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OCEAN ORBIT

THE NEWSLETTER OF THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION LIMITED

Response to the HEBEI SPIRIT incident, Republic of Korea

ITOPF 1968–2008

ITOPF celebrates its 40th anniversary this year. Established in the wake of the TORREY CANYON disaster to administer the TOVALOP voluntary oil spill compensation agreement, ITOPF has since evolved into the leading technical organisation in marine pollution response it is today. Serving the shipping community, ITOPF's activities include providing advice and assistance at oil and HNS spills, assessing damage and claims for compensation, undertaking training assignments and other advisory work, and supplying information via its publications, databases, website and GIS.

Global records of ship-source pollution show an improving trend in absolute terms, but continuing effort is necessary to promote the position of shipping as the most efficient mode of transport, and to make it yet cleaner and safer. The work of IMO is of key importance in this regard and ITOPF is committed to maintaining its contribution in areas of mutual interest.

In some regions maritime trade has increased sharply, bringing a higher incidence of spills in those waters as a result of collisions and groundings. One article in this newsletter describes a new tool using GIS to help assess the risk of oil spill by reference to changing oil transport patterns and historical spill data. As in previous publications, we draw on the ITOPF spill database to show some historical trends.

At 163rd place, the HEBEI SPIRIT incident in the Republic of Korea in December 2007 ranks as a medium-sized incident in terms of oil quantity spilled. However, it occurred in a very sensitive area and has had a profound impact on coastal fishing communities along much of the Korean west coast. This is the reason why, when measured on a scale of effort expended, this incident is the biggest by far that ITOPF has ever attended. The response to this incident has tested the formal links and personal relationships between the ship owner, the P&I Club, the IOPC Funds, Korean government agencies, local surveyors and coastal communities. It is testament to the commitment of all parties that progress continues to be made in resolving the many complex issues arising out of this one spill which has received relatively little attention in worldwide media.

Co-operation with the scientific community during the TREASURE incident in South Africa in 2000 has offered a good opportunity to support some worthwhile research into the effectiveness of wildlife protection and rehabilitation. A guest writer reports the successful results of the most ambitious rescue operation of oiled penguins ever attempted.

ITOPF's anniversary will be marked with a formal dinner in London with industry leaders, friends and associates, old and new. In thanking them for past support, we look forward to serving the needs and shared interests of our members, associates and partners in the future.

Large numbers of volunteers were involved in the early stages of the HEBEI SPIRIT response

ITOPF and the HEBEI SPIRIT

ITOPF's role as an international oil and chemical spill advisory body means that our technical team attends numerous shipping incidents worldwide throughout the year. Our busiest time is typically during the northern hemisphere winter, when high winds and heavy seas may cause accidental groundings and collisions. However, no one could have predicted the turn of events that led to the Republic of Korea's largest ever oil spill on Friday 7th December 2007.

During that morning, while at anchor off Taean, laden with 209,000 MT of four different Middle Eastern crude oils, and awaiting discharge at Hyundai Oilbank refinery, the VLCC HEBEI SPIRIT (146,848GT, built 1993) was struck by the crane barge, SAMSUNG No.1. The barge was being towed by two tugs in inclement weather when it broke free and hit the tanker, puncturing three port-side cargo tanks. The tanker crew carried out emergency internal transfers of oil cargo, but despite these mitigating efforts around 10,800 MT of Iranian Heavy, Upper Zakum and Kuwait Export crude oils were released to the sea.

Shortly after the collision, ITOPF was notified by Assuranceforeningen Skuld, the P&I insurer for the HEBEI SPIRIT, and requested to attend site as joint technical advisers to both the Skuld P&I Club and the IOPC Funds. As preparations were being made for two of our technical team to depart for Seoul, more information was gathered through our contacts within Korea.

On arrival in Taean County on 8th December, our technical team began work with the Korea Coast Guard to provide advice on the most effective response actions with the aim of minimising the level of damage resulting from the spill. The Korea Coast Guard has overall responsibility for marine pollution response in Republic of Korea waters. During the early stages of the HEBEI SPIRIT clean-up operation this involved the command and control of over 100 government vessels, more than 1,500 private fishing boats, tens of kilometres of containment boom and in excess of one million man-days of labour. Since the outset of this response ITOPF has assisted with technical advice, both in the command post and in the field.

One of the most crucial priorities was to determine the full extent of the contamination, both at sea and along the shorelines. From aerial reconnaissance flights it was confirmed that the prevailing northwesterly winds and coastal currents had carried the oil onto shorelines southeast

Filming project

ITOPF has embarked on a filming project with Callisto Productions to capture footage of response measures during real-life pollution incidents. With the backing of the P&I Clubs and other relevant authorities, filming has so far taken place at the scene of two spills – the SERVER (Norway, 2007) and HEBEI SPIRIT (South Korea, 2007).

The aim of the project is to create a series of short educational films and other teaching aids to be used in ITOPF's training activity. A short sequence of key shots from the HEBEI SPIRIT showing examples of contaminated shorelines, a range of clean-up activities and the logistical challenges of co-ordinating and servicing a large workforce is available for viewing on the ITOPF website (www.itopf.com).

of the collision site. During the initial few days of the incident, oil contamination was largely confined to Taean County in Chungcheongnam-Do Province. However, over a period of three weeks, mainland shorelines and islands further south were also oiled such that by early January 2008, the impact of the spill extended across three provinces and hundreds of kilometres of coastline, both on the mainland and on numerous islands.

The sheer extent of shoreline contamination stretched the resources of all organisations involved in the spill response operation. ITOPF made periodic visits to the many polluted sites, making joint inspections with the Korean authorities, to provide advice on clean-up techniques and realistic end-points for the work. In addition, personnel from Korean survey firms appointed by the P&I Club and the IOPC Funds remained stationed at many of these sites in order to monitor progress.

The clean-up recommendations have, at times, been difficult to implement, particularly with regard to terminating active cleaning. It is widely accepted amongst leading oil spill specialists that the use of prolonged or aggressive clean-up techniques, such as excavation or pressure washing with hot water or steam, results in a slower ecological recovery than if the site is left to clean naturally, or more gentle methods are applied. Therefore, it has been essential to build trust with the Coast Guard, government officials and local communities from a very early stage.

In addition to our role in the response, ITOPF has been involved in the assessment of spill-related damages with a particular focus on the losses to the fishing and aquaculture industries. These are of great importance to the national economy. For instance, the southwestern province of Jeollanam-Do normally produces around 80% of the nation's seaweed, particularly laver (*Porphyra spp.*). However, this year, as a result of the spill, seaweed cultivation farms covering thousands of hectares have been affected. In addition, in Taean County extensive intertidal oyster cultivation areas have also been contaminated. Indeed, some oyster farms have been removed entirely in response to the spill. Large-scale hatchery production facilities for laver, sea mustard, abalone, sea cucumbers, and finfish, have also been affected. A key role that ITOPF has played whilst on-site working with Korean survey firms has been to advise fishing and aquaculture cooperatives on ways in which they can reduce the impact to their business and to work with them in assessing the losses they may have suffered.

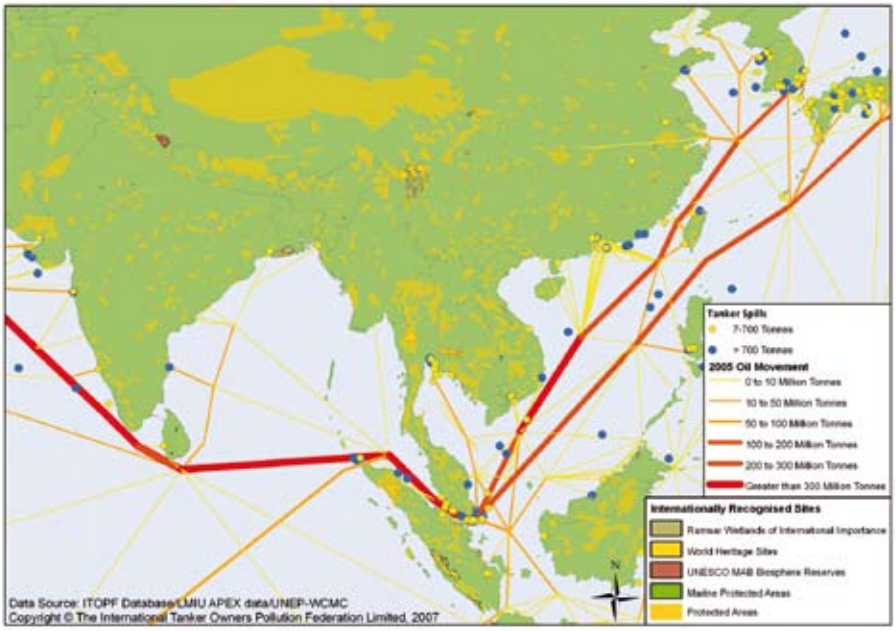
In addition to its significance for fishing and aquaculture, the Taean peninsula is the third most important tourism area in Korea with almost 21 million visitors annually. The area is also designated as the Taean National Park. Its main attractions are its beaches, coastal scenery, marine life and a multitude of fresh seafoods. The full impact of the spill on tourism has yet to be determined.

Shoreline clean-up activities ceased at most sites within Taean County, in time for the summer season. Whilst there is an expectation of decreased numbers of visitors this year, our experience of spills affecting similar prime tourist areas in other countries shows that it is realistic to expect tourism to rapidly recover.

While in attendance at incidents such as the HEBEI SPIRIT, our regular reports provide the P&I Clubs and the IOPC Funds with the technical foundations for the many decisions that must be made regarding compensation for pollution damage. Gathering the information required to make thorough damage assessments in a large-scale incident such as this is a complex task. This can only be achieved with the assistance of local survey firms with whom we have developed a close working relationship over many years. In addition, ITOPF frequently works alongside other independent experts specialising in key areas such as fisheries, aquaculture and tourism. In the case of the HEBEI SPIRIT, nine specialist advisers have been, and continue to be, involved in establishing the likely damages to these important sectors.

Great progress has been made in assessing the impact of the HEBEI SPIRT incident. ITOPF advisers continue to play a key role as part of a team of local and international experts, in striving to ensure that the spill is cleaned up effectively and providing assistance in assessing fair and reasonable compensation to those who have suffered losses as a result of the incident.

The use of hot water washing is justified in amenity areas



GIS information for Asia: 2005 oil movements and UNEP/WCMC international areas of importance

Using GIS to help assess the risk of marine oil spills in China

Following rapid expansion in the 1990s, the economy of the People's Republic of China is currently predicted to become the largest in the world within a generation. Oil imports and marine transportation have experienced a surge in recent years in keeping with the nation's rapid economic growth. This rise in traffic brings with it a greater threat of ship-source oil spills.

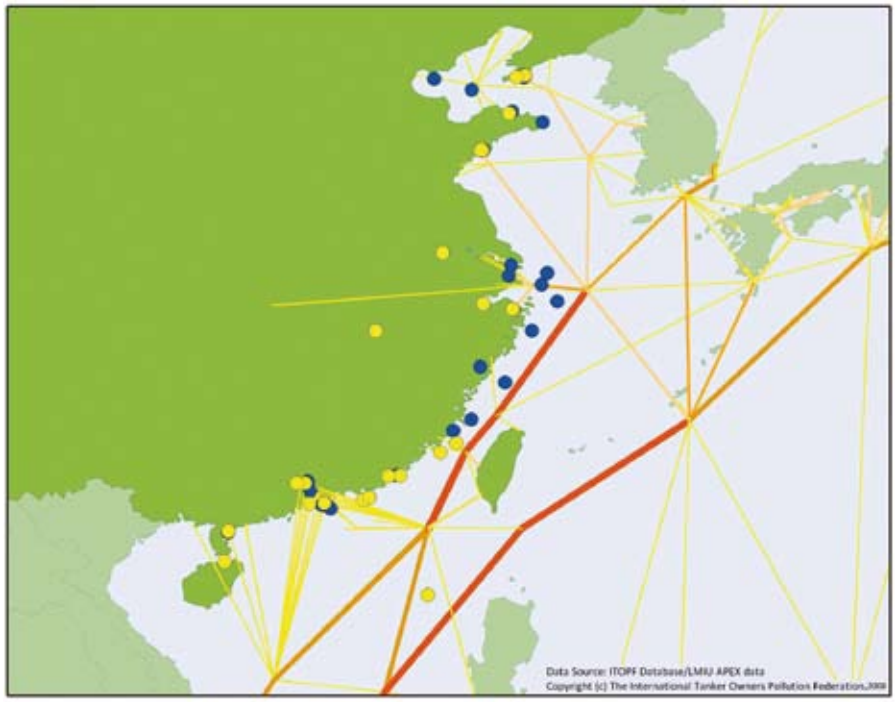
Assessing the risk of oil spills can be a complex process. ITOPF has modelled and analysed the amount of oil transported around coastal areas during 2001 and 2005, using data obtained from Lloyds' Marine Intelligence Unit (LMIU), and compared it with historical data from its tanker spills database. A GIS platform allows this information to be graphically visualised and further datasets can be integrated regarding local sensitivities.

The initial investigation of the tanker route data was undertaken at a global scale. Our analysis looked at panamax vessels and above (≥ 60,000 DWT) carrying crude oil, 'dirty' product (condensates and fuel oil) and 'clean' product (diesel oil, gas oil, jet fuel and naphtha). In order to make the data compatible with a GIS, it had to be transformed from its raw format into a series of geographically digitised routes. During this process the data continued to maintain relevant information such as cargo type, quantity and vessel type. Each route was digitised manually through a set of predetermined waypoints using a variety of information sources to deduce the most likely route taken by each vessel. The tanker voyage dataset for 2001, for example, comprised approximately 10,000 individual routes, which upon digitisation became a complex tanker route network. The tanker routes were then aggregated in order to show the total tonnage and number of vessels moving along any given section of a route in the relevant year.

As both the 2001 and 2005 tanker oil movements were modelled using the same methodology, the evolution in movements over the 4-year period could be calculated. This allowed us to observe, for example, that during the period from 2001 to 2005 oil imports by sea to Chinese ports increased approximately 170% to 140 million tonnes a year.

An increase in vessel traffic is one of a number of factors likely to increase the frequency of spills, and with the proximity of the major shipping routes in China to heavily exploited fishery resources, the consequences of an incident could potentially be severe, affecting both the fishery sector economy and the communities that rely upon it for their livelihood. Fortunately, to date, oil spills in Chinese waters have been relatively small, but ITOPF and other international organisations are working to build awareness of the risks and to develop links with key parties through training courses and seminars. By working closely with the Chinese Maritime Safety Administration (MSA) and with the Northwest Pacific Action Plan (NOWPAP), a regional UNEP initiative, it is hoped that the threat of future incidents can be minimised and handled in a rational manner.

Further information is available in Lisa Woolgar's paper "Assessing the increasing risk of marine oil pollution spills in China", presented at the International Oil Spill Conference 2008, Savannah, Georgia, and available on the ITOPF website.

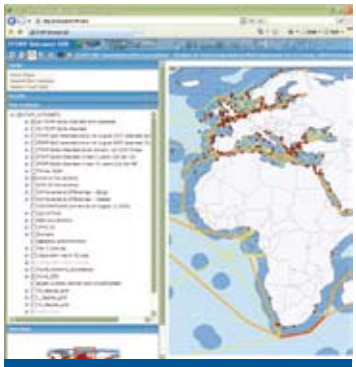


Total 2005 Tonnage

- 0 to 10 Million Tonnes
- 10 to 50 Million Tonnes
- 50 to 100 Million Tonnes
- 100 to 200 Million Tonnes
- 200 to 300 Million Tonnes
- Greater than 300 Million Tonnes

- Tanker Incidents
- Tanker & Non-tanker Incidents Attended by ITOPF

GIS representation of 2005 oil movements and vessel incidents (1970-2007)



Oil spill risk mapping

Oil spill risk information can now be displayed on ITOPF's website through our Geographic Information System (GIS).

ITOPF has analysed and interpreted raw data obtained from Lloyd's Maritime Intelligence Unit (LMIU) on laden oil tanker shipments for the years 2001 and 2005 to produce a graphic representation of worldwide tanker traffic. This can be displayed alongside information on the top 100 tanker spills, spills attended by ITOPF (which include both tanker and non-tanker spills and spills from other sources, such as pipelines), country profiles, and also the status of relevant international conventions. The information can be viewed on a global or regional basis and hard copies of the maps printed off. This data is expected to be of general interest and of particular value in risk assessments for contingency planning. We hope to integrate further datasets, for example on environmental sensitivities, in the near future.

Tanker Spills: The last 40 years

The number of spills from accidents involving tankers has decreased significantly over the last four decades. During the 1970s, an average of 79 spills of at least 7 tonnes (50 barrels) per annum was reported, 25 of which were major (> 700 tonnes or 50,000 barrels). In contrast, since 2000 there has been an average of 19 spills per annum, four of which were of major proportions.

Approximately 5.65 million tonnes of oil were lost as a result of tanker accidents between 1970 and 2007. The spill volumes in any given year can be influenced by a few catastrophic incidents thereby resulting in considerable annual variation. However, an analysis of the volume of oil spilt from tankers does demonstrate a significant improvement through the decades, as Figures 1 and 2 indicate.

During this time, seaborne oil trade has undergone steady growth apart from a fall during the worldwide economic recession of the early 1980s (see Figure 3) and currently, the tanker industry is responsible for two-thirds of all the oil transported annually. The volume of oil lost as a result of tanker accidents in the 1970s represented 0.02% of the volume shipped annually, whilst just 0.001% of the oil transported since 2000 was accidentally spilt, a twenty-fold improvement on the 1970s.

As increased oil movements would normally signal increased risk, it is encouraging to learn that these downward trends continue despite an overall increase in oil trading worldwide over the period. The progress observed is likely the results of the introduction and enforcement of various legal instruments and safety measures which were implemented following major incidents.

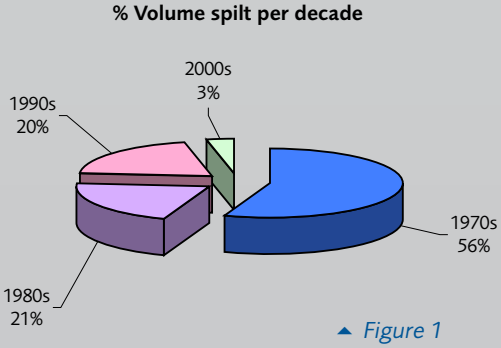


Figure 1

The International Convention for the Prevention of Pollution by Ships (MARPOL 73/78), designed by the International Maritime Organisation (IMO), came into force in 1983 after a series of high profile accidents in the 1970s and is the main international convention covering ship-source marine pollution. Annex I of the convention addresses all but the smallest tankers and includes regulations regarding subdivision and stability which aim to ensure that, in any loading condition, the ship can survive following collisions or groundings. Vessels are also surveyed regularly to ensure that the structure, equipment, materials and arrangements fully comply with the Convention.

The IMO has introduced several other measures over the years to ensure that a ship can still be controlled in the event of a mechanical failure. Under the International Convention for the Safety of Life at Sea (SOLAS 1974) for instance,

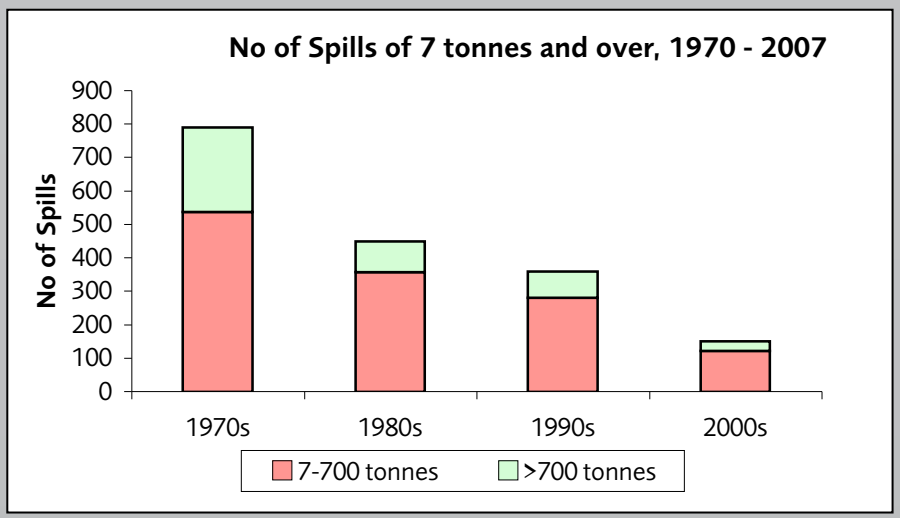


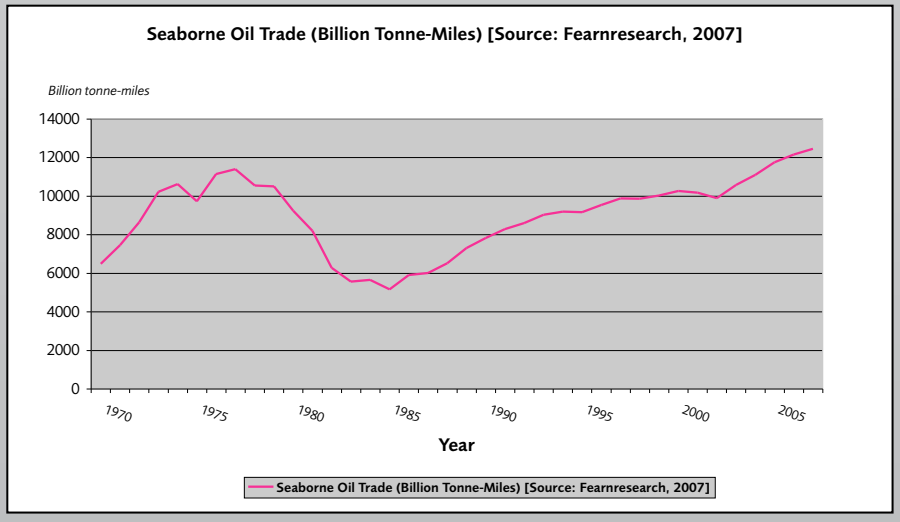
Figure 2

it is necessary that essential parts such as steering gear and navigational equipment are duplicated.

The International Safety Management Code (ISM Code) was added to the SOLAS Convention in 1994 and came into effect in 1998. This Code requires tankers and other vessels to have safety and pollution prevention rules and implement a Safety Management system. The ship is then subjected to an assessment and certification by shore-based managers of the vessel. The Code recognises that many accidents can be attributed to human error and aims to reduce these through training, communication and accountability. If a ship is found to be non-compliant, it would not be allowed to leave the port.

Following the EXXON VALDEZ incident in 1989, the Oil Pollution Act of 1990 (OPA 90) was adopted in the United States and has been credited with a substantial positive impact in decreasing the volume of oil spilt from tankers in US waters immediately following its introduction. It is enforced by the US Coast Guard and contains strict safety procedures for vessels operating within US waters and penalties for regulatory non-compliance. In addition, OPA 90 provided new requirements for contingency planning both by government and industry.

The tanker industry has undergone many improvements in the past four decades and measures continue to be proposed and adopted on international, regional and governmental levels to further reduce the risk of oil spills. The phasing out of single-hull vessels and the introduction of double-hull and double-sided vessels as stipulated in MARPOL 73/78 and OPA 90 for instance is well underway. It remains to be seen whether this measure and other developments will have the desired effect of reducing pollution further.



▲ *Figure 3*

Does cleaning oiled seabirds have conservation value?

Insights from the South African experience with African Penguins – *Anton Wolfaardt*

ITOPF provided Anton Wolfaardt, a South African PhD student, with funding from its Thor Heyerdahl Award to attend the 6th International Penguin Conference in Tasmania where he presented his key findings on the successful rehabilitation of Jackass Penguins during the TREASURE oil spill in South Africa in 2000. Anton is a former Chief Ranger at Dassen Island Penguin Sanctuary and has provided the following summary of his research.

Cleaning contaminated seabirds has generally been viewed as an animal welfare issue, with little conservation value. Proponents of this view argue that de-oiling has little if any impact at the population level due to: 1) the low proportion of oiled birds that are caught alive in a condition that allows them to enter the de-oiling process; 2) limited success of the de-oiling and treatment process resulting in poor release rates from the rehabilitation centre; 3) low survival rates of de-oiled birds after their return to the wild; 4) little evidence of meaningful numbers of de-oiled birds surviving to reproduction; and 5) impaired reproductive performance for those birds that do breed compared with un-oiled birds.

The sinking of the bulk iron-ore carrier APOLLO SEA and subsequent oil spillage near Dassen Island off Cape Town, South Africa in June 1994 provided an opportunity to determine the population-level benefits of de-oiling African Penguins *Spheniscus demersus*. This information was considered vital by the conservation authorities to provide policy and action plans on how to prepare for and respond to future oil spill events. Six years later, another iron-ore carrier, the MV TREASURE, sank between Robben and Dassen Islands, spilling approximately 1,400 tonnes of heavy fuel oil.

Since its establishment in 1968, the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) has treated in excess of 50,000 oiled African Penguins. Although larger numbers of other species, such as the Magellanic Penguin *Spheniscus magellanicus*, have been oiled, based on the proportion of the global population which has been affected by oil spills, the African Penguin can be considered the bird species most impacted by oil pollution globally. Consequently there is no doubt about the severity of the impacts of oil pollution on the conservation status of African Penguins. Indeed, oil pollution is listed as one of the critical threats faced by the species.

In our study, we defined a de-oiled bird as an oil-contaminated bird which has been caught, cleaned and released into the wild from the cleaning centre (SANCCOB). A rehabilitated bird is one which is known to have survived in the wild for at least one month after its release, and a restored bird is one which has been recorded breeding subsequent to its release from SANCCOB. We have been able to measure these parameters because almost all of the de-oiled penguins were fitted with individually marked flipper bands before their release. Moreover, the long-term nature of our study period (greater than 10 years) has allowed us to quantify and assess these parameters in a rigorous manner.

There were marked differences between the APOLLO SEA and TREASURE spills in the number of birds that were successfully de-oiled. Almost 50% of the oiled penguins from the APOLLO SEA spill died, most within 48 hours of their initial capture. The main reasons for this high mortality rate related to the lack of

▲ *Oil contaminated African Penguins, Source: Anton Wolfaardt*

preparedness by authorities for a spill of this magnitude, and inappropriate transport methods. Birds were packed into trucks with little ventilation, and it is thought that many of the birds died of asphyxia. Fortunately, these lessons were quickly heeded, and comprehensive contingency plans were developed, and a special penguin transport box was designed. The implementation of these measures during the TREASURE spill, which contaminated twice the number of penguins that were oiled in the APOLLO SEA spill, resulted in a significantly lower mortality rate during the early phases of the rescue operation. This in turn translated into a greater proportion of admitted birds being released from SANCCOB than was the case in the APOLLO SEA spill.

Our research has shown that almost all penguins which survive the de-oiling process to be released are successfully rehabilitated (i.e. survive in the wild for at least one month). Survival rates of de-oiled penguins are similar to never-oiled birds, in the short, medium and long term. On the basis of these rehabilitation results, it has been estimated that the present African Penguin population is 19% larger than it would have been had de-oiling not taken place since the establishment of SANCCOB in 1968.

Our study has also demonstrated that about 74% of the de-oiled penguins are successfully restored into the breeding population. This represents the highest restoration figure anywhere in the world. Although the majority of rehabilitated birds were successfully restored, the remainder (26%) appear to have been unable to breed. Non-breeding in this context is permanent and so is distinct from temporary non-breeding or intermittent breeding. We are convinced that oiling has inhibited breeding in these birds, but are not certain of the mechanism involved. In several other species, oiling has been found to damage key organs such as the liver and kidney, compromise the immune system of affected birds and to inhibit and reduce breeding.

We also found differences in breeding success between de-oiled and never-oiled birds, which were most severe when feeding conditions were poor. On average the breeding success of de-oiled birds was 11% lower than never-oiled birds. Incubation success (the hatching rate of laid eggs) was similar for both study groups, but there were significant differences in the growth rates of chicks from the two groups and the overall fledging success. We suggest that the reduced growth rates and fledging success of de-oiled birds relative to un-oiled controls relates to a reduced ability of de-oiled adults to meet the energy demands of their chicks, especially when these peak mid-way through the fledging period.

Our results from the monitoring of TREASURE oil spill survivors are consistent with those from the APOLLO SEA spill. During the TREASURE oil spill approximately 19,500 un-oiled penguins were evacuated to Cape Recife in the Eastern Cape (c. 800km from their breeding colonies). This was the first time that such an intervention had been implemented for African Penguins. The aim and hope was that the return swim by the penguins to their breeding colonies would provide sufficient time to clean the oil-contaminated waters around these colonies. Satellite tracking of some of these birds showed that this was the case. The first birds started arriving in the vicinity of the colonies a day or two after the final oil slicks had been cleaned. Further monitoring showed that the un-oiled evacuees returned to their colonies and resumed breeding in greater numbers and more rapidly than the de-oiled birds, highlighting the conservation value of evacuating clean penguins during large oil spill events.

In conclusion, our results show that de-oiling contaminated African Penguins certainly has an impact at the population-level and can be justified on conservation grounds. However, it is also clear that a de-oiled penguin is not as good as new, and we need to re-double our efforts to prevent oil from entering the ocean in the first place.

Interspill 2009 & IMO R&D Forum

ITOPF has a place on the Programme Committee for the 2009 Interspill Conference & Exhibition to be held in Marseille from 12-14th May, 2009 and is supporting the 4th IMO R&D Forum to be held in conjunction with Interspill.

We have been involved in the development of the programme content and will be reviewing abstracts and papers. In collaboration with IMO and EMSA, ITOPF is co-authoring a white paper intended to stimulate discussion around the question "Are HNS spills more dangerous than oil spills?". It is anticipated that we will also host an educational workshop in conjunction with the conference.

Bunker Convention comes into force

The last significant gap in the international regime for compensating victims of oil spills from ships is set to be closed, with the entry into force on 21st November 2008 of an international convention covering liability and compensation for pollution damage caused by spills of oil, when carried as fuel in ships' bunkers. The International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 complements the regime that has been in place for many years with respect to spills of persistent oil from tankers, the International Convention on Civil Liability for Oil Pollution Damage, 1992 (CLC 92). While CLC 92 has always included compensation for bunker spills from tankers subject to it, until the entry into force of the Bunker Convention, bunker spills from dry cargo and other types of ships have been subject only to national regimes.

Mrs Kelly Reynolds and Dr Mark Whittington

New Technical Advisers

In the last 18 months, we have recruited two new technical advisers, bringing to 13 the number of staff available to respond to spills.

Dr Mark Whittington is a marine biologist with a background in fisheries, aquaculture and environmental monitoring. He has previously worked in marine consultancy in the UK and on coastal zone management projects in East Africa and the Middle East.

Mrs Kelly Reynolds has a degree in Maritime Environmental Management and a Masters degree in Coastal Zone Management. Before joining ITOPF she spent five years working for the UK Maritime and Coastguard Agency (MCA) in the Counter Pollution Response Branch where she was involved, amongst other things, with the response to the beached container vessel, MSC NAPOLI.

ITOPF staff had the opportunity for some hands-on practice with clean-up equipment at a CEDRE training course in July (photograph © CEDRE)

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