

AEWA Conservation Guidelines No.2

Guidelines on identifying and tackling emergency situations for migratory waterbirds

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and

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Step chart

To identify and tackle emergency situations affecting migratory waterbirds, each country should take the following steps:

- Step 1: Identify lead agencies, and divide tasks both nationally and internationally.**
- Step 2: Produce a list of possible emergency situations involving migratory waterbirds.**
- Step 3: Rank waterbird sites according to their susceptibility to emergency situations.**
- Step 4: Identify potential risks and negotiate safety measures with industries located near waterbird sites.**
- Step 5: Establish a national Emergency Response Notification System.**
- Step 6: Adopt new legislation or adapt existing legislation where appropriate.**
- Step 7: Raise public awareness.**

Introduction

An emergency situation for migratory waterbirds is a situation where a sudden, unusual change takes place (or is likely to take place) in the occurrence or mortality rate of waterbirds, or in the extent or condition of the habitats on which they depend. While it might not always be possible to deal with such situations effectively, it is very important to react as publicly as possible to draw people's attention to the situation. Public awareness is of extreme importance, especially in the case of human-induced catastrophic events, because it may help to prevent similar events from happening in the future.

Thus, keywords in successfully addressing emergency situations are:

- alertness
- public awareness
- prevention

Emergency situations can be recognised when:

- populations of waterbirds show sudden changes in size, distribution or mortality rate;
- conditions occur which by experience are known to lead to such changes.

Although it is the effect on populations that really matters, it is important to be able to recognise the conditions as soon as they occur, because by the time population changes are apparent, it is often too late to take effective action.

It is not easy to define criteria for recognising conditions that lead to emergency situations for the entire AEWA area. This will vary between regions and countries. In some areas, a small change in numbers may be alarming, while in other areas huge fluctuations are normal. Severe frost, for example, may be catastrophic in temperate Europe, will never occur in most of Africa, and is quite normal in Siberia. Peat fires may destroy waterbird habitats in northern latitudes, but are irrelevant to desert countries in Africa and the Middle East, and so on. Each country (or group of adjacent countries with similar conditions) will have to develop its own criteria.

Development of national criteria within the AEWA framework should be based specifically on the effects of an event on waterbirds. For migratory waterbirds, an event can always be classified as an emergency situation when:

- individuals of a Globally Threatened species are involved;
- more than 10% of the flyway population of a species with an unfavourable conservation status is threatened (these species are listed in Columns A and B of Table 1 of the AEWA Action Plan);
- more than 30% of the flyway population of a species with a favourable conservation status is threatened (these species are listed in Column C of Table 1 of the AEWA Action Plan).

A clear distinction should be made between permanent or slowly developing threats and sudden emergencies. Permanent threats and threat assessment are dealt with in Guidelines No.4: *Guidelines on the management of key sites for migratory waterbirds*.

Step 1: Identify lead agencies, and divide tasks both nationally and internationally

A national co-ordinator for emergency situations concerning migratory waterbirds should be appointed. As implementation of the AEWA Action Plan is a governmental responsibility, it is logical for the national co-ordinator for emergency situations to be someone with a position in a governmental agency or institute. However, it would also be possible to appoint an independent individual, or someone working in a non-governmental organisation (NGO), provided he or she can get sufficient support (financial, logistical and legal) from the government agency responsible for implementation of the AEWA.

Emergency situations are, by definition, unexpected, and very often call for rapid input of resources (especially manpower) for relatively short periods of time. Very often this includes a great deal of private effort from volunteers, and heavy involvement of NGOs. The respective roles of all agencies, both governmental and non-governmental, that might be involved in tackling emergency situations should be clearly defined.

The industrial sector and sometimes also governmental institutions are often reluctant to take safety measures because these may be costly. It often takes a disaster to change attitudes, and this is where NGOs may play an important role. In the case of emergency situations that arise as a result of neglect or failing legislation, government agencies are often eager to avoid publicity. However, public opinion is often extremely important in creating the pressure needed to stimulate action. NGOs may sometimes be better situated than government agencies in this respect. The national co-ordinator should therefore endeavour to locate financial resources to support NGOs dealing with emergency situations.

Emergency situations affecting migratory waterbirds often have international dimensions. The national co-ordinators of countries involved in a particular emergency situation should liaise with each other and with the AEWA Secretariat. International co-ordination of measures taken in the case of an international emergency situation should rest with the AEWA Secretariat, acting on the advice of the AEWA Technical Committee.

Step 2: Produce a list of possible emergency situations involving migratory waterbirds

Emergency situations for migratory waterbirds can be caused by human actions or by natural causes, although the distinction is not always clear (see Box 1).

Box 1: The human factor in the impact of a natural disaster

A non-AEWA example

This example features a non-migratory, non-waterbird from outside the AEWA area, but is one of the best examples to illustrate how human activities can affect the impact of natural disasters.

In 1989, Hurricane Hugo hit the coast of South Carolina in the USA, and severely damaged the Francis Marion National Forest. This would not have been a national ornithological emergency situation, had this forest not been the last stronghold of the Red-cockaded Woodpecker *Picoides borealis*, a species threatened with extinction.

The Red-cockaded Woodpecker lives in long-leaf pine forests, nesting in trees of 90 years of age and older that suffer from heart rot. Forestry management had rendered virtually all forests in its former range unsuitable for nesting, reducing its range to a few pockets, with over 60% of the world population in one single forest: the Francis Marion National Forest. Hurricane Hugo knocked down 90% of the trees suitable for nesting.

After some years with very low productivity, the species is now gradually recovering, thanks to new nesting trees becoming available through ageing, and the use of artificial nest sites.

(source: South Carolina Department of Natural Resources)

An AEWA example

Due to eutrophication and impoverishment of wetland habitats, the number of large insect species in Northwest European marshes has been greatly reduced. Large insects such as dragonflies are the main source of food for chicks of the Black Tern *Chlidonias niger*.

The occurrence of dragonflies shows distinct seasonal peaks, which differ between species. With fewer species available, there is an increased risk of short periods when no food is available for the tern chicks. This problem does not appear in breeding seasons with fine weather, but can occur during breeding seasons with periods of adverse weather.

Mass mortality of Black Tern chicks is often observed during prolonged periods of cold, rainy weather, and it may be concluded that the weather is causing an emergency situation. However, in a more diverse habitat with more prey species available, the same weather conditions would not cause an emergency at all.

In The Netherlands, a former major stronghold of the species in the Western Palearctic, Black Terns have shown a decline of more than 90% in recent decades.

(Source: Beintema, 1997)

Possible causes of emergency situations are:

- Extreme weather
- Earthquakes and volcanic activity
- Infectious diseases
- Botulism
- Harmful algal blooms
- Predation
- Introduction of alien species
- Fire

- Oil spills
- Chemical pollution
- Nuclear accidents
- Lead poisoning
- War

These are briefly discussed below.

Extreme weather

Extreme weather conditions affecting waterbirds include:

- adverse weather during the breeding season, causing low reproductive success;
- unusually cold weather in winter at temperate and northern latitudes, causing high mortality;
- excessive rainfall and flooding;
- drought.

The weather is beyond human control. Once populations of waterbirds have been affected, the only practical measure that can be taken is to optimise conditions for the recovery of the populations by increasing protection (see Box 2).

Box 2: Migratory waterbirds in the cold

Problems with cold weather are typical of those parts of the AEWA that lie close to the frost-line in the northern winter and support large numbers of wintering waterbirds. The countries involved lie in a belt running from Northwest Europe southeast through Central Europe and the Black Sea region to the countries bordering the southern half of the Caspian Sea.

Two possible measures to help waterbirds through a severe winter are winter feeding and shooting bans.

Winter feeding

Winter feeding is popular in many parts of Europe, but should not be encouraged. Common species such as the Mallard *Anas platyrhynchos* and Common Coot *Fulica atra* tend to profit disproportionately, because they are well adapted to the human environment. The shyer, rarer or more vulnerable species often escape attention, and may even suffer from competitive disadvantages.

Shooting bans

As winter conditions vary greatly between countries, the criteria for imposing shooting bans will have to be defined specifically for each country involved, in close collaboration with hunting organisations. Co-ordination between countries is necessary to avoid situations in which birds escaping cold weather in one country are shot in large numbers in a neighbouring country. The AEWA Technical Committee could play a central role in this international co-ordination.

The following example of a protocol for the introduction of a temporary shooting ban was developed in Great Britain, and is based on ground conditions. The protocol consists of six steps:

1. If the ground has been reported frozen for 5 successive days for more than half of the British weather stations, a state of alert is declared.
2. On the 7th day the hunters' organisation is informed. This organisation will then gather its own data, and call for voluntary restraint in shooting.
3. On the 13th day, the Secretary of State is asked to institute a shooting ban, which, after signing, comes into effect at 9 am on the 15th day.
4. Three consecutive days of intermittent thaw terminates the count-down process.
5. Shooting is banned for an initial period of 14 days, but this period can be extended or shortened, depending on conditions.
6. Bans can be instituted for Great Britain as a whole, or for Scotland, Wales or England alone.

(Source: Stroud, 1992)

Flooding is not normally a problem for waterbirds outside the breeding season, but may be catastrophic for nesting birds. River flooding is compounded by deforestation and loss of wetlands upstream, both of which lead to accelerated runoff. Wise management of river basins often requires international co-operation.

Drought may cause waterbirds to move out of an area. If there are insufficient alternative sites for the displaced birds, this may be classified as an emergency situation. Drought affects both breeding birds and non-breeding birds. Artificial flooding as a remedy for drought should be treated with caution, as irregular drought may be essential to the maintenance of certain natural ecosystems (e.g. in the Sahelian floodplains in Africa).

Infectious diseases

Infectious diseases, such as bird malaria, bird influenza (bird 'plague') and bird cholera, are serious threats to poultry, but rarely reach epidemic proportions in nature. A more serious potential threat is Newcastle disease (see Box 3).

Earthquakes and volcanic activity

Earthquakes and volcanic activity have unpredictable and catastrophic impacts over wide geographical areas. There are no well-documented cases of these impacts adversely affecting waterbird populations, but in 1997 on the West Indies island of Montserrat a major volcanic eruption destroyed most of the habitat of the endemic, globally threatened, forest-dwelling Montserrat Oriole *Icterus oberi*.

In the event of such a natural catastrophe, rapid deployment of scientists with appropriate experience to assess the situation and implement remedial measures is essential. Assessment of the necessity for and feasibility of a captive breeding programme for any threatened population might be included in such an assessment. See:

<http://www.rspb.org.uk/science/ecology/otherwork/montserratoriole/index.asp>

Botulism

Botulism is caused by the bacterium *Clostridium botulinum* Type C, which develops in decaying protein where it may produce a highly poisonous toxin. The toxin is only produced when the bacterium itself is infected with a specific bacteriophage, and only at temperatures above 20°C.

Outbreaks may occur when infected carcasses lie exposed on the surface and insects spread the infection to other carcasses. Botulism occurs in shallow water with little flow, and is often associated with oxygen depletion after collapsing algal blooms. This happens more often in artificial water bodies than in nature, and is aggravated by eutrophication (see Box 3).

The USA and Canada have the longest tradition of combating botulism, and have developed a variety of measures aimed at reducing the frequency of outbreaks. However, some of these are considered to be inappropriate for the AEWA area, as they bring about drastic permanent changes to the wetlands. The only measures that are ecologically acceptable are temporarily increasing water depth, improving water circulation (and oxygenation) and, if the site is accessible and enough people can be mobilised, removal of carcasses. Emphasis should be on prevention through the maintenance of water quality.

Harmful algal blooms

Red tides (brown tides) are massive blooms of microscopic algae occurring in relatively warm seas. When algae die off, bacterial breakdown may result in anoxic conditions. Mortality of fish and shellfish may be followed by mass mortality of waterbirds (see Box 3), especially if the birds are unable to move elsewhere, e.g. young birds at breeding colonies. Red tides have been known since historic times, but now occur with increasing frequency in coastal

areas where the sea has been enriched with nutrients (eutrophication). Blooms of blue-green algae also occur in fresh water.

Once an algal bloom is in progress, it is too late to do much, as the algae will die and decompose anyway. The problem can be 'diluted' by increasing water flow, which also helps to aerate the water. The main solution to the problem of harmful algal blooms is prevention through the maintenance of water quality.

Box 3: Dangerous micro-organisms

Newcastle disease

Newcastle disease is a highly infectious, debilitating viral poultry disease that may be very dangerous for concentrations of waterbirds. Symptoms are rapid breathing, neck twisting and paralysis.

Species of Anatidae are fortunate in being resistant to Newcastle disease, but other families of waterbirds are vulnerable. There have been no recorded outbreaks of the disease in the AEWA area, but mass mortality of cormorants *Phalacrocorax* spp. and terns *Sterna* spp. has been reported in the USA and Canada. Newcastle disease has been found in poultry in the AEWA area, and there is therefore always a risk of an outbreak occurring at sites with concentrations of waterbirds.

South Africa has imposed severe restrictions on the taking of poultry products to their outlying weather stations on Marion Island in the Indian Ocean and Gough Island in the Atlantic, to avoid the possibility of introducing Newcastle disease amongst the millions of nesting seabirds.

Botulism

Mass mortality of waterbirds from botulism was first observed in the USA, where it now affects millions of waterbirds every year. In the AEWA area, botulism has been reported in Europe and South Africa. Countries that have reported outbreaks of botulism include:

<u>Year first reported</u>	<u>Country</u>
1910	USA
1914	Canada
1923	Uruguay
1937	Australia
1960	South Africa
1967	Denmark
1969	UK
1970	Netherlands
1971	Germany
1972	New Zealand
1973	Italy
1973	Spain
1973	Japan
1976	Mexico

(Source: *Avian botulism overview*.)

<http://www.pnr-rpn.ec.gc.ca/nature/migratorybirds/avianb/ce00s02.en.html>)

Poisonous algal blooms

Some dinoflagellates causing algal blooms, such as *Alexandrium* spp., produce toxins that accumulate in filter-feeding molluscs, which are not affected themselves. Consumption of such molluscs may produce various kinds of poisoning in humans, one of which, Paralytic Shellfish Poisoning (PSP), can be lethal, and may also kill large numbers of seabirds. PSP is indigenous to North America, but PSP-toxin producing algae have been found in European and Australian waters since the 1980s, and outbreaks have been recorded in Portugal in recent years.

Predation

An emergency situation warranting predator control may arise when predators reach previously predator-free islands with breeding colonies of waterbirds. In such cases, total eradication of the predator on the island may be the only solution, especially if the birds have no safe alternative sites in the vicinity.

Introduction of alien species

The three main types of alien species that may threaten waterbirds to the point of an emergency situation are:

- alien predators (e.g. North American Mink *Mustela vison* in Europe);
- alien waterbirds (e.g. Ruddy Duck *Oxyura jamaicensis* competing with White-headed Duck *Oxyura leucocephala*);
- invasive plant species that cause major changes to the habitat (e.g. *Pistia stratiotis* and *Eichhornia crassipes* in warm countries).

Once an alien species has become widely established, eradication may prove to be impossible. Public awareness of the potential problems of alien species and prevention of further introductions are therefore the key issues. No alien species should ever be deliberately introduced without detailed assessment of the possible consequences.

Fire

Fire can pose a threat to waterbird habitats in two main ways:

- direct effects of peat fires;
- indirect effects of oil fires.

Peat fires may destroy boreal and sub-arctic bogs and tropical peat swamps. The risk is increased when water levels have been lowered for agriculture. Peat fires are difficult to combat, as they can burn underground and continue to smoulder and spread unnoticed for long periods. Digging ditches to stop the spread of a fire may help, but there is a risk that opening up the soil will enable fresh air to reach the smouldering peat, thus re-activating the fire. Ditches are also damaging to wetlands, and if not thoroughly closed afterwards, will increase drainage. Legal restrictions on the use of fire in sensitive areas may help in the prevention of fires.

Oil fires are related to large spills or accidents at oil plants. Burning oil produces thick, black smoke that may be carried by wind over great distances. Soot pollution can cause digestive problems in waterbirds. In northern regions, blackened snow alters melting patterns, and this can disrupt ecological processes. Soot-covered food resources may be unsuitable or poisonous for waterbirds.

Oil spills

The most common causes of major oil spills are accidents with ships, illegal emissions from ships, and accidents or leakages at oil plants or pipelines (see Box 4). Spills from ships most often affect coastal wetlands, but may also occur in lakes and rivers. Oil contamination may kill large numbers of waterbirds by:

- affecting the waterproofing of the feathers;
- poisoning through ingestion when preening;
- affecting the food resources.

Prevention of spills from ships is difficult. Legal measures, which often require international agreements, include:

- restrictions on the use of inshore shipping lanes by oil tankers;
- mandatory safety procedures;
- bans on dumping.

In the case of coastal spills, the use of detergents is often presented as a solution, but the side effects on marine food webs may be as serious as the effects of the oil spill. Mechanical removal of oil is preferable, but this requires considerable human resources and may be costly. Involvement of volunteers is important. The removal of oil involves:

- cleaning coastlines manually (e.g. with shovels);
- use of high-pressure water hoses (especially on rocky shores);
- containing inshore floating oil in inflatable devices;
- sucking up floating oil from ships (in combination with floaters).

The rehabilitation of individual oiled birds is difficult and costly, and often has poor results. Even if successful, the impact on population levels is frequently minimal. However, such operations have good media value for raising public awareness. For details of successful rehabilitation of African Penguins following the June 2000 *Treasure* oil spill off Cape Town, South Africa, see: <http://web.uct.ac.za/depts/stats/adu/oilspill/>

Box 4: When the pipeline bursts

A major leak in a Russian pipeline in the Ousinsk Region, Republic of Komi (Siberia), in August 1994 resulted in 14,000 tons of oil spilling into the environment.

The response included clean-up operations, the construction of four dams on watercourses and the construction of various embankments.

In September/October 1994, the dams collapsed due to heavy rainfall. Oil contaminated two tributaries of the Pechora River, the Kolva and the Ousa.

In November/December 1994, the damaged pipeline was repaired, and clean-up operations were carried out along the affected rivers.

The Komi oil spill may have affected populations of swans, ducks and seabirds. No figures are available for the numbers of birds affected. However, AEWA species vulnerable to oiling in the area include:

- Bewick's Swan *Cygnus columbianus bewickii*
- Whooper Swan *Cygnus cygnus*
- Common Eider *Somateria mollissima*
- King Eider *Somateria spectabilis*
- Steller's Eider *Polysticta stelleri*
- Long-tailed Duck *Clangula hyemalis*

(Source: World Conservation Monitoring Centre)

Chemical pollution

Major sources of chemical pollution are:

- incidents and accidents (spills, situations comparable to oil spills);
- permanent pollution from untreated industrial waste;
- permanent pollution from agro-chemicals.

Untreated chemical waste flowing into rivers may cause incidental mass mortality in fish and waterbirds, but as chemicals often bind to silt, which accumulates in estuaries, pollution may be more structurally present in estuarine habitats. As the problem often develops gradually, it rarely leads to sudden emergency situations (see Box 5). Direct poisoning of birds by pesticides does not often occur, and is most commonly reported in Africa. In wet agriculture, such as rice fields, mortality may include waterbirds.

The collapse of tailings ponds associated with mineral mining are a regular cause of large-scale chemical pollution of extensive wetland complexes. Catastrophes of this type in Europe polluted the Coto Doñana in Spain with heavy metals in April 1998, and the Tisza and Danube rivers with arsenic in January-February 1999. See:

<http://www.yale.edu/ynhti/curriculum/units/1999/6/99.06.01.x.html>
<http://www.reliefweb.int/w/rwb.nsf/0/4e30736ba1fddbbdc12568e300630b90?OpenDocument>

Nitrogen emission from agricultural fertilisers rarely leads directly to emergencies, but the resulting eutrophication of water bodies increases the risk of algal blooms and botulism. Acid rain resulting from nitrogen emission may sterilise poorly buffered waters in northern latitudes, but it is difficult to decide at what stage an emergency should be declared.

Box 5: Gradual pollution leading to a global emergency

A gradual development turned into an emergency in the 1960s when organo-chloride compounds building up through food chains suddenly caused mass mortality in piscivorous birds.

Over a period of years, fish-eating birds had accumulated the poisonous compounds in their fat. When the fat reserves were needed, the poison was released into the bloodstream, and the victims died instantaneously as the poison affected their nervous systems. Sandwich Terns *Sterna sandvicensis* literally dropped dead from the sky.

The problem was most acute in countries bordering the North Sea in Europe, where waste products from the DDT manufacturing industry contaminated the sea.

Species of tern *Sterna* spp. and Eider Ducks *Somateria mollissima* suffered the greatest mortality, with the population of Sandwich Terns declining by more than 95%.

Widespread publicity and research led to a worldwide ban on DDT and some of its derivatives. Since the ban on DDT, populations of the affected waterbirds have been recovering gradually.

(Source: Koeman & Van Genderen, 1966)

Nuclear accidents

Radiation following nuclear accidents is a serious health risk for individuals, but nothing is known about its effects at population level. For example, it is not known how waterbird populations might have been affected, numerically or genetically, by the April 1986 accident at Chernobyl, Ukraine.

Lead poisoning

An emergency situation may develop when lowered water levels bring large deposits of spent lead shotgun pellets or fishing weights within reach of waterbirds, causing sudden mass mortality. A slight rise in water level can cure the problem temporarily. In early 2003, more than 40 Greater Flamingos *Phoenicopterus ruber* died in this way at Larnaca Salt lake in Cyprus.

A number of AEWA Range States have banned the use of lead shot in hunting, while a number of others have similar bans under study. Parties to the AEWA agreed to endeavour to phase out the use of lead shot for hunting in wetlands by the year 2000 (Paragraph 4.1.4 in the AEWA Action Plan).

Raising public awareness is an important issue, as in many countries lead poisoning is not recognised as a problem, and the environmental dangers have yet to be recognised.

War

Where waterbird sites are threatened or destroyed in war situations, records should be kept of the changes that occur, for use in possible future restoration projects.

Step 3: Rank waterbird sites according to their susceptibility to emergency situations

At this stage, susceptibility is based purely on the occurrence of important numbers of migratory waterbirds, irrespective of the presence of nearby threats (see Step 4). The more important a site is for migratory waterbirds, the more serious an emergency situation would be.

Sites should be ranked according to their importance for migratory waterbirds. Ranking can be based on the national site inventory (see Guidelines No.3: *Guidelines on the preparation of site inventories for migratory waterbirds*), if available. Results from a national waterbird monitoring scheme can be used in the ranking, if available (See Guidelines No.9 *Guidelines for a waterbird monitoring protocol*.) Alternatively, ranking can be based on the best possible judgement of local experts.

Ranking is important if resources are insufficient to carry out risk assessments at all sites, or to include all sites in an early warning system (Step 5).

The ranking system should be kept simple. It does not really matter whether similar sites rank sixth or seventh in the list, and any large differences will usually be evident. Thus, complicated, time-consuming calculations should be avoided. Furthermore, in many cases the available data will be incomplete.

Sites harbouring globally threatened species or other species or populations qualifying for Single Species Action Plans should be given the highest ranking. These species and populations are listed in Column A of Table 1 in the AEWA Action Plan (see Appendix I to these guidelines; for further details see Guidelines No.1 *Guidelines on the preparation of Single Species Action Plans for migratory waterbirds*).

Step 4: Identify potential risks and negotiate safety measures with industries located near waterbird sites

If the national site inventory has been completed, those waterbird sites lying adjacent to, or downstream of, an industrial complex should be identified and listed. Otherwise, local experts should be consulted.

For each combination of listed waterbird site and industrial complex (e.g. oil refinery, chemical plant, mining complex), a full analysis should be made of all possible accidents, spills, explosions, leaks etc. The relevant industries should be involved in this process.

Special attention should be given to the relative positions of the waterbird site and the industrial complex, especially with respect to altitude and direction of flow of contaminated water, as this information will be required in the design of safety measures.

Safety measures include:

- proper technical control and regular maintenance;
- guarding of sensitive areas;
- construction of dikes or ditches around the industrial area, to contain the oil or chemicals in the case of a disaster,
- careful routing of transportation routes for hazardous substances (e.g. shipping lanes for oil tankers) away from sensitive and dangerous areas;
- clear definition of responsibilities for safety procedures within the industrial organisation.

Legislation should be developed and implemented to ensure that companies are financially responsible for the consequences of their neglect (the 'polluter pays' principle).

Risk analysis and the design of appropriate safety measures are complicated procedures requiring special skills. In the EU, standard procedures have been developed for HAZOP (Hazard and Operability) studies undertaken at industrial sites. Under the EC Directive on Major Hazards (commonly known as the Seveso Directive), potentially dangerous sites are required to prepare a safety study and also to carry out a HAZOP study, which they must finance themselves.

Existing statistics on incidents in the past are an important source of information in any risk analysis. In Europe, such statistics can be obtained from MARS (Major Accident Reporting System) at the European Commission's Joint Research Centre. The Seveso Directive places an obligation on EU Member States to exchange information on major accidents.

Details of MARS and HAZOP can be found in *The Dobbris Assessment*, published by the European Environment Agency in 1991.

Step 5: Establish a national Emergency Response Notification System

Several countries have established a central organisational structure where all oil or chemical spill incidents are reported, and where remedial measures are co-ordinated. It is important that all relevant information on incidents is entered into an easily accessible database for future reference and use.

Emergency Response Notification Systems are particularly well developed in the USA (see Box 6). For most countries in the AEWA area, a much less complicated (and less costly) structure would suffice.

Box 6: Emergency Response Notification Systems – the US example

The US Coast Guard operates a National Response Center (NRC) 365 days a year, 24 hours a day, where all incidents such as oil spills, chemical releases, transportation accidents, liquid pipeline releases and gas pipeline releases can be reported toll-free in a standard format. These incidents are entered directly into an online database, to be electronically disseminated as part of the National Response System (NRS, see below). The data are stored centrally in the Emergency Response Notification System (ERNS).

The ERNS is a computer database containing information on incidents throughout the US that have been reported either to the NRC, to one of the ten regions of the Environmental Protection Agency (EPA), or to the US Coast Guard.

The National Response System (NRS) is a governmental mechanism for emergency response to oil and chemical discharges in the environment. It has three organisational levels:

- a National Response Team (NRT);
- 13 Regional Response Teams (RRTs);
- a large and flexible number of On-Scene Co-ordinators (OSCs).

The NRT consists of 16 members of government agencies from different departments. The EPA serves as chair, and the US Coast Guard, which operates the NRC, as vice-chair. The NRT also operates special forces to assist the OSCs. These include:

- Coast Guard National Strike Force (NSF);
- Coast Guard Public Information Assist Team (PIAT);
- EPA's Environmental Response Team (ERT);
- Scientific Support Co-ordinators (SSCs).

Information on the NRC (including the standard format used in reporting incidents), ERNS and NRT can be found on the Internet (see References and useful web sites).

Where Emergency Response Notification Systems (ERNS) already exist, these are usually environmental in a general sense, and not particularly focused on birds. It may therefore be necessary to involve a separate body to maintain records of all emergency situations involving waterbirds, and to co-ordinate actions and publicity in close co-operation with the general ERNS.

In the EU, ERNS-related activities should always be linked to MARS.

For continuity, a centralised ERNS and its database are best located within an established government department or institute.

To provide the ERNS with information, an early warning system should be established, based on a network of local contacts at the sites identified as being susceptible to emergency situations. NGOs could play an important role in the establishment of a network of people watching individual sites. This network should be carefully maintained, and names and addresses should be kept in a database, which is regularly updated.

In some countries (mostly in Europe) where BirdLife International has compiled a list of Important Bird Areas (IBAs), networks of IBA caretakers have been established. These networks already function as an early warning system for IBAs (see Box 7). As virtually all important sites for migratory waterbirds are listed as IBAs, these caretaker networks should be involved in the national Emergency Response Notification System.

Box 7: An early warning system based on IBA-caretakers

Lists of Important Bird Areas (IBAs), compiled by BirdLife International, exist for all countries in Europe and the Middle East and Africa.

Sites that are important for migratory waterbirds usually qualify as IBAs.

In an increasing number of countries, BirdLife International is establishing an early warning system for emergency situations in designated IBAs by setting up a network of volunteer IBA-caretakers. These are individuals who agree to keep a watchful eye on one or more IBAs in their neighbourhood. In the case of an emergency, these caretakers can respond immediately to a central focal point.

Step 6: Adapt legislation where appropriate

Legal measures can be temporary or permanent. An example of a temporary legal measure is a shooting ban instituted by the Secretary of State in Great Britain after a certain number of days of cold weather (see Box 2). Permanent legal measures are designed to change the behaviour of people or industries or to force them to take certain precautions. Such measures are often introduced after a major disaster, and while coming too late to help in that event, may prevent repetition of similar events in the future. An important aspect of permanent legal measures is that they can provide for a system of fines, which, in the event of future violations, can produce funds to be used in mitigation. Legal measures are only effective if they are supported by adequate law enforcement.

The introduction of legal measures may be required by international agreements and conventions or, for example within the EU, by regional standards. In such cases, public awareness of the broader issues is especially important, otherwise individual countries may feel that unnecessary measures are being imposed upon them.

Step 7: Raise public awareness

Reports should be published on all emergency situations involving migratory waterbirds, and the press and other media should be involved wherever possible.

Emergency situations involving waterbirds should be reported to the AEWA Secretariat in a brief, standardised format. The report, which may be no more than a single page, should contain the following:

- date and duration of emergency situation;
- location;
- type of emergency situation;
- sites affected;
- species involved;
- estimated impact of emergency situation;
- measures taken;
- estimated effect of measures taken;
- organisations involved;
- public awareness activities undertaken.