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REPORT ON EXPEDITION / PROJECT / CONFERENCE

Expedition/Project/**Conference Title:**

Study the characteristics of selected nesting tree sites by scarlet macaws in Mavita as interns with Wildlife Conservation Society (WCS) Honduras.

Travel Dates:

25/05/2026 to 06/07/2026

Location:

Honduras

Group member(s):

Caitlin Jenner, Lily Milligan, Rachael Hattan, as well as Lara Piffaretti, and Ana Machado Reis

Aims:

To conduct a focused study on nest characteristics and their influence on macaw breeding success. To obtain data on scarlet macaws in a remote and under-documented pine forest habitat to help the conservation efforts to protect the species and inspire future scientific research within the region.

Photography consent form attached:

(please refer to your award letter)

☒ Yes

☐ No

OUTCOME (a minimum of 500 words):-

Due to the incredible support of the James Rennie Bequest, we were able to travel to one of the most remote and inaccessible regions of Central America to take part in a month-long conservation internship with the WCS Honduras-Nicaragua. Without this funding, the significant transport costs of reaching La Moskitia would have been unachievable. The journey required a carefully planned, multi-stage route: flying from London to Managua, Nicaragua, followed by a short acclimatisation period, an international bus journey to Tegucigalpa, and finally a small domestic flight into Puerto Lempira, the gateway to La Moskitia. From there, WCS field staff coordinated all onward transport to the remote Mavita field station. This route, while unconventional, was more cost-effective than flying directly into Honduras and gave the us time to adjust to the climate and time difference before entering the field.

WCS is an international conservation organisation working to protect wildlife and wild places. In Honduras, WCS runs long-term ecological monitoring and community-based conservation programmes in La Moskitia, one of the last large continuous tropical forest landscapes in Central America. We worked directly alongside WCS biologists and local field technicians, including rangers based in Mavita, gaining mentorship and access to an established, on-the-ground conservation effort.

Our research was focused on the scarlet macaw (*Ara macao*), specifically the Mesoamerican subspecies found in Honduras, as they have suffered major population declines due to habitat loss and poaching for the illegal wildlife trade. La Moskitia holds the country's largest remaining population, and as they are the national bird of Honduras, their breeding success is a conservation priority. Unusually, this population nests in mature Caribbean pine forest rather than the tropical hardwood habitats where almost all previous scarlet macaw research has been conducted. Thus, very little was previously known about the specific tree and cavity features driving nest-site selection in this ecosystem and for this unique population.

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Figure 1. A photo of a pair of wild Scarlet Macaws seen in Mavita during the internship. These individuals are specifically from the local village rehabilitation centre where scarlet macaws rescued from illegal trafficking operations are nursed to health before being returned to the wild.

Building on WCS's ongoing nest monitoring work, we designed an independent research project to investigate which structural and environmental characteristics of pine trees influenced the scarlet macaw selection of nesting site and therefore effected breeding success. The hypothesis was that macaws would favour larger-diameter trees with lower canopy cover, higher cavity placement, and declining health status. The findings were intended to help WCS prioritise which trees to protect and inform decisions about future conservation.



Figure 2. A photo taken of a scarlet macaw within the cavity of a nest tree that we measured and acted as a visual confirmation and evidence that a pair of macaws reproduced successful this year as the nest was still active.

Over 12 field days across 14 transects, we recorded data on 101 active nest trees and 191 non-nest control trees (adjacent and randomly sampled along transects) for a total $n = 292$. For each tree we measured trunk diameter, tree and cavity height, canopy cover (via a specialized phone app), cavity dimensions (using photogrammetry with a person of known height as a scale reference), cavity orientation, tree health status, number of cavities, and evidence of human disturbance. GPS coordinates were also used to calculate each tree's distance to roads, water sources, and human settlements using QGIS.

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Figure 3. An example of the tree measurements we would obtain at all 292 tree sites. It was important for us to develop a methodology that prioritized safety, efficiency, and cost to make the most of the field work experience and inspire similar data collection initiatives in the region.

We analysed the data collected using Python to run univariate statistical tests (t-tests, Mann-Whitney U tests, and chi-square tests) followed by two Random Forest classification models — one assessing general tree characteristics and one restricted to cavity-bearing trees — to identify which variables best predicted nest selection. As a team we compiled the methods, results, and reflections into a joint internship report, including tables, figures, and a discussion situating our findings within the broader literature on cavity-nesting birds.

The overall findings of our research showed that trees selected by scarlet macaws to nest in had significantly larger trunk diameters, lower percentage of canopy cover and were more often dead or declining compared to non-nest trees, and they contained far more cavities on average. The tree-level model achieved 79% accuracy (ROC-AUC 0.83), with canopy cover and DBH as the strongest predictors, while the cavity-level model reached 94% accuracy (ROC-AUC 0.985), with the number of cavities as the dominant predictor. The distance to human settlements, roads, and water sources showed no significant relationship with nest selection, suggesting macaws in this area can nest successfully close to human communities without being displaced which is grate new and conservation efforts can be directed where support is most needed.

Table 1. A correlation matrix showing relationships between pairs of the six tree and cavity characteristics we measured for every tree. The values given represent Pearson correlation coefficients, with a larger integer indicating a stronger correlation between variables as seen in the highlighted boxes. NaN denotes missing correlations where data was unavailable.

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	DBH	Tree Height	Canopy Cover	Number of Cavities	Cavity Height	Cavity Dimension
DBH	1	0.24	-0.99	0.35	0.33	0.12
Tree Height	0.24	1	0.014	0.029	0.77	0.37
Canopy Cover	-0.99	0.014	1	-0.37	-0.26	-0.23
Number of Cavities	0.35	0.029	-0.37	1	0.26	NaN
Cavity Height	0.33	0.77	-0.26	0.26	1	0.53
Cavity Dimension	0.12	0.37	-0.23	NaN	0.53	1

We all found the internship to be a once in a lifetime opportunity and beneficial to our future careers in conservation as we were able to apply classroom ecology to real fieldwork. The mentorship from WCS staff, and the experience of living and working alongside the Miskito community in Mavita was extraordinary. We are so grateful to the James Rennie Bequest, WCS Honduras-Nicaragua, and supporting members of academic staff for making an experience of this depth possible at undergraduate level and have enthusiastically noted how this experience has shaped our future career direction on conservation biology and zoology.



Figure 4. Is a photo of our group of students from Edinburgh University with WCS Honduras-Nicaragua staff and rangers in the pine forest landscape of La Moskitia, taken during their fieldwork.