

## Sooty terns as bioindicators of mercury contamination in tropical waters



Meet the Scientist: PhD student Fanny Cusset, La Rochelle University



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The Ascension Island Government Conservation and Fisheries Directorate (AIGCFD) work with scientists across the world to learn more about the unique wildlife of Ascension Island and how these species may fit into global conservation efforts.

The AIGCFD is working with researchers from La Rochelle University in France. PhD student, Fanny Cusset, is analysing breast feathers collected from seabirds across the tropics. Below is a summary of her research and how sooty terns (*Onychoprion fuscatus*) nesting on Ascension Island are contributing to scientists knowledge about the spread of mercury in the Atlantic Ocean.

### **Sooty terns document ocean contamination by mercury, a non-essential and very toxic metal, in the tropical Atlantic Ocean.**

Mercury (Hg) is naturally present in the environment but it is also heavily released by human activities such as coal burning, mining activities and petrochemical industries. Hg is primarily emitted in the atmosphere, allowing it to disperse all over the globe and to deposit in all ecosystems. Hence, even remote oceanic regions are affected by this global pollutant.

Once in the sea, Hg accumulates in marine organisms and along the food chain resulting in elevated concentrations in top predators such as seabirds. Unfortunately, Hg is highly toxic and can lead to severe neurological and physical disorders, or even death. Since the Industrial Revolution, the amount of Hg released in the atmosphere has increased by 450% at a global scale. Thus, monitoring Hg contamination in the ocean is crucial to limit health risks for wildlife and humans.



**Figure 1** AIGCFD scientists collecting feathers for analysis

Seabirds are relevant bioindicators of Hg contamination in the ocean: they integrate and reflect the contamination of the entire food chain on which they rely. Studying seabirds provides information about potential risks for human populations consuming marine resources from the same oceanic regions. Tropical marine ecosystems are overall poorly documented. The sooty tern, as the most abundant tropical seabird, is an ideal candidate to investigate Hg contamination in the tropics worldwide. In the Atlantic, sooty terns gather in huge numbers on Ascension Island for breeding, allowing the Ascension Island Government Conservation and Fisheries Directorate to monitor their populations.



As part of a collaborative research project, feathers of sooty terns were collected on Ascension Island in 2020 and 2021, focusing on both breeding adults and large chicks in order to compare global (annual) and local (seasonal) contamination respectively. Hg acquired through feeding is transferred into the growing feathers during moult. Feathers thus constitute an ideal storing tissue to analyse, without harming or endangering the birds. These feathers were sent to La Rochelle University (France), where chemical analyses are performed to determine birds' contamination levels.

Overall, this work will help identifying potential risks to coastal communities that rely on marine food resources in tropical regions, and will provide additional information for wildlife conservation and management of the Ascension Island Marine Protected Area. Moreover, this will also contribute to a wider research project, aiming to map Hg concentrations in the tropical ecosystems across ocean basins, thanks to a research network that includes 20 seabird colonies around the world (Atlantic, Pacific and Indian Oceans).

Fanny Cusset, Littoral ENvironnement et Societes, La Rochelle Universite, France.



**Figure 2 Processing feather samples for further analysis**



**Figure 3 Advanced Mercury Analyser burns the sample to quantify total Hg concentrations in each feather**