

Rehabilitation guide for pelagic seabirds



Cover: Buller's mollymawk (*Thalassarche bulleri*) showing soft fluffy padding under towels. *Photo: Lisa Argilla.*

New Zealand Wildlife Rehabilitation Fact Sheets are occasional publications produced to describe best practice for rehabilitation of New Zealand native species. They are available from the Department of Conservation website (www.doc.govt.nz) in pdf form.

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Rehabilitation guide for pelagic seabirds

This guide describes the appropriate food, housing and husbandry requirements for pelagic (living in the open ocean) seabirds when they are held in captivity for rehabilitation and it should be considered a reference for minimum standards of care. This guide does not cover specifics of veterinary care.

1. Species

New Zealand has the most diverse seabird community in the world. Eighty-four species breed in New Zealand, including 36 species that are endemic (breed nowhere else). Many migratory seabirds also forage in New Zealand waters. Petrels, shearwaters, gannets, shags (cormorants), albatrosses, giant petrels and skua may all be encountered in rehabilitation (Fig. 1). There are several species of conservation concern and the first step in seabird rehabilitation is accurate identification. Start by identifying the species either by using bird identification books and websites or consulting with DOC staff. An easily available resource is: <http://nzbirdsonline.org.nz/>

A Wildlife Act Authority (DOC Permit) is required to Hold in Captivity. Go to: <https://www.doc.govt.nz/get-involved/apply-for-permits/interacting-with-wildlife/holding-wildlife-for-rehabilitation/>



South Georgian diving petrel (*Pelecanoides georgicus*). Photo: Johannes Fisher.



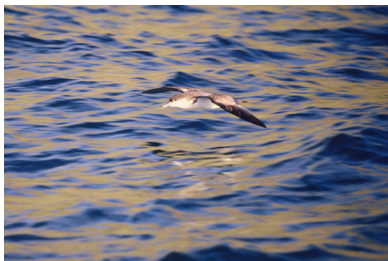
Giant petrel (*Macronectes* sp.) and skuas (*Catharacta* sp.). Photo: Johannes Fisher.



Westland petrel (*Procellaria parkinsoni*). Photo: Herb Christophers.



Sooty shearwater (*Puffinus griseus*). Photo: Brian Bell.



Fluttering shearwater (*Puffinus gavia*). Photo: Kim Westerskov.



Australasian gannet (*Morus serrator*). Photo: Janice McKenna.



King shags (*Leucocarbo carunculatus*). Photo: Andy Cox.



Chatham Islands mollymawks (*Thalassarche eremita*). Photo: Herb Christophers.



Southern royal albatrosses (*Diomedea epomophora*). Photo: Andrew Maloney.

Figure 1. Examples of pelagic seabirds found in New Zealand waters.

Many seabirds are pelagic (living in the open ocean) for much of their life cycle, only rarely spending time on land (e.g. for breeding). Seabirds found inland or at the shoreline may have landed for reasons of illness, injury or exhaustion (especially after storms) and may simply require releasing out to sea when weather conditions improve. This rehabilitation guide is concerned with flighted, pelagic seabirds and does not cover shorebirds, wading birds, waterfowl or penguins. It is important to note that seabird rehabilitation can be extremely difficult and should not be undertaken by inexperienced rehabilitators. Seabirds are prone to complications related to stress and captivity and should be released as soon as possible. Prior to release the feathers of the bird must be in excellent condition and exhibiting the ability to repel all water. Best practice techniques for feeding and appropriate facilities are also imperative for rehabilitation success.

2. First aid

First aid is provided when the bird arrives to stabilise it and minimise pain. This includes oral fluid therapy (50–100 ml/kg/day) to manage dehydration; a source of warmth such as heat pads or hot water bottles wrapped in a towel, a warm room or placing the bird in an incubator (set at 27–29°C); holding the bird in a quiet area away from disturbances (including people and pets) and stabilising broken bones with bandages. If the bird is alert and eating it may not need heat supplementation.

Note that seabirds vary in their requirements for heat. In general, larger seabirds (such as giant petrels and albatrosses) have less need for supplementary heating and can easily overheat in captivity. Monitor birds for signs of overheating (such as open mouth breathing and holding wings away from the body) and reduce the temperature if this occurs.

Severely emaciated and dehydrated birds may require intravenous fluid therapy and careful reintroduction of food with blood sampling for biochemical monitoring to prevent re-feeding syndrome (inability to digest food after a starvation event which causes medical complications). Discuss this with your veterinarian.

Most seabird species have salt glands to enable them to drink seawater. To keep these glands activated it is important that salt is given orally. Initially the 0.9% NaCl in sterile fluids or oral rehydration solutions will be sufficient. Closer to release, captive seabirds will require 1% salt solution orally at 50 ml/kg/day, increasing slowly to 3% salt concentration just prior to release. Alternatively, salt can be given as a tablet (100 mg/kg body weight – start at 25 mg/kg and increase daily for 4 days) or added to fish slurry (3 g/kg of fish).

Pelagic seabirds should also be on a daily preventative dose of an antifungal drug (e.g. 5 mg/kg itraconazole once daily) to reduce the chance of them developing respiratory aspergillosis whilst in captivity.

For details on oral fluid therapy and bandaging, go to Modules 3 & 7 of the DOC online wildlife health course at: <http://www.doc.govt.nz/wildlife-health-course>

3. Why and when do seabirds require health care?

3.1 The most common causes of harm are:

- Extreme weather events, especially prolonged gale force winds.
- Collision with a solid object.
- An attack from a predator.
- Entanglements in fishing lines or nets.
- Foreign body ingestion (e.g. fishing hooks or plastic debris).
- Abandonment of chicks by parents.

- Marine pollution (e.g. oil spills).
- Navigation disorientation (e.g. from distractions such as street lights at night).
- Heat stress (generally during transportation or from inappropriate husbandry).
- Detrimental impacts associated with long-term captive care and rehabilitation (stress, inadequate husbandry and poor nutrition).

3.2 The most common types of injury and illness seen are:

- Traumatic injuries (e.g. bone fractures, joint dislocations, soft tissue punctures and lacerations – mainly from bite wounds, collisions or fishing line entanglements).
- Blockages and complications in the digestive tract (e.g. from ingesting hooks or plastic debris).
- Starvation, exhaustion and anaemia – common in storm-blown birds.
- Loss of feather integrity and waterproofing leading to hypothermia and/or an impaired ability to forage post release. Caused by oil spills, regurgitation or inappropriate husbandry.
- Fungal infection of the respiratory system (Aspergillosis) in captive seabirds – from stress and poor ventilation.
- Chronic stress-induced gastrointestinal disturbance (e.g. regurgitation from handling or vomiting from stomach ulcers).
- Pododermatitis or ‘bumblefoot’ caused by birds standing on firm substrates during rehabilitation.
- Acute visceral gout induced by dehydration, infections or inappropriate nutrition.
- Poisoning from ingestion of fuel residues when birds preen oiled feathers.
- Oral infections – Candidiasis (yeast), bacterial, fungal or viral infections.
- Infestation by external parasites (e.g. lice, which are very common).
- Infestation by internal parasites (e.g. nematodes (roundworms) and cestodes (tape worm), which are common).

4. Veterinary care

A veterinary consultation is required for any bird that displays symptoms consistent with any of the conditions listed above or which is not improving as expected during care (within 1–3 days of arrival). X-rays (radiographs) are usually required to determine the best treatment for broken bones. Medications such as pain relief and antibiotics require a veterinary prescription to ensure the correct drugs and doses are used.

5. Handling seabirds

Correct handling of birds minimises the risk of harm to both birds and the handlers. Always wear protective eye glasses when handling larger seabirds. Before handling a bird, identify its most dangerous features and gain control of these first. The main defence mechanisms of seabirds are their strong, often hooked beaks and large wings. When handling a bird, control its wings and protect its feathers by wrapping the bird in a towel. Either cover the bird’s head with a towel initially or ensure the handler’s face and body are not within the striking distance of the bill. All birds need to be able to move their chests to breathe. While restraining the wings in their natural position against the body, always ensure there is enough space within the restraint for the chest to move with breathing. Gain control of the bird’s head by either holding the bill or the back of the head, which may require the use of leather gloves in larger species, latex gloves or finger bandages. Be careful when holding a bird’s bill to not cover its nares (nostrils). Gannets and shags have no external nares so to breathe their bill must be able to open slightly while being held. Gloves should be worn for any handling or hand-feeding. Never touch a seabird’s feathers with oily or moisturised hands as you will damage the feathers’ waterproofing.

Note: Some seabirds have the defence mechanism of regurgitating during handling. If this occurs, be sure to release the bird's head and allow it to shake its head, as this will help to clear any food from its mouth and avoid aspiration of food into the lungs. Birds cannot passively regurgitate, so if you continue to hold its head it may aspirate food. If regurgitation occurs try not to get any food on the feathers during handling.

For more details on handling large seabirds go to Module 1 of the DOC online wildlife health course at <http://www.doc.govt.nz/wildlife-health-course>

6. Hospital cages

Cages used for housing critically sick and debilitated birds are referred to as 'hospital cages' (Figs 2, 3). They securely hold the bird and encourage it to rest quietly whilst allowing effective monitoring and treatment.

- Cages should allow for provision of supplementary heat via a warm room, heat pad or hot water bottle wrapped in a towel.
- Ensure the size of the cage is sufficient that the bird can easily turn around and flap its wings, but not so large that it can fly or elude capture. Albatrosses and giant petrels may require an outdoor kennel, aviary or indoor room. Suitable dimensions are 2 m (L) x 1.5 m (W) x 2 m (H).
- The cage needs to be frequently and easily cleaned due to the volume and smell of seabird faeces. Stainless steel veterinary animal cages, modified plastic storage boxes, heavy-duty plastic animal crates or carry cages are all suitable hospital cages.
- Provide suitable substrate on the floor of the cage to prevent foot abrasions. Easily cleaned soft rubber matting or tube matting with additional padding and towels are good options. Change flooring at least once daily. Seabirds can also be housed in cages with net floors to reduce faecal contamination of feathers.
- With the exception of shags, standard perches are not required for most seabirds. Provide folded towels or other padding as slightly elevated 'perching platforms' for seabirds to use.
- Provide a 'burrow' (Fig. 4) in each cage that the seabird can rest in. An overturned cardboard or plastic box with a hole cut into one side is suitable. Burrowing seabirds (e.g petrels) will naturally seek out these artificial burrows.



Figure 2. Hospital cage – stainless steel veterinary animal cage. Photo: Kate McInnes.



Figure 3. Hospital cage – modified plastic storage box. Photo: Annemieke Kregting.



Figure 4. Sooty shearwater with 'burrow' behind. Photo: Lisa Argilla.

- Cover transparent doors or whole wire cages with towels or cloth to give birds some privacy and to prevent escape attempts which may cause further injury. Allow some natural light to enter the cage to encourage feeding.
- Place food and water bowls on the floor of the cage, close to the door for ease of access.

7. Diet

7.1 Natural diet

The natural diet of a pelagic seabirds differs between species. Skuas and giant petrels are predators and scavengers of a variety of seafood, mammals and birds. Shearwaters and some petrels eat a variety of squid, live fish and crustaceans. Other petrels (e.g. broad-billed prions) are filter feeders, eating predominantly zooplankton and krill. Once you have identified the species of seabird requiring rehabilitation, you can then research its natural diet, which will assist in working out diet compositions and the method and frequency of feeds required.

7.2 Convalescent diet

A diet for convalescing seabirds must provide all the bird's nutritional requirements and be given carefully to avoid regurgitation. Weigh the birds daily in the initial stages of rehabilitation. Care is required to prevent fish oils from food fouling the feathers of the bird during feeding.

- **Stage one:** After commencing fluid rehydration therapy, provide severely debilitated or emaciated seabirds with a fish slurry via crop-tube to stabilise their digestion. The slurry is made of blended fresh or thawed frozen fish and/or squid with 0.9% NaCl and Mazuri® Vita-zu® multivitamins added. If frozen fish is used, then it is important to supplement thiamine (vitamin B1) by adding a Mazuri® Vita-zu® vitamin supplement, as the freezing process degrades the thiamine in the fish. Mazuri® Vita-zu® vitamins are added at a dose of 1 tablet (0.19 g) per 225 g of fish fed. If the fish slurry is made and then frozen, always ensure the vitamins are added after thawing. Salmon (Fig. 5), pilchards and anchovies are good food options and can be bought from commercial supermarkets. Always blend the entire fish, including the bones and viscera (where the calcium and vitamins are). Do not use bait fish, as it is often preserved using nitrates which can be toxic to seabirds. Squid can be used as a palatable introductory food, but feeding squid (or fish fillets) long-term will cause calcium deficiencies. A variety of fish, squid and krill is the best option if the exact diet of a seabird is unknown. Blend in as much of the entire fish as possible using a high-powered blender, until the fish has broken down into a uniform consistency. Do not overblend. Filter out the pieces of scale and bone with a sieve, so that the blend is smooth enough to pass through the crop tube. Volumes of fluid added will vary depending on the types of seafood available. Fish slurry can be kept for up to 24 hours in the refrigerator, then discarded.
- A diverse, fresh-fish-slurry is the best food option; however, if that is unavailable, alternative options include:
 - Combinations of tinned sardines and frozen salmon with water and mazuri vitamins added.
 - Tinned Brunswick Sardines in soya oil which can be fed in a slurry comprising 1 tin (106 g) Brunswick sardines in soya oil (New Brunswick, Canada), ½ a Mazuri® Vita-zu® vitamin tablet and 50 mL sterile water. Fish or krill oil can be beneficial in some cases and is added at roughly 5% of the total volume. However, fish oil should NOT be used in rehabilitation if



Figure 5. Small frozen salmon defrosting. Photo: Kate McInnes.

birds have: limited space in their cage, only small pools of water or closed water sources for swimming. The addition of fish oil will often make faeces oilier and can rapidly damage waterproofing if feathers become soiled. Vegetable oils (e.g. olive or avocado oils) are not acceptable alternatives. Oil should only be added to the diet of seabirds that have naturally oily diets, so additional oil should not be fed to diving petrels as they do not produce proventricular oil.

- Tinned Hill's® Prescription Diet® a/d® for the first 1–3 days, although this is a poor alternative to a fish- or squid-based diet and can result in diarrhoea or constipation.
- Volumes of food fed and frequency of feeding are very species specific and should be checked with experienced rehabilitators or veterinarians before feeding commences. If in doubt, start with small volumes daily and work your way up based on weight gain and reduce the volume fed if regurgitation occurs. Check the foraging strategy of the seabird. For example, a grey-faced petrel can be fed 50–100 ml but, as long strategy foragers (birds that can forage at sea for several days), they may only need to be fed every 2 days. A fluttering shearwater is a short strategy forager (forages daily) and will need daily feeds of 30–80 ml. While seabirds are recuperating from illness, daily feeding is the safest option. If regurgitation occurs, reduce the frequency or volume of feeds and discuss the symptoms with your veterinarian. Hydration should be given daily while the bird is in clinical care.
- When beginning to feed a seabird, start with giving smaller volumes of diluted food, then slowly increase the volume and concentration over the first 24–48 hours. Warm the fluids and food to 38–40°C. If the type of food being fed is changed drastically, then always transition the food slowly by mixing the food groups together and slowly increasing the concentration of the new food by approximately $\frac{1}{3}$ per day, over 3 days.
- **Stage two:** When the bird is stronger and has been observed digesting food, change to providing whole or sliced fresh/thawed frozen seafood with added Mazuri® Vita-zu® multivitamins. Continue to provide supplementary fluids with a maintenance volume of 50 ml/kg/day.
- The size of the fish or slices of fish fed is important: do NOT try to feed larger pieces than will easily fit into the bird's mouth. Fish should be placed in the mouth without leaving any dribbling or greasing around the edges of the mouth as this can damage the waterproofing of plumage. Any seafood contamination of feathers should be sprayed with a water mist to dilute it, but never rub the feathers to clean them. Fish can be cut in diagonal strips to make them easier to feed. Even if it is cut up, always aim to feed the whole fish. When feeding, place the fish headfirst, so it will slide in smoothly along the fish scales when swallowed.
- If medication is hidden in food, place it under the gill flap and gently into the abdomen, trying to avoid leaving any sharp edges sticking out.
- When thawing fish do not leave them under running tap water, as this will wash off the water-soluble vitamins. Instead, thaw them in the refrigerator overnight. If urgent emergency thaws are undertaken, place the fish in plastic bags under cold running water to prevent the loss of nutrients. Do not feed frozen fish but keeping fish lightly chilled will help to maintain their shape while assist feeding.

For details on crop feeding techniques go to Module 3 of the DOC online wildlife health course: <http://www.doc.govt.nz/wildlife-health-course>

For more information regarding seabird diets contact Wildbase Massey University or WReNNZ.

7.3 Self-feeder diet

A self-feeder's diet is provided to birds that are alert and can demonstrate the ability to feed themselves. However, many species of seabird will always require force feeding (using the diet described in Stage 2 above) as they do not recognise dead fish as food. Scavenging species such as giant petrels will take food from a flat dish or tray. Provide slightly more food than each bird can consume each day. Ensure fresh water is always available.

8. Aviaries for seabirds

Seabirds can be moved from hospital cages to aviaries once they no longer require handling for medical treatments and providing you are able to catch them easily for hand feeding if this is still required.

An integral part of the rehabilitation of sick seabirds is to get them into a pool of freshwater or saltwater to enable them to swim (Figs 6, 7). This relieves pressure on their feet, encourages natural behaviours (e.g. preening), promotes waterproofing and can increase fitness. It is a requirement of seabird rehabilitation that birds have access to a pool. Swimming should start as soon as a seabird is strong and the feathers are mostly waterproof. The seabird may initially need to be placed directly into the pool, to recognise that this is a place to swim. Swims should be of increasing duration; however, the bird must be closely observed during the first couple of swims to check that it is coping and its feathers are remaining waterproof. Swims may be short at first as the birds will lose buoyancy if their waterproofing is poor. Placing a hose underwater to create ripples may encourage some birds to dive. Very light mists of water can help to encourage birds to preen. Misting the feathers can be done both in or out of the pool. Placing a haulout or small rubber-topped raft in the pool can give smaller birds a place to rest if their waterproofing needs improvement; however, if a bird is not buoyant it should not be left in the pool unattended. An aviary with a pool is not always feasible so an alternative is to house seabirds in a dry aviary and make daily excursions to a pool.

Note: As strength and fitness is recovered, seabirds will frequently extend and flap their wings when exercising in a pool and may attempt to fly out of it.



Figure 6. Small, moveable pool with hose to encourage swimming. Photo: Annemieke Kregting.



Figure 7. Prion swimming. Photo: Lisa Argilla.

9. Requirements for seabird aviaries

- Aviary size will depend on the species being held; however, room for flight is not a requirement for seabird aviaries. Aim, instead, for short periods of rehabilitation and rapid release.
- The aviary should be a mix of solid construction materials to provide shelter from sun, wind and rain; and open mesh to present more natural conditions and encourage natural behaviour (Fig. 8). Allowing rain and sunshine into part of the aviary encourages birds to preen and get used to natural conditions after hospitalisation.
- Suitable construction materials include corrugated PVC or polycarbonate roofing, wood, steel or aluminium. Any galvanized materials should be scrubbed with vinegar to remove the oxidised zinc coating. Open mesh sides can be of a metal weld mesh or shade cloth. Shade cloth sides are soft and help to prevent injury if frightened or disorientated birds fly into the walls. Chicken wire mesh is not appropriate as it can cause injuries to birds. Where-ever possible, soft mesh walls are preferable.
- Provide the seabird with hiding places and shelter via the use of upside-down plastic tubs with a cut-out doorway. A screen wall or other visual barrier may also be suitable.
- Provide at least one shallow water tray with 1% saltwater for drinking in the aviary, increasing to 3% saltwater leading up to release.
- The ground inside the aviary must be covered with a suitable substrate to prevent the occurrence of pododermatitis ('bumblefoot'). Natural materials such as soft soil, small areas of smooth stones and fine sand may work for a short time but will require periodic replacement due to contamination from faeces and food. In naturalistic enclosures birds must be monitored closely for bumblefoot and should only be used if the birds have access to large bodies of water. Ensure any natural substrates are dry and free of mould when collected from the environment. Bark chip or wood mulch is unsuitable as it quickly becomes mouldy and is too firm for seabird feet. Sand alone is also unsuitable as it compacts over time to a very hard surface and this increases the risk of foot damage and bumblefoot. Waterproof ply or concrete is a good base layer, but it must be covered with softer materials, especially where the bird prefers to stand. Closed cell foam, PVC tube matting (Fig. 9), padding, towels or a combination of these can help to prevent problems, but seek the advice of an experienced seabird rehabilitator if a pelagic seabird is being housed for longer than 5 days.
- Plastic paddling pools (Fig. 6), half water tanks, large plastic tubs or old bathtubs will provide sufficiently large pools for small- to medium-sized seabirds. Large seabirds will require round swimming pools 3 m in diameter and at least 75 cm deep (Fig. 7). Saltwater of 1–3% is ideal, but freshwater may be used if salt is supplemented orally in the diet.



Figure 8. Outdoor aviary showing construction materials and soft flooring. *Photo: Rosemary Tully.*

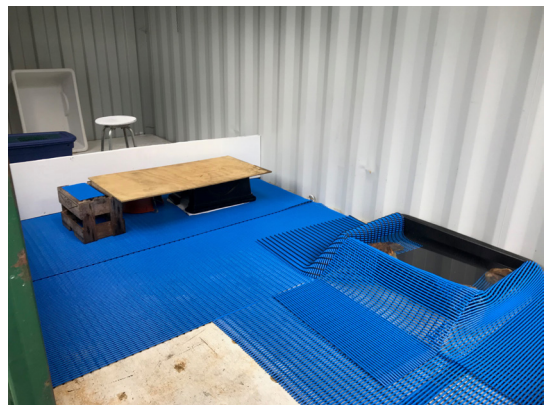


Figure 9. Indoor aviary showing soft flooring. *Photo: Karen Saunders.*

- Pools should have filtration systems that can remove bird faeces and fish oils. The surface of the pools must be kept free of oils by ensuring constant water movement across the pool surfaces towards run-off points.
- Pools outside of aviaries will require some type of enclosure or cover with a support structure to prevent the seabird from escaping. This cover can be made of woven nylon netting (or similar) or shade cloth.
- Cormorants and shags prefer to perch, so offer thick branches or PVC piping with artificial turf, rubber or other external grip attached and position the perch over the pool or inside the aviary.
- Ensure aviaries are predator proof at all times. Any predator traps set around the perimeter must be regularly checked and the aviary walls examined for holes or diggings at the bases of the walls. Ensure the interior of any newly constructed aviary is cleared of all mammalian pests before introducing birds.

10. Cleaning and disinfection

- Food and water bowls are replaced twice a day. Used bowls are cleaned daily with detergent and rinsed with water then allowed to dry.
- Feeding equipment and crop tubes are disinfected daily by thorough rinsing with water and soaking in dilute disinfectant such as Milton™ antibacterial tablets or F10 Veterinary Disinfectant as per the manufacturer's instructions.
- Substrate such as towels and newspaper is changed daily.
- Cages are disinfected daily with a mild disinfectant such as dilute F10 or Avisafe™ (the bird must be removed during cleaning).
- Cages and equipment are thoroughly disinfected and rinsed in between use (between different patients) using a stronger disinfectant such as bleach or SteriGENE™ at manufacturer's specifications, then left for 24 hours in a well-ventilated position.
- Aviaries are cleaned as required, dependent on the amount of use and number of birds present. There should be minimal faecal material or spilled food in the aviary at all times. Hard substrate floors can be hosed clean daily. Soft substrate floors should have faecal material removed daily. Food can be provided in bowls on trays which are easy to clean and catch any spilled food.
- Swimming pools must be emptied and cleaned weekly or as soon as water quality diminishes.

11. Potential complications

The following are common complications resulting from medical care, rehabilitation or prolonged captivity. In any of the following cases, or if the bird is not recovering as expected, seek advice from an avian veterinarian, wildlife nurse/technician or an experienced wildlife rehabilitator.

11.1 Stress and stress-related illnesses

Many seabird species are particularly prone to the effects of chronic stress, which can have a number of negative effects on their rehabilitation. Reducing stress is imperative: keep the seabird in an area where there is minimal disturbance from noise, people or other animals. There should be little need to approach or handle a seabird more than twice a day. Stress-related illnesses include anorexia (unwilling to eat), regurgitation and vomiting, failure to heal and respiratory fungal infections (aspergillosis). Pelagic seabirds should be on preventative doses of an antifungal agent whilst in captivity (5 mg/kg itraconazole SID). Discuss this with your avian veterinarian.

11.2 Failure to heal

Sometimes fractures do not heal adequately or wounds deteriorate. Muscles and tendons contract following prolonged restriction of movement. These issues prevent flight and therefore prohibit release of the bird. A veterinarian can potentially treat these problems with repeated surgeries or utilise other techniques, such as physiotherapy.

11.3 Foot and chest lesions

In the wild, seabirds spend very little time on land and therefore any time spent in captivity increases the pressure on their feet. Skinny seabirds may develop chest sores. Review the floor substrate and ensure it is cushioning for the bird's feet. Commence a routine of daily swims of an increasing duration as soon as the bird is strong enough. If chest or bumblefoot lesions appear, veterinary treatment is essential. Preventative foot bandaging with soft rubber yoga matting (often called 'jandals') is an option for seabirds that are not yet capable of swimming – bandages must be kept dry and changed every few days. For details on bandaging go to Module 7 of the DOC online wildlife health course: <http://www.doc.govt.nz/wildlife-health-course>

11.4 Primary/tail feather damage

Excessive damage to primary wing feathers or tail feathers may mean a loss of ability to fly and the bird will then have to remain in captivity until it moults. Protect feathers from damage by careful handling, using a clean towel and gloves when handling, having appropriately sized cages and burrows, avoiding cages that have wire mesh sides/bases and by installing elevated perches (for perching seabirds such as shags).

11.5 Loss of waterproofing

This can be avoided by following best practice techniques for feeding and hygiene. After feeding, ensure any spilt fish oils are immediately washed off feathers by spraying with water. Ensure cages are cleaned regularly to prevent faecal build up. Mist-spray the bird with water at least once a day to encourage preening. Commence a routine of daily swims of an increasing duration as soon as the bird is strong enough. Always test feather waterproofing prior to release. This is done in two steps. Firstly, assess that all water beads and runs off the feathers of the bird when it is sprayed with water from a spray bottle or hose. Then place the bird in a pool for a swim of 90 minutes' duration with careful monitoring in case it gets into difficulty. At the end of the 90 minutes, check that all exterior feathers and the feather down close to the bird's body are dry.

If the seabird has lost the majority of its waterproofing and buoyance it may require a soft water wash with Dawn detergent. Washing seabirds is a complicated and risky procedure that may require referral to an appropriately equipped facility. Seek consultation with experienced personal at Wildbase or Wellington Zoo before attempting to wash seabirds.

12. Criteria for release

- Courses of medication and treatments have been completed and injuries have healed.
- The bird has a good body weight (evidence of eating properly) and body condition.
- The feathers are in good condition and tests have proven they are waterproof/repel all water.
- The bird is physically and behaviourally able to fully function in the wild.

Note: seabirds can be released when still slightly underweight, rather than keeping them for longer in captivity.

It is best to release seabirds in the early morning. Transport the seabird to the coastline or arrange for a boat trip to a suitable area at sea. The location should be free of risks such as shipping lanes or predator attacks (e.g. from black back gulls). Weather conditions need to be favourable

and with a strong breeze or moderate wind. Large seabirds such as albatrosses may require an onshore or sea surface wind of 20 knots in order to gain enough vertical lift. Once in a suitable position, simply place the bird on the ground or on the surface of the water and allow it to swim or fly away when it is ready. Never release a seabird by throwing it off a cliff top.

13. Further information

'Wild City Neighbours' at: <http://www.doc.govt.nz/Documents/science-and-technical/BirdRehabGuide.pdf>

Wildlife Rehabilitators Network of New Zealand (WReNNZ): <http://www.wrennz.org.nz>

Department of Conservation online wildlife health modules: <http://www.doc.govt.nz/wildlife-health-course>

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- Mandy Robertson, Wild Bird Care Charitable Trust, Tauranga, New Zealand. <https://www.birdcare.org.nz/>
- Pauline Nijman, Senior Wildlife Technician, Wildbase, IVABS, Massey University, Palmerston North, New Zealand. http://www.massey.ac.nz/massey/learning/departments/centres-research/wildbase/wildbase_home.cfm
- Te Kōhanga, The Nest, Wellington Zoo: <https://wellingtonzoo.com/conservation/saving-wildlife-in-the-nest-te-kohanga/>

15. References

- Gaskin, C.P. 2013: Fluttering shearwater. In Miskelly, C.M. (Ed.) New Zealand Birds Online. Retrieved from: <http://www.birdsonline.org.nz/species/fluttering-shearwater>
- Hall, E. 2008: Rescue and Intensive Care of Seabirds. Retrieved from: http://www.awrc.org.au/uploads/5/8/6/6/5866843/seabirdrescueintensivecare-libby_hall.pdf
- Hall, E. 2005: Release considerations for rehabilitated wildlife. Proceedings of the 3rd Australian National Wildlife Rehabilitation Conference. 12 pp. Retrieved from http://www.awrc.org.au/uploads/5/8/6/6/5866843/awrc-elizabeth_hall.pdf
- Szabo, M.J. 2013: Northern giant petrel. In Miskelly, C.M. (Ed.) New Zealand Birds Online. Retrieved from: <http://www.nzbirdsonline.org.nz/species/northern-giant-petrel>
- Taylor, G.A. 2013: Grey-faced petrel. In Miskelly, C.M. (Ed.) New Zealand Birds Online. Retrieved from: <http://www.nzbirdsonline.org.nz/species/grey-faced-petrel>
- Taylor, G.A. 2000: Action Plan for Seabird Conservation in New Zealand. Part A: Threatened Seabirds. *Threatened species occasional publication No. 16*, Department of Conservation, Wellington NZ.
- White, B. 2008) Feeding piscivorous animals. *The New Zealand Veterinary Nurse* 14(45): 16–19.