

Preserving biodiversity of the Falkland Islands

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Learning more about the biodiversity of the Falkland Islands and what can be done to preserve it is the focus of a planned trip for three University of Maine researchers.

Jacquelyn Gill, an assistant professor of paleoecology and plant ecology in the University of Maine's School of Biology and Ecology and Climate Change Institute (CCI), is leading the fieldwork that will be completed from Dec. 4–22 on the small, remote group of islands about 300 miles east of South America.

Gill will travel with two graduate students—Kit Hamley, who is pursuing a master's degree in quaternary studies at CCI, and Dulcinea Groff, a doctoral student of ecology and environmental science in the School of

Biology and Ecology and CCI, who also is part of a two-year fellowship called Interdisciplinary Graduate Education Research Traineeship (IGERT) in Adaptation to Abrupt Climate Change (A2C2).

The researchers will study the islands' environmental history throughout the last 20,000 years to establish a baseline for conservation efforts, and to understand the effects climate change and human land use have on the area's biodiversity, according to Gill.

"The Falklands are home to some of the most important penguin rookeries in the world, and a number of species not found anywhere else," Gill says. "Sadly, this biodiversity is at risk due to a number of threats. Climate change and sea level rise threaten critical habitat already degraded by sheep grazing, and [offshore oil drilling](#) is scheduled to begin in the next couple of years."

The researchers hope to learn more about when humans arrived on the islands and what the ecosystem was like before their arrival. They want to research the threats facing the Falklands' wildlife—climate change, sea level rise, overgrazing, tourism and offshore drilling—and help residents develop sustainable practices in sheep grazing, eco-tourism and fishing that would benefit the economy in addition to wildlife, she says.

The researchers will collect data from locals, as well as materials, including cores from peat bogs, ponds and lagoons, that will be shipped to the U.S. and analyzed in UMaine labs. The cores contain records of past climate change, fire history and species composition, Hamley says.

The team plans to travel around the islands, visiting penguin rookeries, including the world's largest rockhopper penguin colony, according to Gill.

Groff's Ph.D. research will focus on the sensitivity of the penguin-tussac grass relationship to abrupt climate change since the end of the last ice age.

The native grass provides habitat for penguins and other seabirds and marine mammals and relies on nutrients provided from the animals' waste. The relationship may be threatened by climate change's effect on the ocean food web, which would affect the nutrients the animals bring to land. Sheep grazing has also reduced the plant's presence, according to Gill.

While in the Falklands, Groff will collect sediment cores from several locations. She will study pollen and seabird guano, or waste, within the cores.

"By looking at the records in these cores I will be able to reconstruct how penguin and tussac grass populations have fluctuated through time, under different climatic conditions, especially during times when it is known that climate changed within a short time span," Groff says.

She also will collect environmental samples including plants and soil to learn more about how tussac grass uses nutrients from penguin guano.

"The overall theme of my project is what I call a marine-terrestrial linkage," Groff says. "The marine-terrestrial linkage is the connection of nutrients originating in the marine ecosystem that are transferred to the terrestrial ecosystem. The soil in the region is very nutrient poor, which makes nutrients coming from the marine ecosystem very important."

Groff hopes her research will be used to help predict what will happen to the island's wildlife and vegetation in the event of a future [abrupt climate change](#) scenario.

Hamley's research will focus on the Falkland Islands wolf, or warrah, a fox-sized carnivore that was the first canid to go extinct in the historic record and was found only on the archipelago, according to Gill.

Hamley will look into whether indigenous people brought the warrah to the Falklands before Europeans arrived.

"Before the warrah was hunted to extinction in the 1870s, the islands were home to no other terrestrial mammals, and had no human inhabitants, raising the question of how and when the wolves first got to the islands, which are separated from mainland Patagonia by 600 km [about 373 miles] of ocean," Hamley says. "They would have either had to swim, cross a theoretical land or ice bridge—which to date has not been shown to have been present—during periods of lower [sea level](#), drift across on an ice chunk or log, or perhaps be transported via canoe by early humans."

At this point, no archaeological record has been discovered in the Falkland Islands to definitively indicate that humans were there before European arrival, according to Hamley. She will use the same core samples as Groff to look at charcoal within them to determine if there was a human presence in the Falkland Islands before Europeans arrived.

Hamley will visit sites where warrah bones have been found to look for human artifacts. She will also visit a local museum to take samples of warrah bones for carbon dating.

The islands are home to less than 3,000 residents, according to Gill, and the main economies are fishing, sheep and wool, and tourism, with offshore oil drilling expected in the next couple of years. The climate is windy, cool and damp year-round.

"The Falklands are a fascinating place—home to biodiversity found

nowhere else on the planet, and yet they've had a long history of human impacts," Gill says, citing as examples the arrival of the warrah as a native predator, early whaling years, sheep ranching and the Falklands War that left large areas roped off with land mines.

"The past has thrown a lot at the wildlife of the Falklands," she says. "The future has even more in store, and it's critical that we get a baseline sense of the biodiversity and how sensitive it is to global change."

Gill says the islands have a lot in common with the Gulf of Maine, including potential threats to seabirds due to climate change and land use. She says researchers can benefit from studying both areas.

To help fund the \$20,000 trip, Hamley and Groff have created and launched a crowdfunding campaign through Experiment.com. The students hope to raise \$10,000 in 35 days.

"We started this initiative because we feel this project has the potential to be successful in the crowdfunding realm as it deals with a lot of issues that people care deeply about; climate change, loss of unique biodiversity, conservation and human history," Hamley says.

Gill says while she is applying for traditional funding sources, there are a lot of alternative methods such as crowdfunding to kick start new projects.

"Crowdfunding also provides the public with a direct connection to science so they can feel like they're closely connected to the research," she says. "You're not just funding my students' exciting research, you're also investing in them as future scientists and conservation leaders, who are trained right here at the University of Maine."

Groff says those who contribute to the campaign will be able to follow

the team's updates during fieldwork and in the lab when they process the cores.

The Falkland Islands research is part of a new partnership between the CCI and the South Atlantic Environmental Research Institute (SAERI), a U.K. organization in the Falklands.

"SAERI approached the Climate Change Institute to develop a partnership, as they are keenly interested in developing research in climate change in particular," Gill says. "We're a world leader in [climate change](#) research, so there was a natural connection there. Most of SAERI's expertise is in marine sciences, so they're excited to have folks working on land."

Donations to the crowdfunding campaign can be made [online](#).

Provided by University of Maine

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