SEA-PT Wildlife response procedure

Prepared by Oiled Wildlife Response Network & Sea Alarm Foundation
Version 1.3 February 2017

Table of Contents

Introduction and Scope

An oil spill in the Shannon Estuary may threaten or involve marine and coastal wildlife such as seabirds and/or marine mammals (seals, dolphins). Oiled animals arriving on the shoreline will confront the oil spill responder with issues of species conservation, animal welfare and exceptional public interest. Dealing with these issues requires an adequate level of response preparedness. Pending the development of a dedicated oiled wildlife response plan for Ireland, this is a mobilisation procedure for an oiled wildlife response supporting the activities of the established First Responders Team.

The mobilisation procedure is not an oiled wildlife response plan and should not be relied on as such.

During an incident all media corrospondence and releases must be coordinated through the lead authority.

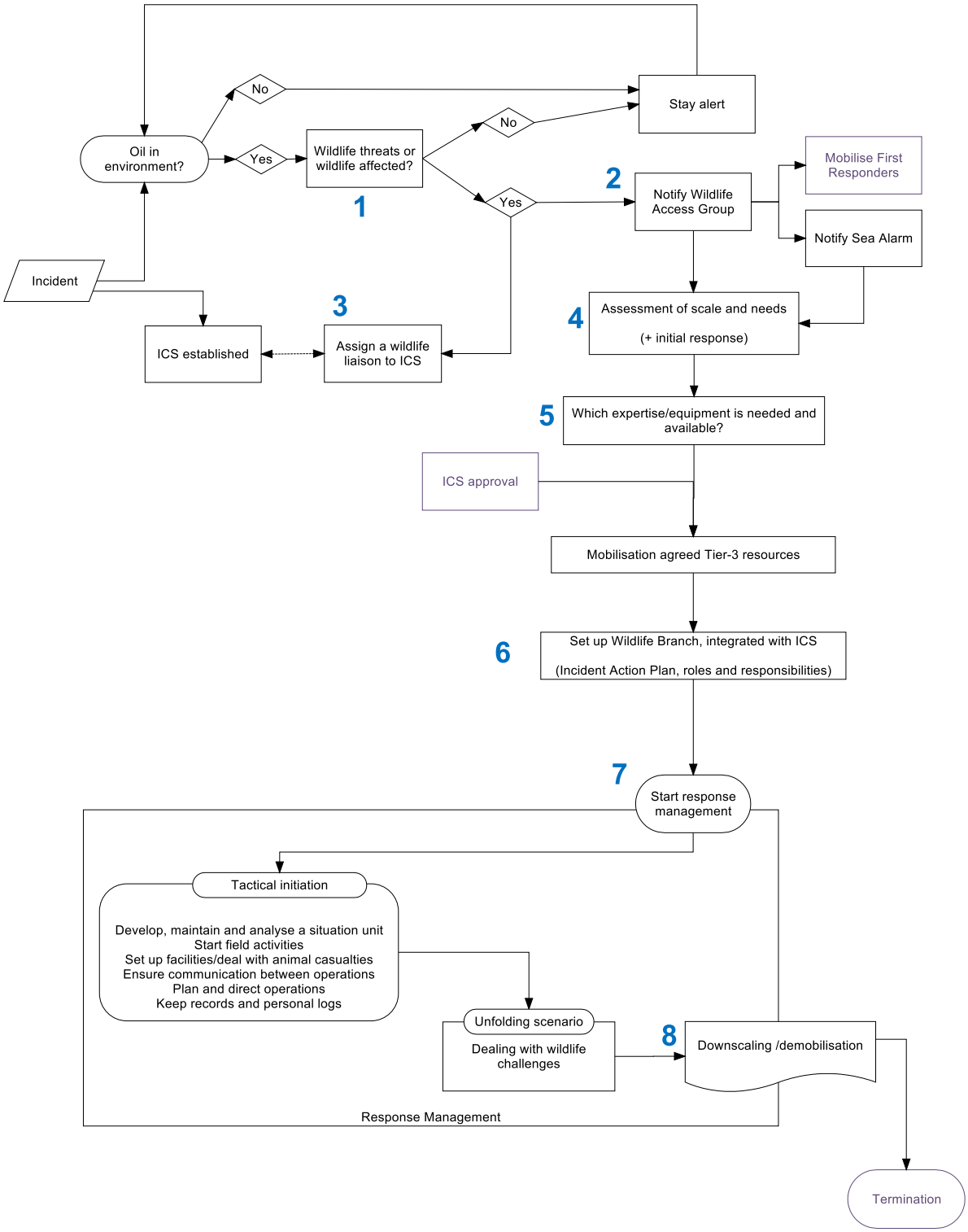
Objectives of the mobilisation procedure

1. To specify which steps need to be taken to start an oiled wildlife response following an oil spill incident in the aquatic environment, including the mobilisation of key Irish and international resources.
2. To provide a coherent overview of the most important decision taking processes in that chain of activities.
3. To provide guidance for decision making officers and authorities on what the main issues in a wildlife response are.

Structure of the document

The backbone of this document consists of an **annotated flow chart** (*Response Overview,* page 3) that illustrates the mobilisation procedure. It shows the sequence from the early notification of oil in the environment down to the identification of the best approach for a response to wildlife and the mobilisation of relevant expertise and resources for that approach. The flow chart is annotated with numbers referring to tables that answer the questions: *Who? When? How? Further guidance?*. The tables provide further access to **annexes** with more specific decision support materials.

Response overview



Annotations to the flow chart

1: Wildlife affected or threatened?

When?	As soon as there is a confirmed oil spill.
By whom?	SEA-PT Duty Manager.
How?	1. Sensitivity maps if available. If they are not available. 2. Common sense.
Further guidance	If there is any doubt, assume that wildlife impact could be major and continue to step 2, *Notification.*

2: Notification and mobilisation of key actors

When?	As soon as there is an indication that wildlife has or might be impacted.
By whom?	SEA-PT Duty Manager.
How?	Use the call list of Annex 1.
Further guidance	The SEA-PT DM will notify and provide key information to: 1. Wildlife Access Group (the Oiled Wildlife Response Network) After their notification, the Oiled Wildlife Response Network will a. Notify and check the availability of the First Responders Team. b. Notify Sea Alarm, discuss the situation and explore what next steps might be. 2. National Parks and Wildlife Service. At this stage mobilisation may be considered, more specifically: 1. Mobilisation of the Oiled Wildlife Response Network to the Shannon area and start working with/under the established ICS. 2. Mobilisation of Sea Alarm to Ireland to advise ICS and Oiled Wildlife Response Network.

3: Ensure communication between ICS and Wildlife Access Group

When?	As soon as the Wildlife Access Group is mobilised
By whom?	ICS
How?	An officer in the ICS is dedicated to maintain close communication with the Wildlife Access Group and provide this group with feedback and support.
Further guidance	-

4: Assessment (and initial response if needed)

When?	After step 3.
By whom?	The Oiled Wildlife Response Network and Sea Alarm.
How?	• Assess the apparent scale (unfolding scenario) and level of current expertise in Ireland. • If animals are arriving (or expected) response to be initiated.
Further guidance	<u>Assessment</u> Sea Alarm will work with the Oiled Wildlife Response Network to provide distant advice, and/or assist to mobilise an assessment team and/or equipment to Ireland. They will also assist with putting other international resources on standby as appropriate. If mobilised Sea Alarm will advise and coach the Wildlife Branch Director and the other Wildlife Branch officers with regards to monitoring and decision making and ensure coordination and integration of Tier-3 responders if they are mobilised. Sea Alarm acts as an advisor only and will NOT take any formal position in the Wildlife Branch. <u>Initial response</u> After the mobilisation of national key actors, local hands-on resources will start organising themselves to collect animals from the shoreline and bring them to simple facilities (basically shelter from the elements). National authorities are expected to organize themselves according to the National Oil Contingency Plan.

5: Which expertise and/or equipment is needed and available

When?	As part of the assessment (see 4).
By whom?	The assessment team in close consultation with ICS and Sea Alarm.
How?	Assessing the potential scale and impact and contacting key organisations in the global wildlife response community, including OSRL (equipment), and wildlife response groups in Europe and the rest of the world, to check availabilities, response times and mobilisation procedures.
Further guidance	See Annex 9 for an overview of Tier-3 equipment kept by OSRL.

6: Establish the Wildlife Branch as part of ICS

When?	Immediately after mobilisation of wildlife resources has been confirmed.
By whom?	ICS
How?	Use Annex 2 and Annex 3 to establish the Wildlife Branch.
Further guidance	ICS will set up the wildlife branch (Annex 2), making sure that the Wildlife Branch Director operating under the authority of the National Parks and Wildlife Service so that legal issues and State priorities are considered within decision taking. Annex 3 provides guidance for the various positions and responsibilities within the Wildlife Branch.

7: Start and manage the response

When?	As soon as the Wildlife Branch has been established.
By whom?	Wildlife Branch Director and the mobilised responders.
How?	Using Annex 4, 6, 8 and13 for management guidance; Annexes 10, 11 and 12 for operational guidance.
Further guidance	**Management guidance** Annex 4 provides a simple overview of wildlife issues that may be at stake. For each of those issue further guidance is provided in the sections of that annex. Annex 6 is a decision making tool to determine to which extent an attempt can be undertaken to rehabilitate live animals, in consideration of specific circumstances. Annex 8 provides guidance to set up and implement a strategy for search and collection activities and choosing the locations for key facilities. Annex 13 provides a draft agenda for meetings of the Wildlife Branch. **Operational guidance** Annex 10 can be used as guidance for selecting a building of opportunity and setting it up as a Forward Holding Centre. Annex 11 provides an overview of operational procedures for the rehabilitation of oiled birds in a Forward Holding Centre and Wildlife Rehabilitation Centre. Annex 12 can be used to set up and running a Wildlife Coordination Centre and a situation unit (exposition of information) as an integrated part of the ICS system. As long as there are animals in care, downscaling, termination and demobilisation should only take place in close consultation all parties involved.

8: Downscaling and demobilisation

When?	When casualties cease to appear, and when the population of animals in care has decreased to levels that can be operated by local responders.
By whom?	Wildlife Branch Director, in close consultation with the Tier-3 response team.
How?	Via on-the-spot-training, local responders increasingly will be able to take over tasks from Tier-3 responders.
Further guidance	Downscaling will allow the demobilisation of Tier-3 responders one by one, as soon as their tasks can be taken over by trained local responders, or as soon as there are no animals to care for anymore. The finalisation and termination of the wildlife response will be at tier-1 level.

Annex 1: Call list

Wildlife Access Group

Name organisation	Contact person	Telephone no.	Email
Oiled Wildlife Response Network	Steve Newton	086 321 4162	snewton@birdwatchireland.ie
	Pauline Beades	087 222 2289	pauline.beades@gmail.com
	Helen Silke	087 786 8229	helensilke@eircom.net
	Laura Kavanagh	087 903 5844	lauramaykavanagh@gmail.com
	Sonia Mooney	085 147 2225	soniamooney@gmail.com

Wildlife Authority

Name department	Contact person	Telephone no.	Email
National Parks & Wildlife Service	Dr. David Lyons	087 660 2159	david.lyons@ahg.gov.ie

Aligned Irish NGOs supporting the Oiled Wildlife Response Network

Topic	Name organisation	Contact person	Telephone no.	Email
Wildlife conservation issues - birds	Birdwatch Ireland	Steve Newton	086 321 4162	snewton@birdwatchireland.ie
Wildlife Conservation issues-cetaceans	Irish Whale and Dolphin Group	Simon Berrow	086 854 5450	simon.berrow@iwdg.ie
Wildlife conservation issues - pinnipeds	Seal Rescue Ireland	Melanie Robinson	+44 79200 53875	sealadpotion@gmail.com
Conservation issues – environment	Coastwatch	Karin Dubsky	086 811 1684	coastwatch@eircom.net
Wildlife Conservation issues-animal welfare	ISPCA	Noel Donoghue	086172167	info@kilkennyspca.ie

Wildlife Veterinarian Professionals

Name organisation	Contact person	Telephone no.	Email
Independent	Dr. Frances Harvey	087 239 2432	frances.harvey2011@gmail.com
Independent	Dr. Michellle Mulvaney	086 359 2590	mmulvaney5@hotmail.com
Donegal County Vet	Dr. Charles Kealey	087 618 2232	ckealey@donegalcoco.ie
Independent	Michael Meehan BSc (Hons)	087 287 3178	mmg.meehan@gmail.com

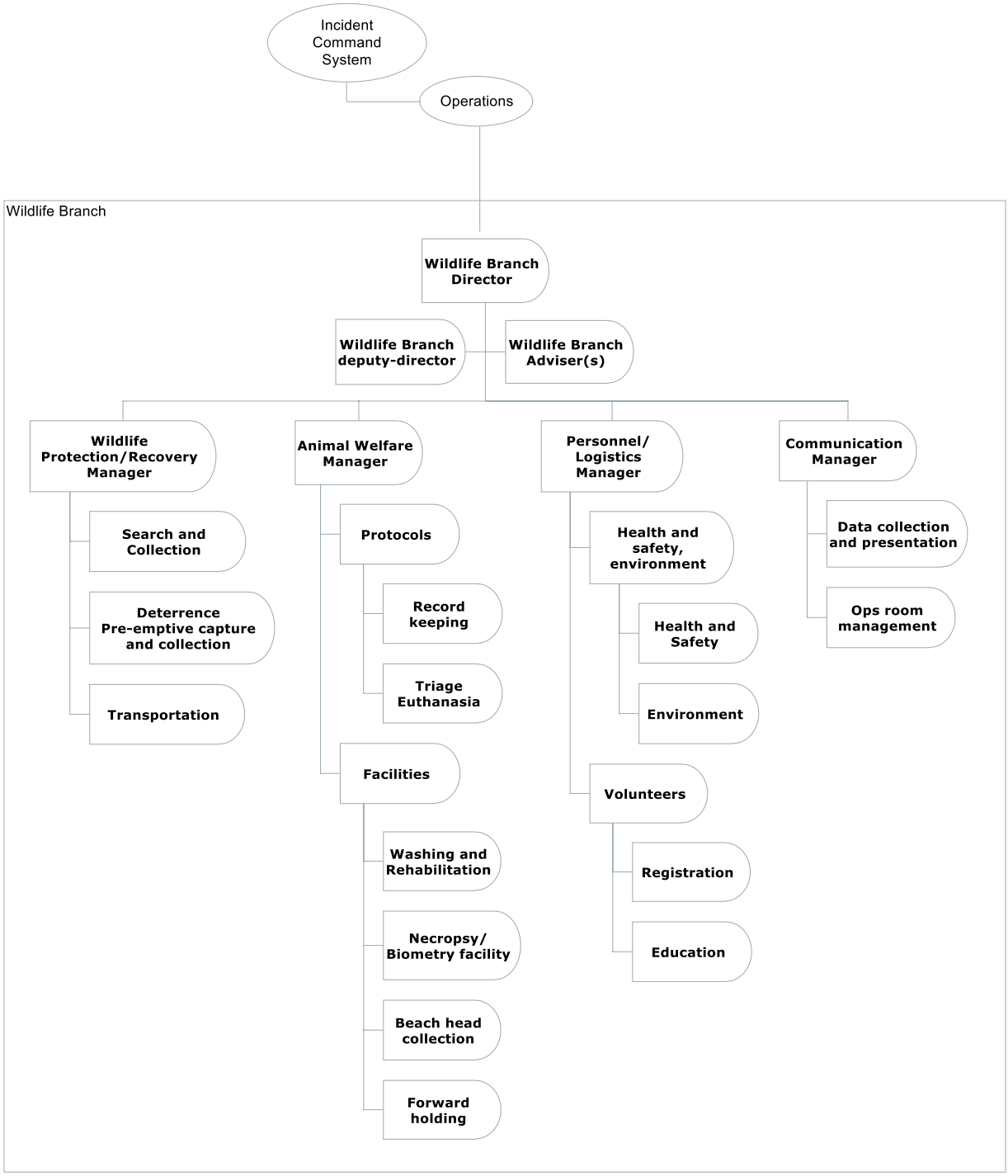
European Oiled Wildlife Response

Name organisation	Contact person	Telephone no.	Email
Sea Alarm	Office (office hours)	+32 22788744	incidents@sea-alarm.org
	Hugo Nijkamp	+32 494900012	nijkamp@sea-alarm.org
	Saskia Sessions	+32 499624772	saskia@sea-alarm.org
	Claude Velter	+32 499359065	claude@sea-alarm.org

Scientific Advisors (knowing species, habitats, seasonal/migration patterns)

Topic	Name organisation	Contact person	Telephone no.	Email
Birds	Birdwatch Ireland	Dr. Steve Newton	086 321 4162	snewton@birdwatchireland.ie
Cetaceans	Irish Whale & dolphin group	Dr. Simon Berrow Dr. Joanne O'Brien	086 854 5450 086 865 7633	simon.berrow@iwdg.ie joanne.obrien@gmit.ie
Pinnipeds	UCC	Dr. Michelle Cronin	087 415 4796	michelle.cronin@ucc.ie
Impact monitoring	Birdwatch Ireland	Dr. Steve Newton	086 321 4162	snewton@birdwatchireland.ie
Beached birds survey & necropsies	GMIT	Dr. Heidi Acampora	086 361 5575	heidi.acampora@research.gmit.ie

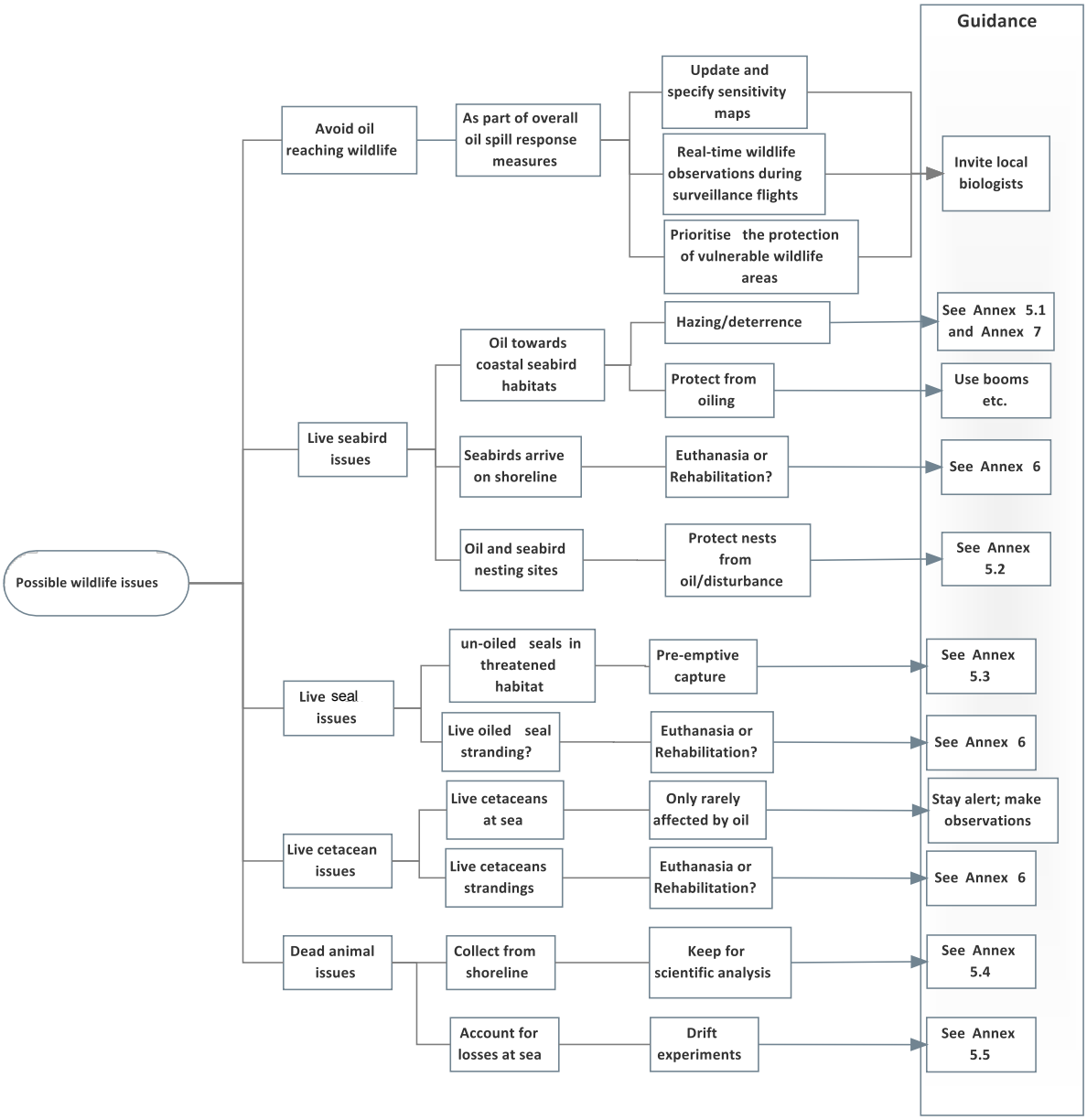
Annex 2: Wildlife branch set up and integration into ICS



Annex 3: Overview of role and responsibilities within the Wildlife Branch

Annex 4: Wildlife issues at stake and guide to operations

This diagram can be used to match the issues at stake with the approach that should be considered as part of the response. The diagram refers to further guidance that is available Annex 5 and Annex 6.



Annex 5: Operational guidance

5.1: Hazing and deterrence

When?	When oil moves towards a sensitive area.
By whom?	Local experts who know the area and the (behaviour of the) species involved and who can apply one or a series of techniques and monitor their effects on the animals.
How?	Basically providing disturbances that make animals leave the area.
Further guidance	Annex 7 provides suggestions for hazing techniques. Techniques may or may not be effective. Effectiveness will be species specific and sometimes only temporary. Animals easily become accustomed to the technique that is used; therefore techniques need to be changed regularly. At all times one should make sure that hazing/deterrence does not result in animals escaping towards or into the oil.

5.2: Protect seabird nests from oil / disturbance

When?	When oil moves towards a sensitive area.
By whom?	Local experts who know the area and the (behaviour of the) species involved.
How?	1. Protecting the areas from oiling by preventing the oil entering. 2. Protect individual nests/areas from disturbance by clean-up crews.
Further guidance	Protection in this case can be achieved by advanced planning of spill response and shoreline clean-up activities.

5.3: Pre-emptive capture

When?	When oil moves towards a sensitive area.
By whom?	Local experts who know the area and the (behaviour of the) species involved.
How?	Advanced capture techniques need to be applied to avoid unnecessary stress with to targeted animals and avoid disturbance of other animals in the area.
Further guidance	Pre-emptive capture of unoiled animals needs to be assessed carefully and if feasible, it must be well planned. Captured animals must be kept in captivity for a while and stress from this captivity minimised. Husbandry must be professional and the time of captivity must be kept to a minimum. Ideally animals are transported and released into a clean area of their natural habitat, immediately after capture.

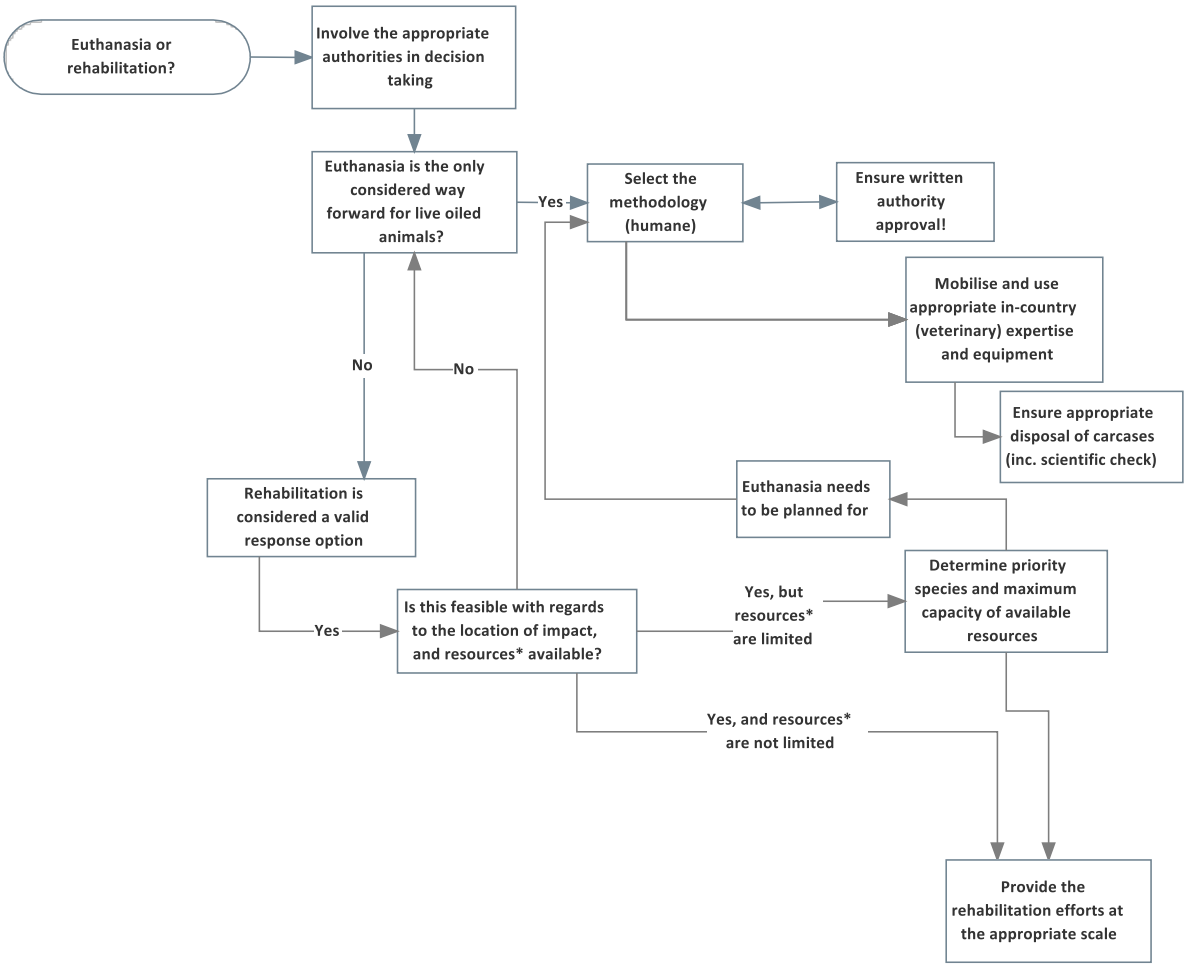
5.4: Keep carcasses for scientific analysis

When?	When carcasses are reported to wash ashore.
By whom?	Volunteers supervised by (local) experts who have experience with scientific beach surveys, especially under oiled conditions.
How?	Planning and execution of systematic beach surveys in areas where beaching of carcasses is expected.
Further guidance	Systematic collection of carcasses is recommended to avoid scavenging and the secondary pollution of unoiled animals that are attracted to the carcasses. Collecting the carcasses systematically, labelling them with references to location, date and time, will allow a scientifically reliable estimate of animals impacted by the spill. This needs to go hand-in-hand ideally with drift experiments (see section 5.5) to account for affected animals that remain at sea. Beaching of carcasses may follow other patterns than oil beaching. Carcasses may arrive ashore in other areas than shorelines where impacts from oil are monitored or expected. Carcasses that have been collected from beaches must be kept in freezers until seabird experts can inspect them, normally in a (temporary) necropsy facility. Only in this way reliable data can be produced on the origin (population, breeding colonies) of the species affected.

5.5: Drift experiments

When?	When oil at sea is moving through areas that are known for high seabird abundance.
By whom?	Local seabird experts.
How?	Objects that mimic the behaviour of an animal carcass drifting on the sea surface are released in the same offshore area where oil is reported. Each object is labelled with reporting instructions for a potential finder.
Further guidance	Objects may be wooden blocks or unoiled carcasses of birds. Released objects will drift with currents and winds. The relation between objects released offshore and those that are reported back from findings ashore will help to make a more reliable estimate of the multiplier that can be used to calculate total population impact on the basis of animals that have washed ashore.

Annex 6: Euthanasia or rehabilitation?



Annex 7: Hazing and deterrence

Hazing and deterrence techniques can be applied to try scare away animals from oil threatened or impacted areas. A variety of techniques have been described, but their effect is strongly dependent on circumstances and species.

The tables below[1] provide a rough guidance to techniques that could be considered for the defined species groups. Techniques are best applied after expert assessment. Most of the materials can be obtained relatively easy, and do not need to be stockpiled.

[1] **Gorenzel, W.P and T.P Salmon (2008)**. Bird Hazing Manual – Techniques and Strategies for Dispersing Birds from Spill Sites. Pp 102. Regents of the University of California.

Table 1. Hazing techniques that may be effective for selected groups of birds

Technique	Diving birds	Gulls and terns	Waterfowl	Wading birds	Shorebirds	Marine birds
pyrotechnics	X	X	XX	XX	X	X
cannons	?	X	X	X	?	?
biosonics	?	XX*	?	?	?	?
wailer	X	?	X	?	?	X
mylar tape	NA	X	X	X	X	?
scarecrow	NA	X	X	X	X	X†
flags	NA	X	XX‡	X	X	?
balloons	NA	X	X	X	X	?
lasers	XX§	XX*	XX#	X	X	X
lights	?	?	?	?	?	?
ATV	?	X	X	X	X	?
aircraft	X	?	X	?	?	X
boats	X	?	X	?	?	X
model airplanes	NA	X	X	X	X	?
overhead lines	NA	XX*	X	X	?	?
netting	X	X	X	X	NA	NA
plastic balls	X	X	X	X	NA	NA
spikes, coils	XX**	XX**	X	?	NA	NA

Key:
NA = not advised, not effective
X = may or may not be effective
XX = known to be effective
? = effect unknown
Notes:
*Effective on gulls.
†Possible at seabird colonies.
‡Best on Canada geese, snow geese, and dabbling ducks on land.
§Effective on double-crested cormorants.
#Effective on Canada geese and probably other waterfowl as well.
**To deter perching on structures by gulls, cormorants, and brown pelicans.

Table 2. Effectiveness of selected hazing techniques for spills at inland marshes and coastal bays

Technique	Marsh		Coastal bay	
	Day	Night	Day	Night
bird bombs, screamers	good	good	fair	fair
shell crackers	good	good	good	good
CAPA rockets	very good	untried	very good	untried
propane cannons	good	good	good	good
biosonics	good, species dependent	unknown	good, species dependent	unknown
Phoenix Wailer	fair	fair	fair	fair
mylar tape	fair	none	fair	none
scarecrows	fair to poor	none	fair to poor	none
flags, balloons	fair	none	fair	none
lasers	none	good to very good	none	good to very good
lights	none	poor to fair	none	poor to fair
ATV	good	unsafe	good along shorelines	unsafe
fixed-wing aircraft	fair	unsafe	good	unsafe
helicopter	good	unsafe	very good	unsafe
boats	good	good	good, weather dependent	fair, weather dependent
model airplane	good	none	fair	none
overhead lines	impractical	impractical	impractical	impractical
netting	impractical	impractical	impractical	impractical
plastic balls	possible	possible	none	none
spikes, coils	good on perches	good on perches	good on perches	good on perches

Table 3. Effectiveness of selected hazing techniques for spills in offshore waters and seabird colonies

Technique	Offshore waters		Seabird colonies	
	Day	Night	Day	Night
bird bombs, screamers	fair, limited range	fair, limited range	fair	fair
shell crackers	good	good	fair	fair
CAPA rockets	good, long range	untried	untried	untried
propane cannons	unlikely, hard to deploy	unlikely, hard to deploy	good	good
biosonics	impractical	impractical	untried	untried
Phoenix Wailer	not seaworthy	not seaworthy	possible on land	possible on land
mylar tape	none	none	poor to fair	none
scarecrows	none	none	poor to fair	none
flags, balloons	none	none	poor to fair	none
lasers	none	unknown, but possibly very good	none	unknown, but possibly very good
lights	none	poor to fair	none	poor to fair
ATV	none	none	possible	unsafe
fixed-wing aircraft	weather dependent	unsafe	unlikely	unsafe
helicopter	good, weather dependent	unsafe	possible	unsafe
boats	good, weather dependent	fair, weather dependent	good, weather dependent	fair, weather dependent
model airplane	none	none	possible	none
overhead lines	none	none	possible	untried
netting	none	none	possible	possible
plastic balls	none	none	none	none
spikes, coils	none	none	possible	possible

Annex 8: Managing the early days of a response

When an oil spill is reported, animals may already have started arriving on shorelines. This sheet provides guidance as to how to start up an effective response : ensuring that animals are picked up safely and transported to facilities where they receive care for several days before being washed.

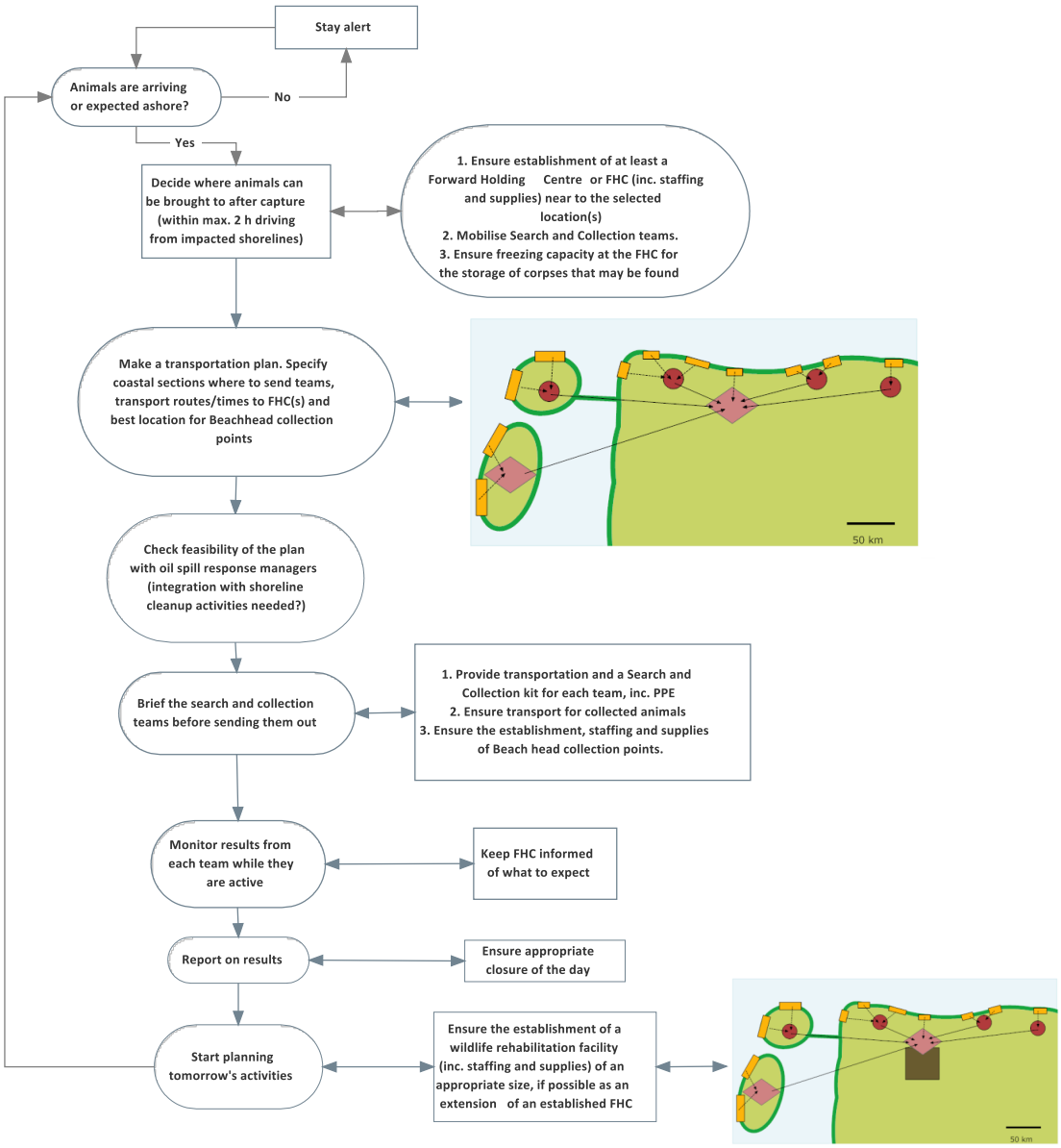


Table 1: Types of facilities (explaining symbols in figures)

Beachhead Collection Point (BCP) (circles)	A warm and ventilated place where live animals can spend a few hours before they can be transported. No animal stays here overnight!
Forward Holding Centre (FHC) (diamonds)	A facility where animals can be provided with pre-wash care (see technical sheets for set up, lay-out and procedures). Animals can stay here for many days, but are not released from here.
Wildlife Rehabilitation Centre (WRC) (square)	A facility that is in fact a Forward Holding Centre extended with adequate washing and post-wash care capabilities. Setting up and running a Wildlife Rehabilitation Facility needs the involvement of qualified experts!

Annex 9: Description of tier-3 equipment available from OSRL

Oil Spill Response Limited (OSRL) is the oil industry owned company that has stockpiles of wildlife equipment in Southampton, Singapore and Bahrain. SEA-PT can arrange with OSRL to mobilise these stocks.

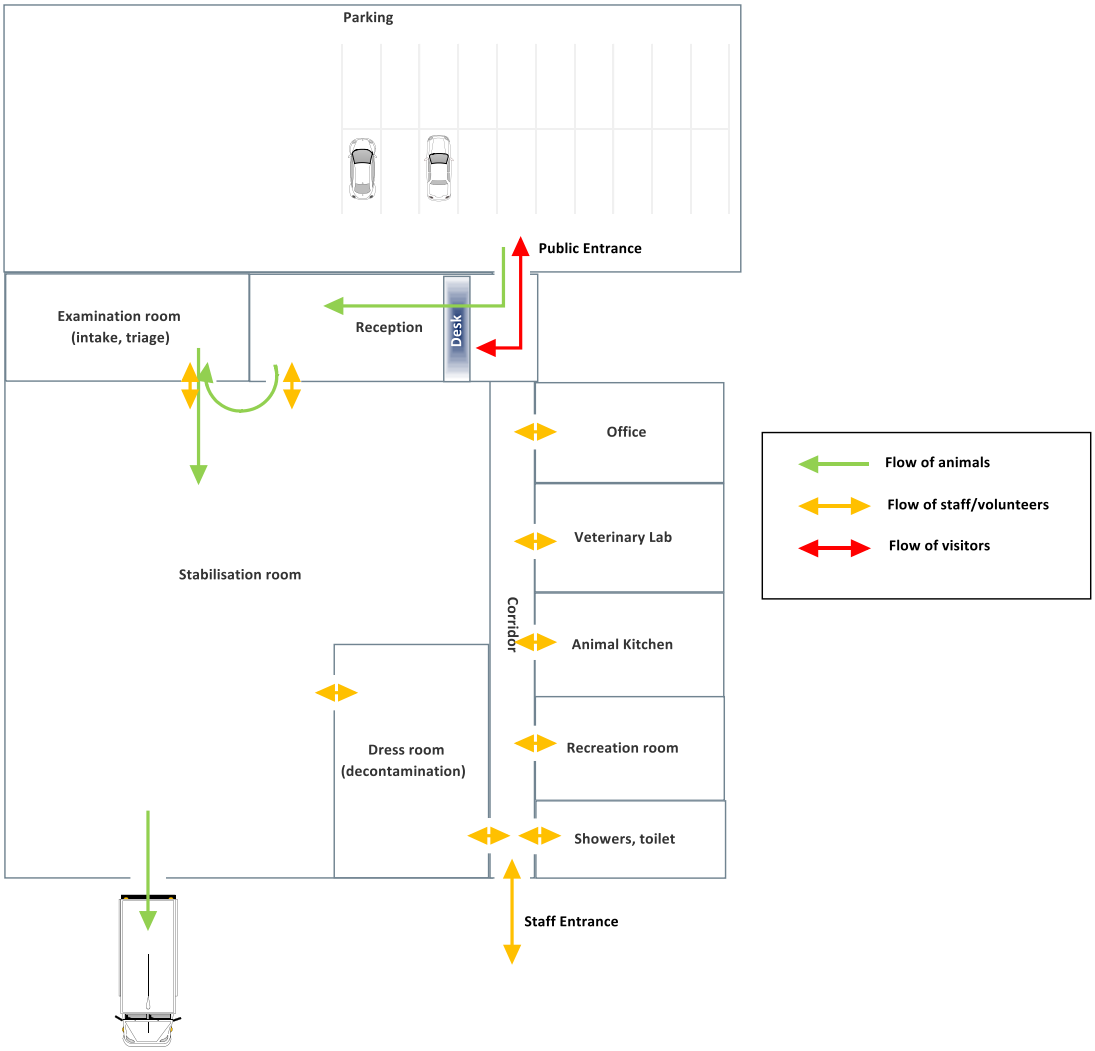
OSRL's wildlife equipment is stored and will be mobilised in flight containers, each of which has a fixed and invariable contents. Three sets of equipment are available as follows:

		Search and rescue	**Veterinary**	**Rehabilitation**
				
	Total	Nets, PPE, carton board boxes, plastic bags	Scales, blood centrifuge, various consumables such as syringes, tubes, gloves, etc.	Pools, pet dryers, tubs, detergent, PPE, washing gear, tools
Southampton (Tier-3)	4 containers	1x	2x	1x
Singapore (Tier-3)	2 containers	1x		1x
Bahrain (Tier-2)	2 containers	1x		1x

A detailed pack list of each container can be obtained from OSRL or Sea Alarm.

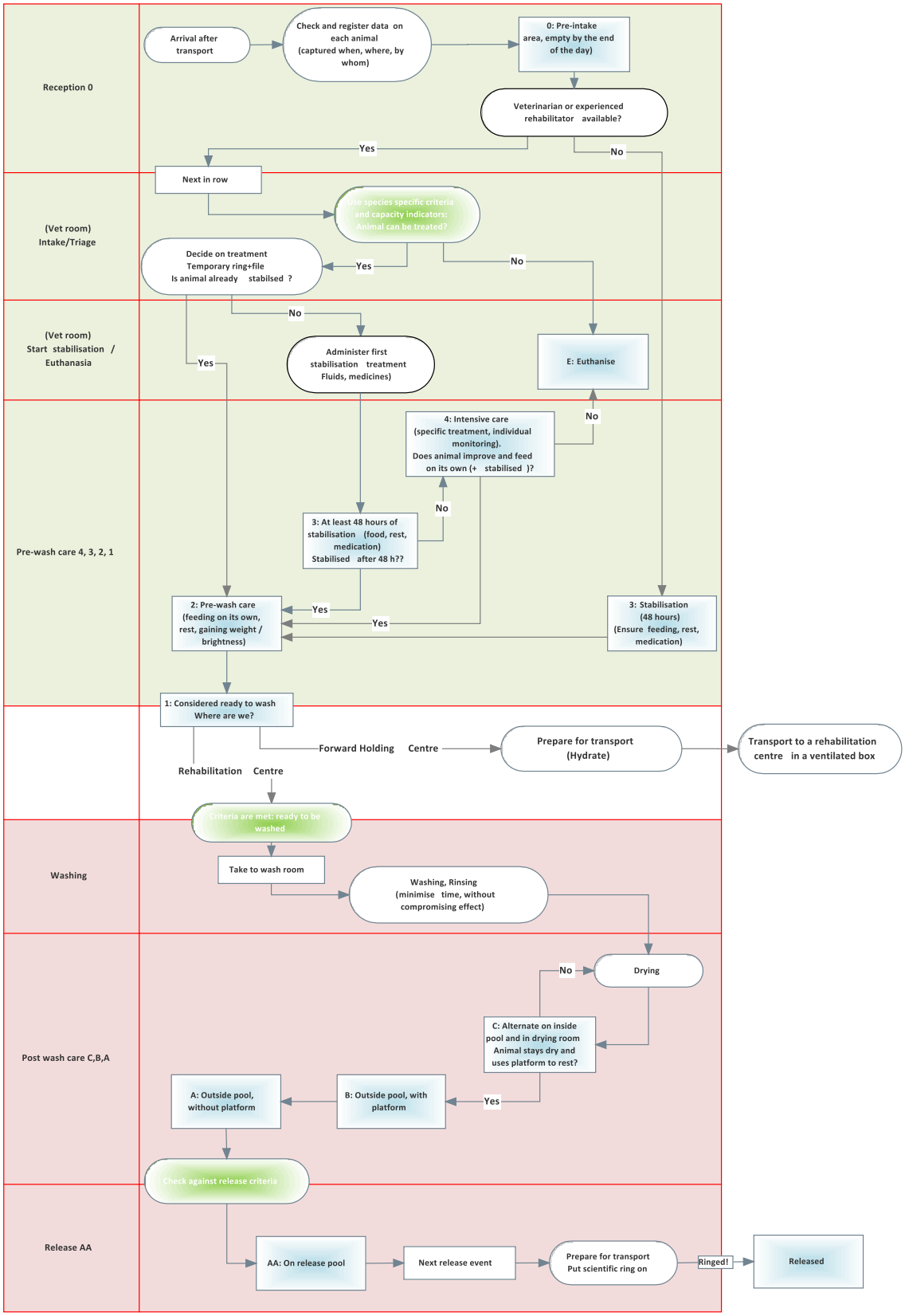
Annex 10: Set up and layout of a forward holding centre

Example layout of a Forward Holding Centre



Checklist of most important characteristics and equipment		
Reception ✓ Desk ✓ Space to put bird boxes ✓ White board	**Corridor** ✓ Connecting all indicated rooms ✓ Signposts	**Showers, toilet** ✓ For women ✓ For men ✓ Hot/cold running water ✓ Benches/chairs ✓ Coat hooks
Examination room (if vet available) ✓ Water, electricity ✓ Table ✓ Cupboard with medical equipment, medicine ✓ Balance	**Office** ✓ Desk, chair ✓ Computer, internet, telephone, fax/copier/printer ✓ Meeting table ✓ White board	**Recreation room** ✓ Table(s), chairs ✓ White board ✓ Mugs, plates, cutlery ✓ Fridge with snacks ✓ Microwave
Stabilisation room ✓ Clean working environment ✓ Good ventilation ✓ Net bottom cages and pens	**Veterinary lab (if vet available)** ✓ Desk, chair ✓ Computer ✓ Centrifuge ✓ Freezer (to put dead animals)	**Parking** ✓ Parking space ✓ Security checkpoint ✓ Signposted ✓ Waste storage containers
Dressing Room ✓ Benches and hooks ✓ Lockers for personal belongings ✓ Signs with instructions	**Animal kitchen** ✓ Hot/cold water ✓ Work tables ✓ Fridge, freezer ✓ Microwave, mixers	**Facility as a whole** ✓ Existing building or party tents ✓ Hot & cold water, electricity ✓ Climate control (+ventilation) ✓ Space & flexibility ✓ Near city/ main roads

Annex 11: Operations in a FHC and WRC



Annex 12: Setting up and running a control room

The control room is an important place in the wildlife operations. It must be set up as an integrated part of the overall spill management, so that decisions can be made overseeing all the relevant information on both sides. An example of the physical set-up of the control room is illustrated in Figure 1, with a checklist of its equipment in Table 1. Table 2 provides suggestions for organising the information on display in the meeting room.

Figure 1: Physical set-up

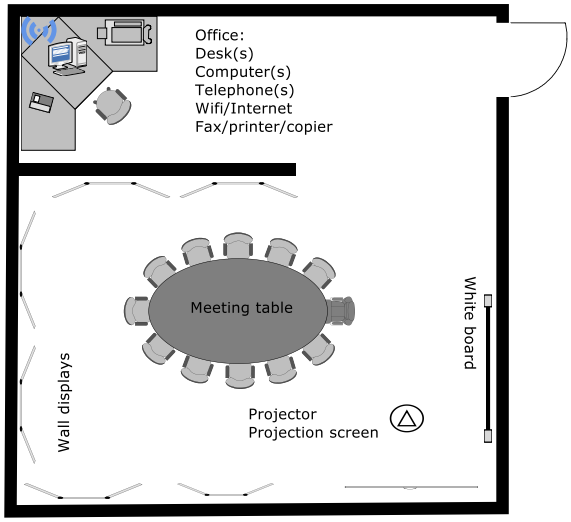


Table 1: Checklist equipment

Office:

- ✓ Desk (s) and chairs
- ✓ Office tools (paper, pens, tape, stapler, hole punch, etc.)
- ✓ Computer
- ✓ Internet connection (wifi)
- ✓ Telephone land line(s)
- ✓ Fax/printer/copier

Meeting room:

- ✓ Meeting table and chairs
- ✓ Wall displays (or empty walls)
- ✓ Flip chart with paper and pens
- ✓ Whiteboard with pens and cleaner
- ✓ Projector
- ✓ Projector screen (or white wall)

Table 2: Contents of wall displays

Heading	Information presented (printed files or hand written on flip chart sheets)
Spill History	The source of oil, date of spill, exact location, oil type, amount and properties, future issues and contact information for the spill advisor.
Species information	Information on species affected, habitat, distribution, identification photos, life history, previous oil spill knowledge (post release survival data) and care/washing information if available.
Rehabilitation Process	Description of process (with photos), triage policy and euthanasia policy.
Key Facts (Media)	Media lines, bird numbers (overview), news articles.
Training Program	List of roles and trainers (with photo) for allocation of trainees.
Maps	Showing oil spill area, sensitive areas, collection points and rescue facilities.
Facility layout	Room plan and copy of health and safety protocols.
Team information	Name, organization, role and contact number with coordinators highlighted (can be arranged by organization or by role).
Facility Operations	Lists the number of birds in each part of the facility, updated twice daily. It helps to include a list of daily tasks, which can be ticked off when complete.
Field Operations	Shows who is in the field, their role and contact information, updated twice daily.
Equipment requests	Central point for gathering requests, highlight if urgent, to be checked daily.

Annex 13: Agenda for tactical meetings

Chair: (Deputy) Wildlife Response Director

1. Welcome.
2. Agree on the agenda: priorities.
3. Update on current developments with regards to:
    a. Source of oil spill (contained?).
    b. Spread of oil and forecast modelling.
    c. Oil combat at sea (activities and success).
    d. Shoreline protection (where?).
    e. Shoreline cleanup (where?).
4. Assessed wildlife threats:
    a. Sensitivities in the track of the oil.
    b. Which species in the area, which species expected, how many?
5. Casualties observed or found?
6. Field operations: Protection, pre-emptive capture, search & collection.
    a. Results so far.
    b. Bottlenecks.
    c. Plan next operational period.
7. Facilities operations:
    a. Results so far.
    b. Bottlenecks.
    c. Plan next operational period.
8. Overview animals in care and released:
    a. Results so far.
    b. Bottlenecks.
    c. Plan next operational period.
9. Personnel, volunteers and logistics:
    a. Results so far.
    b. Bottlenecks.
    c. Plan next operational period.
10. Documentation and communication:
    a. Results so far.
    b. Bottlenecks.
    c. Plan next operational period.
11. Conclusions on actions to be taken.
12. Time and location of next meeting.

Annex 14: Overview of vulnerabilities in the Shannon Area

Landscape & setting

The Shannon estuary is the largest estuarine complex in Ireland and is a designated Special Area of Conservation and Special Protected Area. It is approximately 100 km in length from Limerick City to the open sea, ranging in width from approximately 0.5 km to 8 km across just west of Scattery Island. It comprises the estuaries of two major rivers, the Shannon and the Fergus with other smaller, but significant freshwater inputs from the Rivers Maigue, Deel and Feale. A deep water channel extends up the Shannon to Aughinish Island though smaller vessels can access Limerick Docks. The Fergus system is very shallow with 80% of it drying out at high tide.

The system can be thought of as a series of nested estuaries and bays comprising of a wide range of habitats: brackish river channels with reedbeds, saltmarsh, mudflats, sandflats, stony beaches, occasional low cliff-lines and rocky shores. Islands abound in the Fergus system but are otherwise scarce, with those inland of Shannon Town supporting scrub and woodland.

Figure 1: Map showing the Shannon Estuary, which borders counties Clare, Limerick and Kerry.

The Shannon estuary can be divided into four major subdivisions, comprising of seven units:

Upper: 1+2 Mid: 3+4 Lower: 5+6 Outer: 7

Upper	Unit 1:	Limerick City to Shannon Town [relatively narrow, inflow from Maigue in south].
Upper	Unit 2:	Fergus Estuary [with multitude of islands and inflow from Deel in south].

Mid	Unit 3:	Aughinish/Foynes Islands and relatively narrow channel to Tarbert.
Mid	Unit 4:	Clonderlaw Bay.
Lower	Unit 5:	Tarbert to Kilcreadaun Point, plus Scattery Island.
Lower	Unit 6:	Poulnasherry Bay.
Outer	Unit 7:	Opening to sea, Ballybunnion, Loop Head, Kerry Head.

Habitat distribution

	Habitat						
	River Channel	Mudflats / sandflats	Saltmarsh	Reedbeds	Islands	Shingle beaches & rocky shore	Open Saltwater
Unit							
1	X						
2		X	X	X	X		
3		X	X		X		
4		X					
5			X		X	X	
6		X	X				
7						X	X

Other habitats – lagoons and farmland are widely available in all units.

Some waders will forage in grassland at high tide e.g. Oystercatcher, Curlew and godwits, others may day roost e.g. Lapwing and Golden Plover.

Key concentrations of wildlife

Unit 1: Mute Swans and Black-headed Gulls in Limerick City, growing nesting colony of Cormorants at Bunlicky presumably forage mostly in the Shannon.

Unit 2: Greatest area of mudflats occur in the Fergus Estuary and to a lesser extent the Deel – these support the largest proportion of the wader populations; presume a tern colony still present on Rat Island. Low numbers of harbour and grey seals have been recorded here.

Unit 3: Significant numbers of waders and ducks; tern colony on Sturamus Island (near Foynes) which also supports a winter Cormorant roost; a second Cormorant roost is present at Bolands Buoy/Rock. Occasional occurrence of bottlenose dolphins.

Unit 4: Mostly waders.

Unit 5: Nonbreeding seabirds overlap with more estuarine waterbirds, gulls plentiful. Bottlenose dolphins regularly occur between Scattery Island and Tarbert from November to March and Moneypoint is an important area all year round.

Unit 6: Farmland feeding Whooper Swans and Greenland White-fronted Geese fly in to this bay to roost at night, also waders and Brent Geese likely to feed here.

Unit 7: Nonbreeding seabirds (auks, Shags, Manx Shearwaters) most likely to occur here, also presence of seaduck such as Common Scoter and Red-breasted Merganser possible. Kilcredaun is a known year round important area for bottlenose dolphins. Grey seals have been recorded breeding between Loop Head and Rehy hill.

Table 1: Seasonality of birds present in the Shannon estuary.

	Autumn (Sep-Nov)	Winter (Dec-Feb)	Spring (Mar-May)	Summer (June-Aug)
Cormorant	Resident + arriving migrants	Present	Present	Residents breeding
Auks, Shags, shearwaters,	Most likely, outer estuary	Some, outer estuary	?	? some towards end of period
Gulls	Some resident; more arriving to winter	Some resident; but augmented by many more migrants	Some resident; migrants depart	Resident e.g. Black-headed and Herring but relatively few
Terns	Passage in outer estuary: Sandwich, Arctic	Absent	Sandwich start arriving	Breeding colonies: Foynes area & Fergus (Sandwich & Common)
Herons & egrets	Resident, low numbers	Resident, low numbers	Resident, low numbers	Colonies need to be identified
Divers & grebes	Present	Present	Present	Largely absent
Mute Swan	Present/resident	Present/resident	Present/resident	Present/resident
Whooper Swan & geese	Arriving	Maximum numbers	Departing	Absent
Shelduck	Arriving	Maximum numbers	Departing	Small numbers breed, some probably moult on Estuary
Other duck	Arriving	Maximum numbers	Departing	Largely absent, though Mallard present year round and breed (e.g. Westfields, Limerick City)
Waders	Some passage (short-term stop-offs, others arriving)	Peak numbers	Most depart for breeding areas to north and east	Small numbers of immature birds can over-summer
Kingfisher & Water Rail	Present/resident	Present/resident	Present/resident	Present/resident

Table 2: Approximate abundance of seabird, waterbird and wader species and groups across the Shannon estuary.

West -> East	7	6	5	4	3	2	1
	Outer	Poulnasherry Bay	Tarbert area	Clonderlaw Bay	Aughinish-Foynes	Fergus	Inner - Limerick
Cormorant	+	?	+	?	+	?	++B
Shag	+		+				
Gannet	++		+				
Manx Shearwater	?						
Skuas (Arctic)	+						
Small gulls	+	+	++	+	++	+	++
Large gulls	+	+	+	+	+	+	++
Kittiwake	++		?				
Terns	++		+		+B	+B	
Auks	++		+		?		
Divers	?		?		?		
Grebes			?		?		?
Grey Heron		+	+	+	+	+	+
Little Egret		+		+			
Mute Swan							++
Whooper Swan I		++				++	
Greenland White-fronted Goose		+					
Brent Goose I	+	++	+	+	+	+	
Shelduck N		+	+	+	+	+	+
Wigeon N		+	+	+	+	++	+
Teal N		+	+	+	++	+	+
Other duck	?	+	+	+	+	++	+
Moorhen, Coot, rails		?	?	?	?	?	+
Kingfisher						?	?
Oystercatcher		?	?	?	+	?	+
Golden Plover I		+	?	?	+	++	++
Lapwing N		++	?	?	+	++	++
Curlew I		+	+	+	++	+	+
Black-tailed Godwit I		?	?	?	+	++	++
Redshank I		+	+	+	+	++	+
Greenshank N		+	+	+	+	+	+
Dunlin I		+	+	+	+	++	++
Other waders		+	+	+	+	+	+
White-tailed Sea Eagle					?	?	?

Key:

+	Occurs	B	Breeding colony
++	Common-abundant, main concentration	R	Roost
?	Probable-possibly occurs		
N	Species occur in nationally important numbers		
I	Species occur in internationally important numbers		

Vulnerability of species and groups to oil spills

Clearly those bird species that sit on water to forage or roost are of highest vulnerability. Amongst seabirds, Cormorants, auks (Guillemots & Razorbills) and gulls are of highest vulnerability as are all wildfowl species (ducks, geese and swans). Waders mostly forage on exposed mud or the water's edge and longer-legged/larger species may be vulnerable on an incoming tide. Scarce species, of the swimming 'guild', for which little information is available includes divers (particularly Red-throated) and grebes (particularly Great Crested and Little) are all highly vulnerable. White-tailed Sea Eagles have been reintroduced to the Killarney area of Kerry; these birds range widely and one satellite-tracked individual has been recorded on the upper part of the Shannon Estuary. These eagles will catch their own fish and maybe scavenge oil-stricken birds. Plunge-diving seabirds such as Gannets and terns are unlikely to dive into oil-covered water, as they are unable to see target prey.

Key information gaps

- Very poor understanding of the distribution of seabirds in the outer/marine parts of the estuary especially Units 5 and 7 at all times of year. This would require a 'Seabirds at Sea' methodological approach or possibly the newly emerging technique of high definition digital aerial photography.

- There has been no recent monitoring of tern colonies [e.g. on Sturamus and Fergus islands].

- Ground-based winter (I-WeBS, September-March) waterbird monitoring has almost ceased because of a lack of local volunteer counters and such regular surveys have been replaced by one or two aerial surveys per winter. While these give a snapshot of broad-scale distributional patterns, these can miss some species/groups that are sensitive to aircraft noise/disturbance.

- Some winter Cormorant roosts are known; others need to be identified, particularly on jetties and buoys.

- Grey Heron and Little Egret colonies need to be mapped.

- The distribution of Otters and seals are not monitored in any systematic way.

- The key areas for bottlenose dolphins in the outer estuary are well known, all though occurrence in the inner estuary may be underestimated.

Information on the wildlife of the Shannon Estuary has been drawn from the following sources:

Winter Waterbirds

Hutchinson, C. 1979. *Ireland's wetlands and their waterbirds*. IWC, Dublin

Sheppard, R. 1993. *Ireland's wetland wealth*. IWC, Dublin

Merne, O.J. 1985. *The infauna of the Shannon and Fergus estuarine mudflats as a food resouce for shorebirds*. MSc thesis, Trinity College, University of Dublin.

Crowe, O. 2005. *Ireland's wetlands and their waterbirds: status and distribution*. BirdWatch Ireland, Wicklow.

Boland, H. & Crowe, O. 2012. *Irish Wetland Bird Survey: waterbird status and distribution 2001/02-2008/09*. BirdWatch Ireland Report, Kilcoole, Co. Wicklow.

Breeding Terns

Whilde, A. 1985. *The All Ireland Tern Survey 1984*. IWC/RSPB Report, Rosscahill, Co. Galway.

Hannon, C. 1997. *The 1995 All-Ireland Tern Survey*. BirdWatch Ireland Conservation Report No. 97/1, Monkstown, Co. Dublin.

Breeding & wintering Seabirds

Lloyd, C. S. 1982. *An inventory of seabird breeding colonies in the Republic of Ireland*. Wildlife Service Report, Bray, Co. Wicklow.

Newton, S. (pers. obs.)

Berrow, S. (pers. comm.)

Cetaceans

Berrow, S.D., Holmes, B. & Kiely, O.R. 1996. *Distribution and abundance of Bottle-nosed Dolphins Tursiops truncatus (Montagu) in the Shannon Estuary*. *Biol. & Envmt. Proc. R.I.A*. 96B: 1-9.

Englund, A., Ingram, S. and Rogan, E. 2008 *An updated population status report for bottlenose dolphins using the lower River Shannon SAC in 2008*. Final Report to the National Parks and Wildlife Service, 1-34.

Berrow, S.D. 2009 *Winter distribution of Bottle-nosed Dolphins Tursiops truncatus (Montagu) in the inner Shannon Estuary.* Irish Naturalists' Journal. 30(1), 35-39.

Pinnipeds

Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. & O'Keeffe, C. 2007. *An assessment of harbour seal population size and distribution in the Republic of Ireland during the 2003 moult season*. J. Zool. Lond. 273 Issue 2: 131-139.

Ó Cadhla, O., Strong, D., O'Keeffe, C., Coleman, M., Cronin, M., Duck, C., Murray, T., Dower, P., Nairn, R., Murphy, P., Smiddy, P., Saich, C., Lyons, D. & Hiby, A.R. 2007. *An assessment of the breeding population of grey seals in the Republic of Ireland, 2005*. Irish Wildlife ManualsNo 34. National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. 50pp.