

## Introduction

Ecuador is bordered by Colombia to the North and Peru to the East and South. Its coastline, which is about 2,237 km long, is characterised by a wide diversity of habitats including mangroves, estuaries, coral reefs, sandy beaches, with high levels of biological diversity and endemism.

In the waters off Ecuador including the Galapagos Islands, which are located 972 km west of Ecuador, four species of marine turtles have been recorded including the Leatherback *Dermochelys coriacea*, the Pacific green *Chelonia mydas agassizii*, the Hawksbill *Eretmochelys imbricata* and the Olive Ridley *Lepidochelys olivacea*. Nesting activity for Leatherback, Pacific green and Hawksbill turtles occurs along the continental Ecuadorian coast (Green & Ortiz-Crespo 1982), mainly in the Machalilla National Park, a protected coastal zone. In the Galapagos Islands, the Pacific green turtle is the only species that breeds and feeds there (Jackson 2001). Olive ridley turtles have not been observed nesting in mainland Ecuador or the Galapagos Islands (Green & Ortiz-Crespo 1982) although they are thought to forage in large numbers in the waters off Ecuador.

A total of 33 species of marine mammals have been recorded in Ecuadorian waters. Its coastal habitats, especially in the provinces of Manabí and Esmeraldas, are preferred breeding grounds (from June to October) of the South Eastern Pacific Humpback whale population. Two species of penguins also occur in Ecuador, the Humboldt penguin *Spheniscus humboldti* and the Galapagos penguin *Spheniscus mendiculus*.

Many of the species found on Galapagos are sea birds. The native avifauna includes 57 residents, of which 28 (49%) are endemic and 31 are regular migrants; a number of vagrants are also present. Endemic taxa include 13 species of Darwin's finches. Other noteworthy species include Galapagos penguin *Spheniscus mendiculus* (EN), Galapagos petrel *Pterodroma phaeopygia* (CR), Galapagos flightless cormorant *Phalacrocorax harrisi* (EN), lava heron *Butorides sundevalli*, Galapagos hawk *Buteo galapagoensis* (VU), greater flamingo *Phoenicopterus ruber*, Galapagos rail *Laterallus spilonotus* (VU), Lava gull *Larus fuliginosus* (VU), swallow-tailed gull *Creagrus furcatus*, Galapagos dove *Zenaida galapagoensis*, Galapagos martin *Progne modesta*, Floreana mockingbird *Nesomimus trifasciatus* (EN) and thick-billed flycatcher *Myiarchus magnirostris* (Stone et al., 1987). Other threatened birds include the waved albatross *Diomedea irrorata* (VU), Markham's storm-petrel *Oceanodroma markhami* and whitevented petrel *Oceanites gracilis*. Dolphins and the endemic sea lions and fur seals are abundant. Several species of baleen whales, among them the fin and humpback whales *Balaenoptera physalus* (EN) and *Megaptera novaeangliae* (VU), and toothed whales, including sperm *Physeter catodon* (VU), pilot whales *Globicephala melas* and killer whales *Orcinus Orcaare* regularly seen.

On the mainland, three Marine Reserves, including the Galera-San Francisco peninsula (north coast of Ecuador), Machalilla National Park (southeastern coast of the province of Manabí) and the Puntilla Santa Elena Marine Reserve have been established. All of them are important breeding and feeding grounds for sea turtles and marine mammals.

Ecuador is the fifth-largest producer of oil in South America. Ecuador's most productive oil fields are located in the northeast corner of the country. The largest oil field is Shushufindi. Other major oil fields include Sacha, Dorine and Eden Yuturi. Ecuador has two major oil pipeline systems: the Trans-Ecuadorian pipeline (SOTE) and the Pipeline of Heavy Crude (OCP). The completion of the OCP pipeline in 2003 led to a sharp increase in Ecuador's crude oil production. Ecuador also utilises one international pipeline, the TransAndino, which connects Ecuador's oil fields with the Colombian port of Tumaco.

The extent and intensity of oil and gas exploration and development in the western Amazon may soon increase rapidly. Oil and gas blocks overlap areas of peak biodiversity, protected areas and indigenous territories. Ecuador permits oil and gas extraction in national parks, which poses a great threat to wildlife.

**Regional Seas**

Pacific Ocean

**Past experience**

Various spills have occurred in Ecuador including the ST PETER spill (1976), off the Colombian/Ecuadorian coast. In Galapagos, a few oil spills have also occurred. The MV IGUANA (1988) ran aground and sank in the main port of Academy Bay, releasing 20 tonnes of diesel. 20 tonnes of diesel was also lost off Puerto Villamil (1999). An additional 8 tonnes was released at Puerto Villamil (2002) when a container of diesel fuel for the local electrical generating plant was lost during resupply. There were no reports of oiled wildlife. Nevertheless, JESSICA (2001), which ran aground in Wreck Bay on its way to Baquerizo Moreno port on San Cristobal Island, spilling about 600 tonnes of diesel and bunker oil spilled to San Cristóbal and Santa Fé, caused an oiled wildlife incident. The oiled wildlife was rescued by staff of the National Park Service (GNPS) and the Charles Darwin Station (CDF). Via Charles Darwin Station, two international teams had officially been invited by the national authorities. An expert team of three sea mammal specialists from Seal Rehabilitation and Research Centre (Netherlands), Emmen Zoo (Netherlands) and RSPCA (United Kingdom) was sent by Sea Alarm (Belgium) to the archipelago to assist local organisations with the treatment of marine mammals. IFAW's International Oiled Wildlife Team was also invited to assist with the bird rescue and rehabilitation. In total 370 affected animals were reported to the Charles Darwin Research Station (Lougheed et al., 2002b). Most species affected were sea lions lava gulls, Galapagos Penguins, Flightless Cormorants and Dark-rumped and Brown pelicans (117 individuals). In total, 79 Galapagos sea lions and 145 marine iguanas were also oiled. Regarding the sea lions, almost half of these animals required washing and other treatment. One sea lion died and a high incidence of conjunctivitis and burns were detected during the period of the oil spill. However, uncorroborated reports also described large numbers of fish and invertebrates as having been affected (Lougheed et al., 2002a). Moreover, during the year following the spill the population of marine iguanas on Isla Santa Fe suffered severe mortality, probably as a result of long-term effects from Jessica contamination (Romero and Wikelski, 2002; Wikelski et al., 2002). Sea lion populations also exhibited a tendency for decline in the first months following the spill at all three colonies monitored close to the grounding site on San Cristóbal. By comparison, declines of similar magnitude occurred at only one of six sea lion colonies monitored on islands more distant from the spill. However, no significant decreases in population numbers were detected for any colony in the year following the spill. The Charles Darwin Foundation (CDF) conducted an evaluation study of the spill's impact. World Wildlife Fund (WWF) made an emergency contribution to help fund clean-up efforts on the Galapagos Islands in the wake of the oil spill.

Another ship spilled nearly 2,000 gallons of diesel fuel near the Galapagos islands on July 4, 2002.

During the last 20 years, spills from the Trans-Ecuadorian pipeline have polluted areas of the Ecuadorian Amazonian, including the Cuyabeno Wildlife Production Reserve, located in the northeastern Ecuadorian Amazon, which is a special protected area.

**Response: the role of the authorities**

The Merchant Marine and Coastal Directorate (DIGMER) of the Ecuadorian Navy is the responsible agency for preventing and controlling oil spills in Ecuador.

In the event of a spill, the Ministry of Environment coordinates the overall mitigation and clean-up efforts of any oil spills. In Galapagos Islands, the Galapagos National Park Service (GNPS) on behalf the Ministry of Environment would have the responsibility to clean up the spilled oil and remediate its impacts. Under this authority, the National Park Service will also be responsible for co-ordinating the wildlife operations.

**Oiled wildlife response**

Formal guidelines?

In mainland Ecuador, no formal policy or oiled wildlife plan has been defined.  
In the Galapagos Islands, contingency and prevention plans against oil spill incidents do exist.

#### Response objectives and strategy

It can be expected that the Ministry of Environment, as it did with the Jessica oil spill, will establish an emergency coordination mechanism which will include the following components: scientific and technical issues, communications and information, logistics support and coordination of international assistance. Priorities will be focused on evacuation of the remaining fuel from the tanker and minimising the impacts of the oil spill.

#### Euthanasia or rehabilitation?

The authorities will allow the rehabilitation of oiled animals.  
During the Jessica spill in Galapagos, two oiled wildlife rescue and rehabilitation protocols were developed. A general protocol was developed by the overall wildlife coordination team, consisting of an operational strategy and guidelines from internal and external communication. A second protocol on sea lion capture and rehabilitation was first drafted by local experts and approved with an extension on medication and euthanasia by international experts and the coordinating team. This latter protocol contained the criteria for the selection of oiled animals whose recovery would require capture and rehabilitation. In Galapagos, the Charles Darwin Foundation (CDF), will assist the National Park Service (GNPS) particularly on clean up operations and wildlife rescue and rehabilitation activities.  
An oiled wildlife response in the Amazon would be challenging due to its remoteness.

#### Impact assessment

The Galapagos National Park authorities and the Charles Darwin Foundation (CDF) have a list of priority species, based on their conservation status and the degree of impact they are likely to suffer from oil spills. In Galapagos, CDF conducted an evaluation study of the spill's impact in the aftermath of the Jessica spill. From 1994 until 1999, different research groups included the Ecuadorian Foundation for the Study of Marine mammals (FEMM), Natura Foundation and the National Fisheries Institute (INP) collected data on stranded sea turtles found on beaches.

#### Notification and early response

In Galapagos, the Ministry of Environment would in turn notify the National Park Service, which in turn will inform the Charles Darwin Foundation.

#### **Wildlife responders**

There are no specialised wildlife rescue centres dealing with oiled wildlife, nor any experts in this subject. Charles Darwin Foundation (CDF), in Galapagos, is an NGO that provides scientific research and technical information on the Galapagos. The Foundation is part of a network of local and national organisations supporting Galapagos Island protection. This is the single organisation that has experience in dealing with oiled wildlife.

Santa Martha Rescue Center is working to rescue animals from illegal trafficking in conjunction with the Ministry of Environment and the Environmental Police (UPMA) of Ecuador. The new established Merazonia Animal Rescue Centre (Pastaza province) also rescues Amazonian animals. Birds and monkeys are the main animals that the centre accommodates. Flor de la Amazonía Animal Rescue Group (Amazonia Fauna Foundation) is helping to assist the other rescue centres.

There are a few organisations that could provide useful information and local knowledge during an oiled wildlife incident.

### Birds

Birds & Conservation, which is the Birdlife partner has a specific program on seabirds, but not specific to oiled birds. The organisation manages a national database on birds. Birds & Conservation have recorded oiled birds in Peninsula St. Elena in the artificial lagoons, where thousands of birds, both migrants and residents are using this habitat all year round.

### Marine mammals

Pacific Whale Foundation-Ecuador does research on Pacific humpback whales in Machalilla National Park (PNM). The Ecuadorian Foundation for the Study of Marine Mammals (FEMM) focuses on the protection of marine mammals and the development of plans for sustainable use of marine and coastal protected areas. An assessment of seabirds, marine mammals and reptiles as part of a study before oil exploration activities was carried out by FEMM. The Nazca Institute for Marine Research has also been studying the population biology, behaviour and conservation issues regarding the marine mammals of Ecuador.

### Sea turtles

The NGO Equilibrio Azul deals mainly with sea turtles.

International organisations such as International Conservation- Ecuador, the International Union for Conservation of Nature IUCN (Regional office for South America) and World Wildlife Fund (WWF) have offices in Ecuador. Natura Foundation has some conservation programmes in Ecuador.

### Cooperation between stakeholders

The Foundation is part of a network of local and national organisations supporting Galapagos Island protection. For fifty years, CDF has worked closely with the Galapagos National Park Service (GNPS).

### Permanent facilities

Facilities are very limited with a lack of resources and key personnel.

### Current processes

No reference

### Documentation and references

General references

ITOPF CountryProfile

[http://www.gefweb.org/Documents/Medium-Sized\\_Project\\_Proposals/MSP\\_Proposals/ECUADOR-Galapago.pdf](http://www.gefweb.org/Documents/Medium-Sized_Project_Proposals/MSP_Proposals/ECUADOR-Galapago.pdf)

<http://www.eia.doe.gov/cabs/Ecuador/Oil.html>

<http://www.unep-wcmc.org/sites/wh/pdf/Galapagos.pdf>

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