refill holes as the area is investigated

8. If/when top of chamber exposed, gently refill
9. Consider placing a non-metal marker 50cm upslope from chamber location only if use of triangulation with 2 or more inland posts or landmarks is not sufficient. Insert temperature datalogger approx. 1 m to the side of the chamber location to a similar depth (if depth of nest is unknown, bury to 50cm for loggerhead and 60cm for green nest)

   Ensure datalogger is calibrated before deployment. Use of temperature dataloggers helps develop our knowledge of incubation periods
10. Ensure flagging tape and thin rope attached to logger. Attach both to non-metal stake adjacent nest site
11. Note time datalogger inserted and refill hole
12. Take photographs of nest from various angles and place stakes in discrete locations in vegetation around nest
13. Measure distance from the posts to the egg chamber location so it can later be relocated through triangulation. The beach can change greatly over ~80 days and the area will look very different. The more details the better
14. Use a compass (or GPS with compass function) to take a bearing for each measurement when doing nest triangulation. Nests that go over 110 days and are excavated can be very tricky to find even with good measurements – a compass bearing gives that little bit of extra information to help chamber location.

610. The following equipment is required to verify the egg chamber*:*
    - phone/ camera
    - GPS/mapping tool
    - compass
    - tape measure
    - data sheet or paper
    - disposable gloves
    - calibrated datalogger with flagging tape and string / twine attached to secure to stake.

611. Return temperature data logger to Marine Wildlife Team in the Biodiversity and Wildlife Unit to be downloaded or attach file to Elements Animal Information record.

4.7.6.4 Enter Assessment details into Elements

612. Enter the relevant information from the above Assessments in an Elements marine wildlife event and on the NSW Bionet Atlas. It is important to record as much information as possible.

4.7.7 Response actions

4.7.7.1 Threat Assessment

613. Undertake a site-specific assessment of threats to determine whether any in situ protection measures or nest relocation are required. Impacts to nests can come from anthropogenic factors (such as four-wheel drives, track erosion and physical interference), vertebrate pest predation (foxes, pigs) or shoreline erosion and tidal inundation.

4.7.7.2 Nest Protection

614. Actions to manage and mitigate threats should be taken before nest relocation is considered. The following measures can be applied where relevant. Contact a NPWS turtle specialist for assistance and technical advice, if required.

615. **Installing Barrier Mesh** – If predation or disturbance by foxes, dogs, pigs or goannas is a likely threat, the following options have been effective mitigation measures.

Option 1: 1m plastic barrier mesh pegged with non-metal pegs (Source: TurtleCare SOP)

Option 2: 1m x1m x 20cm made of 70mm diamond security mesh (Source: Col Limpus QPWS)

Option 3: Pig wire dug in approx. 20cm deep. 5m x 5m perimeter using plastic/timber star pickets. (Source: NPWS Clarence Area)

Option 4: Use combination of fencing and sand bagging. Note: remove sandbags after inundation risk as can result in sand accretion.

Figure 54 Options for protecting nests with barrier mesh

616. If the nest is off park, staff should liaise with land manager to seek endorsement for any protection measures (if deemed necessary).

617. **Managing 4WDs on Beaches** – If nest has been laid on a beach with high vehicle traffic, consider fencing nest area in consultation with the local council and restricting or alerting traffic post 80 days directly in front of nest to prevent hatchlings being run over.

618. **Signage** – Standard ready to print signage (Figure 55) is available if appropriate in the NPWS sign catalogue. If signs are to be located off park, staff should seek approval, if required from the relevant land manager.

Figure 55 NPWS turtle nesting sign

4.7.7.3 Nest Relocation

619. Relocation should only be considered if threats cannot be managed in situ and destruction of the nest in inevitable e.g.:
    - if prolonged inundation (below the high tide line) is imminent
    - the area subject to erosion and cannot be successfully raised / sandbagged for protection.

620. Nests should only be relocated under direction of NPWS staff and accredited volunteers.

621. **When to relocate nests –** Relocation should ideally occur between 2-12 hrs after nesting or from 21 to 60 days post nesting, when the embryos are robust enough to sustain movement. Note that temperature and time of year for the nest should be considered due to the extended incubation length of nests in NSW.

622. Where practicable, do not move a nest between 24 hours and 21 days or after 60 days. However, if the exact nesting date is unknown and the nest is at imminent threat of destruction, an attempt should be made to move the eggs.

623. **Relocation equipment**:
    - tape measure
    - non-toxic pen or pencil to mark the eggs
    - pen and paper to record notes
    - gloves – wear these when handling eggs

- tray to transport eggs in a single layer in 5 cm of sand
- plastic tent peg or other device to mark relocated site
- digital camera
- small plastic shovel to dig a new nest
- GPS to record both the original nest and the relocated nest
- temperature data logger (contact a specialist to obtain one).

624. **Where to relocate nests** – Find a suitable site to relocated nest e.g. directly inland or the closest suitable stable dune without dense vegetation and above spring high tide. It should not be relocated to the top of elevated dunes (despite those locations appearing to be attractive for nesting) because elevated dunes have reduced moisture content in the sand. When a nest is placed in this location, it results in increased invasion of grass and tree roots into the egg mass.

625. The location should be far enough up on the beach that it will not be overwashed, but not too near vegetation where it may be invaded by roots. Do not select an area that is a known for high rates of erosion, depredation, or disorientation. Ideally keep nests away from tracks and creek or river inlets.

626. **Relocation procedure** – extreme care must be taken as moving marine turtle eggs may kill developing embryos by rupturing the delicate membranes attached to the top of the egg.

627. Where possible, dig a new nest chamber to the same depth, size and shape of the original. It should have a spherical bottom with a slightly narrower neck (Figure 56). If the original nest cavity measurements could not be collected, a loggerhead nest should be 46-56cm deep with a spherical bottom the size of a soccer ball (~22-25cm wide). The neck should gradually become narrower (5-10cm) than the bottom. Adjust measurements for small or extra-large clutches.

628. Fill a bucket with ~5cm of moist (not dry) sand from above the original nest (make sure the sand does not contain ants.

629. Find the location of the egg chamber by gently probing with your hand. Once the eggs are located, remove eggs from nest very carefully and place them in the bucket with sand.

630. When moving eggs, **be sure to maintain each egg's original orientation** − do not rotate, tilt or invert eggs in any direction and avoid any abrupt movements, as the yolk sac could detach from the eggshell.

631. If relocating a long distance, the top of the egg should be marked with a non-toxic marker to help maintain the eggs orientation.

632. When placing eggs in the bucket, take care not to let them roll. Layer them so that they will not move during transport.

633. Count the eggs as you place them in the bucket. If there is someone with you, have them count as well.

634. Once all the eggs are out of the nest cavity, cover the bucket with a towel and place moist sand from the bottom of the original nest cavity on top of the towel to help stabilize the eggs. If possible, keep eggs shaded.

635. Take original nest cavity measurements (distance to bottom of nest and width of nest) if possible.

636. Adjust new nest cavity with measurements from original nest so they are as close as possible.

637. Very carefully place eggs into the new nest cavity starting with the eggs at the top of the bucket (as these were the eggs at the bottom of the original nest). Again, do not tilt, rotate or invert eggs while moving them. Use moist sand to hold their position if necessary.

638. Count the eggs again as you place them in the nest to make sure you got an accurate count.

639. When you have placed all the eggs inside the new nest, place the moist sand from the bottom of the bucket (original nest sand) into the new nest cavity. Do not allow dry sand to fall into the egg chamber.

640. Deploy temperature data logger 1 m adjacent nest and to similar depth if original nest depth is known.

641. Continue to fill the nest cavity with moist sand until you reach the upper level of the surrounding moist sand, “tucking” it around the top of the nest cavity.

642. Gently pat down the moist sand and then add dry sand on top of the moist sand

643. Ensure the following has been recorded:
    - Date
    - Depth to first egg
    - Number of eggs (make a note if any are damaged)
    - Distance to bottom of nest cavity
    - Width of nest cavity
    - Time of deployment of temperature data logger
    - New nest GPS.

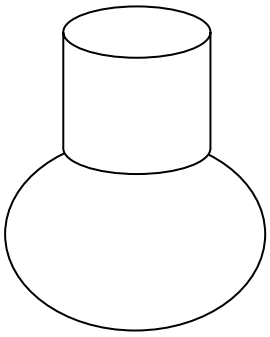


Figure 56 The shape of a sea turtle nest (Source: Mote Sea Turtle Conservation & Research Program).

4.7.8 Follow up

644. For record keeping, refer to 4.1.9 Situation reporting and records and 4.1.3 Initial reporting.

4.7.8.1 Nest Monitoring Schedule

645. Monitor nesting sites, where possible, for several weeks after noting egg-laying. Females typically lay several clutches of eggs in a breeding season at fortnightly intervals and will often return to the same beach to lay subsequent clutches.

646. Develop and implement a monitoring schedule – the schedule will depend upon the location and accessibility of the nest. More frequent monitoring should begin at approximately 70 days incubation to check for a hatch or boil. Ideally nest should be checked early morning to check for tracks and in case hatchlings are found.

4.7.8.2 Factors to be monitored

647. **Predator disturbance** – Foxes, dogs, pigs, goannas and humans can cause significant impacts when it comes to damage of turtle nests. A predated nest is generally characterised by fresh yolky eggshells or partially consumed eggs littering the nesting site. They may have claw or teeth marks on them. Where predation has occurred:
    - Rescue any live hatchlings (refer to Hatchling Rescue in 4.7.8.2).
    - Clean the area, try to remove any yolk or dead hatchlings/embryos as this will attract more predators
    - Count and record damaged eggshells and hatchlings, then bury away from nest (these will be included in the final egg count during the nest exhumation, which is undertaken after the incubation period is complete)
    - Re-bury or cover any exposed eggs
    - Record in database.

Figure 57 Example of predated nest (Source: Mote Sea Turtle Conservation & Research Program).

648. **Weed / vine invasion of nest –** Where possible keep an area of approximately 1m^2 around nest clear of vegetation by hand removal.

Figure 58 Nest with grass roots invading the egg chamber (Source: NPWS 2018).

649. **Inundation** – A nest can handle being washed over by waves or rain periodically. A ‘one off’ inundation of <24hrs is unlikely to have a significant impact on hatchling success and should not trigger nest relocation, depending on embryonic development (ref). However, relocation should be considered if nest is likely to experience 2-3 days consecutive inundation e.g. from king tides (ref).

650. **Wash out –** When eggs have been exposed from a nest and are definitively in danger of being swept away, immediate relocation should occur if feasible.

Figure 59 Example of nest about to be washed out via erosion of the sand (Source: Mote Sea Turtle Conservation & Research Program).

651. Drop **–** A drop is a depression or indentation in the sand on top of the nest that occurs when the hatchlings have started to hatch. As the hatchlings move towards the surface the sand falls, creating the depression.

652. If a drop is recorded, begin monitoring daily as a hatch should occur within 3-5 days. Note: a drop may not always be obvious, it may look like a crab hole. Daily monitoring post 80 days should capture the emergence if no drop is detected.

Figure 60 A depression above a nest or drop (Source: NSW TurtleWatch Project)

653. **Hatch** – A hatch is evident by the presence of hatchling tracks or hatchlings. Make note of number and direction of tracks. The recorded date of a hatch should be when there are a large number of tracks seen, not just 1 or 2 tracks. If a few tracks are seen most likely the hatch will occur soon after. If any tracks are seen heading away from the water, refer to Disorientation below. If hatchlings are found, refer to 4.7.8.2 Hatchling Management.

Figure 61 Hatch and hatchling tracks (Source: NSW TurtleWatch Project)

654. **Disorientation** – Hatchlings can get disorientated when emerging from the nest, primarily from light pollution, and move away from the water. If tracks are seen heading away from the water the following steps should be taken:

- Follow any tracks that when exiting the nest, head away from the water until live or dead hatchling is found or tracks reach the water. Hatchlings left on the beach during the day may dehydrate and are exposed to predators
- Record number of hatchlings found that didn't make it to the water
- If hatchlings are found on the beach, follow Hatchling Rescue in 4.7.8.2.
- Report disorientation to BWU / local council to consider future light pollution mitigation measures.

Figure 62 Hatchling disorientation (Source: Mote Sea Turtle Conservation & Research Program).

4.7.8.3 Hatchling Management

655. In NSW, hatchlings typically emerge around 70-90 days from their nest. Most hatchlings will emerge at the same time as movement stimulates them to hatch – an event known as a 'boil'. However, there will be a few early and late individuals.

656. **Hatchling behaviour** – is instinctual, so the less handling the better. Some basic hatchling behaviours to be aware of:
    - Hatchlings can take a few days to climb from the egg chamber to the surface of the nest.
    - Hatchlings emerge roughly between dusk and dawn – they wait below the surface of the sand until they feel a drop in temperature
    - Light – hatchlings orient to the lowest brightest light which should be the ocean horizon and lead them to the water. Artificial lights can lead to disorientation
    - Exercise – hatchlings need to make their own way to the sea to exercise their lungs before entering the water, and to magnetically imprint where they are for navigation.

657. **Hatchling identification** – if required, use Figure 63 to identify the hatchling species

658. **Response to a report of hatchlings** – follow the quick response guide in 4.7.1.

659. **Hatchling rescue and transport protocol** – Healthy hatchlings should be able to make a dash to the sea unaided. However, if hatchlings are cold, weak and lethargic, are being washed back into shore, or show signs of injury or unabsorbed yolk where the umbilical scar should be, they may need rehabilitation before being released.

660. If a hatchling is assessed as needing care, the following steps should be taken:
    - Wash hands with sea water before handling hatchling
    - Place hatchling in bucket with damp sand; NOT in water
    - Shells are soft, be gentle
    - Cover bucket with a dark cloth, keep dark and quiet until release or taken to rehab
    - Do not place in A/C or in direct sunlight, they are reptiles
    - Make note if hatchling was in the water
    - If hatchlings come into care – record number of individuals under event in Elements and cc BWU
    - Contact BWU if unsure as to where to rehabilitate hatchlings.

661. **Hatchling release near nest** – All hatchlings that are deemed healthy should be released as soon as possible and close to original nest. Summary of release steps:
    - Only release around sunset or early morning
    - Do not use flashlights, use a red filter if releasing in the dark. Instruct any public not to use flash photography
    - Ensure no obstacles are in the path of the hatchling to the water and that no bright lights are present
    - If public are present, use a barrier or line in the sand in an arc shape to help keep the path clear. Do not allow public in the water with hatchlings, especially around surf areas
    - Place hatchlings on sand at least 5m up the beach from the water line and allow hatchlings to run to the water.

662. **Hatchlings found in the water with algae or barnacles on their carapace** – can no longer be released off the beach as they have undergone their swim frenzy (that is the initial energy that they have from yolk reserves). They must be released offshore by boat.

663. **Release of rehabilitated hatchlings offshore** – The following guidance has been provided by Dr Duan March from Dolphin Marine Conservation Park and applies to hatchlings that have been found in the water with algae or barnacles on their carapace or have been rehabilitated at a facility:

- If animals seem fit and healthy and sea conditions suitable, deliver out to sea into East Australia Current (nearest point is approximately 10 NM from Cape Byron)
- Collect dry seaweed / kelp prior to boat trip
- At the release site, release hatchlings onto a raft of dry kelp or other buoyant seaweed. It is important to be aware that they will be highly buoyant and may simply seek shelter in a patch of kelp until they are prepared to swim off. The seaweed will also provide optional shelter from predatory birds and fish
- If hatching is not synchronised, hatchlings may need to stay in care to avoid multiple trips. Refer to Code of practice for marine turtle hatchling rehabilitation (in prep).

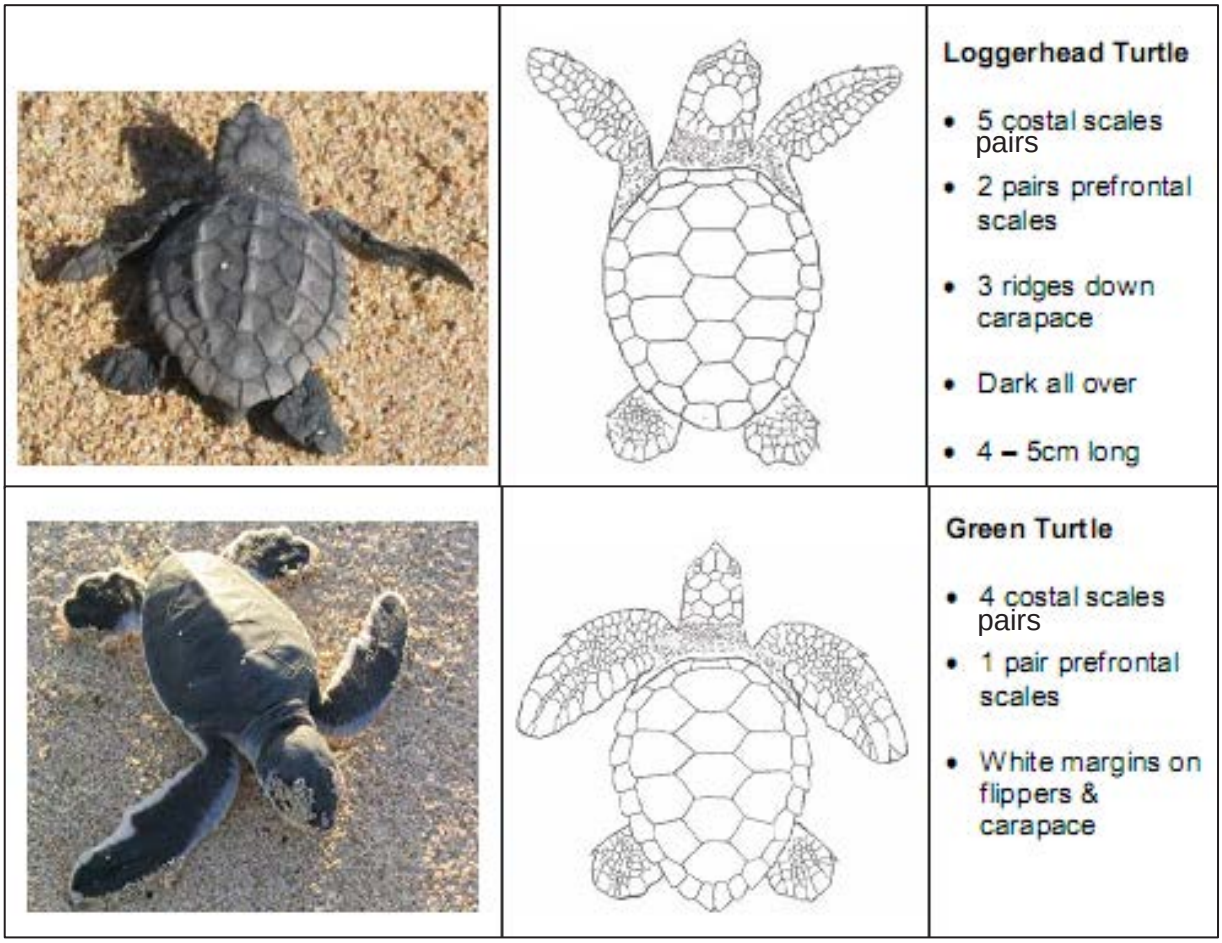


Figure 63 Loggerhead and Green turtle hatchling picture and characteristics (Source: Col Limpus, Queensland Parks and Wildlife Service; NTP Field Guide)

4.7.8.4 Nest Excavation and Evaluation

664. **Timing** – Nest excavation and evaluation should be completed when majority of the nest has hatched. Excavate 5-7 days after a large number (not just 1 or 2) hatchling tracks have be observed. Alternatively, if no activity is seen, the nest can be excavated at 110 days incubation. If after excavation and upon inspection it still seems a viable clutch, cover the nest and continue to monitor. Continue to inspect the nest weekly to monitor the success. Record details and photograph the clutch at each inspection and update the Elements marine wildlife event.

665. Start excavation around 2 hours before sunset so that any healthy hatchlings can be released quickly.

666. **Equipment List:**

- multiple tape measures (at least 3) for effective triangulation
- compass
- pen and paper / excavation datasheet (Appendix 17)
- gloves
- bucket and dark towel for hatchlings
- shovel (for digging up datalogger; can also use to lay handle across dug nest to get surface level indicator when measuring chamber depths)
- phone or digital camera
- hand sanitiser
- esky and alfoil (only if taking DNA samples).

667. **Procedure:**

1. Locate nest. If no drop or hatch use triangulation measurements to locate nest area to start digging
2. Only ever dig with hands
3. If 5 hatchlings are found in the neck of the nest stop excavation, replace sand removed and allow another few days before performing excavation
4. Measure distance from sand surface to top egg
5. Wear gloves when handling eggs
6. Carefully remove entire nest contents by scooping gently with hands, to minimize breaking or tearing eggs and eggshells. Be sure to check sides of nest well for any hatchlings, especially if there are roots around the nest
7. Measure distance to bottom of nest
8. Place the contents to the side and sort into the following categories (see Figure 64 to Figure 67) – count number of each category and record using the Nest Exhumation Datasheet (Appendix 17):
    - Eggshells – shell should be more than 50% of the shell, fragments not counted
    - Live hatchlings (count then follow hatchling protocol)
    - Dead hatchlings
    - Undeveloped eggs (no sign of blood vessels or embryo)
    - Unhatched eggs – developmental stages Phase 1 to Phase 6 (see Figure 68). Note: open egg and look for signs of embryo
    - Depredated eggs

- Live pipped (hatchling has broken eggshell but hatchling is not completely free)
- Dead pipped (as above)
- Make notes on eggs encased with roots or yolkless eggs

9. Once all eggs are counted, take any required samples, double check all records have been filled out and then return all contents to the nest and fill it in
10. Ensure the species, locality/nest ID, date laid, date hatched, excavations date have also been recorded.
11. Collect and return temperature data logger to the Marine Wildlife Team in the Biodiversity and Wildlife Unit.

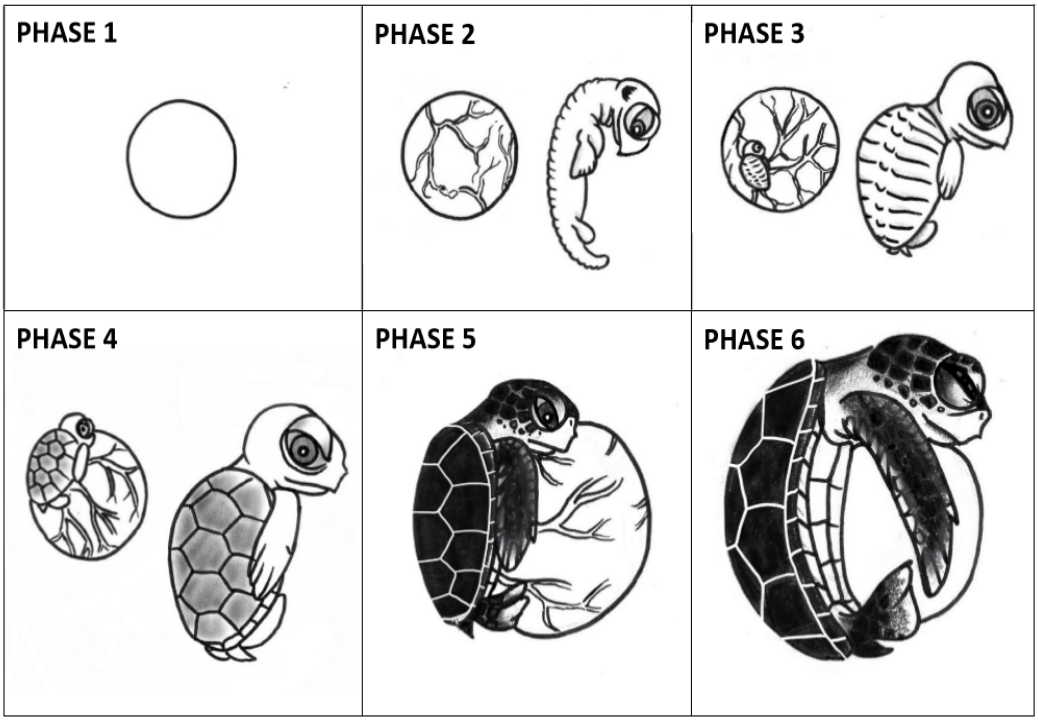
Figure 64 Eggshells (Source: Lynn Rees)

Figure 66 Unhatched egg with developing embryo (Source: Dolphin Marine Conservation Park)

Figure 65 Unhatched egg predated by ghost crab

Figure 67 Pipped egg with live hatchling

(Source: Florida Fish & Wildlife Conservation Commission)



Developmental stage	Morphology	Developmental timeline
Phase 1	No development	Days 0–7
Phase 2	Limb buds present	Days 7–17
Phase 3	Carapace present, but no scutes on carapace	Days 18–23
Phase 4	Carapace scutes present, no scales on head or flippers	Days 24–36
Phase 5	Head and flipper scales present, yolk bigger than turtle	Days 37–43
Phase 6	Full embryo, yolk smaller than turtle	Days 44–50

Figure 68 Unhatched egg developmental stages (Source: NSW TurtleWatch Project)

4.7.8.5 Ex situ incubation

668. There will be times after initial excavation where a few live pipped eggs, or eggs showing signs of movement/viability, remain in the nest after the majority have died. If unfavourable conditions are expected, these hatchlings / eggs are likely to perish if left in situ (e.g. where forecast low temperatures may impact on muscle motor function and energy, reducing their chance of emerging from the nest).

669. On limited occasions NPWS has planned or attempted ex situ incubation of hatchlings / eggs when faced with the above scenario. Success rates have been extremely low.

670. Ex situ incubation should only be considered as a last resort emergency measure, when no other management options seem viable. This option should be weighed up against the merit of non-intervention and letting nature take its course.

671. The need for ex situ incubation may often arise as an emergency wildlife rescue situation. It may not enable adequate lead times to prepare documented plans or briefings; and may depend on the capacity of local NPWS staff and volunteer partners to provide immediate assistance.

672. Ex situ incubation should only be planned or performed under the direction of NPWS staff and after consultation with BWU and advice from turtle experts.

673. In general, the hatchlings / eggs should be re-buried in the nest at around 150mm below surface and left for 24-48 hours to see if they emerge and depart naturally, before starting any ex situ incubation process. Any imminent threatening circumstances may give cause to skip this step.

674. If ex situ incubation is attempted, apply the following measures where relevant:
    - Carefully move the pipped hatchlings/eggs into a container with moist local sand and transfer to the incubation facility
    - Adjust room temperature or use a thermostatically controlled heat pad or device to maintain temperature in the incubation facility at around 26^{o}C to 28^{o}C
    - Monitor and adjust environment where necessary to ensure the sand does not completely dry out and desiccate the animals; but avoid too much moisture that could promote humidity or fungal problems
    - Observe pipped hatchlings/eggs regularly for yolk absorption, activity levels and mobility
    - If hatchlings emerge quickly and appear to have good vitality and energy levels, release at a beach may be feasible.
    - If the incubation period is prolonged or the hatchings appear deprived of energy reserves, then release from a vessel into the warmer waters of the East Australia Current may be preferable. Ideally this should be done early morning and in waters above 24^{o}C and at least 3nm to 5nm offshore to maximise their survival chances. ‘At sea’ release gives the animals an opportunity to avoid near shore predation risks from higher bird densities and coastal predatory fish. See 4.7.8.3 Release of rehabilitated hatchlings offshore for more information
    - If the timing of all the animal hatchings is not relatively synchronous then consider multiple release events.

675. Ex situ incubation is an area of research that BWU will monitor to inform future management of this issue.

4.7.8.6 Reporting in Elements

676. Report all nesting data into Elements including photos, nest excavation details and datalogger files. Elements should be the main repository for all data relating to the nest for future reference.

4.7.9 Debriefing

677. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

678. BWU will coordinate a debrief of each season with Branch representatives to improve on current practices.

4.8 Entanglements – large whales

4.8.1 Quick-response guide

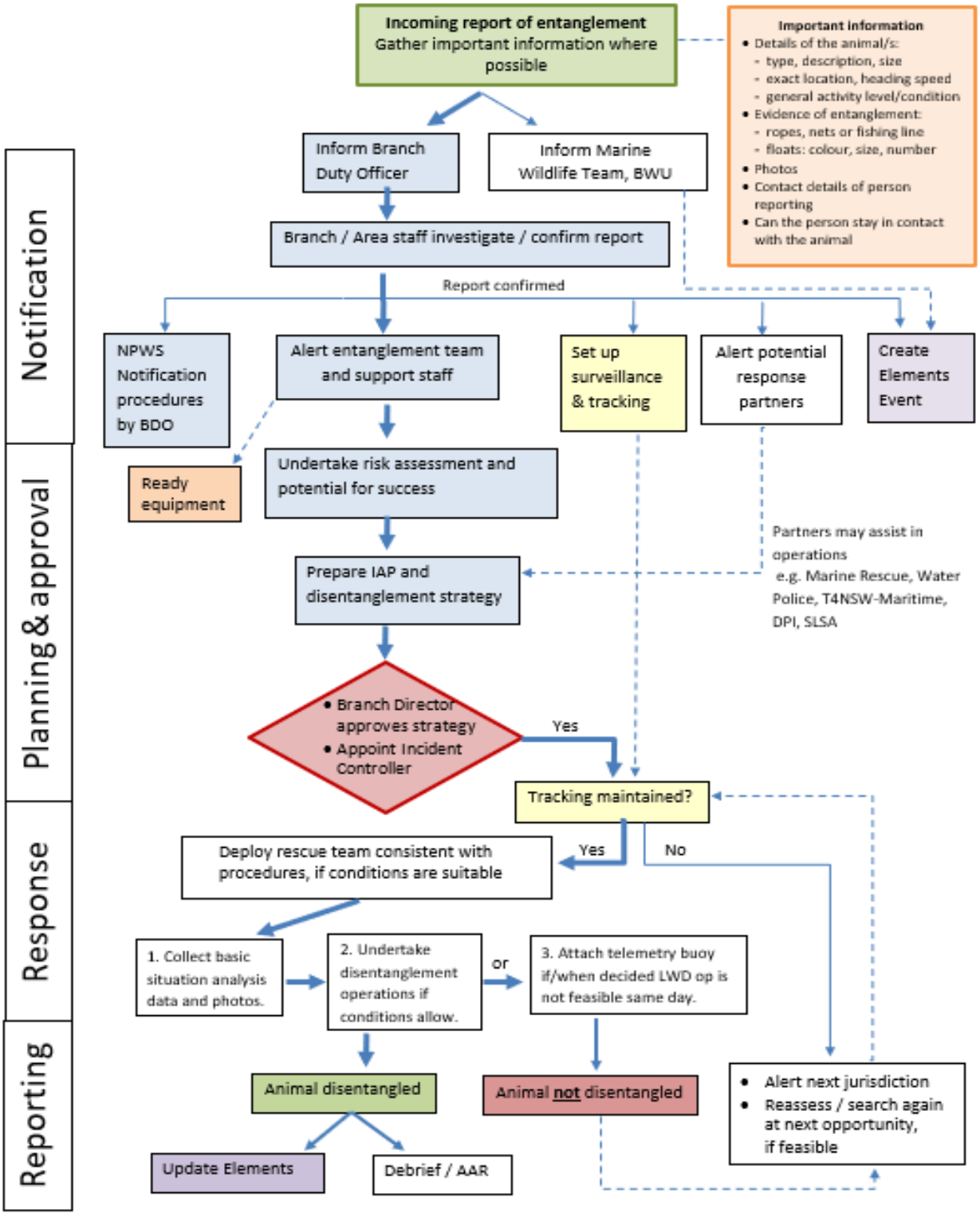


Figure 69 Large Whale Disentanglement Quick Response Guide

4.8.2 Policy

4.8.2.1 General

679. NPWS recognises a response to a large whale entanglement is predominantly motivated by concern for the animal's welfare and public expectation rather than species conservation. However a response to a tangled Southern Right Whale from the SE Australian population estimated at less than 300 individuals (as at 2020) may contribute to population level conservation outcomes.

680. NPWS's response to, and management of, large whale entanglement events will:
- ensure the safety of all personnel assisting in the event response as the top priority
- as far as possible, treat entangled large whales humanely to minimise their pain and distress
- ensure the safety of members of the public and spectator vessels during disentanglement operations
- free whales from entanglements
- collect and analyse data on entanglement frequency and causes
- work with partners to improve response capability and success.

681. NPWS recognises disentanglement is not the solution to the issue of entanglement. It will endeavour to minimise the risk of large whale entanglement in NSW waters wherever possible by:

- providing advice for development applications, fisheries activities and by seeking to eliminate or minimise or modify those practices leading to entanglement
- working with the Department of Primary Industries and other agencies and industry groups to improve the design and spatial and temporal use of fishing gear.

682. NPWS supports scientific investigation into quantifying marine wildlife entanglements in Australian waters and will provide information to partner agencies and organisations, and the Commonwealth Government for relevant agency, industry, state and national reports.

683. Although priority is given to human safety and animal welfare considerations, NPWS will attempt, wherever possible, to minimise damage to fisheries gear that has become involved in an event. NPWS will liaise with DPI and industry representatives to ensure all parties are aware that neither NPWS, nor any officer of NPWS, nor any person or organisation assisting NPWS, is liable for any compensation claims for any damage or loss of equipment that results from a disentanglement attempt.

4.8.2.2 Safety

684. NPWS recognises significant risks are associated with disentangling large whales. The safety of NPWS personnel, those assisting NPWS and the general public takes precedence over all other considerations and all precautions will be taken to protect them.

685. NPWS and partner organisations will address risk assessment through a job safety analysis (JSA) and job safety briefing (JSB) for each event, as well as utilising 'Take5' and/or other spot check safety procedures to react to changes or variations to any situation not covered by the JSA/JSB. Any such reactive safety assessment by staff on a small 'wet' vessel, should where possible be recorded by staff onshore or on a dry vessel through an appropriate communication process. A standard JSA has been prepared and is available on the intranet. Responders will make any modifications to this JSA for individual circumstances.

686. Take extreme care to minimise risks to the response team, including:
    - storing equipment safely
    - keeping ‘personal rescue’ knives accessible
    - wearing safety equipment (e.g. lifejackets and helmets)
    - using a support vessel with first-aid equipment
    - attending to changing weather and sea conditions
    - managing fatigue, hypothermia, and harmful exposure to environmental conditions and sunburn
    - maintaining safe working distances from tangled whales
    - maintaining safe working positioning from tangled whales.

687. Work Health and Safety (WHS) conditions associated with the industrial awards and NPWS policies will be observed during disentanglement operations.

688. Whales are large and capable of inflicting injury or death, particularly if harassed or distressed.

689. NPWS and partner organisations will take all precautions to protect the public and staff when responding to large whale entanglements. A whale’s rescue does not take precedence over human safety.

690. Only personnel specifically trained in large cetacean disentanglement, and with the necessary preparedness as specified in Section 3.5.2, are to participate on a response team aboard the response vessel.

691. All actions need to be thoroughly planned and communicated to the team.

692. Actions should not be pressured by weather, public expectations (onlookers) or the perceived need to act. Rescues must not be attempted in failing light or in poor sea or weather conditions.

693. While the focus is on the job at hand, response teams must pay attention to the overall environment to ensure safety at all times.

694. At no time may a person enter the water without specific authorisation from the IC. Such authorisation will only be given in exceptional circumstances, such as to rescue personnel, and must be subject to a JSA, “Take5” and/or other detailed risk assessment process. There is a high probability a person in the water assessing or attempting to assist a large entangled whale will also become entangled. In addition, whales are very large, strong animals and they do not always move in predictable ways. There is also a high probability that a whale in distress will be attractive to other marine predators such as sharks, which further risk the safety of any swimmers or rescuers in the water.

695. Each member of the response team will carry a personal rescue knife (Hoffmann 911 or equivalent) tethered in a universal location and kitted out in full wetsuit, gloves, boots, flotation device and helmet. (where possible, wetsuit and helmet should incorporate high visibility and/or reflective materials in case a person goes overboard)

696. The response vessel should never approach the whale from directly behind unless assessed as safe and free of trailing entanglement. The response vessel should never approach the whale from directly ahead to avoid an aggressive whale “charge” or “lunge” at the response vessel. The vessel must also avoid the ‘danger zones. These are:

- within range of the animal's tail flukes and pectoral flippers, noting that flukes and pectorals can move sideways as well as up and down
- in front of and up to 30^{o} either side of the observed line of travel of the whale unless / until the whales behaviour demonstrates clear exhaustion or fatigue from the entanglement or control equipment.

697. The response team needs, at all times, to be aware of the location of the whale, other escort (potential competitive mates) or dependant whales (mother and calf pair), other wildlife (sharks), other team members, equipment and tools, and the overall operating environment.

698. All responders in parent or tender vessels, or other supporting vessels will monitor the whale at all times to identify potential threatening behaviour or warning signs such as head lunges, charging, tail slashes, or pectoral slaps, s-shaped body posturing, bubble trails, trumpeting, All responders should be mindful that sometimes aggressive / defensive behaviours may come without warning.

699. The team will keep all gear attached to the whale out of, and not attached in any way, to the response vessel (IRB)and free from the engine. The team will stay clear of any load-bearing line and never loop any rope around hands, feet, legs or body, and will safely store all equipment aboard all vessels to avoid accidents (e.g. keep ropes coiled in buckets, knives closed, trip hazards stowed).

700. In the event of a person falling overboard, all marine wildlife rescue operations are to be suspended and attention diverted immediately and exclusively to retrieving the person.

701. If an accident involves personal injury to any of the crew, suspend all marine wildlife rescue operations immediately and manage the injury event as a priority. The Master of the support 'Parent' vessel will (is required by AMSA to) take charge of managing the injury event.

702. To manage fatigue and exposure to the cold, response team members working in the IRB are to constantly consider and assess the need for crew change-over depending on operational activities, crew fitness and fatigue, or conditions. This need and timing may vary due to operational activities, sea state, weather conditions and temperature.

4.8.2.3 Response policy

703. Generally, a marine wildlife entanglement response will occur at the NPWS Area or Branch level; be approved by the Branch Director; and be scaled up or down as the event requires. The process to approve a deployment by either NPWS or other partner organisations, will be subject to the relevant agency procedures, delegations, and potential Award related implications. For NPWS teams, a response Out of Branch (OOB) will be coordinated by a competent person within the relevant Branch or Area/s after notification and concurrence of the relevant Branch Director.

704. The IC, in consultation with operational staff, determines the management strategy and/or IAP if one is required, including the level of response by NPWS and other organisations and, where appropriate, a decision not to respond. A decision not to respond is appropriate when the circumstances make it unsafe for staff to attempt a response.

705. The IC will keep the Branch Director informed (often via AM, BDO or SCPO) of the management strategy. The Branch Director is responsible for approving the management strategy and will be responsible for any decision to declare the event operation an 'incident' under the relevant industrial awards.

706. The IC will take steps to minimise harm and interference by private viewing craft and to ensure the safety of onlookers and spectator vessels.

707. Disentanglement operations will be cost effective. An early and quick response, which may include several alternate options e.g. detailed situation assessment, attaching telemetry, visual tracking or a rescue response, is required to minimise costs and suffering to the animal.

708. Communication and management strategies will be developed to ensure other relevant agencies and jurisdictions are aware of the situation and that the public is kept regularly informed of the management strategy and outcomes, where possible.

709. The branch duty officer coordinates cross-border (Queensland and Victoria) issues in consultation with the Marine Wildlife Team in the Biodiversity and Wildlife Unit.

4.8.3 Background

710. The incidence of large cetacean and marine wildlife entanglements in anthropogenic materials in the marine environment is increasing every year in Australian and international waters. Entanglement may pose a significant threat to a number of species, particularly those already listed as vulnerable or endangered.

711. Marine wildlife may become entangled in a variety of anthropogenic materials in the marine environment including fish trap ropes, fishing nets, ocean beach shark control nets, estuarine swimming enclosure nets, lobster trap ropes, crab trap ropes, aquaculture equipment, vessel mooring lines, navigational marker mooring lines, monofilament fishing line, and marine debris. Animals may be entangled in both inshore or deeper waters. They may still be mobile or anchored to a structure or the seabed.

712. Recent growth in coastal development, fishing activities and aquaculture, combined with a gradual increase in humpback and southern right whale populations has increased the likelihood of entanglements occurring, particularly as these two vulnerable species migrate annually through NSW coastal waters. However, other species such as Brydes and Minke Whales and some other smaller Delphinid whale species, that are resident populations or enter coastal waters, are also at risk of entanglement.

713. The best solution to entanglement is prevention and NPWS recognises the need to work towards reducing the rate of entanglement. However, there is a public expectation and an ethical obligation to assist, as much as possible, individual animals that have become entangled in ropes, nets, debris and other anthropogenic materials, providing human safety is assured.

714. There are serious risks to the animal, personnel and volunteers when assisting a large animal entangled at sea. The task requires trained, experienced individuals using appropriate specialist equipment and resources. They may commence work only under an approved incident management structure.

4.8.4 Initial report

715. Reports may be received from members of the public, commercial or recreational fishers, media organisations, commercial vessels, and agencies that regularly have personnel on or near coastal waters and in situations where they are likely to observe an entangled large whale.

716. Log all information into Elements. The Elements system will designate a unique identification number for each reported animal. Staff entering data into Elements should enquire either through Elements or other staff, if the animal they are entering has been previously sighted and recorded (to avoid duplication) and ensure new locations for known animals are recorded accurately to assist in event tracking.

717. Elements will also allow use of a swim distance calculator (see Appendix 14) to assist in event tracking and predicting the movement and possible intercept of entangled cetaceans. The swim-distance calculator can model travel of cetaceans for a range of swim speeds. Results are to be communicated to affected Areas and disentanglement teams.

718. Following receipt of the initial report, standard notification arrangements apply (**Figure 4**).

719. When a report is received, the NPWS officer taking the call gathers as much information as possible about the event, including:
    - the caller's name and phone number (to allow for call back)
    - the animal's exact location
    - where the observer was and how far from the animal they were
    - exact time and date of observation, and when last seen
    - type of animal or species if known
    - visible evidence of entanglement (support by collection of as many photos of animal, entanglement, and trailing gear as is safely possible)
    - the animal's general activity level (swimming strongly, lethargic, circling, stationary, etc)
    - any other animals (same and other species) present
    - as much detail as possible on the animal's location at last sighting, swimming speed and direction (to allow for "intercept" planning on a mobile tangled animal).
    - cross referencing to other Elements records (or via CB staff) to check if animal may have been previously recorded, and any track record of the animal from earlier reports or situation assessments.

720. Where reports are received second-hand, attempt to contact the initial source directly to obtain and confirm relevant details.

721. Encourage the person who first identified the entanglement to remain in visual contact with the entangled whale, if possible, until a response team arrives, a trained LWD Team Leader can talk directly to the observer by phone or radio (to gather intel), or another vessel or observer can take over surveillance. This will save much time and effort for the response team in relocating an animal at sea. NB – be realistic with the observer how long they may be asked to stay "on station" and modify advice to suit.

4.8.5 Take control of the site

722. Once a report of a large whale entanglement is received, NPWS or partner agency officers should attempt to locate and assess the animal, and where an onsite witness or observer cannot remain, the responding officer should attempt to maintain visual contact. Do this as soon as practicable to improve both the chances of locating the animal quickly and cost efficiency of any potential immediate response.

723. Observations for the initial assessment will depend on the circumstances and may be from a headland, vessel, drone or aircraft. To assist in any assessment, the responding

officer may contact the Biodiversity and Wildlife Unit and/or partner organisations and share photos, videos, or witness descriptions.

724. Other partner organisations may be contacted to assist at this stage, particularly those with more rapid access to vessels and the entanglement site (e.g. DPI Fisheries, NSW Marine Rescue, Water Police, RMS Maritime, local surf lifesaving clubs or whale watch industry) to assist NPWS and/or partner organisations to establish situation assessment and site control if possible. Assisting partner organisations must be briefed on risks, approaches, and expectations.

725. Any competent vessel operator and crew (with or without a trained LWD Team member assisting) may undertake a vessel-based situation assessment consistent with the BC regulations (see 2.2.2). The vessel operator should be briefed on safety risks posed by changes in whale behaviour, escort animals, other species, and potentially long trailing lines.

726. For a more detailed vessel based situation assessment, either a trained, skilled and experienced LWD Team Crew Member must lead, or assessment may be undertaken by a competent non-LWD trained vessel master under direct and continuous supervision from a competent LWD Team Leader subject to clear advice on vessel positioning and proximity to the whale, including;

- not closer than 3 whale body lengths or 30 meters (whichever is greater)
- only from 4 o'clock or 8 o'clock positions,
- not forward of a line perpendicular to the line of travel and behind the back of the tail, and
- not passing directly behind the animal within 300 meters (unless it has been confirmed that the animal is not trailing and tangled lines where the vessel passes behind. (Note – a case in 2017 had 1,500 meters of trailing line behind it)

727. If the initial observer does not remain in the vicinity, or there is a delay until an NPWS officer is available to search for the animal, it may be necessary to organise an alternate form of surveillance, such as volunteers on headlands or other vessels, a "NOTAM" style radio broadcast to all vessels in the area, drones, or potentially light aircraft to locate it. While aircraft surveillance is expensive, an hour or two of flight time with a skilled and well briefed AOB is more cost effective than many hours of constrained searching from headlands or by vessel involving numerous staff.

728. Targeted detection flights may be appropriate in calm conditions to spot a reported entangled whale that has not been tagged with a location tracker. However, locating an entangled whale from an aircraft is, generally, exceptionally difficult.

729. Detection flights may also be used for surveying animals at sea during multiple strandings or dependent-calf events.

730. Remotely Piloted Aircraft (drones) may also be appropriate if conditions are suitable and minimum distance requirements are met.

731. All vessels and aircraft not engaged as part of either a situation assessment or rescue response, must be requested to maintain minimum approach distance separation from the entangled animal. Site control may be performed by other partner organisation vessels or personnel, under direction from the IC.

732. Where the information provided is considered reliable and a response team is available on short notice, the team may, once approval for deployment is obtained, with the necessary equipment to the site to make the assessment.

733. Ultimately a disentanglement operation can only occur if undertaken by a fully trained and current Large Whale Disentanglement Team. See the marine wildlife incident and information contact list for details of experts in other states/agencies who may also be available to assist.

734. Once a response team has been contacted and deployed, the team collects a full set of disentanglement gear, one response vessel (a small inflatable), a support vessel (a larger vessel), or other vessel arrangements as may be determined appropriate by the Team and Team Leader, as a result of assessment.

735. The Area Manager or Branch Director appoints an incident controller to take control of the operation.

4.8.6 Assessment

736. Response teams plus an incident management team, are drawn from the relevant coastal NPWS Areas within North Coast, Hunter Central Coast, Greater Sydney and South Coast Operations branches.

737. Once on site, the response team (or the personnel undertaking situation assessment until the response team arrives) takes control of the site to prevent any disturbance or unauthorised action by any person outside the Incident Control System, and continues situation assessment and photographic documentation.

738. During any entangled whale assessment, the response team must strictly follow safe working procedures, to ensure safe positioning and proximity to whale and any trailing gear until a “plan” is determined, reported to and approved by the IC.

739. The assessment may be made from a small inflatable vessel or a larger vessel depending on availability and conditions. Initially approach of the animal is at a slow speed from behind, off centre and parallel to it,

- not closer than 3 whale body lengths or 30 meters (whichever is greater)
- only from 4 o’clock or 8 o’clock positions,
- not forward of a line perpendicular to the line of travel and behind the back of the tail, and
- not passing directly behind the animal within 300 meters (unless it has been confirmed that the animal is not trailing and tangled lines where the vessel passes behind

This is to minimise disturbance, avoid startling the animal, and avoid potential trailing entanglement. Maintain a distance that is both safe and allows visual assessment of the entangled gear. Once the behaviour of the animal is less unknown, a trained LWD Team may consider closer approaches to obtain finer scale detail about the tangle and to develop specific strategies for the operation.

740. An accurate assessment is critical to the success and efficiency of the disentanglement effort. Take as much time and care as necessary to determine how and where the animal is entangled. Where possible, photograph both the animal and the entanglement. If possible, view the entanglement from underwater via an underwater

bathiscope, sea-view scope, pole cam or equivalent. Use this information in the assessment.

741. Record the initial situation assessment in the Elements event or if in the field a marine mammal initial information collection form (Appendix 5), or directly into an IAP, and include:
    - the species, size, behaviours and condition of the animal
    - the type and extent of entanglement, location of entangled materials and where on the body they are entangled (include a diagram if possible)
    - any potential obstacles to the rescue operation such as location, weather conditions, time of day, escort animals or other species present, vessels or other activity taking place in the vicinity of the operation
    - general activity level, average swim speed and general swim directions of the animal
    - include as many photos of animal, entanglement, trailing gear, and any gear identification, as reasonably possible.

742. It is imperative that everyone on board all vessels continuously monitor any trailing entanglement gear that could foul the vessel's propeller. Only under exceptional circumstances is any direct unassisted action to be taken by the assessment officer in the absence of the LWD response team. Such cases are subject to vessel master agreement, Job Safety Analysis, task specific briefing, and vessel and operator safety being assured. This may include:

    - an assessment vessel providing a platform for an appropriately trained LWD Team member (LWD Crew Member under instruction from a Team Leader communicating in real time by phone or radio), to attach a tracking device only to equipment trailing BEHIND a tangled whale, or

    - an assessment vessel providing a platform for trained LWD Team (minimum Team Leader and Crew Member) to use cutting equipment on long handled extension poles or other remote operational equipment from the deck of the Parent Vessel, ONLY when;

        - the tangle is a simple tail loop or wrap, likely to be freed with a simple cut sequence or 'single cut'

        - the operation can be conducted without the need for attachment of a control line and minimal risk exposure time

        - the behaviour of the whale is observed to be fatigued or their condition declined such that the animal is safely accessible without a control line

        - the master of the vessel is briefed in detail about positioning and proximity of the vessel in relation to the whale

        - it doesn't involve compromising the safety of the vessel or crew

        - it doesn't involve participation of any non-LWD trained crew with use or operation of the LWD equipment (Note - non-LWD trained crew may assist with safe storage, securing or passing equipment to LWD Team members on board the vessel)

        - all crew working in proximity to the task must have appropriate PPE

- appropriate separation (position and proximity) between the whale and the vessel, can be maintained at all times.

743. he IC, once established, may seek a more detailed assessment of the situation and evaluate available resources. The assessment is critical to the safety, efficiency and success of the event.

744. The IC in consultation with the LWD Team, may decide not to respond or assist. This decision should be based on risks to staff safety, whether the entanglement is life threatening to the animal and whether the animal would be able to shed the gear unassisted.

745. In situations where there is a significant time lapse before a response team can attend or where the operation must be called off due to weather, time of day, or other limitations, it will likely be difficult to relocate the animal, unless enhanced visual or telemetry tracking is possible.

746. Where the equipment is available, enhanced visual or telemetry tracking may assist in relocating an animal when a response operation needs to be suspended or is unable to commence on the day of the situation assessment. If available, attach a buoy with an internal satellite or radio tag, preferably on a lighter weight trailing line of around 20-30 meters to allow the buoy to remain at the surface most of the time. If a telemetry buoy is unavailable, and visual tracking would be enhanced with the use of an additional float(s) on a longer trailing line, this may be an option to improve sightings and relocation. This will help narrow down the search field when searching for the animal later on.

747. An underlying principle when attaching anything to an entangled whale is to minimise the risk that the attachment will further un-necessarily compromise the health of the whale. Large “keg” floats or heavy breaking strain ropes should not be left on a whale when a response operation is suspended, as this could significantly compromise the whale if it was not subsequently relocated.

748. The alternatives are to use aircraft searches to relocate animals (when conditions are suitable), to conduct boat- or land-based surveys based on the animal’s last known location and speed and direction of travel, or to wait for further reports. Emerging management options (such as use of rotary wing or fixed wing drones) may also be viable to assist in surveillance for tangled whales and other marine wildlife.

4.8.7 Response actions

4.8.7.1 Disentanglement strategy

749. The strategy employed in any given event will vary, depending on many different conditions, and may change dynamically during an operation. The following are examples and points to consider. This is not an exhaustive list and as incidents occur, new scenarios and points to consider will become evident, and will be shared via debriefs and after action reviews where possible. Some of the dynamics to consider prior to and during a response include;

The animal(s):

- Size, species, temperament, behaviour, body condition, mobility, company of other cohorts including young and/or potentially aggressive adult escorts, and other species including large predators such as sharks or orca.

Nature of the entanglement

- **Type of entanglement material:** The type of entangling material which may include one or more of the following: bare ropes, ropes with buoys, shark mesh nets, fishing nets, fishing line including monofilament or rope longlines with hooked snoods or droppers, mooring and/or anchor lines, or floating debris. Some entangled whales have been tangled in more than one type of gear or material making the situation far more complex. Past experience also suggests that many ropes are within a 7mm to 25mm size range, but a few cases have included very large diameter ropes (in excess of 100mm diameter) likely originating from commercial shipping mooring or anchor lines.

- **Point of entanglement and trailing length:** The entangling gear may be attached to or wrapped around the tail flukes, peduncle, pectoral fins, through the mouth, twisted over the body, or a combination of the above. The entangled gear trailing the animal may be nil, but one case example in 2017 had around 1.5km of trailing rope, and may include floats, anchors, weights and other hardware like traps, hooked lines or aquaculture pens, etc.

- **Position of working line:** How and where a working line may be attached (or if required) to achieve control and manage the whale's ability to dive. Where cuts to the entangling lines will need to be made to achieve maximum effect.

- **Mobility consequences of entanglement:** The animal may be stationary as they are tethered or remain free-swimming and may fall into one of the following categories which may also change during the event:
  - entangled, towing material but freely mobile
  - entangled so that swimming is inhibited, but not precluded ('hog tied')
  - entangled and anchored to the seabed, only capable of swimming in a circle
  - entangled and anchored with restricted ability to get to the surface.

Other:

- Other conditions and local features will also need to be considered before preparing a strategy: weather conditions, sea surface temperature, sea state and swell, water depth, tides , proximity to shore, surf breaks and/or bomboras, rocks, reefs or other oceanographic features which may impact on vessel mobility or safety, location and availability of resources, presence of other nonoperational vessels, commercial shipping and aircraft, presence of sharks or other species, time of day and remaining daylight, distance from a safe port or harbour.

750. In general, where an attempt to disentangle the animal will be made, the first step in determining strategy is to accurately assess the situation, assess the activity level and behaviours of the whale, and consider which strategy options, sequences and/or variations may be available. Or, if there are no safe and viable strategy options under the prevailing circumstances, then surveillance and tracking may provide another safer opportunity at a later date or time.

751. A key principle of the large whale disentanglement strategy options and methods used by skilled and experienced teams around the world (and borrowed from old whaling methods) is to exhaust or fatigue the whale before engaging at close quarters, so that the subdued behaviours may increase safety for anyone approaching.

752. The most common method to achieve this exhausted or fatigued condition is to attach rescue equipment, via a thrown grapple or remotely placed clip, attached to a 10 meter to 30 meter control line, and a succession or series of large 0.5m to 1.2m diameter buoys (referred to as kegs) to act as both drag and buoyancy. Known as kegging, it is designed to exhaust the animal so a vessel can approach more safely and attach the equipment by whichever means (grapple, clip or directly tied to trailing materials) is

considered most appropriate. This is determined by the LWD Teams progressive and continual assessment of the situation.

753. The time taken for kegging to result in a whale being sufficiently exhausted or fatigued to allow for improved safety for rescuers will depend on its pre-existing condition. Some animals may take many hours (or potentially days) to tire enough to be safer, whilst other animals may already be exhausted by the nature and duration of the entanglement.

754. In cases where the animal is already exhausted, a detailed situation assessment by an experienced LWD Team may indicate the opportunity to employ other strategies and methods where safety can be managed, and the duration of the operation (and therefore risk exposure) may be reduced. This may include a series of cuts or even a single cut without the application of a 'keg' line.

755. Alternate strategy options may include, but are not limited to;

- kegging, with attachment of a control line and inflatable buoys to a moving whale, followed by;
    - a team in a small vessel, culminating in approaching along the control line (walking the line) to a point where a controlled series of planned cuts can be made, while effectively being towed behind the whale, or
    - excess keg load applied to the control line to attempt to break the entanglement away through drag without further crew contact.
- kegging (as above) with an additional umbilical line between a smaller operational platform vessel, and a nearby support vessel to maintain outward control on the smaller vessel, to stop whale and vessel drifting together, on a stationary, drifting or slow-moving whale
- a direct cut approach, with no use of a control line or kegs, but with controlled approaches by an operational platform vessel under power, into a safe position (offset and to the rear) to allow single or sequenced cuts directly to a simple and accessible area of tangled material
    - only from approximate 4 o'clock or 8 o'clock positions,
    - not forward of a line perpendicular to the line of travel and behind the back of the tail, and
    - not passing directly behind the animal within 300 meters (unless it has been confirmed that the animal is not trailing any tangled lines where the vessel passes behind.

    The direct cut approach may be employed either from:

    - a smaller operational platform vessel, tender vessel or IRB, with a crew of 2 or 3 PoB (without the need to manage a control line, a smaller IRB style vessel is likely to be more manoeuvrable with 2 PoB) or
    - subject to Vessel Master briefing and agreement, concise instruction on positioning and proximity, and appropriate LWD Team on board a larger support vessel.
- Where a whale fails to tire sufficiently, or the operational opportunity is closing, attachment of a telemetry or visual tracking device, from either a smaller operational

platform vessel or a larger support vessel (subject to the same caveats as a direct cut approach as listed above.

- Other innovative options, so long as the general principles of whale fatigue and exhaustion, positioning appropriate to the situation, and full team CRM principles are applied, subject to clear JSA or other risk assessment processes, and Vessel Master and IC approval.

756. Large Whale Disentanglement responders around the world are involved in continual innovation and collaboration to advance new and/or refined options and strategies for rescuing tangled wildlife. Strategies, methods and approaches may evolve or change over time and as these strategies and methods are employed into practice, NPWS will seek to include, training and practice of alternate option methods into Annual Preparedness Day activities and other operational forums.

4.8.7.2 Deploying kegging equipment: phase 1 – Control Line

757. Kegging is a very process driven method to gain situation control, encourages safety through the discipline of following the principles of increasing whale exhaustion or fatigue, and managing safe positioning and proximity to the animal, and should be the first-choice method unless the situation presents other opportunities or constraints.

758. Once the situation has been assessed and a plan of action involving kegging determined, the next step is to attach a working line to the gear entangled on the whale. This can be done using a grappling hook, a flying-gaff hook or a long extendable pole rigged with a loose-fitting hook or clip. The working line with a small buoy at the end should be attached to the hook. The buoy is essential as it surfaces each time in advance of the whale, helping the response team locate the whale and get into position.

759. The response vessel makes a slow, quiet rear and offset approach to the whale. The response team can then clip the hook onto the entangling gear, leaving the whale trailing a line with the trailing end marked by a small buoy. Do this by using the grapple hook, clip or by picking up a trailing rope from the entanglement on the whale.

760. Carefully plan the attachment site for the working line so loads are not applied to any ropes entangled around pectoral fins or the mouth. This is especially important for baleen whales as this may cause significant injury to the whale.

761. Once the working line is attached, slowly feed out the line in a controlled manner to avoid fouling, ensuring all lines attached to the whale are outside the vessel, not attached to the vessel and not wrapped on any part of any crew member.

762. Should an uncontrolled situation develop, or snagging, fouling or similar occur, immediately cut the working line, or jettison it entirely overboard.

763. As the working line is deployed, it may be possible to break the length of the line at any of the connecting points to best suit the scenario at hand. In the case of a highly mobile animal, it may be possible to deploy multiple standard lengths of control line. However, for an exhausted or placid animal, 40 meters or less of line may be enough.

4.8.7.3 Deploying kegging equipment: phase 2 – applying load, drag and buoyancy

764. With the control line secured in place, apply load to the line by deploying the large inflatable buoys (kegs), starting on the working line at the furthermost pre-set loop from the animal.

765. Working forward towards the animal (walking the line with the motor leg clear of the water and engine off), successive buoys may be attached to the working line to create additional drag and buoyancy to tire the animal until it is slow, fatigued or subdued enough to be approached.

766. Walking the line creates a quiet work platform with less chance of the vessels motor leg becoming entangled in trailing lines or net in the water, particularly for a mobile animal.

4.8.7.4 Deploying kegging equipment: phase 3 – increasing buoyancy near the tangle and work environment

767. As the animal tires, the large buoys may be progressively leap-frogged forwards along the mainline. The buoys not only add resistance and drag to tire the animal out, they also help keep the animal at the surface so the team can work on the entanglement.

768. Eventually it may be possible to retrieve the excess detachable mainline as the load is moved close to the animal, to reduce un-necessary clutter, obstructions or tangle risks behind where the team are working, unless there is concern that the animal may recover from fatigue and resume active swimming and evasive or aggressive behaviours.

4.8.7.5 Release cuts

769. There is no set formula for releasing a whale from an entanglement. Each case is unique, different strategies and methods may require a variety of approaches and will require patience and planning. The team should continue to review and assess the situation and resultant strategies in case a more reliable, efficient or safer alternative presents.

770. Once it is determined the whale appears to be sufficiently exhausted or fatigued, and is accessible at the surface (even if still swimming slowly), the response vessel can approach (either by walking the line, or under power for a direct cut approach, and the team can begin to cut away the entangling gear.

771. This phase of the operation may involve a prolonged planning and cutting effort, but it must not be rushed. Time should be taken to identify the best location for cuts to be made, and where this involves a sequence, to plan that sequence in a methodical, considered and measured way.

772. Carefully plan the cutting sequence so the fewest cuts possible can be made to release the entangled materials. Try to ensure the order of planned cuts does not permit the whale to break free with some materials still attached or for the control line to be cut away before all materials are released. A bathiscope, goggles worn by a crew member leaning over the side of the vessel, a pole cam, or GoPro may be useful in planning when and where to make the cuts.

773. Cut the gear using appropriate hand-held knives or specially made hooked knives on extendable poles to maintain separation from the whale and higher risk proximity and/or positioning.

774. Cutting should typically proceed from the animal's head to tail as once the tail has been freed the animal may become more mobile, including dramatic changes in behaviour and reactions.

775. There is no need for divers to enter the water to disentangle a whale. This activity is considered very dangerous and there are other safer and more suitable methods. A person should only enter the water under instruction from the IC, and then only in very exceptional circumstances; for example, to rescue personnel in the water.

4.8.7.6 Disentanglement communication

776. After receiving advice of an entangled animal, standard notification procedures apply.

777. The IC establishes and maintains contact with the Branch Manager, Branch Duty Officer and Public Affairs Officer once an entanglement has been confirmed. The Public Affairs Officer develops and manages a communication strategy agreed to by the IC to ensure the public is reliably informed of the rescue progress and outcomes as appropriate.

778. The branch duty officer notifies adjacent jurisdictions of the entanglement, particularly if the animal is mobile and likely to enter another jurisdiction while still entangled.

779. Conservation Branch will assist in developing and maintaining communications with DPI, NSW Water Police, NSW RMS, NSW Marine Rescue, other partner organisations and industry representatives to develop agreed contingency plans for responding to incidents that may cross jurisdictions or require joint agency support. NPWS branches are expected to develop and maintain working relationships with regional branches of these partner agencies for event response.

780. The Marine Wildlife Team in the Biodiversity and Wildlife Unit will maintain a marine wildlife network via informal arrangements with Branch and Area staff. It may be used to share information about disentanglement events, emerging issues and advances in technique and equipment.

4.8.8 Follow up

781. On successfully completing the rescue phase, monitor the animal's condition for as long as necessary. This will mean following the animal, maintaining a reasonable and safe distance for as long as the weather and daylight permits or until the response team is satisfied the animal is moving, breathing and behaving normally, and that all entanglement, or as much as necessary to improve the animal's survival chances, has been removed.

782. Satellite tracking individual animals to determine longer term success would be a useful tool. Consider doing this if the opportunity arises through a research program or tracking technology and the equipment is available. (Require separate research approvals and licenses and also partnerships with other organisations, universities and/or NGOs)

783. Log all information, images, email and logbook data, etc. into Elements (managed by NPWS) which is the central record keeping and data repository for each and all marine wildlife entanglement events, for protected species as per the BC Act.

784. For further detail on record keeping, refer to 4.1.9 Situation reporting and records.

4.8.9 Debriefing

785. Debriefing at a scale and time suited to the operational context should occur as soon as possible to capture all observations and suggestions relevant at the time, and also following subsequent analysis. This may include all or some of;

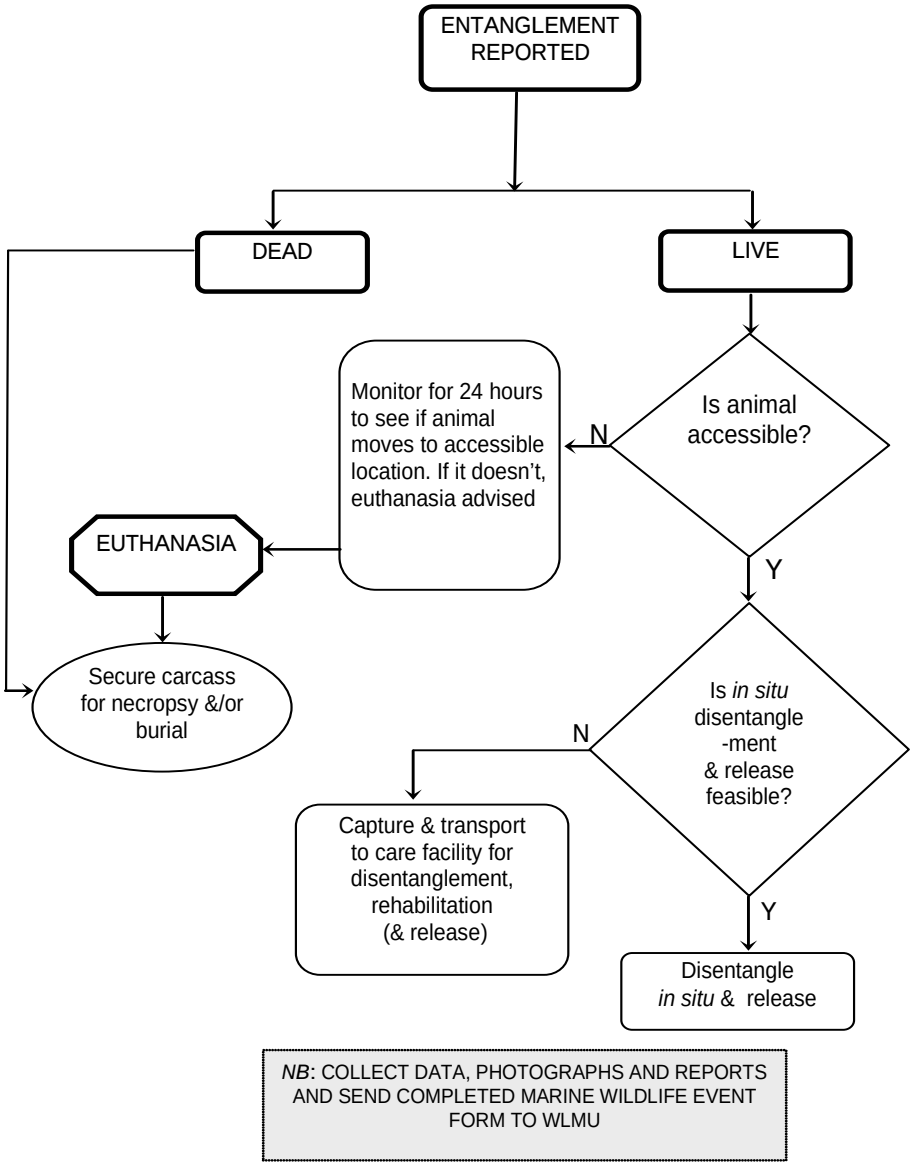
- a hot debrief of all operation crew members and partner organisation personnel on return to shore,

- an After Action Review (AAR) within a few days or weeks of the event concluding, and
- an end of season analysis to review all events in the context of the season total.

786. For further detail on debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.9 Entanglements – seals

4.9.1 Quick-response guide



NB 1: This diagram is intended as a guide only. Consultation with NPWS officers with pinniped experience and/or with veterinarians experienced in marine mammal health is strongly advised.

NB 2: Decisions regarding euthanasia (of hauled out pinnipeds) must involve consultations with an experienced veterinarian and the Co-ordinator, Marine Fauna Program.

NB 3: Once Antarctic or sub-Antarctic species are taken into care, they cannot be released back into the wild; the only management options are permanent care in an approved care facility or euthanasia.

Figure 70 Decision flow diagram for seal entanglements.

4.9.2 Policy

4.9.2.1 General

787. NPWS recognises that response to a seal entanglement is predominantly motivated by concern for the animal's welfare and public expectation rather than species conservation.

788. NPWS response to and management of seal entanglement events:
    - ensures the safety of all personnel assisting in the event response as the top priority
    - as far as possible, treats entangled seals humanely to minimise their pain and distress
    - ensures the safety of members of the public during disentanglement operations.

4.9.2.2 Safety

789. NPWS recognises the risks associated with disentangling seals. The safety of NPWS personnel, those assisting NPWS and the general public takes precedence over all other considerations and all precautions will be taken to protect these people.

790. Address risk assessment through a job safety analysis (JSA) and job safety briefing (JSB) for each event. The appendices contain an example JSA.

791. When entangled seals are in the water, only disentangle them from the safety of a vessel, using trained crews with large whale disentanglement cutting equipment. Refer to Appendix 3 Recommended standard equipment lists.

4.9.3 Background

792. Seals are affected by several different types of entanglements including monofilament fishing line, trawl fishing nets and bait-box packaging straps (plastic bands).

793. Entangled seals require immediate intervention by experienced NPWS officers, where possible. Capturing, restraining and removing entanglements from seals requires specialised equipment and experienced staff.

4.9.4 Initial report

794. For initial reporting procedures refer to 4.1.3 Initial reporting. Reports may be received from members of the public, commercial or recreational anglers and agencies that regularly have personnel on or near coastal waters and in situations where they are likely to observe an entangled seal.

4.9.5 Take control of the site

795. Once an entangled seal has been reported and confirmed, inform the appropriate land manager (e.g. the local council). The attending NPWS officer(s) need to establish a cordon around the stranded animal/s for the safety of the public and the animal/s.

796. When establishing a cordon:
    - treat the animal with caution at all times and do not approach it closely
    - cordon-off an area around the animal/s, making sure people and dogs do not enter the exclusion zone

- ensure that signs, people and vehicles on site do not block the animal/s access to the water.

797. Assess the site for risks to personnel, bystanders and the entangled seal.

4.9.6 Assessment

798. Different types of entanglements pose different management challenges for NPWS so it is vital to assess the situation thoroughly before initiating any intervention measures.

4.9.7 Response actions

799. **Chronic entanglements**: Entanglements involving fishing line (illustrated in Figure 71 to Figure 73) can result in deep tissue injuries. In some cases they can cause the entangled animal to become emaciated over time by preventing it from feeding properly. Not all fishing line entanglements are lethal as some animals may lose their entanglements without assistance but conspicuous scarring may remain and these scars may be mistaken for injuries. It is important to consult with experienced NPWS staff or a veterinarian with experience in marine mammal health to ensure old entanglement scars or deeply embedded entanglements are not misidentified and that a hauled-out animal is not unnecessarily disturbed.

Figure 71 An Australian fur seal (*Arctocephalus pusillus doriferus*) carcass with a monofilament line embedded around its neck (indicated by the dotted line). Note the visibly bony shoulders, rump and rib cage. Photo: John Gibbens/sealimages.com.

Figure 72 An Australian fur seal (*Arctocephalu pusillus doriferus*) with a monofilament line (from a helium balloon) that has cut into the animal's neck. Photos: John Gibbens/sealimages.com.

Figure 73 A fur seal heavily entangled in fishing net. Seals in such conditions can be captured and disentangled in situ and released immediately unless they need veterinary care. Chemical restraint with darting by an experienced veterinarian was required with this animal. Using physical restraint on a seal such as this one would be very difficult and dangerous, given its size. The animal recovered consciousness about four hours after being anaesthetised. Photo: Bronwyn Conyers/NPWS.

800. **Acute entanglements**: Seals with longstanding entanglements tend to move more slowly and may appear sluggish, whereas seals with recent entanglements are still able to move very quickly and are much harder to capture. It is crucial to assess the situation carefully before taking action so the entangled animal is efficiently captured. This must be done with maximum safety for personnel and minimal stress for the animal.

801. **Small seals may be hand-netted and entangling materials removed using disentanglement cutting knives or sharp diving knives. If the wounds caused by entangling material are minor, release the animal in situ.**

802. **Where entanglements are severe, seals may need to be chemically restrained (veterinary advice must be sought). Animals may be treated and released in situ.**

803. **Where chemical restraint is part of the disentanglement procedure, recovery may take several hours. NPWS staff must consider this possibility when allocating staff and other resources to deal with an entangled seal.**

804. **Where location and geography prohibit access to an entangled animal, consider** euthanasia by the use of firearms. A decision to euthanase an animal must receive the prior approval of the delegated officer. This decision must be based on advice provided by a veterinarian or other expert individual and the attending NPWS officer. Section 4.1.10 Euthanasia details authorisation and notification requirements for euthanasia.

4.9.8 Follow up

805. Where practical, monitor the condition of a disentangled seal following intervention.

806. For record keeping, refer to 4.1.9 Situation reporting and records and 4.1.3 Initial reporting. Update information in the Elements marine wildlife event.

4.9.9 Debriefing

807. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.10 Entanglements – turtles

4.10.1 Trawled turtles at sea

808. Marine turtles may become trapped in trawl nets. If they are alert and active, they may be able to swim away after the net is removed. If they appear weak or lifeless, they may simply need time to recover and not require treatment or a period of rehabilitation. Turtles that appear lifeless are not necessarily dead but if they are returned to the water before they recover, they may die. Fishers who inadvertently trap a turtle in a trawl net should notify the closest NPWS area office as soon as possible, while still at sea or immediately after their return to port.

809. An NPWS officer who responds to an event involving a netted marine turtle must advise the fisher that this rehabilitation may take up to 24 hours. Steps to be taken to rehabilitate the turtle on-board the trawler/vessel are as follows:

- Land the turtle on the boat – keeping hands clear of the head as turtles bite).
- Monitor the turtle for activity (breathing or movement).
- If **active** (i.e. moving strongly and breathing regularly), gently return the turtle to the water (if possible, with the engine in neutral) and do this without dragging or dropping the turtle on the deck, as the plastron underneath it can be easily damaged.
- If **not active and not breathing**, the following turtle recovery procedure may be used:
  - turn the turtle upside down, so the bottom of the shell (the plastron) faces upwards. Insert a plastic tube down the throat to open the air passage which is closed by the glottis at the rear of the throat. Blow through the tube inflating the turtle's chest slightly then deflate the turtle by pressing down the plastron lightly. Repeat this action every 10 seconds each minute. Cease after 5 minutes.
- If **not active but breathing,** keep the turtle on board and position the animal to raise its **rear off the deck** about 20 cm, keep it shaded and damp, and allow it to recover for up to 24 hours. If the turtle does not become active it may be moribund/weak or dead.
- Contact NPWS on return to port so they can arrange veterinary assessment or carcass retrieval,
- Acquire any information on the event's location and record any tag numbers on the turtle's flippers.
- The reporting NPWS officer is to ensure information is entered into Elements marine wildlife module .

4.10.2 Hooked turtles at sea

810. Turtles have been recorded taking commercial drop-line hooks, recreational angling hooks and long-line hooks. Ingested fishing tackle can perforate the bowel or cause chronic bowel obstruction, causing death.

811. If a turtle is hooked, bring the animal on board and cut the line to remove any pressure.

812. If the hook, sinkers or swivels have been swallowed or the hook is embedded in soft tissues in the mouth, return the animal to port and contact the local NPWS area office. NPWS will arrange retrieval of the animal and, where required, veterinary assessment.

813. Ingested hooks are unlikely to dissolve before causing internal lesions.

814. Hooked animals may have been trapped underwater for a time. If this is the case, or if the animal is not alert and moving vigorously, then use turtle-recovery procedures described above.

4.11 Managing marine wildlife in ports, harbours and estuaries

4.11.1 Policy

815. The objectives of managing marine wildlife in ports, harbours and estuaries are to:
    - minimise harm and distress caused directly or indirectly to marine wildlife by human activities
    - increase scientific knowledge of cetaceans to further their conservation and management
    - promote public awareness, knowledge, concern for and positive behavioural change towards cetaceans and gain support for NPWS management strategies and policies
    - interact with other government and non-government agencies in developing, disseminating and managing information on cetaceans and managing incidents
    - ensure consistent, efficient and effective management of all marine wildlife events that will:
        – ensure personnel and public safety is not compromised
        – return to the sea as many fit and healthy animals as possible
        – treat all animals involved expeditiously and humanely to minimise their suffering, wherever possible
        – improve scientific knowledge of marine wildlife by ensuring scientific investigations are carried out and that accurate records are maintained and accessible
        – facilitate and support the involvement of key stakeholder groups
        – manage and meet community expectations through good public relations during an incident, including developing and providing educational information to the community on priority issues in incident management and veterinary and scientific activities essential to the effective and humane treatment of marine wildlife.

4.11.2 Background

816. Increasing whale and seal numbers will lead to more entanglements, entrapments, vessel strikes, strandings and haul outs in harbour channels and corridors

817. In the case of an entrapped, entangled or stranded animal, NPWS leads a response that may engage other support agencies, such as NSW Maritime, Marine Rescue NSW, NSW Water Police, NSW DPI, Life Saving Australia or other response partners. This also applies where an animal's welfare appears compromised by the proximity of shipping.

818. Managing marine fauna events in harbours and confined waterways requires organisations to work cooperatively.

4.11.3 Response actions in working harbours

4.11.3.1 Incident control and coordination

819. Working harbours such as Newcastle, Sydney, Botany Bay and Wollongong experience heavy commercial and recreational vessel traffic as well as public transport

vessels. NSW Maritime and Ports Authorities have responsibility for coordinating harbour traffic in these ports. All aspects of marine wildlife events within ports and harbours are coordinated through an incident management structure that includes NSW Maritime and Ports Authority who are responsible for managing on-water strategies. Example incident management team structures are provided in Figure 74Figure 74, Figure 75 and Figure 76.

820. During a whale event response, establish an NPWS incident management team to facilitate coordinated decision making. This structure recognises five reporting streams including stakeholder relations, events, urban domain/ government, transport, and security.

821. Base the NPWS incident operations at a location that facilitates good communication and liaison. If NSW Maritime is involved, the 'on-water commander' will be based either on a command vessel for low-level operations or at the local emergency operations centre.

822. Whale visits and the operational responses are classified as either Phase 1, 2 or 3 alert and are described below.

- **Phase 1 alert**: Response is under the control of NPWS who maintains control on water and on land. Low-level assistance may be provided by other agencies (Figure 74). NPWS IC establishes boundaries set at existing approach distances and alerts all harbour traffic through local Marine Rescue NSW radio.

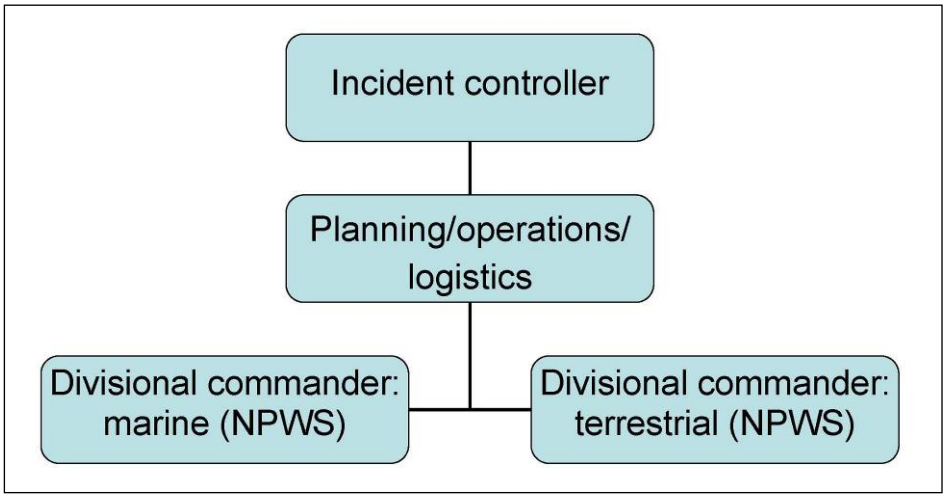


Figure 74 Incident management team structure for Phase 1 alert.

Phase 2 alert: An event that, by necessity, involves more than one agency − such as the presence of a mother and calf in a working waterway or a disentanglement exercise. NPWS maintains control on water and on land, with NSW Maritime in attendance. The Water Police may attend on a voluntary basis.

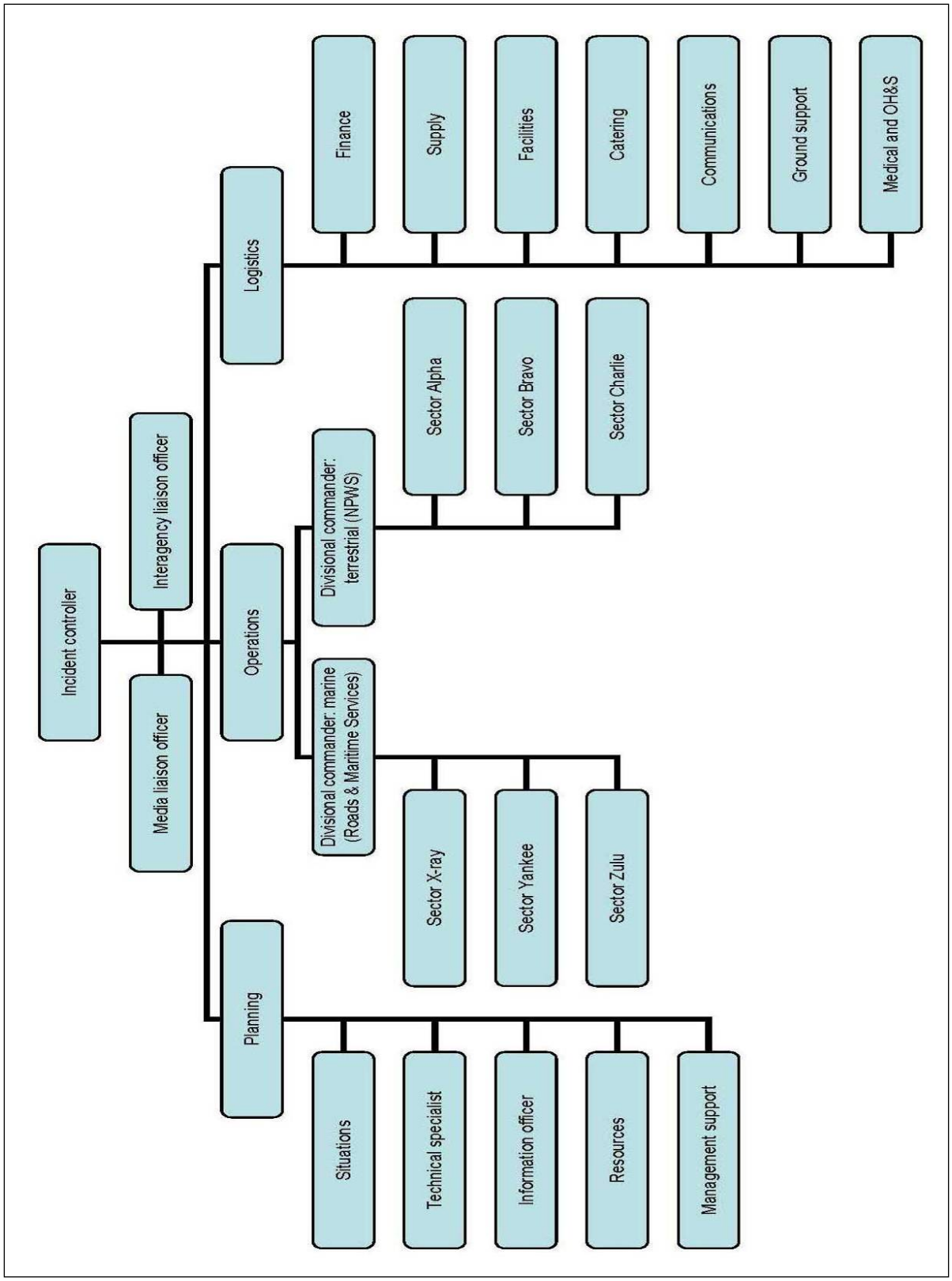


Figure 75 Incident management team structure for multi-agency Phase 2 alert.

Phase 3 alert: Whale/s located in an area of the port where the highest movements of shipping occur or in a major shipping channel where it is critical to have safe traffic coordination. In this situation, NPWS is responsible for incident management and NSW Maritime is responsible for vessel traffic management.

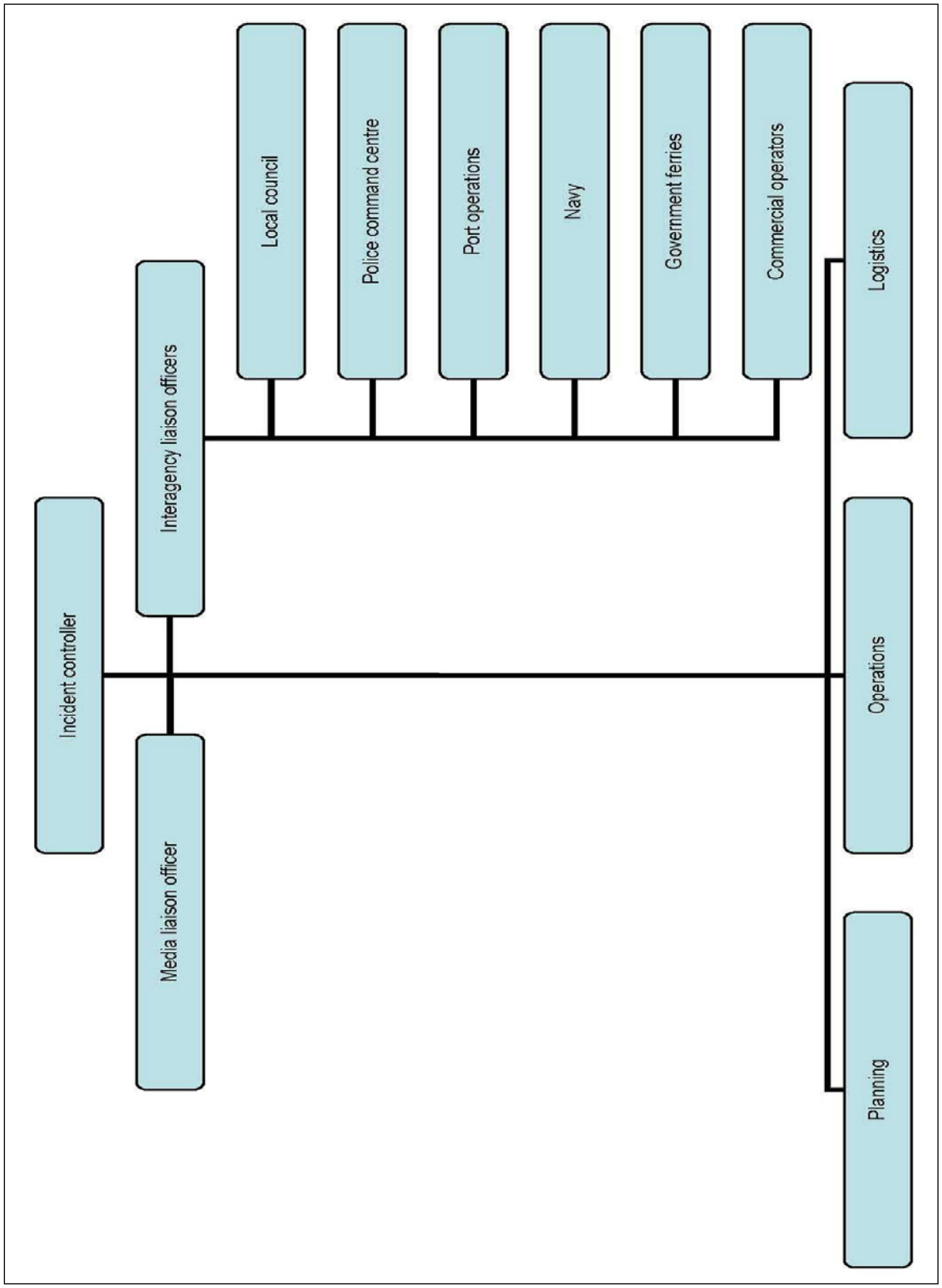


Figure 76 Incident management team structure for multi-agency Phase 3 alert**.**

4.11.3.2 Division / sector arrangements

823. Depending on the size of the incident, a number of sectors will be activated to assist in management. Marine and terrestrial operations may be split into separate divisions.

824. Operations are conducted according to an IAP. The operations unit develops strategies and tactics from the incident objectives included in the IAP to enable resources under divisional and sector command to be deployed. The operations officer is also responsible for visitor services. Tactics are used according to NPWS policy.

825. The planning unit is responsible for situational analysis, resources, volunteer coordination, management support, information services and environmental monitoring during the operational period. The planning officer is responsible for preparing the incident action plan.

826. The logistics unit is responsible for procuring the required facilities and ensuring services and materials are readily available during the operational period, especially transport, maintenance, finance, catering, accommodation and communications.

827. The media liaison officer is responsible for developing the media strategy during an incident and ensuring media opportunities are developed with other agencies. The media liaison officer also assists with any ministerial or associated issues during the period.

828. The NPWS liaison officer is responsible for liaising with local police command centres, local councils, port operations and any other authority affected by the marine mammal event. The liaison officer provides feedback to the NPWS IMT.

829. The divisional/sector commanders contribute to the sector plans developed by the planning officer. They also provide situation reports to the operations officer regularly throughout the operational period.

830. A key component of the operations strategy is disseminating quality information and deploying staff in sufficient numbers to protect the park and ensure visitor and staff safety.

831. NPWS adopts a risk-management approach to ensure visitor safety without creating unacceptable impacts on the park. Where visitor safety cannot be achieved without irreversible or long- term damage to the park's primary values, the visitor capacity of the area will be reduced and access restricted with visitors diverted to other areas of the park.

832. The IMT develops a type 3 IAP to distribute to divisional commanders who implement it during the operational period. The IAP includes objectives and strategies, operations plans, operations structures, divisional/sector plans and logistics plans.

833. Planning is ongoing, with plans constantly being reviewed and the developing situation reflected in regular situation reports from divisional commanders to the IMT. The IMT assesses the effectiveness of previous strategies and develops and implements new ones based on regular meetings of the IMT and feedback from the liaison officers.

834. Sector plans must incorporate each of the key spectator precincts. They need to incorporate the zoning details and consider the park's visitor levels.

835. Following sector plan development, brief and deploy NPWS staff to each of the activated sectors to:
    - disseminate information on marine mammals and the operation response, possibly by using information stations at key locations
    - provide directions and general visitor information
    - provide crowd control and ensure visitor safety throughout the park
    - manage traffic
    - enforce park exclusion zones
    - monitor visitor numbers entering and exiting the park
    - report on visitor health and safety
    - assist people with disabilities
    - routinely patrol and maintain NPWS estate.

4.11.3.3 Communications and information

836. Develop an NPWS communications plan for the incident's operational period. This plan will incorporate key messages to be promoted by NPWS, media opportunities, inter-agency initiatives, website updates, telephone response, interpretive displays, publications and on-site customer relations to communicate key messages to the public.

837. Set up information stations at key spectator vantage points to disseminate information on marine mammals and provide immediate response to spectators/park users' questions. Where to locate and erect these information stations is flexible and can change to suit the level of visitation. One NPWS officer and one volunteer will staff each of the information stations.

838. Locate an NPWS media liaison officer at the NPWS control centre to deal with contentious media issues. The officer will set up direct contact with other authorities affected by the incident who are assisting with its management.

839. NPWS develops a radiocommunications plan for the operational period that incorporates all radio operations, including, field radio operations and marine vessel radio operations etc.

4.11.3.4 Visitor management

840. NPWS is responsible for managing spectators within Sydney Harbour National Park. Expect spectators to gather along the foreshores to gain prime vantage points to view any marine mammals.

841. It is sensible to establish dedicated viewing zones − both on water and on land − at locations where the public may gather to view an animal. Select the zones by comparing them to viewing and vantage points used by visitors during previous major harbour events. Estimate how many people can be managed on the site without significant impact. Use NPWS experience gained from New Year's Eve celebrations or Boxing Day to calculate this figure. Monitor visitor numbers at each precinct and, if necessary, restrict access through passive enforcement by NPWS staff. If visitor numbers exceed the calculated capacity, erect temporary barricades and signage.

842. Use special protection zones to delineate national park features of significance which may be damaged by the impacts of high numbers during the incident period (unless protective management is established). Special protection zones may be divided into visitor exclusion, supervised access and self-regulated access to help protect cultural

and natural heritage, special park features and visitor risk sites. Put up temporary signage and fencing to restrict visitor access. This is in addition to staff regulation, monitoring and passive enforcement.

4.11.3.5 Park closures

843. Implement closures if visitor numbers or conditions pose an unsustainable risk to the heritage values of the park and/or public and staff safety. This can be a complete park closure or closures of particular sections (including restricted access).

844. Generally, branch directors have the delegation for park closures. During marine wildlife responses, the incident controller will have delegated authority to enforce park closures under Clause 6 of the *National Parks and Wildlife Regulation 2019*.

4.11.3.6 Road closures

845. Avoid road closures within the park, if possible. Only implement these if conditions on a specific day require them. After consulting with the Branch Director, the incident controller approves such road closures.

846. NPWS advises RMS of any road/park closures that may impact on traffic management or public transport. Implement such road closures only after consulting with the relevant local police commands and councils.

4.11.3.7 Spectator/crowd control on water

847. NSW Maritime is responsible for vessel control and spectator management on the water. NPWS assists Maritime in managing spectator vessels within the minimum approach distances specified in current legislation.

4.11.3.8 Other agency and command centre responsibilities

848. The local ports authority is responsible for ensuring temporary infrastructure and services are in place for managing commercial vessel movements around harbours and facilitating transport requirements.

849. NSW Transport and Maritime is responsible for ensuring safety and amenity for recreational and commercial vessels. Their key responsibility is to control spectator vessels and other traffic on the harbour.

850. During an incident, the NSW Police Force provides normal policing services and security at spectator vantage points as required by the IMT.

851. NPWS has a statutory responsibility for managing parks estate surrounding many bays and estuaries in NSW. This includes conserving and protecting natural and cultural heritage values. NPWS is also responsible for protecting marine mammals and reptiles and avifauna in state waters.

852. For record keeping, refer to 4.1.9 Situation reporting and records.

4.11.4 Debriefing

853. For debriefing, refer to 5.1 Debriefing, After Action Reviews and incident analysis.

4.12 Collecting information and samples, necropsy and record keeping

4.12.1 Policy

854. NPWS endeavours to ensure viable populations of cetaceans known to occur in NSW are conserved throughout their range by efficiently and effectively managing cetacean incidents with the intention of returning as many fit and healthy stranded animals to sea as possible, and collecting scientific information, including samples and specimens, that will improve scientific knowledge on species biology, ecology and stranding phenomena.

855. NPWS endeavours to collect and store accurate and detailed records of marine events and sightings and establish information sharing strategies with other organisations and agencies holding similar information.

856. NPWS aims to maximise information collected that will increase knowledge of species, populations and stranding incidents and assist in defining and monitoring threats to cetaceans and gather evidence for law enforcement, when appropriate.

857. NPWS endeavours to collect and/or facilitate collecting data, samples and specimens at all marine wildlife events based on logistics, access to technical expertise and resources.

858. NPWS takes opportunities to collect samples from free-swimming cetaceans whenever possible. Samples from live animals may only be taken where collection techniques will not cause unnecessary harm or suffering to the animal.

859. NPWS maintains the Elements marine wildlife module which provides a central record of all information on marine wildlife events throughout NSW. It makes accurate and detailed information available for assessing cetacean conservation and for management issues. These include determining the conservation status of vulnerable species, identifying key cetacean habitats and evaluating potential threats along the NSW coast. Details of any marked or tagged marine wildlife are entered into Elements to monitor the success of release efforts and provide further information on species biology and ecology and post-response survivorship.

860. NPWS has information exchange procedures for collating sighting, stranding and interaction data between NPWS and other government and non-government agencies and organisations. NPWS also accepts the voluntary contribution of sighting records of marine wildlife to the NSW Wildlife Atlas by interested individuals and organisations.

861. Only experienced or trained individuals will carry out tagging/marking using techniques accepted and approved by the OEH Animal Ethics Committee.

4.12.2 Background

862. Strandings and haul outs play a vital role in the study of marine wildlife. For many species, strandings or haul outs are a source of information on the life history or ecology of a species that cannot be obtained in any other way. It is therefore essential to maximise the scientific data collected from marine wildlife responses.

863. The incident controller decides if samples will be collected. That decision is determined by the:
    - scientific importance of the carcass or animal
    - situation of the carcass or animal (i.e. location, sea-state etc)
    - condition of the carcass or animal
    - available resources
    - staff skills.

    Most responses require, as a minimum, sample collection and measurement. Undertake a full necropsy where the species is unique (such as beaked whales), rare, or where further investigation is required or considered necessary. Seek advice from the Marine Wildlife Team in the Biodiversity and Wildlife Unit on how to organise this. Refer to the Guidelines for undertaking a full necropsy.

864. Researchers may want to obtain specific specimens from a carcass. The Australian Wildlife Health Register at Taronga Zoo has a list of researchers along with their requirements. Forward any samples collected in the field to Taronga Zoo for preparation and storage. The Australian Museum should be contacted to determine which parts of the carcass they require. Ideally they would like frozen muscle or skin tissue samples or tissues in DMSO from all stranded animals. Where possible the head (or whole body where rare, small species are concerned) could also be collected and stored frozen for the Australian Museum to collect. If the carcass is buried or composted the site should be clearly marked in case the skeleton can be recovered or exhumed at a later date. All researchers are required to hold a scientific licence (issued under S132c of the NPWA) before they are allowed to receive samples from the register. Where there is high demand for samples from stranded pinnipeds, the Coordinator Marine Fauna Program determines the priorities for specimen and data collection.

4.12.3 Initial report

865. Before heading off to a stranding or haul out, assemble the following equipment:
    - digital camera or phone camera
    - identification guide for marine wildlife
    - morphometric and sampling protocol sheet
    - notebook and pencil
    - basic sample kit (refer to Appendix 15 Basic sample kit).

866. Accurate and careful documentation is critical to good scientific records. Where safety permits, take standard morphometric measurements from all carcases prior to disposal and record these in the Elements marine wildlife module .

4.12.4 Assessment

867. Assess the body condition of all animals and note:
    - gender
    - body condition
    - previous entanglement or ship-strike marks or wounds
    - whether the carcass is a calf (indicated by hairs protruding from the skin of its head)
    - any cookiecutter shark wounds (see the seal section Figure 28) – how fresh are they? How numerous are they and where on the body are the wounds located?
    - Whether the flukes, pectorals, jaw and dorsal are intact.

868. Determine whether the animal is agitated (e.g. flailing tail). Identify the species, if possible; otherwise to the nearest grouping. Take photographs and send them to experts to verify identification and evaluate the animal's condition.

4.12.5 Management options

869. Never undertake sampling when doing so places personal safety or property at risk.

870. Undertake minimal sampling when resources and staff skills are unavailable, when there is no public, political or scientific interest in the carcass, or when the animal died through natural causes and further information is not required.

871. Collect a set of minimal samples and measurements from each carcass/animal where time and resources and situation permit. Collect samples of skin or body tissue by following the instructions that follow. The basic sampling kit also contains a set of instructions. Dispatch samples to the address on the sample container label together with a completed copy of the marine wildlife event report form. Wear protective gloves and personal protective equipment at all times. The minimum measurements to collect are shown in 4.12 Collecting information and samples, necropsy and record keeping

872. Priority samples:
    - photographs of markings, size, location etc
    - morphometric measurements (see below)
    - tooth counts (do not undertake on live animals unless the data can be obtained without forcing the jaw open)
    - skin samples (taken opportunistically via sloughed skin or biopsy)
    - blubber samples (must not be taken from live stranded animals)

873. Undertake necropsy, including pathology work, only where the following criteria are met and a necropsy is requested by NPWS, such as:
    - animals with a suspected disease (e.g. coccidiosis)
    - animal mortalities associated with possible compliance issues (shooting, net entanglement)
    - all Antarctic seal species
    - where a significant abnormally high frequency of animal deaths has occurred over a short period of time in a specific location, as advised by the Marine Wildlife Team in the Biodiversity and Wildlife Unit
    - when resources and staff skills are available
    - when public, political or scientific interest in the carcass warrants this procedure
    - when the animal died through anthropogenic cause and the information will support further investigation or court action
    - when an unusual mortality event is suspected, such as:
        – when there is a marked increase in the number or frequency of strandings when compared to previous years
        – when more than the usual number of strandings or beach-washed carcasses occur in one location
        – if animals are stranding at a time of year unusual for that species or location
        – when stranded animals exhibit unusual behaviours or present with disease or unusual symptoms
        – when stranded animals present with poor body condition are under weight or have severe skin lesions

– if the age, species or gender distribution of stranded animals is different from that normally observed at a location or for that time of year.

874. Where an unusual mortality event is suspected the IC or duty officer contacts the Marine Wildlife Team in the Biodiversity and Wildlife Unit for further advice. Make every effort to investigate the cause of death. Collect samples from the carcass/es and the local environment (e.g. water samples) for pathology and toxicological analysis and environmental assessment.

4.12.6 Photographic record of markings

875. Photographs or videos are important for recording distinctive markings or colour patterns. They can be quickly transmitted to the Coordinator Marine Fauna Program for identification or may be uploaded to wildaboutwhales.com.au. Clearly label all photos with the date, time, location, size of animal and be sure to include a scale in the photo. The series of photographs should include:

- full body length on both sides of the body
- dorsal surface including dorsal fin (where present) and flukes
- close-up of head, jaw, dorsal fin, pectoral fins and flukes
- any wounds and old scars
- calosities on right whales should be photographed from both sides, top and frontal.

4.12.7 Assessing the value of a carcass

876. The samples collected will vary according to the carcass's condition. The table below indicates which samples can be collected as they relate to the degree of carcass decomposition.

Table 10 Carcass condition codes and sampling opportunities

CODE 1 **Live animal that subsequently died**	**USES:** morphometrics; DNA analysis; life history (observational studies, analysis of faeces); external parasitology; external gross pathology; external microbiology; biopsies; blood studies.
CODE 2 **Carcass in good condition (fresh / edible)**	**CHARACTERISTICS:** normal appearance; fresh smell; minimal drying and wrinkling of the skin, eyes and mucous membranes; eyes clear; carcass not bloated; tongue and penis not protruded; blubber firm and white; muscles firm, dark red, well defined; viscera intact and well defined; gut contains little or no gas.
	USES: morphometrics; museum specimen; DNA analysis; life history (age determination, stomach contents, reproductive status); parasitology; gross pathology and histopathology; toxicology; microbiology; limited blood studies.
CODE 3 **Carcass in fair condition (decomposed but organs basically intact)**	**CHARACTERISTICS:** carcass intact; bloating evident; tongue and penis protruded; skin cracked and sloughing; possible scavenger damage; characteristic mild odour; mucous membranes dry; eyes sunken or missing; blubber blood-tinged and oily; muscles soft and poorly defined; viscera soft, friable and mottled but still intact; gut dilated by gas.
	USES: morphometrics; museum specimen; DNA analysis; life history (as in code 2); parasitology; gross pathology; histopathology of skin, blubber, muscle, lung and possibly firm lesions; toxicology (poor for biotoxins).
CODE 4 **Carcass in poor condition (advanced decomposition)**	**CHARACTERISTICS:** carcass may be intact, but collapsed; skin sloughing (epidermis of cetaceans may be entirely missing); often severe scavenger damage; strong odour; blubber soft, often with pockets of gas and pooled oil; muscles nearly liquefied, easily torn and easily falling off bones; viscera often identifiable but friable, easily torn and difficult to dissect; gut gas-filled.
	USES: morphometrics; museum specimen; limited DNA analysis; limited life history (age determination, some stomach contents, possibly reproductive status); parasitology; gross pathology; toxicology (poor).
CODE 5 **Mummified or skeletal remains**	**CHARACTERISTICS:** skin may be draped over skeletal remains; any remaining tissues are desiccated.
	USES: morphometrics; museum specimen; limited DNA analysis; limited life history (age determination).
CODE 6 **Disarticulated bones**	**CHARACTERISTICS:** disarticulated bones, no skin remaining.
	USES: morphometrics; museum specimen; limited DNA analysis; limited life history (age determination).

4.12.8 Morphometric measurements

877. Undertake measurements using a standard tape measure. The minimum measurements to take are shown in Figure 77 to Figure 80. Take morphometrics only when it is safe for personnel and stranded animal/s to work in close proximity. Sketch any external or obvious injury or distinguishing marks. Measurements are usually done using a straight line and don't follow the curve of the animal's body.

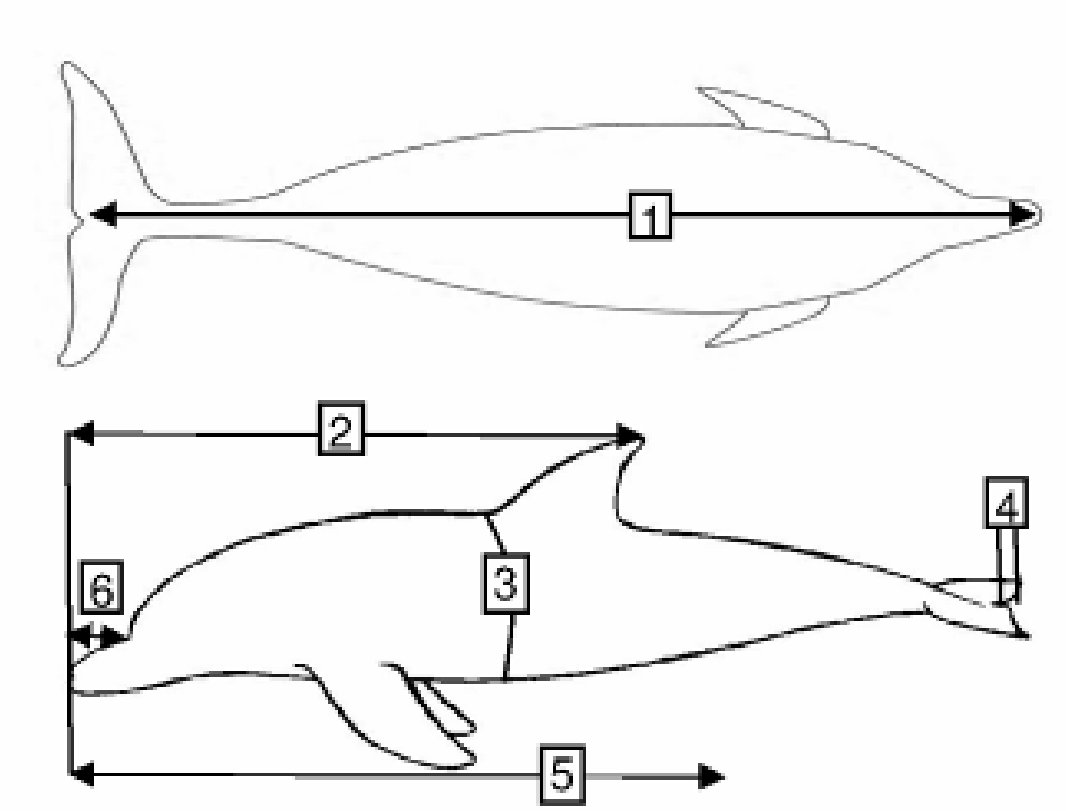


Figure 77 Standard measurements to record for stranded cetaceans.

Standard cetacean measurements			
1. Total length (upper jaw to tail notch)			cm
2. Tip of jaw to tip of dorsal fin			cm
3. Girth (front of dorsal fin, widest if no dorsal)			cm
4. Depth of tail notch			cm
5. Tip of jaw to centre of anus			cm
6. Rostrum length			cm
7. Number of teeth	upper jaw		
	lower jaw		

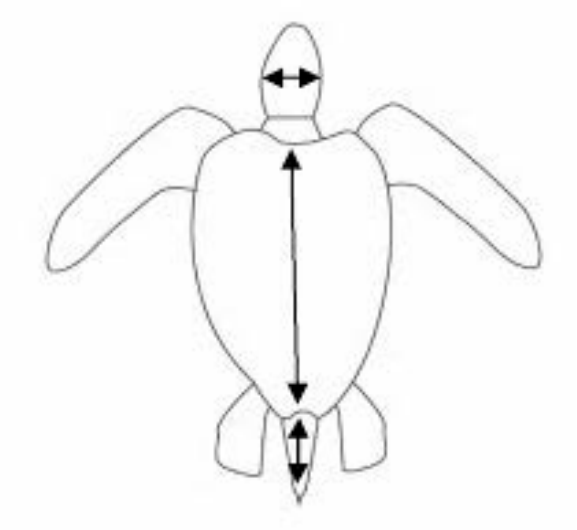


Figure 78 Standard measurements to record for stranded marine turtles.

Standard marine turtle measurements		
Carapace length		cm
Tail length		(+ / -) cm
Head width		cm
Weight		kg

Standard pinniped measurements		
1. Total length (tip of snout to tail tip)		cm
2. Anterior length of fore flipper		cm
3. Girth (axillary)		cm
4. Girth (maximum – across the widest point)		cm
5. Girth − at the level of the anus		cm
6. Anterior length of hind flipper		cm
7. Blubber thickness posterior end of sternum		cm

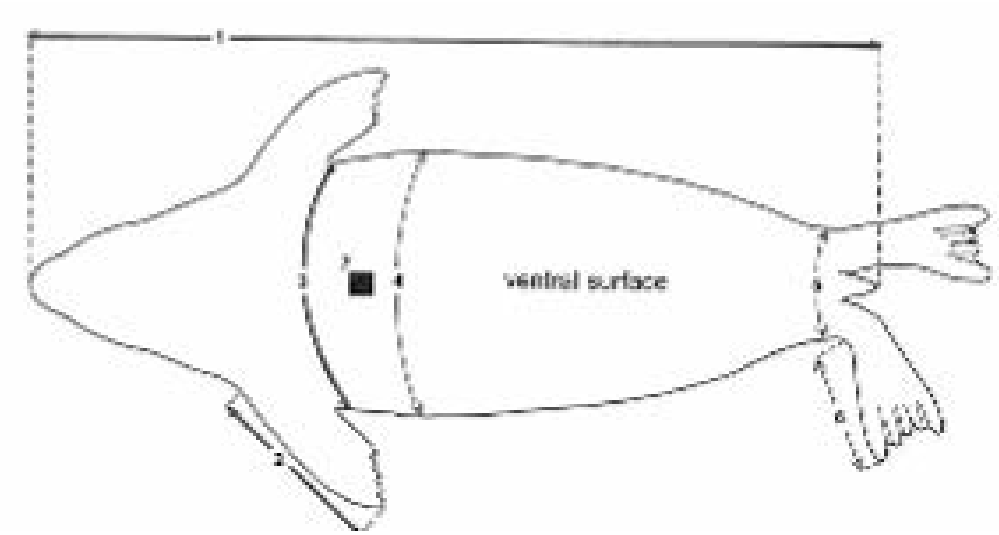


Figure 79 Measurements to record for hauled-out pinnipeds.

4.12.9 Blubber thickness and sample collection

878. Blubber thickness is a useful indicator of the animal's condition prior to death. Measure blubber thickness in pinnipeds at the base of the sternum by making an incision into the blubber down to the muscle layer. Insert a tape measure/rule into the incision (see below).

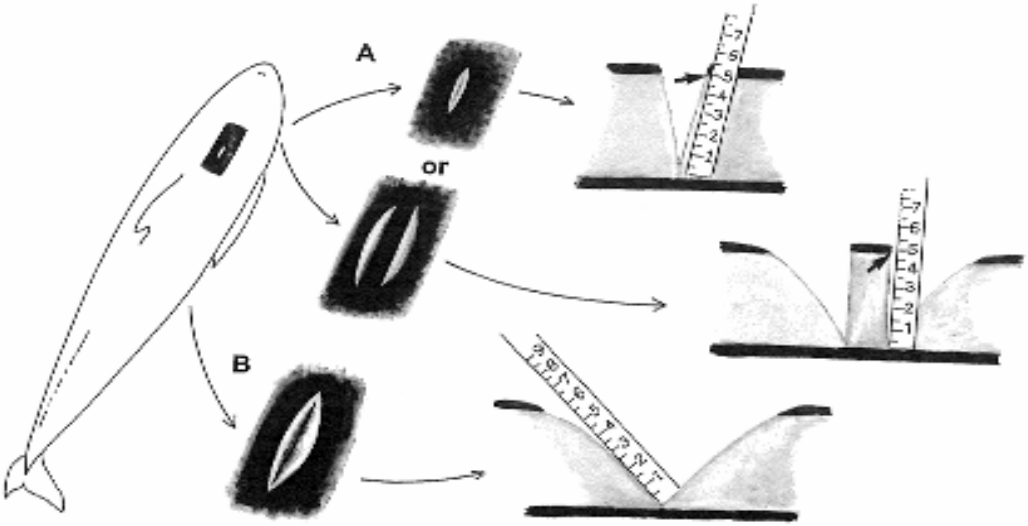


Figure 80 Making the incision for blubber thickness measurement (source: Geraci & Lounsbury 2005).

879. Estimating the mean blubber thickness on larger cetaceans may require sampling from multiple sites. The nine sites from which to take these measurements from a humpback are shown in 55.

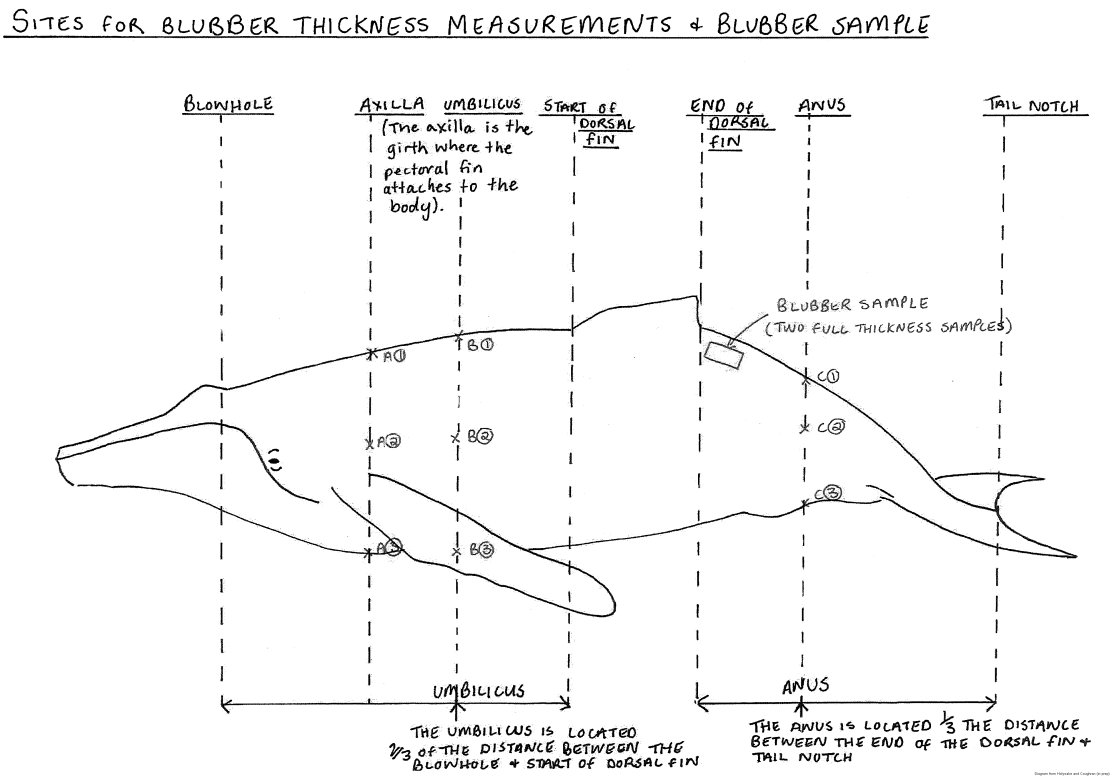


Figure 81 Sites for collecting blubber thickness measurements and taking blubber sample. Sites A1, B1 and C1 lie on the dorsal surface. Sites A3, B3 and C3 lie on the ventral surface**.**

880. Take two full-thickness blubber samples from the site behind and adjacent to the dorsal fin. Wrap these in aluminium foil and freeze as soon as possible for toxicological analysis.

4.12.10 Skin samples

881. All basic sampling will involve skin samples for DNA analysis. One small piece of skin and blubber is required, measuring approximately 2 × 0.5 × 0.5 cm.

882. Clearly label the sample using the waterproof paper tags. Write in pencil and place the tag in the vial along with the sample and pour in enough 70% ethanol to cover the sample. Seal the vial lid with a strip of parafilm. All this equipment is provided in the basic sampling kit.

883. Take the skin sample from those areas where the skin is still relatively intact, preferably from the leading or trailing edge of the tail flukes, flippers or dorsal fin. Ensure the sample is no thicker than 0.5 cm at any point. If samples are thicker than this, the ethanol will not preserve it all the way through to the centre and it will rot.

4.12.11 Other samples

884. Where time and resources permit, other samples may be collected as required.

4.12.12 Follow up

885. The operations officer compiles a list of all samples taken and where they were dispatched.

886. Collate the information collected during the assessment and use it to complete the Elements marine wildlife event .

887. Immediately following the response, send the completed form to the Marine Wildlife Team in the Biodiversity and Wildlife Unit. These data will be entered into the NPWS marine event database.

888. Incorporate any subsequent analyses made after the event into the marine wildlife event database, including necropsy and histology reports, photographs, debriefing reports etc.

889. The Australian Wildlife Health Network maintains a register of sample requests for marine species from researchers.

890. Send all samples to the Australian Wildlife Health Network Office to disseminate them to interested researchers.

Sperm whale jaw removal

This 10-m sperm whale (*Physeter macrocephalus*) carcass washed ashore at Newport Beach, Sydney, in May 2011. The carcass was cut up into smaller pieces and transported to a waste-disposal facility. Inclement weather, high tides and rough seas hampered the response. Processing and disposal of the carcass took two days.

Figure 82 Dealing with beach-wash carcasses can pose a number of serious workplace hazards. The mixture of seawater, blood and whale oil from a carcass is extremely slippery. Heavy machinery, chainsaws and sharp flensing knives are hazardous. Staff must wear appropriate personal protective equipment and adopt safe work practices. Photo: S Rajkumar/NPWS.

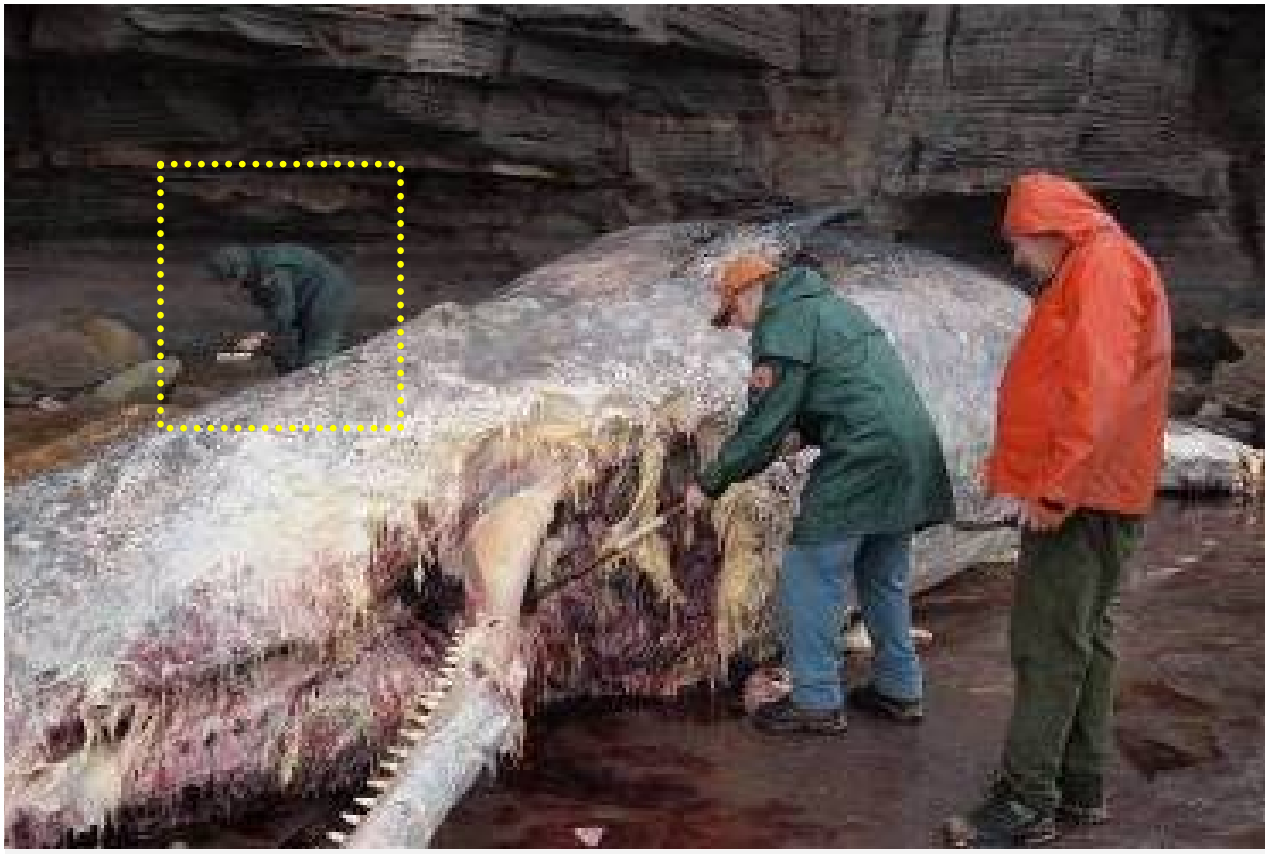


Figure 83 Before removing the jaw with a chainsaw, flense as much blubber and tissue off the jaw as possible. This reduces the chance of the chainsaw blades becoming fouled by blubber. Having one person assigned to sharpening knives and blades reduces processing time (the person in the dotted rectangle was assigned this task.) Photo: S Rajkumar/NPWS.

Figure 84 (a and b) A lookout (in the dotted rectangle) monitors the cordon zone for incoming tides, rough surf and/or other factors that may pose safety risks to the person wielding the chainsaw and other noisy equipment. Posting a lookout while working in dangerous situations is critical to ensure safety. Photos: S Rajkumar/NPWS.

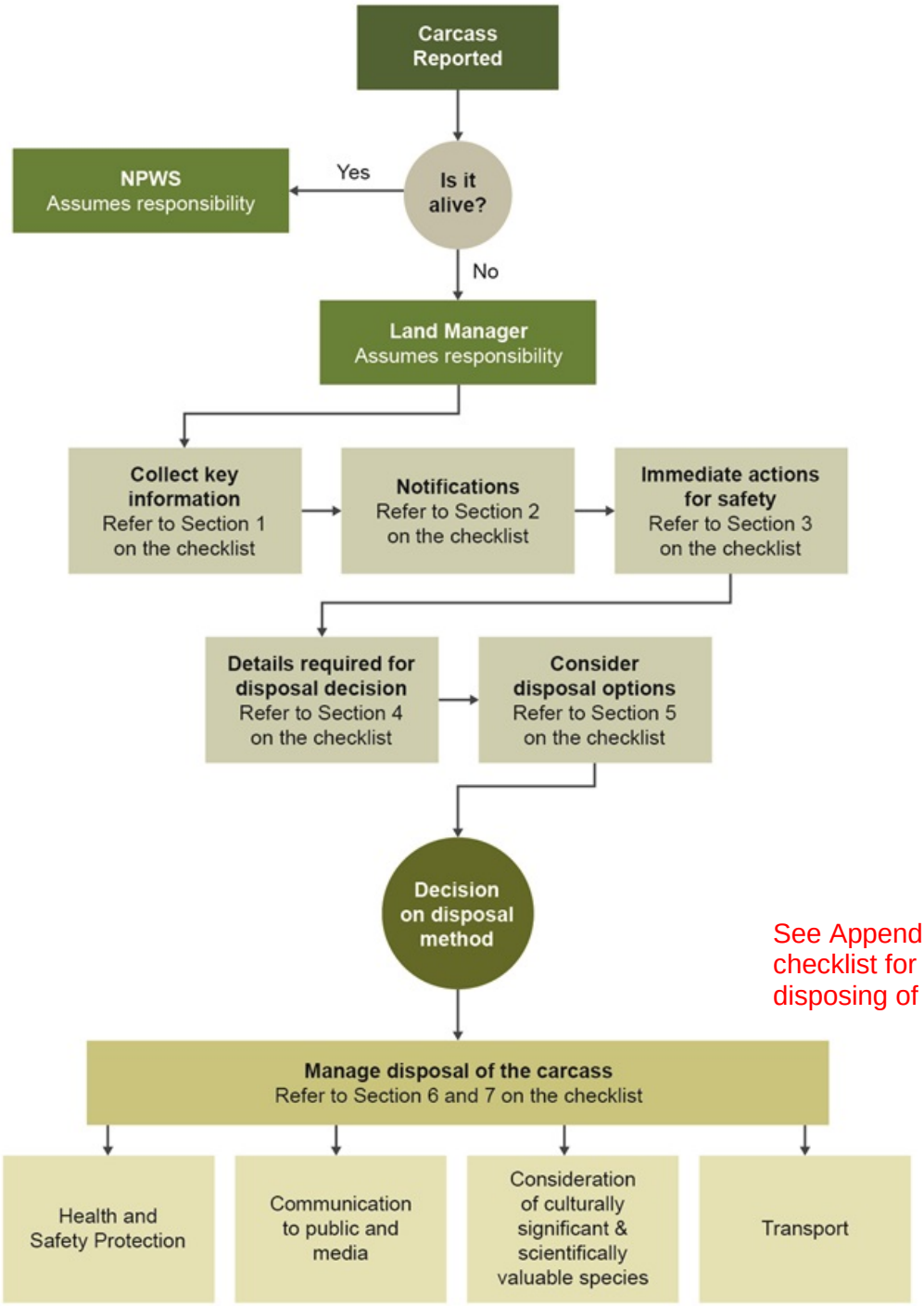
Figure 85 Once the jaw has been completely separated from the body, flense as much tissue from the jaw using flensing knives, as shown. Photo: S Rajkumar/NPWS.

Figure 86 This sperm whale jaw was sent to the Australian Museum for their specimen collection and research purposes. A close study of teeth can reveal useful information about physiological, behavioural and ecological aspects of the animal. Strandings of dead whales provide excellent opportunities for obtaining specimens, such as tissue, blubber, skin and teeth. They can be analysed and studied to reveal extremely useful information about these far-ranging and usually inaccessible animals without harming any animals. Photo: S Rajkumar/NPWS.

4.13 Carcass disposal

4.13.1 Quick response guide

Although this flowchart and associated checklist is for large whale carcass disposal, these guides generally apply to carcasses for most other marine wildlife species



See Appendix 18 for the checklist for land managers disposing of whale carcasses

Figure 87 Flow chart for managing whale carcass disposal

4.13.2 Policy

891. It is the responsibility of the relevant landholder to safely manage carcasses on, and carcass disposal from the tenure they manage. This will generally be local council, Crown Lands, Department of Primary Industries (within Marine Parks and Aquatic Reserves) or NPWS.

892. NPWS is the recognised central advisory body for land managers seeking advice on management of deceased whales in NSW.

893. In remote locations or where there is no risk to public health or safety, the NPWS preferred option is to leave a beach-washed carcass in situ to decompose naturally.

894. On urban, highly populated peri-urban, or popular regional recreational beaches where leaving the carcass to degrade naturally is deemed to be inappropriate or unacceptable to the community by local authorities, carcasses may be removed and disposed of at an appropriately licensed waste disposal facility.

895. Where a carcass is determined to be scientifically valuable, NPWS may assist in its dismemberment and burial at the request of the Australian Museum. NPWS maintains specialist holding sites including Garigal National Park (Sydney North), Munmorah State Conservation Area (Central Coast−Hunter Range) and Pine Creek (Bongil Bongil National Park). These sites may be used when a carcass is deemed important to be held for the Australian Museum

896. In some cases the Australian Museum and/or the Taronga Zoo based Australian Registry of Wildlife Health may request retention and immediate delivery of particularly valuable carcasses, or samples rather than burial or disposal.

897. In many coastal Aboriginal cultures, there is a strong connection to marine environments or ‘Sea Country’ and local marine species. This includes marine wildlife such as whales, dolphins, seals, turtles, dugongs, sea-snakes and sea birds.

898. Where possible, as part of a process for managing marine wildlife carcasses, appropriate representatives of the local Aboriginal community (Local Aboriginal Land Councils, Elders etc) and any other relevant local Aboriginal people (where feasible) should be offered the opportunity to express and practice relevant cultural or spiritual protocols or to seek access to resources safely harvested from a carcass associated with traditional practices consistent with requirements in the BC Act. These protocols vary from place to place, and managers need to be both flexible and diplomatic in trying to meet these objectives, and balance them with overarching community amenity, health and public safety and legal obligations.

899. Where specialist holding sites are not available or where the carcass is on NPWS estate, NPWS will negotiate with local waste management authorities for disposal of the carcass at an appropriately licensed waste disposal facility. On other lands, the local land manager is responsible for disposal decisions, but are advised to follow the same guidelines and considerations.

900. Avoid burying carcasses on beaches as beach burials are the subject of significant community opinion and concern and mis-information related to a perceived risk that decomposition leachates from buried whales may continue to attract sharks and other scavengers for extended periods of time. In addition, shifting sands have been known to rapidly uncover a beach buried carcass. Beach burials are also very difficult to relocate at a later date for exhumation of scientific skeletal samples. Only bury a carcass on a beach if it is not possible to remove entirely, or to leave it on the surface in situ, and leaving it in situ would pose a high safety or public amenity risk.

901. Towing or detonating a carcass is not recommended due to potential liability, pollution and numerous safety risks.

902. Carcasses being transported on a Heavy Vehicle must comply with legal dimensions and mass limits in the Heavy Vehicle National Law (HVNL) If the intended load exceeds the legal dimensions and mass requirements then apply for a permit from Roads and Maritime Services on 1300 656 371. NSW Road rules also apply

903. Remove the jaws of any dead adult sperm whales before proceeding with the burial or disposal at an appropriately licensed waste disposal facility. This is to prevent the sale or export of whale teeth (or whale body parts or tissue) which is prohibited under federal law, and helps to minimise opportunity for creating a market for ivory and wildlife bone trade. NPWS will dispose of jaws and teeth as appropriate. In some cases, these resources may have Aboriginal cultural values, and 'gifting' them for legitimate cultural purposes to the local community may be an appropriate option.

904. Wear appropriate personal protective equipment whenever handling cetacean carcasses. Including gloves, leather or rubber boots, clothes that cover exposed skin, eye protection and a P2 face mask, particularly where a carcass may have built up gas and potentially discharge onto nearby persons.

905. Where possible a machine (excavator or backhoe) should be used to handle a carcass to avoid frequent manual handling and to avoid contact with any body fluids from the dead animal. Keeping carcasses entire and intact also helps reduce loss of biological fluids which may pose numerous risks. Machinery will require thorough wash down once tasking is completed.

4.13.3 Background

906. Valuable species information, causes of death, wildlife disease monitoring, and data on other anthropogenic impacts is obtained through samples and necropsy of marine wildlife carcasses.

907. NPWS provides advice and guidance to other land managers about the management of carcass disposal.

908. A multi-agency Review into the management of deceased whales in NSW was completed in 2017. This specifically included investigation of public concerns that leachate from carcasses buried on beaches could potentially attract sharks.

909. This section deals with the carcasses of marine mammals or reptiles that have either come ashore alive and then died, have washed up on a beach or rock platform or were reported floating offshore.

910. Carcass remains from a mass stranding event (typically smaller and highly social toothed whale and dolphin species) may be buried in GPS-marked mass graves dug in the foredune zone, however consideration should be given to the strong negative community attitudes related to beach burial of large whale carcasses and relevant waste disposal requirements of the relevant local government. If beach burial of smaller carcasses is considered, then assessment of potential cultural and natural heritage impacts at the burial site should be considered, and approval from the local land manager must be obtained first. Otherwise, dispose of them at an appropriately licensed waste disposal facility following approval from waste management authorities or the local council.

4.13.4 Initial report

911. When a report of a carcass is received the following key information must be collected:
    - obtain the exact location
    - species identify (where possible)
    - accurate size and state of decomposition
    - photographs of identifying features, wounds and basic morphometrics.
    - A tooth count or photograph of the contents of the mouth for toothed whales and dolphins is also important to assist with species ID.

912. If a report of a floating carcass is received, the Branch duty officer must obtain the location and then calculate a rough course to determine a predicted or estimated approximate landfall. The officer then notifies local land managers of the impending event as well as Marine Rescue and the Ports Authority (VTS) to broadcast the hazard over marine radio.

913. Log all information into Elements.

914. If they are not already aware, notify the relevant land manager (e.g. Local Council for carcasses on beaches, Crown Lands for carcasses on Crown land not managed by council, or DPI for Marine Parks and Aquatic Reserves.)

915. Contact Public Affairs (9995 5347) to commence formulating key media messages, and to liaise with media units from other land managers

916. The local Aboriginal Land council must be notified to ensure established protocols are followed and opportunities for cultural practices are afforded for species with cultural significance.

4.13.5 Assessment

917. The decision to bury and/or dismember the carcass of a marine animal is the responsibility of the land manager and based on location and available resources.

918. Consideration for disposal options must include
    - Site access
    - Current and forecast weather conditions
    - Appropriate machinery and adequate resources.

919. Policy guidance for necropsy is found at 2.3.4 Necropsy policy.

4.13.6 Response actions

920. For carcasses on NPWS estate, the top priority is to take control of the site and ensure the safety of all personnel by the following steps:
    - Undertake a risk assessment of the site to identify and address hazards to all personnel
    - Cordon-off or control access to the site around the carcass(es). This will include keeping people and dogs out of the exclusion zone and installing appropriate signage, noting the same approach distances apply for deceased marine mammals.
    - Co-ordinate crowd management and seek assistance if needed. e,g. NSW Police.

- If a carcass has been handled by members of the public, advise them to thoroughly wash their hands with disinfectant soap as soon as possible for their own hygiene and anyone else that they may come into contact with.
- If public interest is high, and resources are available, providing a spokesperson on site to talk to the public can be beneficial to local community appreciation of the situation, and help minimise mis-information contributing to ongoing concerns.

921. For carcasses over 10 m, it may be necessary to reduce the carcass to a more manageable size. Do so by dismembering and flensing it using butcher's knives, flensing knives, chainsaws, pole saws, rock saws and baling hooks. (Note that this may result in a significant volume of body fluids escaping the carcass and requiring additional site clean up, and difficult containment during transport.

922. If beach burial is determined to be an acceptable / appropriate option given all other considerations, the criteria for good burial sites include:
    - good, dry substrate (sand is good, clay is poor)
    - behind the foredune and above extreme tides for beach burials
    - away from stream mouths (they will shift and uncover burials)
    - away from erosion
    - above water tables (if not, using a liner may provide sufficient protection to groundwater)
    - out of vandal range (2 to 3 m depth)
    - the soil at depth is non-permeable
    - the integrity of the soil is such that it will retain leachate over time
    - the bottom and sides of the pit do not show signs of fissures that might result in loss of containment
    - if the chemical composition of the soil aids preservation rather than decomposition of a carcass, chemical additives, such as lime, may be added to the pit to promote decomposition.

923. Wrap the carcass in chicken wire to keep the skeleton together. Cover it with at least 2-3 m of soil. Bury a large metal object with the carcass to make the position locatable with a metal detector, simplifying later retrieval.

924. While burying any cetacean carcasses, prior to closing the pit, open the animal's body cavity. This promotes decomposition and reduces the chance of gases distending the carcass and opening the pit. Do not open the abdomen before the carcass is transported to a burial site.

925. Heap surplus soil over the pit as overfill; its weight will help stop the carcass rising out of the pit due to gas entrapment. It also prevents scavengers digging up carcasses, helps filter out odours and assists in absorbing any fluids of decomposition.

926. Where necessary, prevent surface run-off from entering the pit by constructing diversion banks.

927. Mark any burial sites and carefully record the location in Elements along with attached copies of site plans, photos and a GPS location.

928. Fence-off the graves of large whales as there may be subsidence following decomposition and erect signage to warn of the risks.

929. Clean all equipment thoroughly after it is used for carcass disposal. Vehicles used to transport dead cetaceans and/or any transport equipment that was in direct contact with carcasses should also be cleaned thoroughly.

930. If transport for disposal at an appropriately licensed waste disposal facility is determined to be an acceptable / appropriate option given all other considerations, the removal from the beach and subsequent transport by road needs to be planned well, with consideration given to;

- Securing the carcass on the beach as soon as possible to avoid it shifting in subsequent high tide or swell conditions,
- Ensure the managers of the waste disposal facility are prepared to accept the carcass, will be open when the transport arrives, and are willing to assist with directions on where to unload at the site.
- Sourcing appropriately sized machinery (excavators to shift and long bed trucks to transport) to handle the size and weight of the carcass, (reference to guides such as “WhaleScale App” or similar are strongly advised to ensure weight is not underestimated – NB clause 841 above)
- Try not to rupture the carcass while manoeuvring from beach to heavy vehicle transport, to minimise risk of biological fluids escaping onto public roads (high fat or oil content fluids can cause an extreme risk to other traffic, and do not easily wash off roads)
- For the transport truck, attempt to bund the carcass using large tarps and/or sand to help contain the carcass and fluids. For decomposed carcasses, consider the use of cargo nets or similar to help hold the carcass together as much as possible.
- Carcasses being transported on a Heavy Vehicle must comply with legal dimensions and mass limits in the Heavy Vehicle National Law (HVNL) If the intended load exceeds the legal dimensions and mass requirements then apply for a permit from Roads and Maritime Services on 1300 656 371. NSW Road rules also apply
- For large carcasses, consider a Police escort to assist with traffic control and transport safety, and to alert management to any need for clean up of liquid spills on the roads.

Carcass transport and disposal

Figure 88 (a and b) A beach-washed 3.5-m female beaked whale (family Ziphiidae) carcass being placed on a sliding tray ready for transport to a nearby burial site using a trailer. Photo: S Davern/NPWS.

Figure 89 (a and b) Heavy machinery in a burial pit used to dispose of the carcass of a 10.6-m Bryde's whale (pronounced brooda's; *Baleanoptera edeni)* that stranded alive but died shortly after. Deep cuts were made to the abdomen before the carcass was placed in the burial pit to allow gasses to escape, thereby hastening the natural decomposition process. Photo: NPWS.

Figure 90 (a and b)

Deep wounds on the tail stock of 7-m male calf Humpback whale (*Megaptera novaeangliae*) had cut through the lower spine, leaving it unable to swim. They were consistent with being struck by a larger cruising boat's propeller. At the mercy of the currents and tides, the animal drifted onto the rocks at The Pass, Byron Bay, in October 2008. It was discovered there by surfers at first light, only to die soon after. Photo: D Maguire/ MPA.

4.13.7 Follow up

931. Take standard morphometric measurements from all carcasses prior to their disposal and record these within the event in the Elements marine wildlife database.

932. Where a vet or experienced persons are available or present, attempt to perform a basic necropsy on all fresh beach washed carcasses. Where experienced marine wildlife vets are not immediately available, it is often possible to get one of them to assist an inexperienced vet or other person with advice by phone. Causes of death, anthropogenic impacts, basic pathology, and wildlife disease screening are all valuable details that can be obtained from suitable carcasses and provide data which can influence future management planning and conservation decisions.

933. Photographic or video records are vital for recording distinctive markings or colour patterns. This is especially important when monitoring the movement of a carcass where intelligence will need to be passed on to another NPWS area office.

934. There are researchers who are seeking specific specimens from carcasses. A list of these researchers and their specimen requirements is held by the Australian Wildlife Health Register at Taronga Zoo. Forward any samples collected in the field to the Australian Wildlife Health Register at Taronga Zoo for preparation and storage.

935. Skeletal material and DNA may be sent to the Australian Museum. All researchers must hold scientific/general licences before they are allowed to receive samples from the register. Where there is a high demand for samples from stranded cetaceans, the manager of Marine Wildlife Team in the Biodiversity and Wildlife Unit will determine priorities for specimen and data collection.

4.14 Oiled wildlife

4.14.1 Policy

936. NPWS is not the combat agency for marine wildlife event responses triggered by marine oil or chemical spills in NSW waters. NPWS staff will only become involved in marine wildlife event responses at the formal request of the NSW Department of Primary Industries.

4.14.2 Background

937. The NSW State Waters Marine Oil and Chemical Spill Contingency Plan, a sub-plan to the NSW State Emergency Management Plan (EMPLAN), outlines arrangements for dealing with marine oil or chemical spills and marine incidents in NSW state waters.

4.14.3 Initial report

938. Responsibility for combating an oil or chemical spill is determined by its location as set out in the NSW State Waters Marine Oil and Chemical Spill Contingency Plan. Depending on the location of the spill, the combat agency will be either the nearest Port Corporation or NSW Transport and Maritime. The combat agency will appoint an incident controller who must notify all functional areas identified under EMPLAN. Functional areas are comprised of government agencies, utility services and private sector organisations involved in providing support and resources for emergency responses. Functional areas activate support agencies as required.

939. The NSW Department of Primary Industries (DPI) is the coordinating agency for the Agriculture and Animal Services Functional Area (AASFA). The AASFA is responsible for coordinating agricultural and animal services resources, and providing immediate animal support services and advice on animal welfare during an emergency.

940. In the event of an oil or chemical spill which affects animals, the AASFA coordinator (AASFAC) is responsible for activating the Agriculture and Animal Services Supporting Plan . For the purposes of this plan, the term ‘animal’ includes all wildlife.

941. NPWS staff must assess any report they receive of oil on the shoreline. Where oiling is confirmed, they need to contact Environment Line (131 555) and the relevant branch; and follow the notifications procedure.

4.14.4 Assessment

942. The combat agency may engage NPWS staff to conduct an oiled shoreline assessment to inform response planning and operations.

4.14.5 Response actions

943. At times staff may respond to an event where only one or two animals may be affected by oil and no triggers are apparent for a scaled-up response. This may be an individual pelican or gull. Larger birds, such as pelicans or albatrosses, may be washed, cleaned and rehabilitated by local wildlife carers following procedures outlined on the DPI website. Where the bird is a relatively common species or extensively covered with oil (e.g. cormorant, silver gull) and there are no washing facilities or experienced carers are available to assist, euthanasia by a veterinarian may be the best option.

944. The appearance of a single oiled animal on a shoreline may be an early indication of a much larger event occurring at sea. Where this is suspected, follow the appropriate notification procedures outlined earlier.

945. For a confirmed spill, the activation of the Agriculture and Animal Services Plan by the AASFAC may include:
    - establishing a wildlife treatment centre
    - on-site assessment and capture of wildlife (using sectors established for the overall event/emergency response)
    - coordinating the transport of wildlife as needed
    - providing appropriate personnel to the event/emergency response
    - coordinating veterinary support during the event
    - rehabilitation and repatriation of wildlife.

946. The AASFAC, with the agreement of participating and supporting organisations, has the authority to request resources from those organisations. Participating organisations are government departments, statutory authorities and other agencies that are willing to participate in emergency management response and initial recovery operations under the direction of the incident controller of a combat agency, or the coordinator of a functional area. NPWS is a participating agency.

947. If a spill impacts on wildlife, the AASFAC can contact the NPWS liaison officer to request the appointment of a wildlife coordinator to coordinate a rescue and rehabilitation operation. The wildlife coordinator establishes a wildlife unit within the combat agency's operations section, to coordinate the wildlife response. While the AASFAC has ultimate responsibility for animal welfare in NSW, on-ground decisions about animal welfare issues during a wildlife response are taken by the wildlife coordinator after consulting veterinary personnel and the incident controller.

948. The wildlife coordinator oversees the wildlife unit's operations, which comprises teams responsible for rescuing, transporting, triage/first aid, cleaning/drying, rehabilitating and eventually releasing the affected wildlife. The coordinator also oversees the establishment of wildlife treatment facilities at a site or sites determined by the event's needs and available locations.

949. All combat agencies for marine incidents/emergencies have agreed to use a version of the incident control system, called the oil spill response incident control system (OSRICS), to control and manage marine event/emergency responses. This is the incident control system used for spill-response management under the *National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances*.

950. The wildlife unit sits within the operations section of the OSRICS structure. The OSRICS structure can be scaled up or down, depending on the size and complexity of the response required to effectively control the incident.

951. NSW Department of Primary Industries (DPI) specifies the policies and procedures to follow when wildlife is affected by an oil or chemical spill in NSW state waters. These policies and procedures must be followed by NPWS and all other agencies involved in a wildlife response initiated by DPI. They describe the roles, responsibilities and required competencies of the various roles within the wildlife unit. Such a unit is established to coordinate a wildlife response whenever there is an oil or chemical spill in NSW state waters that affects wildlife. The wildlife unit is established within the combat agency's operations section. The combat agency is determined by the location of the spill as stated in 4.14.3 Initial report.

5. Recovery

5.1 Debriefing, After Action Reviews and incident analysis

5.1.1 Background

952. Debriefings provide an important forum for staff to discuss the management effectiveness of marine wildlife operations and the need for changes to policies and operational procedures. They are an important opportunity to openly recognise and capture good performance and shortcomings during incident management operations.

953. Debriefings can take place at many different levels, from informal debriefings within the workplace to more complex multi-agency and stakeholder investigations.

954. NPWS applies the recommendations from debriefs to implement policy development and operational change at field, agency and interagency levels resulting in improved incident management coordination.

955. After Action Reviews (AARs) are a debrief process for analysing what happened, why it happened and how things can be done better next time. It involves comparing what actually happened with what should have happened and then carefully diagnosing the gap, be it positive or negative. The goal of the AAR is to sustain and improve individual, team and organisational performance.

956. Incident analysis is the process of assessing the effectiveness of marine wildlife operations and the identifying causes of any problems encountered, and then determining solutions, or mitigating or preventive actions, to improve operations and prevent problems reoccurring.

5.1.2 Conducting operational debriefings and AARs

957. Debriefings or AARs, either local or with stakeholders, should be conducted as soon as possible at the conclusion of all marine wildlife operations, regardless of the scale of the event. These can range from a quick chat after the event to a formal joint-agency / stakeholder debrief or AAR.

958. The Incident Controller is responsible for ensuring that an appropriate debrief is conducted for each marine wildlife response operation.

5.1.2.1 End of shift debriefings

959. Shift debriefs of crews should be conducted at the end of a shift or after a critical incident occurs. The findings and recommendations of shift debriefings should be provided to members of the IMT.

960. Noteworthy observations or rapid lessons from shift debriefs should be submitted to the NPWS Lesson Learned Portal or emailed directly to the Lessons Learned Mailbox.

5.1.2.2 Disentanglement debriefing

961. Review any video recordings of the disentanglement, where possible, for learning purposes.

962. Examine the entangling gear to identify the type of equipment and where the animal was likely to have encountered it. This information can help identify the types of fishery gear that could cause future entanglements. It can also help develop techniques to reduce entanglement and/or assist in disentanglement.

5.1.2.3 NPWS After Action Review (AAR)

963. An AAR should be held as soon as practicable after the marine wildlife event.

964. The Lessons Learned Review Guide *Lessons Learned Review Guide* outlines the different review types available to NPWS. The guide includes the trigger, purpose, required facilitator and reporting requirements for each of the listed review types.

965. For Type 2 and Type 3 AARs the Branch Director or Area Manager will be responsible for organising the AAR, coordinating the chairing of the review and preparing a report at the conclusion of the review.

966. All personnel involved in marine wildlife operations should be invited to participate in the AAR process.

967. NPWS AARs are a candid professional discussion where participants can share their observations, insights or questions that will help identify issues or concerns. Learning from individual experience will assist the organisation to sustain our strengths and improve our weakness.

968. The process used for NPWS AARs is to explore:
- What did we set out to do?
- What happened?
- What are the things that worked well and that we need to sustain?
- What is the thing that we need to improve?
- What are the specific issues that you want to talk about?

969. *NPWS AAR Guidelines* detail the process that must be followed to plan and conduct an AAR. The format and structure for the AAR reports is included in the guidelines and should be followed.

970. The following topics can be used by the AAR facilitator as prompts for discussion too ensure that all issues are covered:
- Overview by Incident Controller
- Preparedness
- Response
- Access
- Strategies
- Incident control centre
- IMT
- Field operations and coordination
- Agencies / stakeholders involved
- Resources
- Marine response operations (all stakeholders)
- Aviation (if relevant)
- Plant
- Welfare
- Communications
- Catering
- Accommodation
- Transport
- Health and safety (including near misses)
- Injuries
- Media and public awareness
- Equipment not returned
- Agency reports
- Any other issues
- Summary of resolutions and recommendations.

971. Information from AARs should be shared as soon as possible after completion to either NPWS Lesson Learned Portal or emailed directly to the Lessons Learned Mailbox. This information will be used to analyse trends and look for re occurring issues.

5.1.2.4 End of season debriefings

972. End-of-marine wildlife-season debriefing may be conducted at Branch level.

973. Branches may collate and forward a summary of recommendations to the Fire and Incident Management Branch for input into the Marine Wildlife Management Manual review.

974. Information from end of season debriefs should be collected and forwarded to the Fire and Incident Management Branch for collation.

975. Receiving all AAR and debrief issues by this deadline is critical to the timely revision of the Marine Wildlife Management Manual and other operational documents.

976. NPWS will review all outcomes of debriefings. Recommendations will be made at:
- tactical or field level – Branch Director responsibility
- operational or management level – Executive Directors' responsibility, and
- strategic or corporate level – Director Fire and Incident Management responsibility.

5.1.3 Incident analysis

977. The decision to conduct an incident analysis can be made by the senior management of any stakeholder organisation or by the Incident Controller. It will be carried out by a person (or persons) independent of the operation.

978. Key factors to be investigated include:
- competency of key personnel
- adequacy of incident and action plan — objectives and strategies
- analysis of options
- briefings of all staff, including crews
- opinions of IMT, crews and other staff
- adherence to policies, procedures, codes
- the tasks to be completed during the work shift
- animal, weather, beach and sea conditions
- potential hazards
- weather forecasts and current conditions
- the command structure
- the location of other crews
- communication arrangements
- equipment and resources available
- maps of operational areas provided for all personnel.

5.1.4 Community relations

979. Following a major marine wildlife event NPWS will:

- consider conducting debriefings with stakeholders to seek feedback on preparedness and response
- provide information to the public on any proposed changes to marine wildlife management planning and operations
- review preparation, preparedness and response components to improve systems of operations, and update community contact details.

5.2 Staff support services

5.2.1 Critical incident support services

980. NPWS provides support services to help staff cope with stress and other issues. Information about these services can be found on the intranet.

981. NPWS has a confidential peer support program that is available to all NPWS employees. To access this service staff should contact a peer support person directly in the first instance. Details are located here. The NPWS WHS Duty Officer is contactable on 6841 0960 and can arrange for a peer support person or a counsellor to attend a site or reach out to someone who may need assistance.

982. The provision of professional counselling services for NPWS staff will be via the Employee Assistance Program (EAP). The EAP helpline is available 24 hours a day on 1800 818 728.

983. Contact numbers for professional counsellors, peer support and chaplains should be included in the *Branch Incident Procedures*.

984. Information on critical incident stress management will be included in Branch annual marine wildlife response preparedness training.

985. The Incident Controller will contact critical incident support services personnel for any incident involving a fatality, serious injury or other event that could result in critical incident stress.

986. Based on the nature of the critical incident, the Incident Controller will take advice about:
- immediately withdrawing affected staff from the field
- standing staff down from further involvement with the marine wildlife operation, and
- offering affected staff a critical incident debriefing.

987. The Incident Controller will advise the managers of personnel who have been involved in a critical incident.

988. During large multi-agency incidents, the NPWS Liaison Officer will ensure that critical incident support services are available to NPWS staff involved in critical incidents.

989. Critical incident debriefings will not be recorded and will be conducted separately from operational debriefings.

Appendix 1
Hygiene protocol for handling marine wildlife

Personal hygiene

To ensure human safety and prevent the spread of zoonoses, standard hygiene protocols are critical when handling live or dead wildlife. Individuals handling sick, injured or dead wildlife must practice the following standard precautions for infection control.

- Wear gloves when handling live animals, if possible, and change torn or damaged gloves. Wash hands as below before putting on or removing gloves.
- Ensure tap handles are clean. Use hot water and soap or hospital-grade disinfectant to wash hands. Water alone will not kill some viruses and domestic disinfectants offer little protection from infections. Wash the backs and palms of the hands, between fingers and between the thumb and forefinger. Rinse well and dry with paper towel.
- If clean running water is unavailable, use an alcohol-based hand rub and wash hands as described.
- Check hands for cuts and abrasions and treat immediately with a disinfectant such as Betadine. Cover open wounds with water-resistant dressing.
- Where it is not possible to wear gloves, wash hands between handling individual animals.
- Observe strict hygiene when handling animals (e.g. no food or drinks, no smoking). Ensure surfaces used during animal handling activities are thoroughly cleaned with disinfectant, particularly if they are also used for other purposes.
- When animals are suspected of having a disease (e.g. a large die-off in a wild cetacean population) or respiratory infections, wear protective clothing when entering the area and while handling animals. Disposable protective clothing is preferred including suit, gloves, boot covers, goggles or safety glasses and mask.
- Thoroughly wash off any gross contamination of skin such as animal blood, faeces or similar materials as soon as possible.
- Always wear gloves when handling dead animals. For necropsies, always wear protective clothing. Eye protection and masks should be worn as soon as zoonotic lesions are discovered.
- At the end of any activities, thoroughly wash hands, equipment and clothing with disinfectant. Wash hands and shoes with soap or detergent after entering areas where animals are present, even when they are not handled. Oxidising agents such as sodium hypochlorite (bleach) or Virkon© and alkalis such as caustic soda can be used to disinfect clothing.
- Wash hands with disinfectant before preparing or handling food or drinks.
- Wash hands before and after eating, smoking or going to the toilet.
- Avoid contact between the hands and any part of the face unless hands have been thoroughly washed.
- Consume food off site, if possible, and before or after the activity. Only eat on-site in clean designated areas away from risk areas. Avoid contact between dirty clothing and clean hands or face when eating.
- If you become sick with flu-like symptoms, allergies or respiratory disease, tell your doctor you have recently handled marine animals.

Cleaning and disinfecting equipment

Methods used to clean equipment should be based on the degree of risk and the availability of facilities and equipment.

Translocating animals presents a high disease risk. Following transport wash equipment, removing any animal products. Soak in VirkonS® for 10 minutes, rinse in clean water and air-dry in the sun. If VirkonS® is unavailable use a 1% bleach solution, rinse in clean water and air-dry.

Equipment must be cleaned before disinfecting, because many disinfectants become de-activated when they come into contact with organic material. Simply washing and scrubbing bags and equipment with soap or detergent and hot water to remove dirt and faeces etc. will remove most (but not all) biological contaminants and agents that can transmit disease.

Likewise, drying and exposure to sunlight (e.g. hanging hessian bags in the sun) will kill most (but not all) bacteria. Bacteria flourish in warm, moist environments where biological material such as blood, tissue and faeces is present.

Once equipment is mechanically cleaned, applying chemical disinfectants will kill most (but not all) of the remaining biological agents of disease. Choose disinfectants that are:

- broadly or universally effective
- non-irritant to skin and other tissues
- used on the surface of hands and equipment and prepared according to the manufacturer's instructions (e.g. concentrations/dilutions) and used as directed
- rinsed off so that no residue remains in the cage/trap or bag -residues can cause irritation to animals.

Common effective disinfectants include:

- Povidone iodine (e.g. Betadine®). A non-irritant that can be used on the skin and wounds of animals and is effective against most bacteria, fungi and many viruses.
- Chlorhexidine (e.g. Savlon® or Hibitane®). Dilute as recommended and use on equipment or skin. Useful against some viruses, including rabies, but less effective against some bacteria. Effective in the presence of organic material.
- Swabbing alcohol. A rapidly acting disinfectant that kills most bacteria and some viruses. Drying to skin and irritating to eyes and open wounds.
- Chlorine bleach (e.g. sodium hypochlorite). Effective against bacteria, spores, fungi and many viruses. Causes irritation and can be corrosive to metal and fabric. Use at 1:10 dilution for at least 10 minutes. **Never use on animals or hands** and always thoroughly rinse it off anything likely to come into contact with animals.
- Ammonia compounds are **not** recommended. They can be deactivated by soap residues and organic matter.

Complete sterilisation is impossible in the field and some bacteria, fungal spores and viruses will be resistant to the above common disinfectants. Other disinfectants that are effective against some specific viruses with greater resistance include:

- VirkonS®. Effective against papilloma and polyomaviruses at 1:100 dilution for minimum of 10 minutes. Always rinse equipment following use. **Do not use** directly on animals, or equipment or hands that may come into direct contact with skin / eyes.

  Note: pre-diluted powder is an irritant to the skin, eyes and respiratory tract.
- F10SC® veterinary disinfectant. Not as effective as VirkonS® against resistant viruses, but more so than other disinfectants. It is less irritating than VirkonS® and needs to be used at 1:125 dilution for more than 30 seconds on hands, or more than 30 minutes for sterilising equipment (F10 gel is also available for using on hands in the field).

Appendix 2
Marine mammal satellite/radio tracking transmitters

Background

EES has three marine mammal satellite/radio tracking transmitters (platform transmitter terminals – PTT) and has access to the Argos network. These transmitters improve the ability to relocate entangled cetaceans.

Disentanglement crews endeavour to attach the PTTs to entangled cetaceans whenever they anticipate the current disentanglement shift may not free the animal and it will later need to be relocated.

Test fig

The Coastal Branch PTTs are stored at Byron Bay and Narooma. Deployment to other locations may be arranged through the branch duty officer (phone: 02 6650 7124). Greater Sydney Branch has one PTT in Sydney at Middle Head.

The PTTs can be tracked by satellite via the Argos network and by VHF via receivers on aircraft, vessels or land. The Argos network can also provide temperature, surface time and activity sensing. PTTs have an on-water accuracy ranging from 250 m to 1500 m, depending on satellite conditions.

Figure 91 Satellite and VHF PTTs on buoy. Photo: Eric King, Australian Antarctic Division.

Figure 92 One PTT unit to be attached to buoy. Photo: Eric King, Australian Antarctic Division.

Figure 93 PTT close-up. Photo: Eric King, Australian Antarctic Division.

Operation

The three EES buoys have the following code allocations and VHF frequencies

Unit	PTT code allocation /satellite tag number	VHF frequency and pulse rate
North Coast (Byron Bay)	60397	150.700 (80 ppm)
South Coast (Narooma)	60403	150.600 (80 ppm)

Sydney	60666	150.500 (80 ppm)

Codes for interstate buoys are at http://data.marinemammals.gov.au/buoys/

Satellite transmitter activation

- **To turn on**: The GPS Argos is switched on continuously. Once turned on, the PTT is activated automatically on deployment by a saltwater switch on top. Remove the transmitter from the stainless steel case and apply a magnet to the silver spot on the grey plastic casing for over half a second. A red light will flash 10 times on the top of the unit.
- **To turn off**: Remove the transmitter from the stainless steel case and apply a magnet to the silver spot on the grey plastic casing for over half a second. The red light will flash twice.

VHF transmitter activation

- **To turn on**: Tune a receiver to the correct transmitter frequency. Remove the VHF transmitter from the stainless steel case and apply a magnet to the silver spot on the grey plastic casing for over half a second. A continuous tone will sound, followed by five quick beeps.
- **To turn off**: Tune a receiver to the correct transmitter frequency. Remove the VHF transmitter from the stainless steel case and apply a magnet to the silver spot on the grey plastic casing for over half a second. A continuous tone will sound, followed by silence.

Satellite tracking

- Once the transmitter has been activated the unit can be tracked on the Argos website. Data for website access has been supplied by the Australian Marine Mammal Centre, Australian Antarctic Division.
- Go to www.argos-system.org/?nocache=0.8484510436234955. Click ‘LOGIN’, Username: galesnick Password: fantastic.
- Select your preferred time zone (GMT, Sydney etc.)
- This brings you to the welcome page. Online help is available by clicking on the ? icon at the top right of each page. Lower on this page briefly describes how to use the left menu bar.

To view a map of your PTT

1. Go to the left-hand menu bar and select **Data access.**
2. Select **Mapping**. This opens a new window with a map of the world.
3. **Platform**: Specify the whale buoy satellite tag number. In the drop-down box, select ‘by ID numb. (s)’ and enter the tag number manually in the field to the right.
4. **Time frame**: The map displays recent data to a **maximum** of 10 days previously. It is best to look at the previous two days.

5. **Location Class:** This allows specific classes (see Table 11) to be displayed or omitted. It is best to leave this box unchecked to display all location classes.
6. Click **Search**

Several buttons control the map display itself. Hold the mouse over each for a short description.

To get details of a recent location the important buttons are:

- The **zoom** buttons (fourth and fifth buttons from the left) allow zooming in or out of selected areas by clicking and dragging to your selection.
- The **world view** (third) button goes back to the widest view available. Use the left zoom button (fourth button) to click and drag a small box over the data point(s), which will zoom in on that area. Repeat if necessary (there is a maximum zoom limit).
- Use the **information button** (sixth button) to click on a data point of interest; this will display the ID number (named 'mobile'), date/time (you set the time zone when you logged in), latitude and longitude and the location class. The location classes give an indication of accuracy of the location fix (see Table 11), if you have several locations received within a few hours, give priority to the point with the highest location class.

Table 11 Estimated on-ground accuracy relative to the location class of the satellite fix

Location Class	Estimated accuracy in latitude and longitude
3	< 150 m
2	> 150 m but < 350 m
1	> 350 m but < 1,000 m
0	> 1,000 m
A	Three messages received, no estimate of location or accuracy
B	Two messages received, no estimate of location or accuracy
Z	Rejected locations

- The **distance** (seventh) button can measure distance between any series of *mouse clicks*. Click on your tag location, then on your next point of interest (e.g. coastline or another data point); to display the distance you need to *click the tick button* on the toolbar (displayed above). You can remove the last or all points using the second or third buttons on this toolbar respectively.

Before you log out, return to the world view layout in the map. This makes it easier for the next person who logs in.

To view (and then download) the Argos data from your PTT

1. Go to the left-hand menu, then select **Data access.**

2. Select **Messages.**
3. **Platform**: Specify the whale buoy satellite tag number. In the drop-down box, select ‘by ID numb. (s)’ and enter the tag number manually in the field to the right.
4. On the **Filter by messages** dropdown box at the top right of the data filter window, choose to either download all messages received from the tag, or the most significant or best on satellite pass. (The most significant message is defined as the one received from your transmitter the most times, consecutively, in identical form during a satellite pass. In Argos jargon, this is called the message with the highest compression index.)
5. **Time frame**: The map displays recent data to a *maximum* of 10 days previously. Enter the number of days of data you would like to download.
6. **Location Class:** allows specific classes (Table 11) to be displayed or omitted. It is best to leave this box unchecked to display all location classes.
7. Click **Search.**

After your data appears onscreen, **print** it by clicking on  . Print either all data or selected data by clicking on ‘selection’.

Export data from this window by clicking  . You can choose to export data in CSV, Excel, Google Earth or Map format. You can choose to export all or a selection. You can export up to 1,500 messages from Messages or Most Recent Message. To download an unlimited number of messages, please use the Message Download or Download COM/PRV/DIAG function on the left menu bar.

To download using the Message Download

This function is useful for downloading data without previewing, or for downloading large amounts of data.

1. Go to the left hand menu, then select **Data access.**
2. Select **Message Download**.
3. **Platform**: Specify the whale buoy satellite tag number. In the drop-down box, select ‘by ID numb. (s)’ and enter the tag number manually in the field to the right.
4. On the dropdown box at the top right of the data filter window, choose to either download all messages received from the tag, or the most significant or best on satellite pass. (The most significant message is defined as the one received from your transmitter the most times, consecutively, in identical form during a satellite pass. In Argos jargon, this is called the message with the highest compression index.)
5. **Time frame**: The map displays recent data to a *maximum* of 10 days previously. Enter the number of days of data you would like to download.
6. **Location Class:** allows specific classes (Table 11) to be displayed or omitted. It is best to leave this box unchecked to display all location classes.
7. Choose columns to display (best option is to choose all).
8. Click **download**.
9. Choose your preferred download format − .CSV, Excel, Google Earth or Map − and click **download**. The file will download to your computer’s default download folder.

VHF tracking

- VHF transmitter frequencies are noted above, and are unique for each unit.
- Ground or aerial receivers can be used to locate the PTTs providing there is line of sight between the PTT and the receiver.
- There is a comprehensive guide to preparing the aircraft and telemetry equipment before aerial tracking operations: N:\PWG_Coastal_Branch\Marine wildlife\Equipment\AERIAL TELEMETRY IN WILDLIFE RESEARCH.doc. However it is restricted to discussing the attachment and calibration of the antennae. It does not discuss the setup of the receiver because there are a number of different types of VHF receivers in service within OEH.

Maintenance

- Test the unit for 12 hours annually to confirm the correct location.
- Activate the batteries for 24 hours every three months.
- Battery life is estimated to be 135 days for the satellite PTTs and 250 days for the VHF units.
- The regional PTT coordinator needs to schedule battery replacement, considering battery life and likely peak-use periods for PTTs (e.g. schedule before whale migration periods). Batteries must be replaced by the manufacturer.
- For PTT refurbishment (new batteries, antennae and potting), mail the unit to:
  Sirtrack Ltd
  Private Bag 1403
  Havelock North 4157
  New Zealand

Support and reference

- The Marine Mammal Centre of the Australian Antarctic Division based in Tasmania can provide support and information on these satellite buoys. Contact the support officer:
  Sarah Robinson
  Scientific Support Officer
  Australian Marine Mammal Centre
  Australian Antarctic Division
  203 Channel Highway
  Kingston, Tasmania 7050
  Phone: 03 6232 3122
  Fax: 03 6232 349

  See information specifically related to the buoys at www.marinemammals.gov.au.
- The PTTs are supplied by Sirtrack Limited
  Phone: +64 6 877 7736
  Fax: +64 6 877 5422
  Email: sirtrack@sirtrack.com
  www.sirtrack.com

  View KiwiSat 101 product specifications at
  www.sirtrack.com/product_details.asp?Prod_ID=38
- The PTT supplier can also provide technical support (phone: 1800 427247).
- View the technical summary at
  www.sirtrack.com/downloads/WildlifeTrackingUsingArgos.pdf.

- Download the Argos manual in pdf at www.argos-system.org/html/userarea/manual_en.html, online http://www.argos-system.org/manual/index.html#6-data/61_overview.htm

Appendix 3
Recommended standard equipment lists

Equipment category	Item	Average no. / base
STRANDING		
Storage	Clearly marked large plastic boxes to store equipment to allow quick deployment (e.g. Space case)	5
PPE	Wetsuit, 3/2 mm steamer with NPWS logo	16
	Rash shirts	20
	Wetsuit booties	20
	Handtowel/rag (blue) × 1 roll	1
	Sunscreen 100 g × 4	4
	First aid kit	1
	Disposable gloves	1
Rescue	Whale trailer	1
	Rescue mats – dolphin, 2.5 m long × 1.8 m wide (orange colour vinyl)	2
	Rescue mats – whale, 4 m long × 2.4 m wide (yellow vinyl)	2
	Turtle rescue mat	1
	Inflatable rescue pontoon	3
	2 tonne lifting slings with bow shackles	2
	Tape measure 30 m	1
	Plastic buckets	10
	Cotton sheets	8
	Water sprayers	6
	Webbing (seat belt) 5 m	4
	Rope 20 m	2
	Plastic numbers (animal ID)	5
	Marker tags – write-on plastic	1
	Party balloons × 20 (for temporary buoys/markers)	1
	Triage Tape x1 roll each red, yellow black green	4
	Shovel, square-mouth	2
	Quickshade tent	1
	Camera – waterproof, disposable	2
	Dog cage (for transporting small seals)	1
	Radio shoulder harness	2
	Radio waterproof covers	2
	Turtle transport tub	1

Equipment category	Item	Average no. / base
	Cargo/trailer net	1
	Dog-catching pole (for catching seals)	1
Crowd management	‘Restricted area’ signs × 4	4
	Flagging tape ‘CAUTION DO NOT ENTER’	4
	Barrier mesh, orange plastic, 20 m rolls	2
	Starpickets, white plastic or wooden stakes	10
	Plastic cones 200 mm high	10
	PVC tube containing posters for public display	
	Blank coreflute 900 mm square boards and whiteboard markers (for public displays)	4
	Laminated signs ‘seal visitor’	2
Volunteer management	Staging area coreflute signs	2
	Volunteer registration forms	1
	Daily ‘sign-on’ forms	1
	NPWS stranding fold-out card	50
	Lecture pad and folder	1
	Sunscreen	2
	Beach umbrella	1
	Towels	10
	Shadehouse tent (2.9 m × 2.9 m − for beach shelter)	1
Incident Management	Regional incident procedures, marine blue book	1
	IMS tabards	1
	IMS unit log sheets	1
	Stationary – pens, whiteboard markers, permanent markers, plastic rulers, all-weather paper, 5 clipboard folders, notepads, document envelopes, notebooks, incident logs	1 kit
	NPWS reporting forms – initial report forms MF/0, situation report forms MF/1, individual report forms MF/2 (2 pages)	1
	Relevant coastal maps and charts	1
	Whale, dolphin and pinniped identification book	1
	Drinking water 10 L × 1 and 20 cups	1
	Dolphin torch and spare batteries/globes	4
	Extension lead 50 m and 15 m, 4 outlet power boards, insulation tape, cable ties	1 of each
	Floodlight and stand	2
	Fluorescent or halogen work light	2

Equipment category	Item	Average no. / base
	5 kVA generator with earth leakage protection and fuel	1
	Surgical gloves (boxes): large, medium, small	1 of each
Carcass Management	Disposable overalls	3
	Rope 20 m	1
	Roll of black plastic (for carcass when transporting)	1
	Large garbage bags	1
	Duct tape 30 m	1
	Tape measure	1
	Necropsy kit	1

DISENTANGLEMENT		
Storage	Clearly marked large plastic boxes to store equipment to allow quick deployment (e.g. space case)	
Response vessels	3.85 m rigid hull inflatable (attack vessels)on trailers with 30 hp outboards and prop guard, 22.7 L fuel tank	2
	Support vessel (greater than 5 m in size)	1
	Safety equipment – 6 flares, 2 V sheets, marine radio, 1 paddle, 1 foot pump	1
PPE	Wetsuit: 3/2 mm steamer with NPWS artwork	6
	Rash shirts	6
	Wetsuit booties	6
	Gath helmet, retractable visor	3
	Waterproof VHF marine handheld radio	
	Waterproof UHF radios	2
	PFD type 1 jackets with safety knife attached	6
	Gloves for rope handling	3
	‘911’ rescue knives	6

Equipment category	Item	Average no. /base
Rescue	Disentanglement mainlines – ropes and hardware, 14 mm double braid rope (10 m mainline and 30 m mainline), stainless steel rings and carabiners, D-shackles, 200 mm styrene floats, spliced sisal (biodegradable) 2 m link ropes	2
	Large polyform inflatable floats (kegs) A5	5
	Large polyform inflatable floats (kegs) A6	6
	Float pump – double-action hand pump	1
	Assorted grapples with style heads and trace	6
	Assorted flying-gaffs with style heads and trace	3
	Mooring hooks	3
	Type I cutting knives with enclosed blades	4
	Type 2 cutting knives with enclosed blades	2
	Type 3 cutting knives with enclosed blades	1
	Type 4 cutting knives with enclosed blades	2
	Five-blade neoprene protective pouches for knives	2
	One-blade neoprene protective pouches for knives	3
	Extension pole for knives fitted with 10mm metric female attachment	2
	600 mm extension handle for knives	2
	Bathoscope – glass bottom bucket	1
	Waterproof camera, pole and monitor with cable	1
	Helmet camera (per helmet)	1
	Radio-tracking kit	1
	Radio/Satellite telemetry buoy (Narooma, Sydney, Byron)	1

Appendix 4
Volunteer induction checklist

The role of the operations officer or the appointed volunteer coordinator at a marine wildlife event is to:

- ensure the public understand the NPWS officer is in control
- direct the public to ensure their safety and the stranded animal's wellbeing is being maintained
- request assistance from the public if required (they are not obliged to assist)
- register all people accepted as suitable volunteers on volunteer registration forms, (or by recording their names and addresses − this is an interim measure only)
- brief all volunteers about the tasks and WH&S issues (see tables following)
- ensure if euthanasia is to be performed, that the animal wherever possible is screened or physically removed from public sight, while being careful to avoid further stress or pain to the animal
- request public to move away or leave the area if there is a safety risk to themselves or the animals.

Induction – general

All personnel involved in response activities must undertake general health and safety training. This will cover:

- wildlife safety issues
- safe materials handling
- avoiding slips and falls
- personnel hygiene
- hypothermia or working in high temperatures
- heath and safety organisation,
- responsibilities and expectations.

Each section leader is to:

- check all team members have received induction training
- verify all members are registered and have completed required medical checks
- recap on main points of induction training
- check the site and maps for specific hazards
- check team members have necessary personal protective equipment
- instruct team in avoidance of hazards.

Appendix 5
Marine wildlife initial information collection form

Collect the following information when notified of a marine wildlife incident.

1 Date Time (24-hour format)

2 Name and contact number of caller

3 Type of marine animal

a. Whale?

b. Dolphin?

c. Seal / Sea lion?

d. Dugong?

e. Other marine wildlife (e.g. marine turtle, sea bird)

4 Details about the animal(s)

a. Number of animals?

b. Species (or detailed description)?

c. Length?

5 Where is the incident?

a. Name of nearest town/suburb/beach?

b. Nearest street/road to the incident site?

6 Where exactly is the animal?

a. Northern or southern end, or middle of beach?

b. In the water?

c. On the sand?

d. On the rocks?

e. On the wharf?

f. Other?

7 Additional information from the caller

8 Action requested by caller

9 Action required

Yes / No?

10 Action taken

11 Name of the NPWS officer/s sent to attend incident

Appendix 6
Physiological effects of strandings

Understanding the key physiological effects of strandings on cetaceans can help staff better understand the implications of a stranding response and the management options NPWS uses. Unfortunately there is insufficient information about the effectiveness of rehabilitation measures on the long-term survival of stranded cetaceans.

Many physiological, biological and physical features of cetaceans make them particularly vulnerable to injuries and/or serious illness when they strand. These include their large body size, blubber layer, skin pigmentation and the absence of sweat glands. Consequently when these animals strand, several factors may be considered life threatening even if they don't have any pre-existing pathological state that may have caused them to come ashore. Paramount among these factors is the difficulty controlling body temperature and fluid balance on land.

Effects on body temperature

Stranded cetaceans readily absorb considerable amounts of radiant energy. Their lack of sweat glands to aid in cooling and the thick insulating layer of blubber act together to prevent loss of excess body heat. Their circulatory heat-exchange mechanisms rely on immersion in water and are rendered ineffective on land. These problems are further compounded by the low surface-area-to-volume ratio of the cetacean body form, which results in a tendency to retain body heat. Consequently, a cetacean exposed on a beach − even on cloudy, temperate days − is at risk of hyperthermia. The higher the ambient temperature, the more rapidly this will occur.

Sun and windburn

Cetacean skin is hairless, smooth and relatively thin. Sunburn and windburn present a visually dramatic consequence of stranding exposure. The severity of the skin damage depends on the duration of exposure. Drying, blistering and sloughing of the epidermis may occur quite rapidly in summer. The reversibility of these burn injuries and their effect on survival in the long term, once the animals are returned to the sea, is unknown. Extensive skin peeling contributes to fluid and electrolyte loss and the raw exposed areas may be prone to infection.

Covering the animal with wet sheets is an effective measure to prevent sunburn. **Never** apply sun block or zinc cream sun-protection to the animal's skin.

Dehydration

Body water is lost in urine excretion, through the skin (if skin is in poor condition e.g. blistered) and during respiration. There is limited information on the incidence and treatment of dehydration in stranded cetaceans, so the treatment chosen is a matter for expert veterinary advice.

Respiratory problems

Stranded cetaceans can experience respiratory difficulties for a number of reasons. Cetaceans battered in the surf zone are often unable to maintain an upright posture and can inhale water and sand. Heavy, struggling animals can become bogged in soft sand or mud. These animals often drown in the incoming tide. Large whales left stranded 'high and dry' and deprived of the buoying effects of seawater will experience abnormal

pressures on the lungs and abdominal viscera. This impairs respiration and may result in pulmonary oedema (fluid on the lungs).

Injuries

Both external and internal traumatic injuries may be inflicted on cetaceans stranding in rough weather, either from being pounded against a rocks or being buffeted in heavy surf. Extensive skin lacerations, fractured ribs, shattered mandibles and ruptured diaphragms have been noted in cetaceans stranded in these circumstances.

Shock and stress

Any stranded cetacean will be distressed. Within a few hours of stranding, some cetaceans can show evidence of shock and vascular collapse. This is particularly evident in large animals and may result in impaired organ function. Reduced lung function will exacerbate organ impairment due to the reduction in oxygen exchange. Liver malfunction reduces the body's ability to handle the toxic products of metabolism while renal malfunction will contribute to fluid imbalances. Damage to these and other organs including skeletal muscle will significantly impair the chances of survival even if animals are returned to the water.

Prolonged release of stress hormones will eventually damage the heart, skeletal muscle and other systems and result in sudden death while the animal is beached or contribute to death after release.

Clinical assessment

Clinical examination at a stranding is used to determine the likelihood of the animal recovering sufficiently to be released. It can be difficult, even for experienced operators, to determine if an animal is suitable for release based on a single observation. Repeated assessments of multiple variables (preferably with the animal in the water) and how these variables change over time are crucial for informed decision making. If unsure, give the animal the benefit of the doubt and continue monitoring. An improving demeanour over time may be associated with a far better prognosis for return to sea than one that is worsening. Before deciding an animal can finally be released, it is crucial to assess it in the water if possible, preferably free-floating. In some cases, even animals that appear to be on the verge of death improve remarkably once they are re-floated (Gales, Woods & Vogelnest 2008).

Assessing maternal or social dependence

After establishing the species of a stranded cetacean the next step is to determine the age class of the animal. Whether a stranded juvenile is maternally dependent can be assessed by comparing its body length with the known adult body length. In toothed cetaceans, it is also indicated by the absence of erupted teeth. Exceptions are females of most species of Ziphiids and weaning sperm whales. Apart from their smaller size, physical signs of recent birth are a pronounced foetal curl to the flukes, a sideways fold or curl to the dorsal fin and a ray tag-like stump of the umbilicus that is just beginning to heal. Neonates may also have hairs present on their lower jaw. Foetal creases on the body alone are not a reliable indicator of recent birth as they can persist for weeks or even several months, but this time range would include dependent calves. Mother-calf bonds are exceptionally strong so if the mother has not beached she may be close by offshore and behaving in an unusual manner. Only release maternally dependant calves if conspecifics are observed immediately offshore. If none are observed, these calves should be euthanased.

Social dependence is a more fluid concept but the implication is that in highly social species the chances of a lone, weaned animal's survival is reduced below a certain age. Generally, a juvenile up to about three quarters of adult length of any of the highly social species can be assumed to be socially dependent. Euthanasia based on this observation alone is probably not indicated but consider it a possibility as part of the overall clinical assessment.

Behaviour and body condition

The animal's behaviour when first approached is an important indicator of its health status and eventual prognosis. Behavioural criteria can be used to assign the animal to one of three categories:

- alert (aware, responsive to environmental stimuli)
- weakly responsive (responsive only after stimulation)
- non-responsive (not responding to noise or touch).

Some odontocetes (e.g. pilot whales) may make audible sounds emanating from the blowhole. The whistles and high-pitched squeals of these species are used for communication with others in their group and in a stranding situation may indicate emotional distress. Active vocalisation may however be a sign of relative clinical wellbeing as animals cease to vocalise when they become depressed.

Due to the general fusiform shape of cetaceans and their firm outer blubber layer, the general nutritional status (i.e. starving versus fat) is difficult to determine visually except in extreme cases. Body condition is judged by observing its back and neck. As cetaceans become progressively more emaciated, the epaxial muscles and overlying blubber reduce in mass making the shape of the dorsal spine appear more prominent. The neck of emaciated cetaceans also often becomes more obvious. Animals in poor body condition and weak or non-responsive animals have a poor or hopeless prognosis for successful release.

If the stranded animals are in the surf zone, they may make very violent, rapid movements because their blowholes are being inundated with water. Such movements will take place irrespective of whether people are nearby or not. Animals above the waterline, however, will typically be very non-reactive and it may be difficult to determine if they are dead or alive. To test for reflexes, touch the animals around the blowhole, eyes or genital area. To assess body condition, look for sunken areas around the dorsal fin, behind the head or visible vertebrae.

Traumatic injuries

Certain types of human-related injuries may be obvious, such as a ship strike which leaves parallel propeller wounds on the back. Animals with these types of wounds may also have associated severe muscle bruising and/or damage to the viscera. Observe the animal for haemorrhage from the mouth, blowhole or other body orifices as well its ability to move and maintain a normal position if in the water.

Injuries from entanglement may appear as grooves around the peduncle, net marks or amputated fins or flukes.

Lacerations caused by the animal being pushed against rocks by heavy waves during a stranding event are not uncommon. Occasionally such animals present with serious fractures and dislocations. These may be due to the stranding event or result from ship strike and, when diagnosed, euthanasia is usually indicated. Injuries such as fractures, muscle tears or extensive bruising may not be detected unless there is an abnormality in the animal's movement or appearance. Such injuries may first be noticed when the animal is refloated.

Odontocete whales commonly suffer jaw injury and if live animals strand in heavy seas or on a rocky shore they are particularly prone to fracturing or damaging the jaw. Any assessment of odontocete whales must include looking for jaw damage.

Cardiovascular function and respiration rate

Heart rate can be determined using a stethoscope or by feeling by palpation in a very small animal. It can sometimes be felt in larger animals by placing a hand in the left auxiliary region. However, heart rate may vary considerably during the breathing cycle and measurement usually provides little information regarding prognosis. If the animal is depressed the mouth may be opened and a rough estimate of circulatory function made by examining the mucous membranes and testing the capillary refill. As in most other mammals, normal gum colour is pink and the gum should refill within two seconds after blanching by applying firm pressure with a gloved finger. The rate of respiration of small cetaceans at rest may be only two or three breaths per minute; for a large whale it is as low as one breath per 10 to 15 minutes. An increase in rate will occur with physical activity, anxiety, or impairment of the respiratory system by water inhalation, trauma, abnormal pressures on the thorax and disease.

Stranded cetaceans inevitably develop respiratory fatigue and distress. This occurs sooner in larger animals because of the pressure on the lungs and development of pulmonary oedema. Signs include irregular and increased respiratory rate and audible gurgling sounds as the animal breathes. A useful prognostic indicator of respiration is the time interval for expiration and inspiration. In small cetaceans, the normal interval is quite short; that is, less than four seconds. For large whales, such as sperm whales, it is less than 10 seconds. The duration of each breath becomes longer as the degree of depression or shock increases. Bleeding, frothy discharge or foul-smelling fluids from the blowhole are poor prognostic signs. Respiratory function often improves dramatically if the animal is able to be stabilised in shallow water.

Reflexes and muscle tone

When assessing comatose or depressed animals, manipulating the animal to elicit normal reflexes is a reliable method. Touching the blowhole orifice, anus or eye should stimulate a reflexive closure or tightening of muscular sphincters. Muscle tone can be assessed by jaw tone and withdrawal of the tongue when pulled. Only attempt these procedures in quite depressed animals.

The loss of body reflexes is generally a poor sign. The blowhole should always remain tightly closed except during inspiration and expiration. The palpebral reflex can be tested by tapping gently near the eye. The reflexive closure of the eye is the normal, healthy response. The pupillary reflex is difficult or impossible to measure as stranded cetaceans typically have pinpoint pupils and will not respond to light sources. A fully dilated pupil is a sign of death. The corneal reflex is not useful in live animals, as the lids are often held tightly shut, but can be used in assessing death. Jaw muscle and other skeletal muscle tone can be tested by attempting to open the jaw or by gently pulling the pectoral flipper forward. In both cases, a healthy animal will resist the efforts. The ‘tongue reflex’, elicited by gently squeezing the edge of the tongue and observing the response, can be useful in assessing moribund animals or checking to see if an animal is dead. This can be dangerous as some animals may react violently. It should only be done by experienced operators or when there is confidence that an animal may be dead.

Skin condition and sunburn

The extent and degree of drying and sunburn damage to the skin will affect the long-term chances of survival of a stranded animal. Evaluate the significance of burns and blisters

in relation to the proportion of the exposed body surface affected. Some observations suggest that minor drying is not overly detrimental and will heal readily.

Cetacean skin has evolved to function efficiently in water. It is easily damaged in air, particularly when exposed to wind and direct sunlight. It is also highly vulnerable to laceration from rocks, shells etc. When exposed, the skin will wrinkle, blister and peel which can rapidly lead to critical fluid loss. A skin condition assessment should include a description of the nature and extent (percentage of body) of the damage. Animals with substantial amounts of skin loss (over 30%) are likely to be poor candidates for release and survival. It is important to differentiate between acute skin damage associated with the stranding event and prior damage – such as cookiecutter shark (*Isistius* spp.) bites (c- or oval-shaped and usually about 5–7 cm diameter), and rake (bite) marks from con-specifics. The latter can be quite extensive and are normal in some species. There may be a normal dark reddish discharge from the rectum of pygmy and dwarf sperm whales (*Kogia* spp.), which is associated with a diet of squid and should not be mistaken for blood. The presence of cyamids (whale lice) and/or barnacles may indicate the stranded cetacean has been swimming at a much reduced speed for a prolonged period of time. This may affect the animal's chances of being rehabilitated

Blood parameters

Testing blood parameters may provide useful information, but collection of blood for testing must be conducted only by an experienced member of OEH, or by a veterinarian with experience in cetacean health. Collecting blood from live cetaceans may only be done where such sampling is deemed to be of high priority and the animal will not be subjected to undue stress or trauma.

Response to refloating

The animal's response to being refloated can be a useful guide to its condition. Good prognostic indicators are its ability to remain at the surface unassisted to breathe, maintain normal posture and self-right. As soon as each animal is returned to the water, manoeuvre it to a depth sufficient to provide buoyancy, but enabling handlers to stand firmly and support it in an upright position. Severely debilitated animals will sink and so it may be necessary to lift its head to keep its blowhole above the surface by passing a towel or wide band of suitable (non-irritant) material under its chest and fins. Alternatively cetacean rescue pontoons, if available provide a much easier way of supporting the animal in the water.

Behaviour in water

If the animal is in the water when it is clinically examined, or has been moved to the water during the process of the rescue operation, assessing its behaviour can provide much information. After being stranded or rolled in the surf zone, cetaceans are typically disorientated. They are often unable to swim and remain upright. An animal's ability and eagerness to remain in an upright position and swim are key indicators of its readiness for release. It may take a period of appropriate handling for a cetacean to regain muscle tone and orientation. This involves gentle manual support of the animal while it is fully suspended in water. Do not release a cetacean until it is able to swim strongly.

Ability to swim can be difficult to assess. Various techniques can be used, including taking the animal for a 'walk', with one person providing support at either side of the front of the animal. A 'break person' directly in front of the animal can also be used. However, caution needs to be exercised as some animals may swim off, others sink and drown, and others 'run-over' the break person. Only calm animals up to about 5 m long can be 'walked'. But

only those very experienced in handling cetaceans should use this technique. Conditions need to be calm, and there should be a flat, solid substrate.

The return of tail movements, associated with being moved through the water, coupled with a good righting response (ability to reposition itself in the water if the long axis of the body is rotated), strong, reasonably steady respiration and good reflexes generally indicate that an animal is able to swim. Animals with abnormal buoyancy, including sinking, listing to one side or circling may not be suitable for release. When animals are released as a group, it is important that all of the group have regained the ability to swim strongly. A single, weakened animal can result in the group re-stranding soon after release.

Appendix 7
The pontoon rescue system

Using pontoons to refloat stranded cetaceans

The cetacean rescue pontoon is an inflatable device designed to refloat small cetaceans weighing up to 2 tonnes. By interlocking two or more sets of pontoons together, larger whales may be successfully refloated. Correctly assembled, the pontoon system will float a full-grown pilot whale in knee-deep water. It is important at least one person in the group assembling this device has had prior training. Incorrect assembly presents a risk of the entire system becoming unstable, causing the whale to be lost before or during towing. Each pontoon kit consists of two cylindrical-shaped inflatable tubes and two lifting mats (one mat is a spare). An assembled unit consists of two pontoons joined together by one lifting mat.

Directions for use

One side of each pontoon is marked left, the other right. One pontoon must be placed to the cetacean's right and one to the left. An arrow icon on the front of each pontoon indicates which is the head-end of the unit.

There are towing rings attached low down on the front and back where the cone-shaping terminates. Handles are situated on the outer edges. There are four snap-lock clips on the inner side of both pontoons. These are attached to specially shaped rings on the underside of the lifting mat.

At the tail-end of each pontoon is a non-return filling valve covered by a plastic screw cap. The pontoons are inflated using a scuba tank or an emergency hand pump, which is included in the pontoon kit. The bottom portion of the pump is submersible and can be held down by placing your foot into a slot at the bottom edge of the pump. The T-shaped pump handle is hollow − this is the air intake. It is hard work to inflate the pontoons with the hand-held pump, so have a few people take turns.

There is a safety grip handle on each pontoon to hold while inflating it. The valve head is spring loaded. When depressed and locked down with a half twist (anti-clockwise), the air will escape from the pontoon. Ensure the valve is unlocked (turn it clockwise) when inflating the pontoon. If the air is put in by tank quickly, it often freezes the valve open. If this happens, use the cap to prevent any air from escaping.

The lifting mat

The lifting mat is rectangular. There are three drainage panels spread along the centre of the mat. Topside has whale icons to show which direction to place the mat under the whale. The underside of the mat has alternate lines of stainless-steel "D" rings or triangle-shaped "V" rings (referred to as D's and V's).

Assembly

The lifting mat is placed under the whale. The pontoons are attached then inflated. Ensure each pontoon is completely empty of air before attempting to attach it to the mat.

Take great care to minimise sand/rubble between the cetacean and the mat as this may chaff its skin

Place the mat ring-side down. Three people roll the mat tightly from one side to halfway (up to the drainage panels). Keeping the mat rolled tight, pick it up and carry it to the whale then place it against the whale's underside.

Four people should be able to gently roll the whale towards them to expose its underbelly without putting the whale's blowhole under water. The leading (head) edge of the mat is placed in line and slightly forward of the pectoral fin (flipper) but clear of the eye. Tuck the tightly rolled mat along the whale's ventral side. As a guide – when the whale is being returned to an upright position watch to see its genital slits are in line with the drainage panels on the mat. Then roll the whale to the other side and pull the mat through. To check the mat is placed evenly, hold it up against the side of the whale and check it comes equally up each side of the whale. If the whale is uneven on the mat, start again. Reverse the previous process to remove the mat. Re-roll the mat and start again. It is important that the whale is square in the mat or it will lie on its side when the pontoons are inflated.

Once the mat is under the whale, attach the deflated pontoons one at a time. Again, gently roll the whale on its side by reaching across it and taking hold of the mat from the opposite side then gently pull the whale towards you. This exposes the rings to which the pontoon clips attach. It is very important to lock hooks onto the rings in a straight line. Ensure that all pontoon hooks are connected to the corresponding line of hooks on the mat which will be either all "D" shaped rings or all "V" shaped rings.

When attaching the pontoon hooks, it is crucial to connect the hooks to the line of rings that lies as far under the whale as possible. (You may have to dig into the sand to uncover the rings).

Check the whale's pectoral fin is not caught up and being bent unnaturally. Try to place the fin in a comfortable position for the whale. This is not always possible; for instance, an orca's pectoral fin is large and very rigid.

Attach the second pontoon the same way. Inflate pontoons via air inlet valves. Inflate one side to no more that half full or until you can see that the whale is starting to be tipped off centre. Completely inflate the opposite pontoon, then top up the first one. Do not overfill. Stop inflating as the last crease disappears from the surface of the pontoon and the surface tension gives slightly to the pressure of your fingers.

When the pontoons are inflated, the whale should be upright and float freely in knee-deep water.

You may have to lift the unit to float it free. Have as many people as possible to take hold of the lifting handles. On one command, lift up and seaward. If the whale appears to be stuck fast, use wave action to help lift it clear. This takes teamwork. Give the command to lift as the incoming wave reaches the pontoons. Repeat as necessary. Take care not to strain your back or drag the whale, which may cause internal damage and/or break its pectoral fins.

Only undertake this where OH&S safety requirements can be met

The unit can now be towed to deeper water. Attach ropes to the towing rings (located front and back, low down where the cone-shaping terminates). Ensure ropes do not chafe the whale's skin. Tow slowly but steadily – always less than 2 to 3 knots (walking pace). Speed is usually determined by the person in charge and depends on the sea conditions encountered.

Always observe the whale and do not leave it unattended as it may start to propel itself with its tail. At any sign of agitation (increased breathing/heart rate, thrashing around), let the whale recover then try again.

To release the whale, one pontoon needs to be deflated. To release the air, undo the screw cap, place a finger on the valve, push it down, then twist it anti-clockwise. The valve will lock down and the air will escape. As the pontoon deflates, the whale will slide or swim off and re-surface some distance away. You will be shown how to work the valves during the practical session.

Be careful not to allow all air to escape as the unit will sink and be lost.

Working around a whale on a beach can be hazardous. Take extreme caution when working near a whale's tail while getting the whale into the pontoons.

Should the whale start to thrash around, abandon any attempt to place the animal in the pontoons.

Follow directions of experienced rescuers to ensure success

Health and safety when using compressed air

Compressed air cylinders are heavy because they are made from steel or thick aluminium. Carry them using both hands.

Use the appropriate lifting technique when lifting cylinders

Cylinders are unstable when left standing and must be secured when in a vertical position.

Do not drop cylinders or regulators into sand or lay the cylinders down to store them

Take care with the valve/regulator assembly, which is the weakest point. Valve failure can be catastrophic. Open the valve slowly. Because it gets really cold, wear gloves. The filling hose must always be held when the valve is open. Do not leave the valve open.

Appendix 8
Safety Data Sheet for pentobarbitone

Pentobarbitone (pentobarbital sodium) is listed as a Schedule 3 substance under the *Poisons and Therapeutic Goods Act* 1966. It is used for the euthanasia of animals and can be dangerous to humans. To ensure human safety, access and handling of this drug must be undertaken by appropriately authorised persons and in accordance with the MSDS at https://www.chemblink.com/MSDS/76-74-4_MSDS.htm

Appendix 9
Seal species identification

In addition to this Appendix, the Biodiversity and Wildlife Unit produced an updated seal identification in 2020 which is available here.

There are three families of seals:

- Otariidae (eared seals, including all fur seals and sea lions)
- Phocidae (earless or 'true' seals)
- Odobenidae (a single species, the Walrus, North American distribution only).

Table 12 Distinguishing features of adult Australian and New Zealand fur seals.

	Adult Australian fur seal		**Adult New Zealand fur seal**	
	Male	**Female**	**Male**	**Female**
Head	Very large and wide Little or low brow Snout rounded (dog-like) Ears light in colour	Small No obvious brow Snout rounded (dog-like) Ears light in colour	Large Brow distinct Snout pointy; enlarged rhinarium which accentuates the pointy snout Ears dark	Small No obvious brow Snout pointy Ears dark
Front flippers	Paddle-shaped (rounded) with obvious thickening of the trailing edge before it joins the body		Oar-shaped (long with straight sides)	
Fur dry	Dark greyish brown dorsal surface Lighter ventral area Mane lighter in older males	Pale fawn to lighter greyish brown Pale throat Brown ventrally	Dark brown to black dorsal surface Lighter ventral area	Brown to dark brown with greyish tones
Fur wet	Generally darker brown/grey with black flippers Lighter grey ventral surface and lighter mane	Generally darker brown/grey with black flippers Brown underbelly	Generally darker brown/grey with black flippers Darker and more uniform than Australian fur seals	

Pups	Australian fur seal pups are born black and turn greyish fawn with a pale throat after the first moult at 4−5 months of age Juveniles moult again a year later and turn silver-grey	New Zealand fur seal pups are born black with a whitish snout and turn greyish-brown after the first moult at 2−3 months of age

Australian fur seal (*Arctocephalus pusillus doriferus*)

Figure 94 Australian fur seals: an adult male (rear) and a female nursing her pup. Photo: John Gibbens/ sealimages.com.

- Light sandy to dark brown dorsally, with a moderately paler chest and dark brown belly (note: the fur colouration of seals varies depending on whether the fur is wet or dry, the stage of moult and the direction in which the guard hairs and underfur hairs lie).
- Females tend to be lighter than males, ranging from light fawn (blonde) to grey brown.
- Pups are black at birth with pale-tipped guard hairs but their fur fades to brown as they get older; juvenile colouration is similar to adult females.
- Adult males have a short, dense mane.

- An adult male has a scrotum and both sexes have four teats on their abdomen.
- An adult male reaches lengths of 201−276 cm and weighs 218−360 kg (average is 279 kg).
- Adult females reach lengths of 136-171 cm and weigh 41−113 kg (average is 78 kg).
- A pup has a birth length of 60−80 cm and its weight range is 5−12 kg.
- Adult females come ashore November to December and give birth to single pups from late November to early January.

- Pupping season is from late October to late December (most pups are born between 26 November and 1 December).
- Mating season is between November and January.
- Females alternate between feeding at sea for three to four days and returning to land to suckle their pups for three to four days; suckling reduces to 1.5 days as the pups get closer to weaning age.
- Pups are usually weaned around September (when they are 10−12 months old).
- It is common to see Australian or New Zealand fur seals on the NSW coast during the austral winter months.

Australian fur seal

Figure 95 A female Australian fur seal and pup, both with a body condition score of 3 to 5. Photo: John Gibbens/sealimages.com.

Figure 96 Australian (foreground) and New Zealand fur seal pups, both with a body condition score of 3 to 5. Photo: John Gibbens/ sealimages.com.

New Zealand fur seal (*Arctocephalus forsteri*)

- Adult males are dark grey-brown dorsally with paler grey-brown shading, ventrally.
- Females tend to have a metallic grey colour; after the moult they become browner.
- Adults have thick, soft, chestnut underfur that is overlain by grizzled guard hairs, which appear silvery when the coat is dry.
- The dorsal fur is longer and more abundant than the ventral fur and reaches its longest and fullest growth in the manes of adult males.

Figure 97 An adult male New Zealand fur seal.
Photo: Geoff Ross/NPWS.

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- Young pups are black or very dark brown all over with grizzled fur and pale-tipped guard hairs around the head.
- Pups appear silvery grey after moult and yearlings are often chocolate coloured.
- Adult males have a scrotum and both sexes have four teats on the belly.
- The snout in both sexes is sharply pointed (unlike Australian fur seals).
- Both sexes have lots of whiskers which are black for the first few years and turn white in older animals; whiskers grow up to 50 cm in adult males.
- An adult male reaches a length of 120−179 cm and weighs 119−160 kg (average is 126 kg).
- An adult female reaches a length of 104−148 cm and weighs 26−69 kg (average is 39 kg).
- Pups of both sexes have a birth length range of 55−70 cm and the average birth weight for males and females is 5.6 kg and 4.8 kg respectively.
- Pupping season is from late November to mid January with most pups born in mid December.
- Mating season is from mid November to mid January.
- Mothers spend the first 6−18 days after giving birth near the birth site with their pups but soon start alternating between suckling their pups and feeding at sea, with the time spent feeding at sea gradually increasing.
- Pups are weaned around September.
- It is not unusual to see New Zealand fur seals (including young pups) on their own in NSW. Unless a hauled-out pup is entangled, monitor the animal for at least 48 hours before taking any action.

New Zealand fur seal

Figure 98 A New Zealand fur seal mother and pup. The body condition score of both animals is 3 to 5. Photo: John Gibbens/sealimages.com.

Figure 99 Two adult New Zealand fur seal males. The body condition score of both animals is 3 to 5. Photo: Sarah Dwyer.

Subantarctic fur seal (*Arctocephalus tropicalis*)

- Adults are very dark dorsally and have creamy yellow-coloured chests.
- Adults have a distinctive, pale ‘facial-mask’.
- Adult males are usually much darker than females and have a dark crest on the top of their head which they raise when excited.

Figure 100 A subantarctic fur seal. Photo: Libby Hall/Taronga Conservation Society Australia.

- An adult male reaches 1.5−2 m in length and weighs 97−158 kg.
- An adult female reaches 1−1.4 m in length and weighs 30−50 kg.
- Pups have a birth length of 60−70 cm and a weight range of 4−6 kg.
- Pupping in subantarctic fur seal colonies occurs between November and January each year.
- Pups are weaned approximately 10 months after birth.
- The only breeding colonies of this species found within Australian territory are on Macquarie Island; all other breeding colonies occur within Antarctic territory.
- Most of the subantarctic fur seals that haul out in NSW have been young animals which have usually been found with body condition scores of 1 to 2 due to extreme thinness.

Once Antarctic or subantarctic species are taken into care, they cannot be released back into the wild. The only management options are permanent care in an approved care facility or euthanasia.

Subantarctic fur seal

Figure 101 A male subantarctic fur seal with a body condition score of 1-2.

Figure 102 A male subantarctic fur seal, showing its distinct peak and cream -coloured ‘face mask’. Photo: Aaron Machado/Project Dolphin Safe, SA.

Australian sea lion (*Neophoca cinerea*)

Figure 103 An adult male Australian sea lion with a body condition score of 3 to 5. Photo: Aaron Machado/Project Dolphin Safe, SA.

- Adult males are a rich chocolate-brown but show age-related colour changes.
- Adult females are highly variable in colour; they can be silvery grey to fawn dorsally and creamy to pale yellow ventrally.
- Newborn pups have a thick natal pelage (lanugo) of chocolate brown hair which they lose in a moult at 4−5 months of age.
- Juvenile males resemble females for the first two years of life after which the chest develops darker spots and the muzzle darkens.
- Full adult males are very dark with a yellowish white mane of thicker, coarser hair over their shoulders.
- Australian sea lions are classed as pups up to 18 months old.

- Adult males reach 200−250 cm in length and weigh up to 300 kg.
- Adult females are much smaller than males, reaching lengths of 150−180 cm and weigh 61−104 kg (average 77 kg)
- Pups have a birth length of 62−68 cm and a weight range of 6.4−7.9 kg The pupping interval for Australian sea lions is 17−18 months whereas it is yearly for most seals.
- Births occur in alternate summers and winters or in alternate springs and autumns and birthing seasons last for 5−7 months.
- Mating season lasts for up to 5 months and takes occurs at different times in different colonies.
- Pups are weaned at 15−18 months of age.

Australian sea lion

Figure 104 An adult Australian sea lion male in good condition at the start of the breeding season. Body condition of males tends to deteriorate by the end of the breeding season. Photo: Benjamin Pitcher.

Figure 105 Australian sea lions. Photo: Aaron Machado/Project Dolphin Safe, SA.

Australian sea lion

Figure 106 A juvenile Australian sea lion with an entanglement scar around its neck. Photo: Benjamin Pitcher.

Leopard seal (*Hydrurga leptonyx*)

Figure 107 A leopard seal in Antarctica. Photo: Fabian Ritter.

- Leopard seals have an elongated body that is dark grey to silver dorsally and light grey ventrally with dark spotting on the shoulders, throat and sides.
- They have a constricted neck with a massive head, long snout and gaping jaws
- Leopard seals have very long canine teeth with sharp, pointy, ornately shaped molars (see Figure 108).

- Leopard seals can move with extreme swiftness, even on land, and they can turn very quickly.
- Adult females grow up to 3.6 m long and 500 kg in weight and are larger than males.
- Adult males grow up to 3.3 m long (though some are more than 4 m long) and 300 kg in weight (Perrin et al 2008 and Rogers 2002).
- Pupping occurs from early November to late December.
- Mating occurs 3−4 weeks after the pupping season.
- Pups are weaned at least 4 weeks after birth.
- There is a tendency for seasonal dispersal northwards to subantarctic islands in the austral winter, with juveniles more commonly making these extralimital, far northern trips (Rogers 2002) where they may reach NSW and haul out. Leopard seals have been sighted as far north as Townsville, Queensland during the austral winter months (late May to the end of September).

Once Antarctic or subantarctic species are taken into care, they cannot be released back into the wild; the only management options are permanent care in an approved care facility or euthanasia.

Leopard seal

Figure 108 A leopard seal displaying its maw. Note the distinctive markings on the throat, the ornately-shaped molars and long canines. This type of threat display is common in seals; some people mistake it for yawning. Photo: Geoff Ross/NPWS.

Figure 109 A juvenile leopard seal hauled out in Windang, NSW. Note the cookiecutter shark wounds. Photo: C. Daley/NPWS.

Figure 110 A hauled-out leopard seal. In NSW, they have been observed to deteriorate rapidly in condition due to dehydration and poor nutrition. Note the boniness near the hind flippers. Sometimes they exhibit behaviours such as sand-eating and biting rocks. Photo: Geoff Ross/NPWS.

Southern elephant seal (*Mirounga leonina*)

Figure 111 A juvenile southern elephant seal undergoing a moult. It has a body condition score of 3 to 5, so no intervention is required. Photo: Kathryn Wheatley.

- Adult southern elephant seals range in colour from dark grey to brown dorsally and paler ventrally.
- Adult males have a well developed proboscis.
- Pups are born with a black coat. It is replaced by a silvery grey coat that is darker on the dorsal surface and paler on the ventral surface.
- Southern elephant seals undergo a dramatic moult during which skin is shed in sheets. The animals fast throughout the moult resulting in significant loss of weight.

- Adult males grow up to 5.8 m long and 4,000 kg in weight.
- Adult females grow up to 3.6 m long and 300−1,000 kg in weight.
- Pups weigh up to 40 kg at birth and an average of 113 kg at weaning, which is 18−22 days after birth.
- Southern elephant seals are very rarely seen in NSW so a haul out of this species here should be regarded as an unusual event.

Figure 112 A female southern elephant seal with a body condition score of 1 to 2. Photo: Wayne Reynolds.

Once Antarctic or subantarctic species are taken into care, they cannot be released back into the wild; the only management options are permanent care in an approved care facility or euthanasia.

Appendix 10 Job Safety Analysis examples for marine wildlife events and COVID-19 operational guidelines

- Marine mammal entanglement JSA
- Marine mammal euthanasia JSA
- Marine mammal stranding JSA
- Seal haul out JSA – see DOC18/365997 on CM9
- Live Animal / Animal Carcass Handling JSA (GSB example) – see DOC19/209294 on CM9
- Boating JSA
- COVID-19 Operational Guidelines for Marine Wildlife Incidents
- Covid-19 Operational Guideline 5 - Field operations & work depots
- Covid-19 Standard Operating Guideline - Engaging with the Public

Appendix 11 Marine turtle identification

Loggerhead Turtle *(Caretta caretta)*

Did you know . . . Loggerhead turtles get their name because of their large square heads and strong jaws.

Olive Ridley Turtle *(Lepidochelys olivacea)*

© Scott Hardy

Did you know . . . Olive Ridley turtles are the smallest of all the marine turtles and their shell is shaped like a heart.

Leatherback Turtle *(Dermochelys coriacea)*

© Scott Hardy

Did you know . . . Leatherback turtles are the largest of all the marine turtles with a leather-like shell up to 2.5m in length.

Hawksbill Turtle *(Eretmochelys imbricata)*

Did you know . . . Hawksbill turtles have thick overlapping scales and a distinctive beak. Their shell was once used to make 'tortoiseshell' jewellery.

Flatback Turtle *(Natator depressus)*

Photo: Scott Whiting

Did you know . . . Flatback turtles have a very flat shell with upturned edges. The species is only found on the Australian continental shelf.

Green Turtle *(Chelonia mydas)*

Did you know . . . Green turtles get their name because their fat is coloured green. They mainly eat algae and other marine plants.

Identification Key

The identification key below will help you identify the marine turtles of the Great Barrier Reef. Follow the flow chart and match the carapace (shell) and/or the pre-frontal scales on the head to the turtle in question.

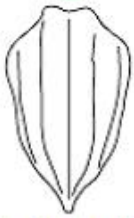
Carapace ridges, no scales

Carapace scales

4 pair costal scales

5 pair costal scales
Colour red-brown to brown

6 pair costal scales
Colour grey-green



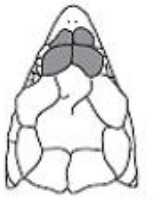
Leatherback

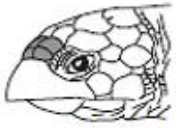
Loggerhead

Olive Ridley

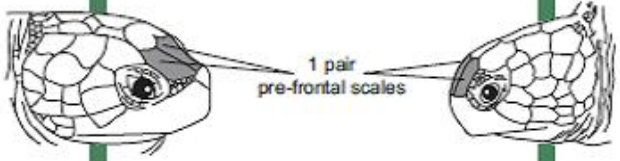
2 pair pre-frontal scales
Thick overlapping carapace scales

1 pair pre-frontal scales
No thick overlapping carapace scales



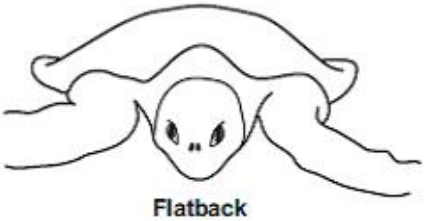


Hawksbill



Carapace low domed
with upturned edges
Colour olive grey

Carapace high domed
Colour light to dark green
with dark mottling



Flatback

Green

Appendix 12
Rescue and rehabilitation organisations

Organisation	Address	Contact details	Species
Australian Seabird Rescue	264 North Creek Road Ballina NSW 2478	Office Phone: 02 6686 2852 Rescue Phone: 0428 862 852 admin@seabirdrescue.org.au	Marine turtles, sea snakes, seabirds
Dolphin Marine Conservation Park	65 Orlando Street Coffs Harbour NSW 2450	Tel: 02 6659 1901 Mob: 0427591901 manager@dolphinmcp.com.au	Marine turtles and sea snakes
FAWNA NSW	22 Blackbutt Rd, Port Macquarie NSW 2444	24-hour hotline: 02 6581 4141	Marine turtles and sea snakes (rescue and temporary hold)
Hunter Wildlife Rescue		24-hour hotline: 0418 628 483	Marine reptiles, seabirds
ORCCA	PO Box 429 Sutherland NSW 1499	24-hour hotline: 02 9415 3333	Whales, dolphins, seals, dugongs
Seaworld	Seaworld Drive, Main Beach Gold Coast, QLD 4217	Phone: 13 33 86	Marine turtles
SEA LIFE Sydney Aquarium	1-5 Wheat Road Sydney NSW 2000	Phone: 02 9333 9200	Marine turtles and sea snakes
Taronga Zoo (Veterinary and Quarantine Centre)	Bradley's Head Road PO Box 20 Mosman NSW 2088	Dr Larry Vogelnest (live strandings) Phone: 02 9978 4618 Jane Hall (dead animals)	Facilities for marine reptiles including veterinarian assistance, rehabilitation and pathology.
Wildlife In Need of Care (WINC)		24-hour hotline: 1300 946 295	Marine reptiles, seabirds

Appendix 13
Sea snakes

Emydocephalus annulatus (Turtle-headed Sea snake)

Hydrophis elegans (Elegant Sea snake)

Hydrophis ornatus/ocellatus (Spotted Sea snake)

Laticauda colubrina (Yellow-lipped Sea Krait)

Pelamis platurus (Yellow-bellied Sea snake)

Images courtesy of Col Limpus Queensland Parks and Wildlife, Hal Cogger and Rudi Kuiter (Stokes' Sea snake)

Appendix 14
Swim distance calculator

Table 13 An embedded excel spreadsheet in the table below calculates the probable distance covered by an entangled or injured cetacean from time of last sighting to a prediction time given three different cetacean swim speeds. Double click to access and enter data into the first three columns.

Time last sighting	Prediction time	Elapsed time (hours)	Distance covered slow - 3 knots (km)	Distance covered mod - 4 knots (km)	Distance covered fast - 5 knots (km)
1300 Friday	0900 Wednesday	24	**133**	**178**	**222**
1600 Wednesday	0900 Thursday	17	**94**	**126**	**157**

Note: A swim distance calculator with mapping interface is available in the Elements marine wildlife module

Appendix 15
Basic sample kit

The contents of the basic sample kit are to be held in each NPWS area with coastal responsibility

. **Material**	**Quantity**
Parafilm	× 1 roll
DNA sample containers with DMSO	× 2
Blubber sample container with alcohol	× 3
Aluminium foil	× 1
Labels	× 10
Scalpel handles	× 2
Scalpel blades	× 10
Stainless steel rule	× 1
Nylon measuring tape (10 m)	× 1
Nylon measuring tape (30 m)	× 1
Nyloc plastic sample bags, various size	× 20
Marine wildlife event report form	× 1
Labelled courier envelope	× 1
Sterile surgical gloves	× 3 pairs
Disinfectant hand wash	× 1 container
Pencil	× 1

Appendix 16
NPWS Area Office contact list – coastal areas

North Coast Branch

NPWS Area	Office Name	Phone number	Address	Postal Address
Branch	Alstonville Office (Branch)	02 6627 0220	494 Bruxner Highway, Alstonville NSW 2477	PO Box 856, Alstonville NSW 2477
Branch	Cape Byron Information Centre	02 6639 8300	199 Lighthouse Road, Byron Bay NSW 2481	PO Box 127, Byron Bay 2481
Branch	Dorrigo Rainforest Centre	02 6657 5913	142 Dome Road, Dorrigo Mountain NSW 2453	PO Box 170, Dorrigo NSW 2453
Branch	Sea Acres Rainforest Centre	02 6582 3355	159 Pacific Drive, Port Macquarie NSW 2444	PO Box 1807, Port Macquarie NSW 2444
Branch	Trial Bay Gaol Visitor Centre	02 6566 6168	73 Trial Bay Gaol Road, Arakoon NSW 2431	PO Box 25, South West Rocks NSW 2431
Clarence	Grafton Depot	02 6642 3090	3 Tyson Street, South Grafton NSW 2460	PO Box 361, Grafton NSW 2460
Clarence	Grafton Office	02 6641 1500	Level 4, 49 Victoria Street, Grafton NSW 2460	PO Box 361, Grafton NSW 2460
Clarence	Saltwater Depot - Iluka	02 6646 5348	1402 Iluka Road, The Freshwater NSW 2466	PO Box 112, Iluka NSW 2460
Clarence	Woody Head campground	02 6646 6134	92 Woody Head Road, Woody Head NSW 2466	PO Box 15, Iluka NSW 2460
Coffs Coast	Bowraville Office & Depot	02 6652 0900	8 Alberta Street, Bowraville NSW 2449	N/A
Coffs Coast	Coffs Harbour Office	02 6652 0900	4/32 Edgar Street, Coffs Harbour NSW 2450	PO Box 4200, Coffs Harbour Jetty NSW 2450
Coffs Coast	Dorrigo Depot		4 Casuarina Street, Dorrigo NSW 2453	PO Box 170, Dorrigo NSW 2453
Coffs Coast	Toormina Depot	02 6652 0900	35 Craft Close, Toormina NSW 2452	N/A
Hastings Macleay	Kempsey Office & Depot	02 6561 6700	247 Old Station Road, Verges Creek NSW 2440	
Hastings Macleay	Port Macquarie Office & Depot	02 6588 5555	22 Blackbutt Road, Port Macquarie NSW 2444	PO Box 5657, Port Macquarie NSW 2444
NPWS	Coffs Harbour Office (Moonee St)	02 6653 0100	Federation House, L3/24 Moonee Street, Coffs Harbour NSW 2450	PO Box 582, Coffs Harbour NSW 2450

NPWS Area	Office Name	Phone number	Address	Postal Address
Richmond River	Alstonville Office & Depot	02 6627 0200	Russellton Industrial Estate 7 Northcott Crescent, Alstonville NSW 2477	PO Box 856, Alstonville NSW 2477
Richmond River	Kyogle Depot	02 6632 0000	278 Summerland Way, Kyogle NSW 2474	PO Box 174, Kyogle NSW 2474
Richmond River	Kyogle Office	02 6632 0000	136 Summerland Way, Kyogle NSW 2474	PO Box 174, Kyogle NSW 2474
Richmond River	Urbenville Depot	02 6634 1455	17610 Clarence Way, Urbenville NSW 2475	PO Box 9, Urbenville, NSW 2475
Tweed Byron	Byron Bay Office & Depot	02 6639 8300	22 Tallow Beach Road, Byron Bay NSW 2481	PO Box 127, Byron Bay 2481
Tweed Byron	Murwillumbah Depot	02 6672 8153	Mt Warning Industrial Park, 5/87-95 Quarry Road, South Murwillumbah NSW 2484	PO Box 724, Murwillumbah NSW 2484
Tweed Byron	Murwillumbah Office	02 6670 8600	Level 1/135 Murwillumbah Street, Murwillumbah NSW 2484	PO Box 724, Murwillumbah NSW 2484

Hunter Central Coast Branch

NPWS Area	Office Name	Phone number	Address	Postal Address
Central Coast	Girrakool Depot		47 Girrakool Road, Somersby NSW 2250	PO Box 1477, Gosford NSW 2250
Central Coast	Girrakool Office	02 4320 4200	59 Girrakool Road, Somersby NSW 2250	PO Box 1477, Gosford NSW 2250
Central Coast	Lake Munmorah Office & Depot	02 4972 9000	1-3 Blue Wren Drive, Wybung NSW 2259	PO Box 8068, Summerland Point, 2259
Hunter Coast	Boat Harbour Depot	02 4982 1891	16 Tomaree Crescent, Boat Harbour NSW 2316	Locked Mail Bag 99, Nelson Bay NSW 2315
Hunter Coast	Nelson Bay Office	02 4984 8200	Level 1, 12B Teramby Road, Nelson Bay NSW 2315	Locked Mail Bag 99, Nelson Bay NSW 2315
Lower Hunter	Glenrock Depot	02 4946 4140	11 Scout Camp Road, Whitebridge NSW 2290	PO Box 351, Jesmond NSW 2299
Lower Hunter	Newcastle Office (Shortland)	02 4946 4100	1 Wetlands Place, Shortland NSW 2307	PO Box 351, Jesmond NSW 2299
Manning Great Lakes	Bombah Point Depot		2582 Mungo Brush Road, Mungo Brush NSW 2423	
Manning Great Lakes	Booti Booti Depot	02 6554 0749	4371 The Lakes Way, Booti Booti NSW 2428	
Manning Great Lakes	Booti Booti Office	02 6591 0300	4372 The Lakes Way, Booti Booti NSW 2428	
NPWS	Newcastle Office (Bull St)	02 4908 6800	117 Bull Street, Newcastle NSW 2302	PO Box 488G, Newcastle NSW 2300

Greater Sydney Branch

NPWS Area	Office Name	Phone number	Address	Postal Address
Branch	Bobbin Head Information Centre	02 9472 8949	688 Ku-ring-gai Chase Road, Mount Colah NSW 2079	PO Box 3031, Asquith NSW 2077
Branch	Kurnell Visitor Centre	02 9668 2010	21 Cape Solander Drive, Kurnell NSW 2231	PO Box 375, Kurnell NSW 2231
Branch	Quarantine Station	02 9977 7913	3 North Head Scenic Drive, Manly NSW 2095	PO Box 623, Mosman 2088
Branch	Royal NP Visitor Centre	02 9542 0648	2 Lady Carrington Drive, Royal National Park NSW 2232	PO Box 144, Sutherland NSW 1499
North Western Sydney	Ku-ring-gai Chase Office	02 9472 8949	580 Ku-ring-gai Chase Road, Mount Colah NSW 2079	PO Box 3031, Asquith NSW 2077
North Western Sydney	Lane Cove Depot	02 8448 0422	52 Lane Cove Depot Road, Linfield NSW 2070	PO Box 3009, Lindfield West NSW 2070
North Western Sydney	Lane Cove Office	02 8448 0400	2 Max Allen Road, Linfield NSW 2070	PO Box 3009, Lindfield West NSW 2070
North Western Sydney	Mount Colah Depot	N/A	81 Ku-ring-gai Chase Road, Mount Colah NSW 2079	PO Box 3031, Asquith NSW 2077
Royal	Royal Depot	02 9542 0659	101 Farnell Avenue, Royal National Park NSW 2232	PO Box 144, Sutherland NSW 1499
Royal	Royal Office	02 9542 0632	159 Farnell Avenue, Royal National Park NSW 2232	PO Box 144, Sutherland NSW 1499
Sydney North	Forestville Depot	02 9451 3479	84 Ferguson Street, Forestville NSW 2087	PO Box 134, Forestville NSW 2087
Sydney North	Forestville Office	02 9451 3479	82 Ferguson Street, Forestville NSW 2087	PO Box 134, Forestville NSW 2087
Sydney North	Middle Head Office	02 9960 6266	2 Governors Road, Mosman NSW 2088	PO Box 623, Mosman 2088
Sydney South	Kurnell Depot	02 9668 9312	34 Polo Street, Kurnell NSW 2231	PO Box 375, Kurnell NSW 2231
Sydney South	La Perouse Depot	02 9311 1235	74 Henry Head Lane, La Perouse NSW 2036	PO Box 461, Rose Bay NSW 2029
Sydney South	Vaucluse Depot	02 9337 5097	1 Steele Point Road, Vaucluse NSW 2030	PO Box 461, Rose Bay NSW 2029
Sydney South	Vaucluse Office	02 9337 5511	6 Steele Point Road, Vaucluse NSW 2030	PO Box 461, Rose Bay NSW 2029

South Coast Branch

NPWS Area	Office Name	Phone number	Address	Postal Address
Branch	Nowra Office	02 4423 2170	55 Graham Street, Nowra NSW 2541	PO Box 707, Nowra NSW 2541
Eurobodalla	Montague Island Office	02 4476 0800	Montague Island Nature Reserve	
Eurobodalla	Narooma Depot	02 4476 5078	9 Murphy Place, Narooma NSW 2456	PO Box 282, Narooma NSW 2546
Eurobodalla	Narooma Office	02 4476 0800	10 Graham Steet, Narooma NSW 2546	PO Box 282, Narooma NSW 2546
Eurobodalla	Tanja Depot	02 6494 0045	52 Haighs Road, Tanja NSW 2550	
Illawarra-Highlands	Mount Keira Depot	02 4229 5256	321 Mount Keira Road, Mount Keira NSW 2500	PO Box 5436, Wollongong NSW 2520
Illawarra-Highlands	Wollongong Office	02 4224 4188	Unit G 84 Crown Street, Wollongong NSW 2500	PO Box 5436, Wollongong NSW 2520
Sapphire Coast	Eden Depot	02 6496 2651	21 Storey Avenue, Eden NSW 2551	
Sapphire Coast	Green Cape Lighthouse	02 6496 9144	2086 Green Cape Lighthouse Road, Green Cape NSW 2551	
Sapphire Coast	Merimbula Office	02 6495 5000	47 Merimbula Drive, Merimbula NSW 2548	PO Box 656, Merimbula NSW 2548
Shoalhaven	Depot Beach Office	02 4478 6582	2B Depot Beach Road, Depot Beach NSW 2536	PO Box 72, Ulladulla NSW 2539
Shoalhaven	Mundamia Office & Depot	02 4428 6300	104 Flat Rock Road, Mundamia NSW 2540	PO Box 707, Nowra NSW 2541
Shoalhaven	Pretty Beach Office	02 4457 2019	1 Pretty Beach Road, Pretty Beach NSW 2539	PO Box 72, Ulladulla NSW 2539
Shoalhaven	Ulladulla Office	02 4454 9500	6 Coller Road, Ulladulla NSW 2539	PO Box 72, Ulladulla NSW 2539

Appendix 17
Turtle Nest Exhumation Datasheet

Excavation Datasheet

Nest ID: Date Laid: Date Hatched: Excavation Date:

Species: Genetic Sample: Yes / No If Yes how many samples:

Recorder: Excavator/s: Start time:

Depth to top of nest: Depth to bottom of nest: End time:

Temperature Data Logger Retrieved: Yes / No Time: Serial #:

empty shells	live hatchlings	dead hatchlings	un-developed	1st stage	2nd stage	3rd stage	4th stage	5th stage	6th stage	Depredated	live pipped	dead pipped	Total unhatched eggs	Yolkless

TOTAL laid = empty shells + undeveloped + unhatched eggs =

Hatching success rate = empty shells / total laid *100 =

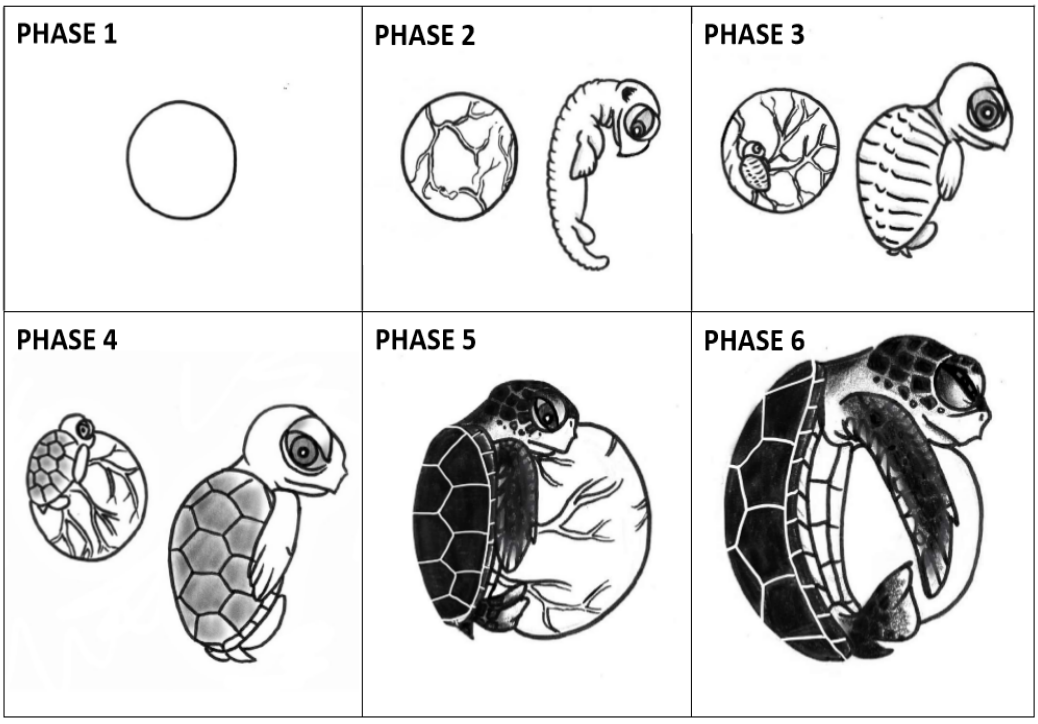
Emergence success rate = empty shells - (live hatchlings + dead hatchlins) / total laid *100 =

NOTES:

Definitions:

Empty egg shells = must be more than 50% of the egg shell
live/dead hatchlings = make note of where they were found within the nest
undeveloped = no blood vessels or embryo
Developmental stages = see table
Depredated = eggs with evidence of predation from crabs or ants,
may contain egg residue inside, or be invaded by roots/fungi/bacteria.
Can see small puncture marks or rips in the shell.
Pipped = hatchling has made an opening in the shell but has not fully emerged.
Total unhatched eggs = sum staged eggs, depredated and pipped
Yolkless = small or different shaped egg with no yolk. Do not count in clutch total.

Developmental stage	Morphology	Developmental timeline
Phase 1	No development	Days 0–7
Phase 2	Limb buds present	Days 7–17
Phase 3	Carapace present, but no scutes on carapace	Days 18–23
Phase 4	Carapace scutes present, no scales on head or flippers	Days 24–36
Phase 5	Head and flipper scales present, yolk bigger than turtle	Days 37–43
Phase 6	Full embryo, yolk smaller than turtle	Days 44–50



Appendix 18
Disposal of marine animal carcasses - Checklist for land managers

Although the checklist is for large whale carcass disposal, it generally applies to carcasses for most other marine wildlife species

NATIONAL PARKS AND WILDLIFE SERVICE

Disposal of whale carcasses

Checklist for land managers

The National Parks and Wildlife Service (NPWS) developed this checklist to assist land managers to dispose of whale carcasses.

The responsibility for the disposal of whale carcasses rests with the land manager. On NSW beaches, this is generally local council.

1. Collect key information

Check	Action	Purpose
☐	Check for signs of life • respiration • eye movement • reflexes of the eye and blowhole when touched	• If alive, NPWS assumes control. Phone: 13000 PARKS • If dead, the Land Manager takes responsibility • Contact NPWS for reporting, advice and data collection at 13000 PARKS
☐	Identify exact location	• To consider logistical requirements and proximity to urban and peri-urban areas
☐	Identify species and state of decomposition	• Contact NPWS for further species information including recording, necropsy procedures, scientifically valuable species and to determine appropriate disposal
☐	Photograph the carcass	• Send images to the assigned NPWS officer. Include photographs of identifying features, wounds and carcass length

2. Notifications (where applicable)

Action	Purpose
NPWS	For carcasses on NPWS estate and reporting, advice and data collection
Local Aboriginal Land Council	To ensure established protocols are followed for species with cultural significance
Local Council	For carcasses on local beaches
Department Primary Industries	NPWS can notify Department of Primary Industries, for the shark smart app
Crown Lands	For carcasses on Crown land not managed by council
Ports Authority (VTS)	For a floating carcass to broadcast hazard over marine radio in NSW Ports
Proposed waste facility for disposal	To ensure the waste facility has space for general putrescible waste and can prepare for carcass arrival
Environment Protection Authority	To seek approval for burial outside of a licensed waste facility. Call Duty Incident Advice Coordinator on 0418 445 035
Agency media unit	To commence formulating key media messages

3. Immediate actions for safety

Check	Action	Purpose
☐	Assess threats to personnel, public, or property	• To identify and then address hazards to reduce risk
☐	Cordon off the site from people and pets	• Consider all accesses (the same approach distances apply if the animal is alive or dead) • Consider installing appropriate signage
☐	Coordinate crowd management	• Seek assistance if necessary, e.g. NSW Police. • Inform people at the scene about the purpose of the operation. • Consider appropriate media statements to alert the local community to appropriate approach distances and restrictions

4. Details required for disposal decision

Check	Action	Considerations
☐	Assess site access	• Safety of personnel, logistics of moving equipment and features of machinery required
☐	Assess current and forecast weather conditions	• Sea state, temperature, daylight hours remaining, and tides
☐	Identify appropriate machinery and equipment	• Size of carcass, beach access and stability of substrate
☐	Ensure adequate resources	• Number of personnel, type of equipment and machinery needed
☐	Complete all necessary documentation	• Photograph completed documentation in case records are affected by prevailing conditions
☐	Collate information needed to inform disposal options	• Extraction method, transport and location of the facilities available for disposal

5. Disposal options for a marine wildlife carcass

Options	Determining factors
1. No burial. Leave in situ* to decompose naturally. Preferred option if location is remote and the site is unlikely to be accessed by the public.	Consider if: • There is a low risk to public health and safety due to proximity to residences, businesses, water sources and recreational areas
2. Dispose in licensed waste facility. Preferred option in urban and peri urban areas or there are health and safety risks to public at or adjacent to the site.	Consider if: • The carcass is not scientifically valuable • The land manager has approved landfill disposal costs • A licensed waste facility has agreed to accept the carcass
3. Bury offsite.	Consider if: • The carcass is scientifically valuable and will be exhumed in the future • Permission is required from the NSW Environment Protection Authority for burial outside of a licensed waste facility • Landholder has nominated a discreet burial site
4. Bury on beach.* Least preferred option. Only to be considered where it is not possible to leave in situ or machinery access is not possible and removal would pose a high safety risk.	Consider if: • The site has infrequent public access and is not adjacent to residences, businesses, or recreation areas • Potential impacts have been communicated to residents and businesses • Risk of the carcass being uncovered by shifting sands has been considered • Remains are not planned to be exhumed for research because beach burials are difficult to relocate

Towing or detonating a carcass is not recommended due to potential liability and safety risks.

* Issues to consider for in situ decomposition and beach burial as the carcass decomposes:

- smell of decomposition
- attraction of scavenging animals on land
- potential zoonotic and parasitic risks to the public
- leachates seeping into adjacent water with unknown implications for public health and safety
- potential souveniring by the public (illegal under the *Biodiversity Conservation Act 2016*)
- community concern regarding risks associated with leachates attracting sharks (note: current research indicates there is no evidence that a carcass buried on a beach increases the risk of shark attack on that beach).

6. Manage disposal of the carcass

Check		Considerations
☐	Health and Safety Protection	• Post a lookout to watch for incoming tides and waves • Ensure all personnel assisting wear personal protective equipment to protect the health and safety of everyone involved • Adopt strict hygiene protocols to stop the spread of disease • Advise all personnel assisting to manage risks associated with operating and working around machinery and how to undertake heavy lifting • Consider site risks to assisting personnel and onlookers and monitor equipment use and bio-waste handling at the site • Clean all equipment and transport vehicles thoroughly after use to ensure equipment is maintained and there is negligible risk of bio-waste contamination
☐	Communication to the Public and Media	• Develop key messages with agency media • Inform any people at the scene with the status and purpose of the operation
☐	Culturally and Scientifically Significant Species	• Consider natural and cultural heritage values • Liaise with Aboriginal land councils to ensure protocols for culturally significant species are followed • NPWS will advise if the specimen is considered scientifically valuable in liaison with the Australian Museum and will discuss necessary arrangements
☐	Transport	• Carcasses being transported on a Heavy Vehicle must comply with legal dimensions and mass limits in the Heavy Vehicle National Law (HVNL) • NSW Road rules also apply • Apply for a permit from Roads and Maritime Services on 1300 656 371 if the intended load exceeds the legal dimensions and mass requirements

7. Guidelines for site selection and burial

Aspect of the burial	Considerations
☐ Site selection:	• Locate the burial site behind the fore dune and above extreme tides for beach burials • Choose generally dry substrate. Sand is good, clay is poor • Check the soil at depth is non-permeable and will retain leachate over time • Ensure the burial site is away from stream mouths, erosion and is above the water table • Check the bottom and sides of the pit do not show signs of fissures that might result in loss of containment
☐ Burial:	• Open the animal's body cavity in the pit to promote decomposition and gas release • Bury the carcass at 2 to 3 metres depth to prevent access by vandals or scavengers • Heap surplus soil over the pit to stop the carcass rising from gas entrapment and to filter odours and fluids • Construct diversion banks to prevent surface run-off from entering the pit • Fence off the graves of large animals in case of subsidence during decomposition • Erect risk signage to warn of subsidence

Appendix 19
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