

**Ref.: 48671-2**

**First Report** (October 2025 – February 2026)

**Project Title:** Beyond the Wings: Evaluating Atlantic Forest Habitat Quality, Connectivity and Conservation through Fruit-Feeding Butterflies' Metacommunity Ecology. Santa Catarina Island, Florianópolis - Santa Catarina State, South Brazil

**Overview:** During the first three months, the project has successfully completed field surveys, engaged undergraduate students, and advanced preparatory work for habitat connectivity analysis and educational activities.

✓ **Fieldwork for fruit-feeding butterflies sampling**

We have completed four sampling campaigns (72 fieldwork days), successfully covering all twelve selected sites and their respective twenty-four sampling units (edge and forest interior). Eight Van Someren-Rydon traps were deployed per site and operated for five consecutive days per campaign, yielding a cumulative effort of 1,920 trap-days (equivalent to 46,080 trap-hours), ensuring balanced and methodologically robust sampling across habitat types.

Ten undergraduate students in Biological Sciences, representing different academic years, have actively participated in the fieldwork, contributing to their practical training in ecological monitoring. They were supported by the principal investigator, three paid field assistants and four volunteers from the Terrestrial Animal Ecology Laboratory.

A total of 204 individuals belonging to 30 fruit-feeding butterfly species were recorded. Among these, nine species represent new records compared to Phase 1 (1st RSG, 2024), with all identifications confirmed by taxonomic specialists (detailed list at the end of the report). Additionally, five nectarivorous individuals were collected in the traps: one Hesperidae specimen (pending identification), two *Pseudoscada erruca*, and two *Ithomia drymo* (both Danainae: Ithomiini). A small number of specimens are currently identified to genus level only and will undergo further taxonomic verification to confirm species-level identification.

In 2024, a total of 358 fruit-feeding individuals belonging to 38 species were recorded across five sampling campaigns. When standardised by sampling effort, overall abundance levels were proportionally comparable between years. A particularly notable difference was observed in Ithomiini butterflies, which totalled 278 individuals representing seven species (including *Pseudoscada erruca* and *Ithomia drymo*). This

group is currently being analysed separately, incorporating both field observations and laboratory experiments to better understand the ecological drivers underlying this pattern, given that these species are not typically known to feed on fermenting or decomposing fruits.

### ✓ **Capacity Building**

To evaluate the educational and capacity-building impact of the field activities, an anonymous feedback form was developed and administered to all participating undergraduate students at the end of the sampling phase. The objective was to assess skill development, professional motivation, and potential long-term engagement in conservation initiatives. Ten undergraduate students participated in field activities, and six (60%) completed the evaluation form so far, representing different academic stages, ranging from early to advanced semesters.

All respondents (100%) reported that the experience met or exceeded their expectations and contributed to their professional development, with 50% indicating a significant contribution. Participants highlighted the value of hands-on fieldwork, teamwork, exposure to real research logistics, and engagement with biodiversity monitoring. Reported skill development included field techniques (100%), teamwork (83%), understanding of habitat quality and landscape connectivity (67%), species identification (50%), research planning (50%), and data organisation (17%).

The project also stimulated academic motivation: 100% of respondents reported increased interest in ecology and conservation, while 67% expressed heightened interest in postgraduate studies. All respondents indicated willingness to participate in future monitoring campaigns, and 83% expressed interest in additional project components such as collection curation, environmental education, and citizen science initiatives involving local communities.

Importantly, all respondents (100%) indicated a perceived need for greater academic support, particularly in scientific mentoring, project writing, fundraising, and access to research infrastructure. These results reinforce the importance of continued capacity-building actions within the project framework.

### ✓ **Challenges and Adaptive Management**

The main operational challenge during this reporting period was a brief episode of intense rainfall, which required the rescheduling of one fieldwork day. The sampling

schedule was promptly adjusted, and all selected sites were successfully covered without compromising the overall sampling design or effort.

Minor budgetary adjustments were necessary due to inflation-related increases in operational costs during field activities, particularly parking fees, food, and butterfly baits. However, all expenditures remain within the approved budget framework.

Considering the consistency of the data obtained and the representativeness of seasonal coverage within the study period, it was determined that an additional campaign would provide limited incremental analytical benefit at this stage. The decision to conclude field sampling after four campaigns allowed optimisation of resources while maintaining methodological rigour and fulfilling the project's core objectives.

Remaining funds will be strategically reallocated to strengthen the project's scientific and educational components, ensuring long-term impact beyond the immediate sampling phase. A detailed reallocation plan will be submitted prior to expenditure.

Additionally, an unexpected but positive outcome emerged when a mantis specimen collected opportunistically during field activities was later identified as a potentially new species, currently under formal description by a specialist. While not a direct project objective, this finding highlights the broader biodiversity relevance of the study areas.

### ✓ **Next steps**

We are currently finalising and organising the databases generated during this second phase of the project in preparation for the initiation of diversity and community-level analyses. These will include assessments of species richness, abundance, and metacommunity structure across habitat types and sampling sites.

All necessary R scripts have been developed and organised for analysis. Environmental variables at the local scale are compiled, alongside regional landscape metrics including forest cover, patch number, edge density, elevation, distance to roads and watercourses, and land-use composition within 500 m, 750 m, and 1000 m buffers surrounding the study sites.

These analyses will provide the basis for understanding how habitat quality and landscape connectivity influence fruit-feeding butterfly assemblages, directly supporting the project's conservation objectives. We will also assess the distribution and conservation status of the newly recorded species, in order to better understand their ecological relevance and potential conservation implications within the study region.

Technical reports will be prepared and presented to FLORAM and partner institutions in the areas where fieldwork has been conducted, strengthening institutional collaboration and ensuring that results contribute to local environmental management. We also plan to prepare educational materials (e.g., interpretative banners) to be used within these institutions.

The preparation of the first scientific manuscript will begin, focusing on a metacommunity framework to evaluate the effects of habitat quality and landscape connectivity, integrating field environmental data with spatial data derived from landscape maps.

With species identifications now confirmed, preliminary planning for a visual identification guide has also begun, with the aim of supporting future educational and outreach initiatives.

In parallel, technical consultations are being conducted to determine the most appropriate layout and materials for the construction of the educational butterfly house. Following the completion of data analyses and report writing, we will initiate the preparation and mounting of specimens for the reference collection.

✓ **Use of funds**

During this first phase, project funds were allocated to subsistence payments, food expenses, vehicle rental and fuel, field equipment and gear, parking fees, and butterfly bait materials, in accordance with the approved budget.

✓ **Accompanying images**

Image 01: Project leader recording field data during standardised butterfly monitoring using Van Someren-Rydon traps. Credit: Carol Neves

Image 02: Undergraduate students participating in field monitoring activities, gaining hands-on experience in ecological research and biodiversity assessment. Credit: Mirella B Gondeck

Image 03: Leafwing butterfly (*Zaretis* sp, Nymphalidae: Charaxinae), characteristic of the southern and southeastern Atlantic Forest and renowned for its remarkable dry-leaf mimicry. On the ventral surface (shown), it closely resembles a dead leaf, complete with visible venation patterns, fungal-like spots, and irregular margins. Credit: Mirella B Gondeck

## SPECIES LIST (2nd RSG)

<b>BIBLIDINAE</b>	<b>23</b>
<b>AGERONIINI</b>	<b>15</b>
<i>Ectima thecla</i>	2
<i>Hamadryas epinome</i>	10
<i>Hamadryas feronia</i>	1
<i>Hamadryas iphthime</i>	2
<b>EPICALIINI</b>	<b>8</b>
<i>Catonephele acontius</i>	1
<i>Myscelia orsis</i>	7
<b>CHARAXINAE</b>	<b>6</b>
<b>ANAEINI</b>	<b>4</b>
<i>Consul fabius</i>	1
<i>Memphis moruus</i>	1
<i>Memphis sp</i>	1
<i>Zaretis sp</i>	1
<b>PREPONINI</b>	<b>2</b>
<i>Archaeoprepona demophon</i>	2
<b>NYMPHALINAE</b>	<b>11</b>
<b>COEINI</b>	<b>11</b>
<i>Colobura dirce</i>	10
<i>Smyrna blomfieldia</i>	1
<b>SATYRINAE</b>	<b>164</b>
<b>BRASSOLINI</b>	<b>75</b>
<i>Blepolenis sp</i>	1
<i>Caligo brasiliensis</i>	12
<i>Dasyophthalma creusa</i>	44
<i>Eryphanis lycomedon</i>	8
<i>Narope sp</i>	1
<i>Opoptera sulcius</i>	4
<i>Opsiphanes cassiae</i>	1
<i>Opsiphanes invirae</i>	2
<i>Opsiphanes quiteria</i>	2
<b>MORPHINI</b>	<b>50</b>
<i>Morpho helenor</i>	50
<b>SATYRINI</b>	<b>39</b>
<i>Carminda griseldis</i>	1
<i>Carminda paeon</i>	1
<i>Cissia eous</i>	21
<i>Hermeuptychia sp</i>	9
<i>Moneuptychia sp</i>	1
<i>Nhambikuara doxes</i>	2
<i>Pareuptychia ocirrhoe</i>	4
<b>Total</b>	<b>204</b>

\*species highlighted in yellow are new records for the Project