

# **Effect of the March 2009 oil spill on the Moreton Bay Ramsar site**

Prepared by:

Natural Resources and Environment Policy Division

Department of Environment and Resource Management

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## Summary

On 11 March 2009, the container ship *Pacific Adventurer* lost 31 containers overboard and leaked approximately 270 tonnes of oil seven miles east of Cape Moreton.

This report investigated the effects of the oil spill on the Moreton Bay Ramsar site. It found that there had been impacts on some components of the ecological character of the Ramsar site, but these are within acceptable levels and natural variability.

The oil washed ashore between Marcoola Beach and Moreton Island. Shortly after the report of the oil spill, Maritime Safety Queensland activated the *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances* and *Queensland Coastal Contingency Action Plan*.

While the spill was outside the Moreton Bay Ramsar site, part of the oil affected area is within the Ramsar site. The draft report *Moreton Bay Ecological Character Description* (draft ECD report) was used to assess the effect of the oil spill on the ecological character of the Ramsar site. Two reference habitat areas were directly affected by the oil spill:

- ocean beaches and foredunes
- Bay island wallum wetlands.

Assessment of the effects on these two areas—against the indicators of unacceptable change or key attributes identified in the draft ECD report—does not indicate that the ecological character of the Ramsar site will change as a result of the oil spill.

The number of wildlife directly affected was low, due to low species numbers where the oil spilled and washed ashore. Also, the weather conditions at the time which had already caused wildlife to disperse.

The small area of wetlands and beaches affected, and the high natural variability of these areas, indicates that limited monitoring is required.

The latest information on the oil spill is available from the Maritime Safety Queensland website:

[http://www.msq.qld.gov.au/Home/About\\_us/Msq\\_headlines/Headlines\\_pacific\\_adventurer](http://www.msq.qld.gov.au/Home/About_us/Msq_headlines/Headlines_pacific_adventurer)

## The incident

The Hong Kong registered container ship *Pacific Adventurer* left Newcastle, New South Wales on 9 March 2009 bound for Brisbane under normal coastal shipping protocols within ship navigation lanes. It was carrying a load of approximately 1000 tonnes of ammonium nitrate prills in fifty 20-foot shipping containers each weighing approximately 19.5 tonnes.

At this time Tropical Cyclone Hamish was moving down the Queensland coast. Conditions were not considered severe enough to halt commercial shipping movements. At 2330 10 March, the Bureau of Meteorology issued a warning that Severe Tropical Cyclone Hamish with maximum winds of 70 knots was centred about 216 miles northeast of *Pacific Adventurer* and moving east at 3 knots.

By around 0300 on 11 March, the ship was located seven miles east of Cape Moreton and rolling very heavily. The timeline for the oil spill incident was:

- 0312: The ship rolled violently and 31 containers from Bay 25 fell over the side of the ship.
- 0313: The incident was reported to Brisbane Harbour Control.
- 0335: Shipping was warned of the danger of floating containers.

0552: During an inspection of the hold and deck leaking fuel oil was observed from the number one port fuel tank. Transfer of fuel oil into number two starboard fuel oil tank commenced.

0650: The master reported the fuel oil spillage to Brisbane Harbour Control

0710: the flow of fuel oil had stopped. The ship's chief engineer estimated that approximately 31 tonnes of fuel oil had leaked.

0852: A harbour pilot boarded and confirmed that no oil was leaking from the ship.

The ship then moved to a suitable anchorage in Moreton Bay. Following an assessment of the ship's condition, it was given permission to berth on 12 March. On 13 March during operations to bring the ship to a layup berth more fuel oil was observed leaking into the Brisbane River from holes in the underwater part of the number one starboard fuel oil tank.

An independent fuel survey subsequently calculated the amount of fuel oil leaked as 270 tonnes.

The rough weather helped to break up some of the oil and push it offshore.

However some of the spilled oil came ashore along the Queensland coastline from Marcoola Beach and Point Arkwright on the Sunshine Coast to areas around Bribie Island and Moreton Island.

On 19 and 20 May, heavy rainfall combined with high tides eroded the previously oiled ocean beaches and redistributed the oil within the freshwater wetlands.

## Ramsar site background

The Moreton Bay Ramsar site is located in the south-eastern region of the state of Queensland, Australia. The site lies immediately to the east of Brisbane, and extends southeast along the Gold Coast and northeast to the Sunshine Coast, and incorporates several offshore sand islands: Moreton, Bribie, North Stradbroke and South Stradbroke islands. Brisbane is the capital city of Queensland, with a population currently estimated at 1.8 million.

Within the Ramsar site, there are several groups of Traditional Owners who have identified their responsibility to manage their country. The Quandamooka people in particular have strong association with Moreton Island and surrounding areas.

The Moreton Bay Ramsar site is a large estuarine bay enclosed by a barrier of sand dune islands. It contains a wide diversity of wetlands with twenty-one Ramsar wetland types represented including ocean beaches, marine waters, coral reefs, freshwater lakes, tree-dominated swamps and peatlands. It supports a number of *Vulnerable* and *Endangered* wetland flora and fauna, and also provides important habitat for a diversity of shorebirds. It is one of only three extensive intertidal areas of seagrass, mangroves and saltmarsh communities on the eastern coast of Australia, and is consequently valuable due to provisioning for fisheries resources and marine megafauna of conservation significance. The Moreton Bay Ramsar site has important cultural values to indigenous people, with numerous archaeological sites containing significant artefacts located within the wetlands of the Ramsar site.

The total area of the Ramsar site is 120 525 hectares.

## Ecological character description of the Ramsar site

The draft *Moreton Bay Ecological Character Description* (draft ECD report) was prepared in 2008 using the *National Framework for Describing the Ecological Character of Australia's Ramsar Wetlands*.

It identified the critical ecosystem services/benefits that characterise the Ramsar wetlands as:

- supporting a diversity of wetland habitat types that are representative of a major coastal wetland aggregation and in many areas show a high degree of connectivity between habitat types
- supporting several coastal wetland habitat types that are in a near natural state and are key reference sites in the context of the biogeographic region
- supporting and assemblage of vulnerable and endangered marine/aquatic fauna species
- supporting an assemblage of vulnerable and endangered wetland-dependant fauna species
- supporting an assemblage of vulnerable and endangered wetland flora species, and endangered and of concern wetland regional ecosystems
- supporting significant populations of shorebirds
- providing valuable recreational and commercial fishing resources
- contains important cultural values and significance to indigenous peoples
- contains importance for research and education
- providing and supporting significant tourism and recreational uses.

A number of underlying processes were found to be important in maintaining the wetlands. These include:

- broad and local scale hydrodynamics and coastal processes
- hydrology (particularly as it relates to groundwater interaction and freshwater flows)
- water and sediment quality
- energy and nutrient dynamics
- climate
- geomorphology
- a range of biological processes such as growth, reproduction and feeding.

To describe the ecological character of such a large and diverse site, the draft ECD report identified and described six important reference habitat areas that are representative of the bioregion and remain in a near natural state:

- seagrass and shoals in the Eastern Banks area
- intertidal flats and estuarine assemblages in the Pumicestone Passage area
- mangroves and saltmarsh associated with the islands in the Southern Bay
- coral communities of the Eastern Bay
- freshwater wetlands (including wallum and peatlands) of Moreton and Stradbroke islands
- ocean beaches and fore dunes on Moreton Island.

Conceptual models were developed for each of the six habitat areas.

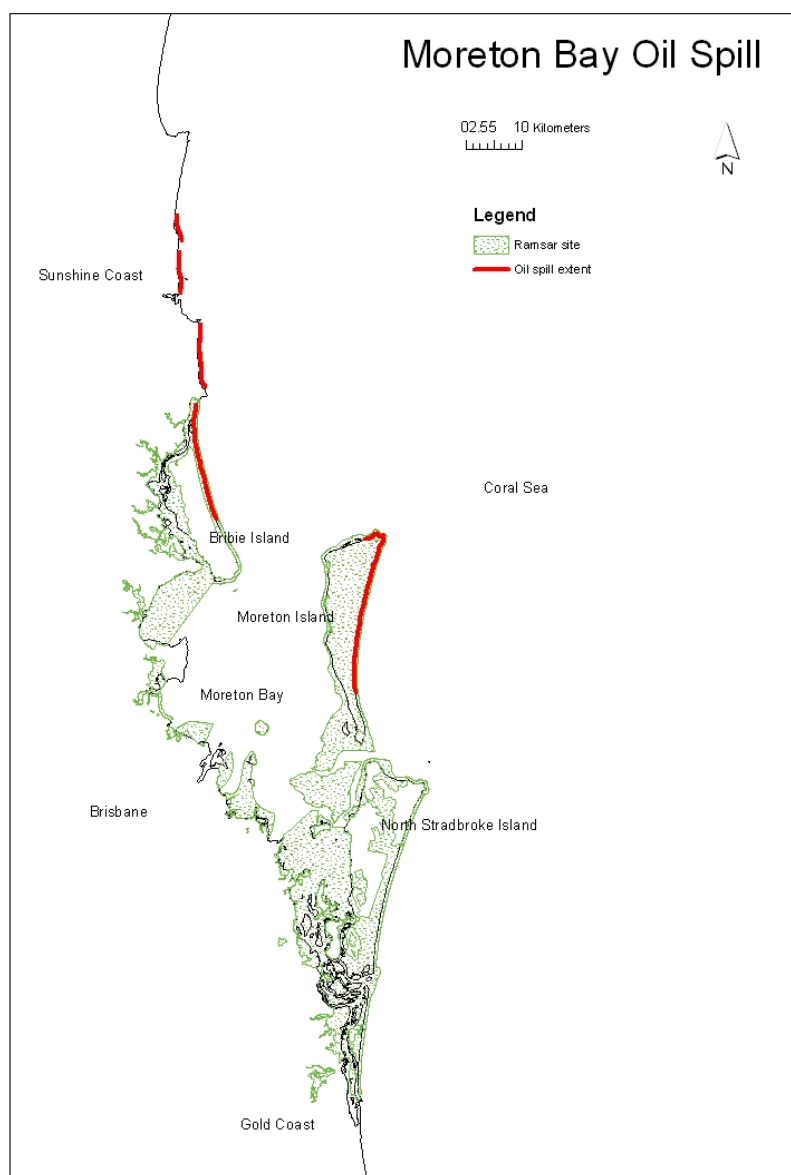
Approximately 200 ha of Type D wetlands (rocky marine shores, sea cliffs) were identified as occurring within the Ramsar site with Cape Moreton and Point Lookout given as examples. However they were not found to be a critical component and were not described in detail in the draft ECD report.

## **Extent of Ramsar site impacted**

### **Extent of oil**

Within the Ramsar site, the oil washed ashore on Bribie Island and Moreton Island. Oil was deposited on ocean beaches on both islands and on rocky shores and in small freshwater wetlands connected to the ocean on Moreton Island. No migratory bird roosting sites, seagrass meadows or coral reefs were oiled. Oil does not appear to have spread into Moreton Bay or Pumicestone Passage.

Figure 1 shows the extent of the oil spill in relation to the Ramsar boundary. Approximately 2.8 kms of rocky shores and 49 kms of ocean beaches were oiled. Spitfire Creek and Eagers Creeks on Moreton Island were the largest freshwater wetlands affected.



**Figure 1 Extent of oil spill**

## Wetlands affected

The Ramsar site includes areas that are not classified as wetlands. The draft revised Ramsar Information sheet (2008) (RIS) includes updated estimates of the Ramsar wetland types. These have been compared to wetland mapping based on the Queensland wetland mapping and classification methodology, a shoreline classification and reports on the extent of oiling to calculate the area of each Ramsar wetland type oiled.

Wetland type	Area* (ha)	Estimate of area oiled (ha)	% Oiled
Ramsar site	120 525	55-82	0.05-0.07%
D Rocky marine shores, sea cliffs	192	2.8-4.2	0.04 -0.06%
E Sand, shingle or pebble shores, sandbars, dunes	2 912	50-75	1.7-2.6%
M Permanent rivers/streams/creeks and U Seasonal/intermittent /rivers/streams /creeks	<5	0.35	7%
Tp Permanent freshwater marshes /pools, Ts Seasonal/intermittent freshwater marshes/ pools, U Non-forested peatlands and Xp Forested peatlands; peat swamp forests	8 417	< 1.8	<0.02%

\* Draft updated RIS 2008

**Table 1 Estimate of indicative area of wetland types oiled**

Note: The numbers in Table 1 should be used with care as they are based on mapping and surveys of differing accuracies and on estimates of the average width of linear features. The areas for rocky and sand beaches are calculated for 10-15 m widths. The width of creeks used in calculations is 10 m.

## Wildlife affected

The number of wildlife affected was low, primarily due to the cyclonic weather conditions which dispersed wildlife, but also due to the location of the oil spill, high tides and where oil washed ashore.

A rehabilitation centre was set up to deal with oil affected wildlife. All deceased wildlife found in the area was autopsied to determine the cause of death. No turtle or wader deaths were found to be related to oil.

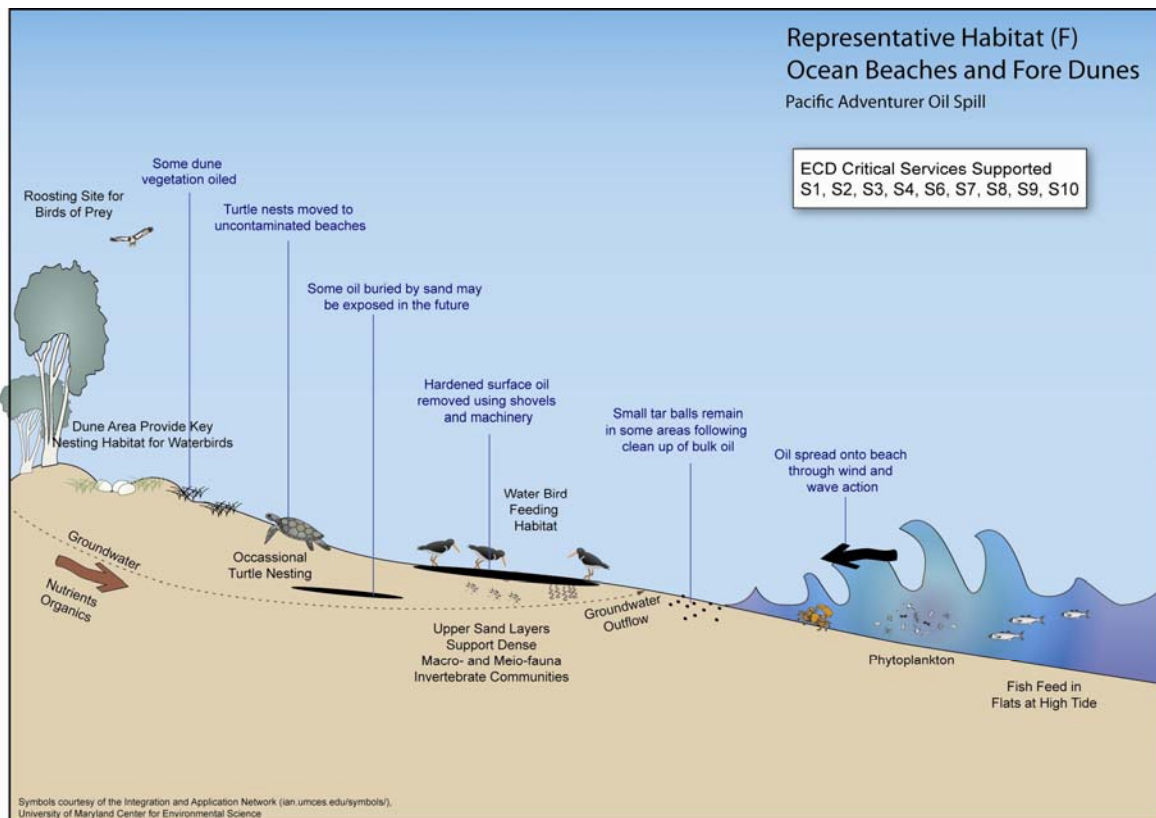
The results to date are:

- 13 pelicans washed, rehabilitated and released
- 1 crested tern, washed, rehabilitated and released
- 1 kingfisher, washed, rehabilitated and released
- 1 wedge-tailed shearwater, still in care
- 1 little tern, deceased
- 1 sea snake, deceased
- 1 great-winged or providence petrel, deceased.

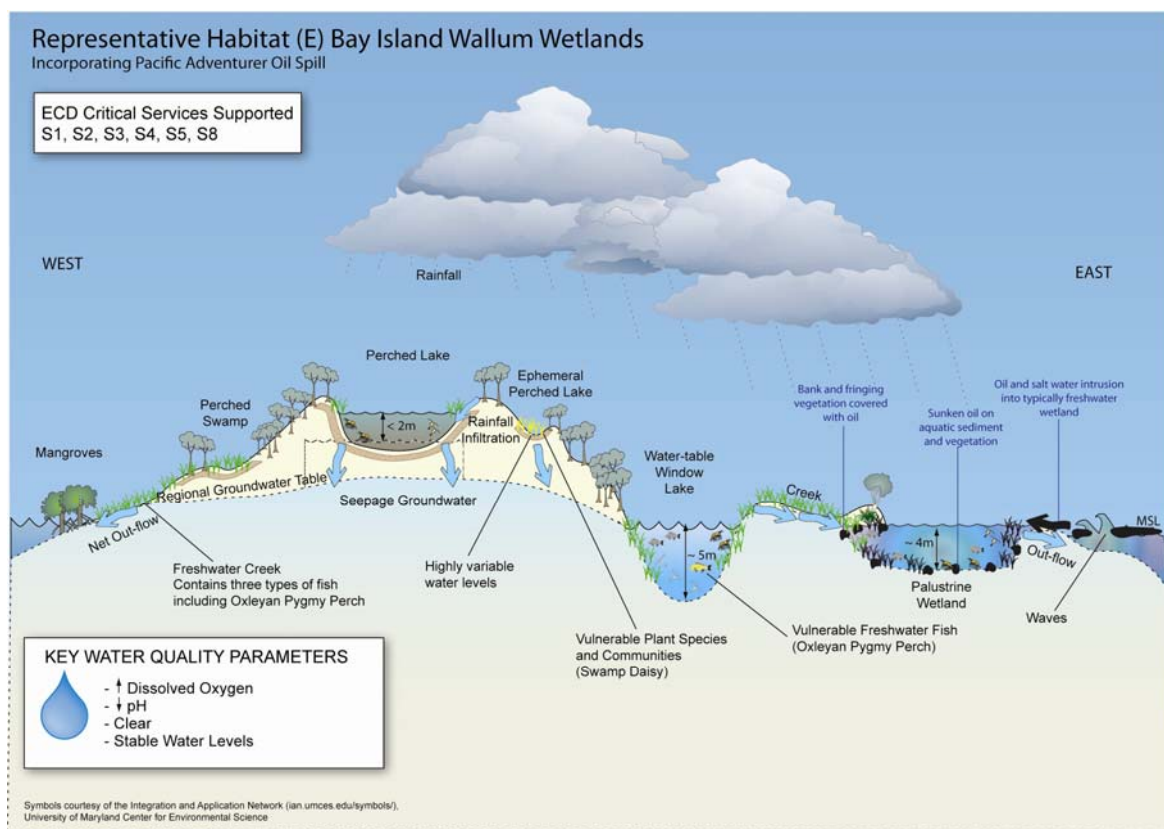
## Ramsar values affected

Two of the six representative habitat areas identified in the draft ECD report were directly affected by the oil spill: Ocean Beaches and Foredunes and Bay Island Wallum Wetlands. Conceptual models from the draft ECD report for these two areas were modified to show the components and processes affected by the oil spill (Figures 2 and 3).





**Figure 2 Modified conceptual model of ocean beaches and fore dunes**



**Figure 3 Modified conceptual model of bay island wallum wetlands**

The likelihood of change to ecological character for each nomination criteria has been assessed using the draft indicators for limits of acceptable change or key attributes where indicators have not been established from the draft ECD report.

The parts of the two of the six representative habitat areas directly affected as indicated in the modified conceptual models were:

- some sandy beaches on the ocean side of Moreton Island
- freshwater wetlands on the ocean side of Moreton island with outflows to the ocean.

Both these habitat types affected are highly variable. The freshwater wetlands are connected to the open ocean and their lower reaches are subject to salinity changes according to ocean levels and wind strength and direction. The ocean beaches are prone to cycles of erosion and accretion, as occurred after the incident in May 2009.

The number of wildlife reported as immediately affected was low. Most vulnerable, endangered species identified in the draft ECD report such as dugongs, green and loggerhead turtles, honey blue eye, Illidge's ant blue butterfly and swamp orchids were not effected. One little tern mortality was attributable to the oil spill. Oxleyan pygmy perch which had been found in the affected freshwater wetlands on Moreton Island were found again at Spitfire Creek subsequent to the oil spill. Results of a fish survey at Eagers Creek were within normal limits.

## Outline of immediate response

Shortly after the report of the fuel oil spill, on 11 March, Maritime Safety Queensland activated the *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances* and *Queensland Coastal Contingency Action Plan*.

An Incident Control Centre was set up at Pinkenba. Command Centres were set up on Moreton Island and the Sunshine Coast. The whole-of-government response in the affected areas included the Environmental Protection Agency, Departments of Transport and Emergency Services, and local governments in the effected areas.

Conditions at the time of the oil spill were not amenable to dispersing of the oil while at sea. This decision has since been confirmed by an independent assessment.

The Queensland Government declared Moreton Island, Bribie Island, and the southern area of the Sunshine Coast a disaster area on 13 March 2009. Due to safety issues and to facilitate clean-up operations, areas of Moreton Island and Bribie Island were closed to the public. By 19 March 2009 the disaster area was reduced to the area of Moreton Island. As a result of the swift clean-up, significant areas were reopened in time for Easter holiday campers in mid-April.

By the end of April Sunshine Coast and Bribie Island beaches were declared clean. Clean-up continued on Moreton Island with cleaning trials taking place in the affected wetland areas and each of the rocky shore types. The trials were based on recommendations of an independent expert and involved discussion with clean-up personnel, officials with expertise in oil spills response, national park managers, traditional owners and observations from a site inspection of the rocky shore preliminary cleaning trials.

The recovery actions that have been implemented include:

- Initial assessment of the impacts of oil spill on wetlands of the Sunshine Coast - 30 March 2009.
- Initial assessment of the impacts of oil spill on the wetlands of Moreton Island.
- Recovery plans for Moreton Island wetlands and other key habitat areas.
- Rocky Reef impact assessment.
- Report on Clean-Up Options for the Selected Moreton Island Rocky Shores (draft 25 March 2009).

- A draft work plan for the *Rocky Shore Response Team* cleaning trials to develop clean-up responses for Moreton Island Rocky Shores - 30 March 2009.
- Oil Response Plan - Wetlands on Moreton Island 3 April 2009.
- A Scientific Advisory Panel established to advise on further actions. This is the primary source of scientific advice and this added to the information gained by scientific and technical staff on site forms the basis for the strategies that are being considered.

Up to 2,500 persons have been involved in the clean-up, including workers from Maritime Safety Queensland, the DERM, local regional councils, Emergency Management Queensland, Queensland Rail, Road Tek, Skilled and private contractors, the State Emergency Service, Queensland Police Service and the Queensland Fire and Rescue Service.

## Existing management framework and the oil spill response

### Management framework

The Moreton Bay Ramsar site is predominantly waters and land controlled by the State of Queensland. Land above the high water mark is largely State-owned National Parks, with some areas of freehold and leasehold land. Land surrounding the Moreton Bay Ramsar site is predominantly urban and suburban development on freehold and leasehold land.

There is no single management plan for the Moreton Bay Ramsar site. Most of the site is managed as conservation areas: Marine Park, National Park, Conservation Park or Reserve. The primary management plans are:

- *Marine Park (Moreton Bay) Zoning Plan (2008)*
- *South-east Queensland Regional Coastal Management Plan (2006).*

Other statutory plans/mechanisms relevant to the Ramsar site include:

- Management plans for national parks and conservation parks within the site prepared under the *Nature Conservation Act 1992*
- *South-east Queensland Regional Plan (2005-2026)*
- *Environmental Protection (Water) Policy 1997*
- *Fisheries Management Plan (East Coast Trawl) 1999*
- *Fisheries Management Plan (Coral Reef Fin Fish) 1999*
- *Water Resource (Logan Basin) Plan 2007*
- *Water Resource (Moreton) Plan 2007*
- *Water Resource (Gold Coast) Plan 2006*

These statutory documents are supported by many non-statutory natural resource management plans and strategies. Key strategies relevant to the Ramsar site include *Healthy Waterways Strategy 2007-2012*, *South-east Queensland Natural Resource Management Plan*, *The Future in Balance* (2004) and *Environmental Protection Agency Shorebird Management Strategy 2005*.

### Oil spill response plans

Australia has a national plan to respond to oil spills: *National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances*.

The State of Queensland has a plan for oil spills within State waters: *Queensland Coastal Contingency Action Plan*. Both of these plans were activated when Brisbane Harbour Control was notified of the oil spill. Maritime Safety Queensland (MSQ) coordinated the response with cooperation from Departments of Resource and Management, Transport and Emergency Services and relevant local governments.

The disaster declaration by the Queensland Government ensured appropriate government resources were available for the clean-up and required the development of three recovery plans to form a triple bottom line

response:

- environmental recovery
- economic recovery
- social recovery.

A State Recovery Group was set up with three sub-groups to oversee the preparation and implementation of these plans. The sub-groups were lead by the appropriate State Government Agency with links to community, special interest and industry groups. Subsequently the *Healing Country Environmental Recovery Action Plan* was developed by the Natural Environment Recovery Group (NERG) to guide activities into the recovery phase of the incident.

## Specific actions and projects being undertaken

### Containers

Ammonium nitrate is stable and dissolves quickly in water. It would be significantly diluted in marine waters. Potential impacts include algal blooming or accelerated growth of seagrass.

The Royal Australian Navy mine hunters HMAS Yarra and HMAS Norman were enlisted to locate the 31 containers of ammonium nitrate lost overboard from the *Pacific Adventurer* using deep sea sonar technology. The containers have been located outside the Ramsar site, within Commonwealth waters. The feasibility of recovering them is being investigated. Shipping, especially trawlers, has been advised to avoid the area they are situated within.

Early calculations by scientists from DERM, CSIRO and AIMS indicated that ammonium nitrate was not detectable above normal levels due to high dilution and currents in the area. Subsequent water quality sampling confirmed this.

### Oil spill

Clean-up of beaches commenced immediately. Moreton and Bribie islands are popular low key holiday destinations especially for camping and fishing. One of the peak periods for visitor numbers is Easter which for 2009 was approximately four weeks after the spill.

Oiled sand was scraped off the beaches, bagged and taken off the islands to mainland waste disposal facilities. Some areas on Moreton and Bribie islands were closed to the public to prevent the spread of oil to other areas. As rain and high tides moved sand across beach profiles, layers of oil were exposed and/or covered, requiring more than one pass along the beaches before all the oil was removed. Heavy seas and high tides in May 2009 eroded much of the beaches.

Expert advice was received that oil on rocky foreshores is best left to weather and to break down naturally. Dispersants and subsequent run-off may be more toxic to invertebrate and micro-fauna and flora than the oil. Also these areas are difficult to access, raising safety concerns for clean-up crews. However in areas with high public access, some clean-up methods were trialled to prevent the spread of oil to other areas.

The expert advice also recommended a wetland action plan be prepared for the sensitive freshwater wetlands as their clean-up could cause more damage than the oil. Traditional Owners (TO) from Moreton Island carried out the wetland clean-up under the supervision of DERM scientists. Care was taken during the clean-up not to disturb sites significant to the TO. The wetland action plan was adjusted due to changes caused by increased flows and high tides in May 2009 which redistributed some of the oil within the wetlands.

A wildlife rehabilitation centre was set up at Lytton with specially trained DERM and Taronga Zoo staff caring for and rehabilitating any oiled wildlife.

The Australian Government pledged \$2M for community groups to undertake rehabilitation and recovery works. This funding is being distributed across the areas impacted by the oil with the majority of funds going to community groups, including Traditional Owners.

## **Monitoring and assessment being undertaken**

An assessment of environmental harm is continuing as part of the oil spill response. A Scientific Advisory Panel with a range of scientists external to DERM is supporting and advising the scientific and technical team during the assessment and recovery phase.

An independent review of the response to the oil spill is being undertaken by a team of experts in ship-sourced marine pollution incidents and related matters, but who had no direct role in the response to the *Pacific Adventurer* incident.

Following the extreme weather conditions experienced on 19 and 20 March 2009 when ocean beaches were eroded by high tides and storm conditions, the impact of the oil is less than expected and the planned monitoring has been reduced accordingly. Regular inspections of the extent and condition of freshwater wetland vegetation on Moreton Island will continue. Fish assemblages within these wetlands will continue to be monitored within ongoing sampling of all wetlands on Moreton Island. Sandy beaches were eroded and no further monitoring is planned. The existing program to monitor the effectiveness of the new zoning plan for the Moreton Bay Marine Park may be expanded to compare sub-tidal fish community structure before and after the oil spill.

## **Likely long term implications for ecological character of the Ramsar site**

The areas of the Ramsar site affected by the oil spill (some sandy beaches and freshwater wetlands) are relatively small and highly variable. The freshwater wetlands are connected to the open ocean and their lower reaches are subject to salinity and bathymetric changes according to ocean levels and wind strength and direction. The ocean beaches are prone to cycles of erosion and accretion. Identifying persisting long term changes is already difficult. Linking their cause to the oil spill will be more difficult. Climate change, changes along the migratory bird flyway, increased human impacts such as disturbance and rubbish are more likely to change the ecological character.

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