Case Study of a Spill Response: How Galapagos Managers Handled the 'Jessica' Spill

Last month, a tanker vessel carrying a cargo of 240,000 gallons (905,000 liters) of fuel ran aground off San Cristobal Island in the Galapagos Islands, Ecuador. After two days, the tanker Jessica began to leak, and fuel continued to spill from her for nearly a week. All told, the Jessica released two-thirds of her cargo directly into the waters of the archipelago – the Galapagos Marine Reserve.

Galapagos resource managers faced a potential ecological nightmare. But through a combination of manpower, technology, and luck, they appear to have kept the spill from becoming the disaster it could have been. This month, MPA News examines how the Galapagos management team responded to the Jessica spill, and what other MPA managers can learn from their experience.

First response

On the night of 16 January, the Jessica was on her way to the Galapagos port of Baquerizo Moreno on San Cristobal Island. Her cargo – 80,000 gallons of bunker oil and 160,000 gallons of diesel fuel – was set for delivery to the archipelago. The thick bunker oil was to be used as fuel for a boat tourism company, while the diesel was headed to the islands’ main marine fueling station.

The Jessica’s captain was reportedly unfamiliar with the waters. When he mistook a buoy for a lighthouse and made a wrong turn, he grounded the vessel about a half-mile (800 meters) off San Cristobal, one of the easternmost of the Galapagos Islands.

On the next morning, 17 January, the Ecuadorian Navy and the director of the Galapagos National Park Service (GNPS) coordinated action to dispense floating barriers, or booms, around the ship to prevent dispersion of the oil in the event of a spill. Waters were calm, and the Navy began efforts to empty the fuel tanks ship-to-ship.

The next day, however, the Jessica listed 25 degrees; this, along with mechanical failures on the vessel, caused bunker fuel to start spilling. Over the ensuing days, cracks in the vessel and heavier weather caused the spillage to accelerate. The GNPS and the Navy announced their response plan: to contain and deflect the spreading fuel from sensitive areas as best as possible, and engage in extensive monitoring efforts of affected areas by plane, boat, and foot.

Coordination

Detailed updates on the day-to-day efforts of the spill’s cleanup and monitoring crews are provided on the website of the Charles Darwin Foundation (www.darwinfoundation.org). These efforts included monitoring areas affected by the spill, monitoring potentially threatened areas to establish an ecological baseline, setting up animal rescue centers, and treating affected animals onsite.

All this required extensive coordination on the part of the spill management team. Not only were GNPS and the Navy involved, but so were staff from the islands’ Charles Darwin Research Station (CDRS), the International Fund for Animal Welfare (an NGO), and international spill experts. Upon request from the Ecuadorian government, specialized oil spill equipment and response experts from the US Coast Guard and US National Oceanic and Atmospheric Administration were flown to the site. In addition, local volunteers, including fishermen, joined in monitoring and rescuing wildlife.

With the Navy in charge of spill containment, GNPS directed the cleanup. In all, 60 park rangers were involved. “The Park has emergency strategies that are implemented when needed,” said Desiree Cruz, a GNPS spokesperson. “We count on excellent teamwork, with well-trained people eager to work non-scheduled shifts.”

Paola Diaz, a spokesperson for CDRS, said the management team worked well. “The Charles Darwin Research Station is always prepared to coordinate activities with [GNPS],” she said. “In this case, we worked jointly following the Park's guidelines. After the coordinators for each activity were established, the response flowed with no problems.”

The team’s hard work was considerably enhanced by favorable weather. Currents and winds eventually pushed the fuel west and north, away from San Cristobal and into deeper waters. Although some of the slick reached the islands of Santa Fe and Santa Cruz, only small numbers of seabirds and sea lions appear to have been affected. Intense sunshine sped up evaporation of the diesel fuel.

Robert Bernted-Smith, director of CDRS, said on 23 January that preliminary assessments indicated the impacts of the oil spill on the Galapagos ecosystem would not be severe. “If we are right...then this will be a great relief to everyone,” he wrote in a published report. “However, relief should not lead us to neglect the need for a great deal of mitigation, ecological monitoring, disaster prevention, and contingency planning, for which Ecuador will need international assistance.”

Role of computers in the response

Computer technology played a significant and varied role in the management team’s response to the spill. To anticipate the projected movement of the oil slick, the monitoring team used a geographic information system (GIS) to analyze drift-buoy data from the last 20 years. Complementing this, regular aerial surveys collected data on the position of the slick, and these data were entered into the GIS database. Managers used these data to determine the best areas to set up wildlife rescue stations.

Websites played a key part in keeping stakeholders around the world informed of the spill and response. The website of the Ecuador-based Charles Darwin Foundation (CDF), which operates CDRS, offered a wide range of detailed and timely information.

Perhaps the most valuable website for spill managers, however, was the site for Charles Darwin Foundation, Inc. (CDF, Inc.), the US-based fundraising arm for CDF, CDRS, and GNPS. The site – www.darwinfoundation.org – not only offered daily spill update information, but also provided a way for web visitors to assist the response. A page on the site enabled visitors to donate money directly to the spill response efforts using a credit card. It also provided CDF, Inc.’s address and phone number for use as an alternate donation route.

Erica Buck, media and outreach director for CDF, Inc., said the public response to the spill was overwhelming. “The CDF, Inc. website normally gets 400-1000 visitor accesses per day,” said Buck. “On one day during the spill, we had over 20,000 accesses.” She estimates that CDF, Inc. raised tens of thousands of US dollars through the site, all of which went directly to Galapagos to support response efforts. Putting up the oil spill donation page was the result of quick thinking and communications, said Buck. “When the spill occurred, we talked with [CDRS] and asked them what their needs were.”

For more information:

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Box: Tips on Oil Spill Response Planning
Prevention:

"The importance of preventing oil spills may seem obvious, but it can't be emphasized enough. Even the most successful cleanups don't remove all the oil from a spill area."

"What you want to focus on is prevention of the incidents that cause the largest types of spills: groundings, collisions between vessels, and allisions [between a moving vessel and a stationary vessel]. These can be prevented through the availability and use of accurate navigational tools and charts, proper training of crews and captains, and the use of pilots in difficult passages."

Planning:

"It is important to map out the vulnerable natural areas that would be most impacted by a spill: once you determine these, you can start planning your response strategy. There are a number of technologies that you can use in a spill response, including booms to deflect oil and chemical dispersants to break oil down. Your choice of technology depends on the areas you want to protect."

"In some countries, like the UK, chemical dispersants are the primary response strategy for oil spills, and they can be effective. However, dispersants shouldn't be used everywhere. They can damage the roots of mangroves, and can be toxic to coral; using booms to deflect oil may be a better option in such ecosystems. Also, dispersants are most effective if used in the first few hours of a spill, before the oil becomes weathered. If you are considering using dispersants as a strategy, explain this beforehand to local stakeholders. The idea of adding additional chemicals to the environment after a spill can be controversial; securing community support ahead of time will enable a quick response when a spill occurs."

"Another strategy is to burn the oil. This has been used effectively in the Arctic. Although burning can result in a substantial amount of thick, black smoke, as much as 98% of the oil can be removed this way. In some cases, however, doing nothing is the most appropriate response. A high-energy beach may be restored to its pre-spill state more quickly by wave action than by human efforts."

"Once you've decided on your technologies, establish a clear chain of command for managing the response."

Response:

"Expect for things to go wrong during a response. Even in the US, where there's a lot of funding for response equipment and there's an emphasis on contingency planning, spill managers still end up having to improvise to some extent."

"With this in mind, the people in charge of responding to a spill need to be skilled managers who can react quickly to unforeseen events. These managers should also be able to deal with cost issues, because costs can add up quickly during a spill."

"In developing nations, where budgets for oil spill response may be very limited, I've seen some creative and effective measures used to control spills. Bales of hay, used as booms, have worked well to deflect spills from sensitive areas. On oiled beaches, once the big blobs of oil have been removed, I've heard of managers raking the sand to aerate it — providing oxygen for naturally occurring oil-eating bacteria. Some managers have applied camel dung to oiled beaches to provide nutrients for those same bacteria."

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More Help on Oil Spill Response Planning

The United Nations Environment Programme's Regional Seas Programme (www.unep.org/unep/program/natres/water/regseas/regseas.htm) has set up several regional cooperatives to help countries aid one another on various issues, including oil spill response.

The World Bank (www.worldbank.org/html/extdr/extme/2050.htm) and the Asian Development Bank (www.adb.org) are funding oil spill experts to teach locals in certain vulnerable areas how to use available resources to plan effectively for oil spills.

The International Petroleum Industry Environmental Conservation Association (www.ipieca.org) offers education and training programs on spill response in various parts of the world.

The International Maritime Organization (www.imo.org) offers courses on oil spill response planning through its World Maritime University (www.wmu.se).