

FINAL REPORT



Creation of biological corridors using family plots, for the conservation of *Abronia campbelli*, within a new distribution zone for the species



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ID 31835-1

Protecting *Abronia campbelli*:
Adoption of a permanent
landscape-level
habitat restoration strategy
by families of a key community,
building a family **conservation legacy**

Introduction

The alligator lizard *Abronia campbelli* is the most threatened *Abronia* species in Guatemala. Campbell's alligator lizard is critically endangered due to habitat degradation and destruction. Habitat loss affects many species around the globe, but the impact can be especially drastic for a small arboreal species with a naturally restricted distribution such as *A. campbelli*.

Since its description 28 years ago, the endemic Guatemalan alligator lizard *Abronia campbelli* had been given up for lost by the scientific community, forgotten by national conservation efforts, unknown to the world and feared by local people.

Severe habitat loss has resulted in fragmentation to such an extent that what little remains consists of mature oak trees, highly isolated from one another, compromising natural movement and dispersion and thus limiting the genetic flow and the population numbers of the species.

This scenario was precisely the state of the habitat outlined in the original

description and the reason why the species was considered practically extinct.

After decades of no reports of *A. campbelli* I was part of a small team of scientists that "re-discovered" the species. Although *A. campbelli* was now known to be extant, it was clearly in critical danger of extinction if aggressive conservation measures were not taken.

Since then I have concentrated my work around this species conducting research on habitat characterization, ethology, population dynamics, reproductive biology, home range size, and distribution; discovering two new distribution zones for the species.

The original description area was the only known distributional zone for the species, until recently, when two new distributional zones were discovered.

Over the past few years, my colleagues and I have begun habitat restoration efforts within the original description area for *A. campbelli*.

This new scientific breakthrough required that we scale- up our previous, local habitat restoration efforts, to a landscape level effort, which has been successfully achieved thanks to the support of The Rufford Foundation through the Rufford Small Grant.

This project marked the beginning of our habitat restoration efforts in one of these new distributional zones with a metapopulation perspective focusing on habitat connectivity.

This was accomplished through a partnership with local families to create biological corridors within family agricultural plots to help reverse the adverse effects of generations of subsistence farming and family agriculture in the area that greatly contributed to current state of habitat fragmentation.

This project reconciled local livelihood with biodiversity conservation making the current use of land compatible with the protection and expansion of new habitat for the conservation of *A. campbelli*.



Methodology

Nursery maintenance: To provide the trees needed for creation of the corridors, activities for seed collection, soil preparation, seed sowing, irrigation, fertilizer addition, pest control and general seedling care, were carried out. This included daily nursery care needs to maximize quantity and quality of seedlings.

Conservation sessions: The COVID 19 pandemic ruled out large community meetings as an option due to safety reasons. Faced with this challenge, the methodology was modified to access families in the community in a safe manner, through house-to-house visits. During these visits there was increased exposure, discussion and verbal knowledge exchange with the families about the conservation issues that exist in their community. The second part of the conservation session consisted of each family interacting with live animals including *A. campbelli*, this activity provided the opportunity to start redefining their relationship with the species and biodiversity in general. These topics gave us the opening to talk about the importance of the forest for wildlife and for themselves

and their communities. Finally, we discussed the impact each family has on the forest and how to make the relationship between the families and the nature around them more sustainable.

Site Planning sessions: Each family collaborated at the plot site with our group to determine and plan the most strategic and effective areas to plant seedlings for the creation of biological corridors.

Reforestation sessions: During these sessions each family planted trees from key forest species for *A. campbelli* within their family agricultural plots. Families received a reforestation kit that included a conservation themed tote bag, a children's book and a pamphlet that explains the conservation status of *A. campbelli*, a map of the biological corridor and oak seedlings.

Neonate liberation sessions: To support our habitat focused conservation work, families liberated 50 *A. campbelli* neonates in high quality habitat remnants.

60
Families

Families implemented agricultural practices that will reduce the main threat for *Abronia campbelli* as they will promote the recovery of the species and its habitat.

120
hectares

Area restored and now dedicated to conservation.

50%
gap
reduction

The gap between two distribution zones for *Abronia campbelli* was reduced in half through the creation of biological corridors within family agricultural plots.

20,000
Trees

Planted trees within family agricultural plots.

8
km

The subsequent maturity of this trees in the next decade will create over 8 kilometers of biological corridors.

Achievements

Results & Discussion

HABITAT RESTORATION

Our planet is a complex system that maintains the dynamics necessary to support all forms of life including ours. Being the human species part of this ecosystem and having an enormous capacity to modify it, the intertwining of challenges associated to biodiversity loss and human development is inevitable. The case of *Abronia campbelli* is no exception to this predicament, as it is critically endangered due to the decline in extent and quality of habitat because of land-use change.

The historical distribution of the *A. campbelli* consist of a small mountainous area with valleys and pine-oak forest eco-type, a place that due to its topography and availability of resources has been converted into land dedicated to cattle raising and agriculture.

The best chance for survival and the opportunity to thrive for the species is to reconcile local livelihoods with conservation, through strategic biological corridors that can coexist with the crops on which the survival and well-being of local families depends. Recently two new distribution zones have

been discovered for *A. campbelli*. This project focuses on habitat restoration in one of these new areas. This area consists of a single 76 ha dense forest patch at the apex of a volcano, that is 7 linear kilometers from the distribution range originally described for *A. campbelli*. This forest patch is the last remaining high-quality habitat for the species, due to its size and low degree of disturbance, with trees that are hundreds of years old.

Surrounding this volcano is a community made up of 60 families that are small-scale farmers. Local land use change is mainly driven by unsustainable agricultural livelihood practices in the specific following scenarios: small family plots used for subsistence agriculture, farming/forestry family plots (field work is done by families, product is sold to sustain the family) and private farms use for intensive farming (managed by families with local employees).

These circumstances have turned the remaining habitat into a matrix of highly fragmented zones, where the majority of areas are left with only of a few mature trees that are highly isolated from each other.



This project turned these threats into conservation opportunities by making this agricultural landscape compatible with the conservation of biodiversity, creating biological corridors within family plots.

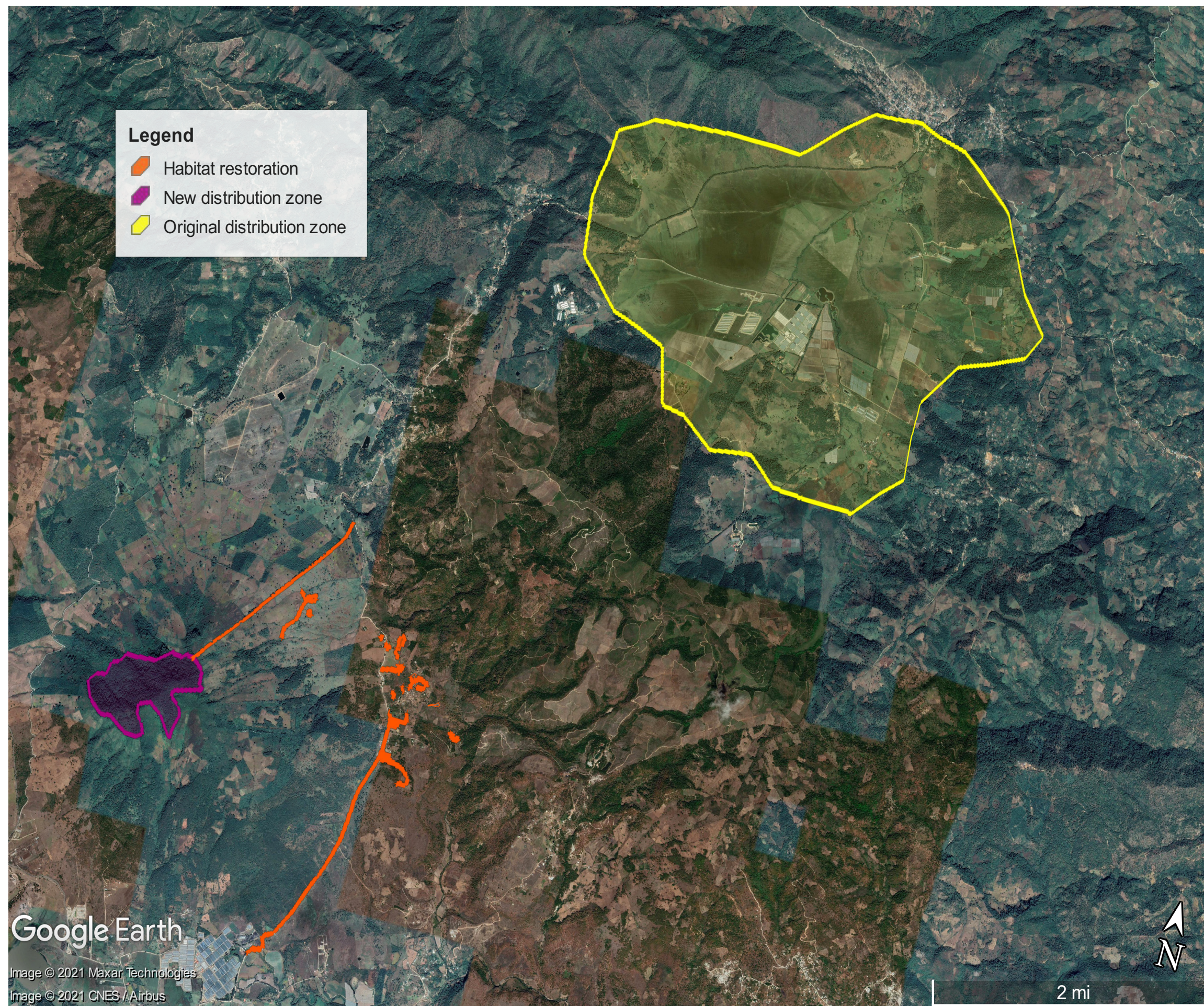
Most of the families in the area plant coffee, a crop highly compatible with the creation of biological corridors, because the coffee will benefit from the shade produced by the planted native trees. The habitat restoration carried out on the lands of each family was highly personalized according to the scenario of each plot. This means that for each family the number of trees and the planting pattern varied.

For example one family received 5 trees which were planted in the courtyard of the house, because their house is embedded in degraded habitat of *A. campbelli* this apparently small contribution is very important. In contrast, another family received 3,000 trees which make up the two largest corridors that descend directly from the high-quality forest patch at the top of the volcano.

In the end the sum of all these efforts achieved the repurpose of 12 ha of highly valued and demanded land for agricultural exploitation into land for the conservation of *Abronia campbelli*.



In situ planning with
local family



The habitat restoration actions carried out in this project resulted in the reforestation of 20,000 seedlings of a key forest species, covering 120,389 m². The subsequent maturity of these trees in the next decade will create over 8 kilometers of biological corridors that will reduce by half the existing gap between one of the new distribution zones recently discovered for the species and its original distribution zone.

These corridors will increase the quality, quantity and connectivity of habitat available for *A. campbelli* and its associated biodiversity, reducing the main threat for the species.

Families were originally expected to get involved in habitat restoration only through living fences, but 42% of families participated beyond the live fence strategy by planting trees also within their small holdings creating small patches of forest. In some cases, it was an action to protect natural springs, but for the vast majority it was a modality chosen by families to be able to protect more habitat on land that they do not harvest. This reflects the level of enthusiasm in the families, which was key to the success of the habitat restoration.

Besides being essential for the conservation of *A. campbelli*, this habitat restoration program will also benefit the local biodiversity and the maintenance of the environmental resources and capacities of the ecosystem, which in turn is very important for the surrounding human population whose agriculturally centric economy depends directly on the goods and services provided by the forest.

In addition, the poverty level of many of the families also makes it urgent to implement habitat conservation measures to ensure local ecosystem services. These

families, unlike people with greater economic resources do not have alternatives to satisfy their basic needs outside the forests that surround them. Although we all depend directly on nature, we are not all subject to the same degree of vulnerability. This interdependence highlights the layers of importance that this habitat restoration has for both humanity and biodiversity.

Families in habitat restoration activities



CONSERVATION EDUCATION

This project was designed to be implemented using conservation awareness education as the main tool to break paradigms, create solutions, build allies and execute conservation actions, so the limitation of access to people due to the COVID-19 pandemic was initially a great difficulty for the project.

Faced with this challenge, the methodology was modified to access families in the community in a safe manner. Instead of holding meetings that the entire community could attend, house-to-house visits were conducted to achieve the project goals.

This greatly multiplied the efforts and time needed to raise awareness among families, but it also multiplied the results. Visiting each of the 60 families directly in their homes allowed us to engage in longer and deeper conversations, resulting in a highly personalized and effective outreach activity that created the strong and lasting alliances needed for the creation of the biological corridors.

The project impacted all 60 families that make up the entire population of the community that lives around the last, high conservation status forest remnant, in which *A. campbelli* lives.

House to house visits

The successful awareness program brought to these families resulted in the enthusiasm and commitment of the community required to design, plan and create biological corridors within their own family farm plots.

In addition, these families now have the necessary information to monitor and reduce or stop the illegal trafficking of the species in their area, as well as to stop the fear-based killing of the species. These families are incorporating a conservation plan for *A. campbelli* into their daily practices, actively reconciling their livelihoods with biodiversity conservation. The community is the central axis of the project. Not only did they participate in the design and planning of the project, but they are also the ones who executed it and will maintain it into the future. The community itself played a vital role in their own awareness journey.

During the house to house visits the elderly had the opportunity to tell the youngest of their family about the forest of their childhood, the forest that had centennial trees and was overflowing with resources and life. They also told how the habitat was lost and the negative consequences that they themselves have been able to experience from that loss throughout their lives.



The most significant achievement of this project is the transcendence of the work carried out during the duration of the project, the biological corridors created are a permanent conservation achievement.

This in turn highlights the high level of fully voluntary commitment on the part of families. Each family that decided to act in favor of the conservation of *A. campbelli* is aware that this needs to be a sustained effort that will start with them but will continue with their descendants.

These families have the will to protect these trees and the species for generations. This project was not an ephemeral family activity, it is a lifestyle change towards biodiversity friendly daily practices. It is the beginning of a new culture that harmonizes human development with the protection of biodiversity.

By focusing the dynamics of the project at the family level, it means that we have multigenerational family teams, for which the values, practices and conservation commitments acquired, implemented, and led by today's adults, will be consolidated in the younger generations, who will grow with a new culture and with the memory of what they built with their grandparents and parents.

This creates a sense of family legacy that will eventually link biological corridors with the will of the ancestors and hope for their descendants, causing each family to treasure the trees within their

**Family meeting
A. campbelli for
the first time**

NEONATE RELEASE

The reintroduction of 50 *A. campbelli* neonates within their natural habitat with the participation of local families is a result of our breeding program which collects gravid females from isolated trees outside of any habitat restoration program site, bringing these isolated, remnant populations from these “Tree Islands” that are at present totally isolated from habitat patches into the genetic pool.

Girl releasing a neonate





Individuals in these isolated trees are the most susceptible to extinction from predation, resource competition, human exploitation and inbreeding depression. If these females were not part of the program they would give birth to their litter in an isolated tree, where neonates have little chance of survival due to high competition with adults and if they survive are doomed to reproduce with close genetic lines.

Our breeding program gives a chance to these neonates to access high quality habitat where they can exhibit natural behavior, dispersal and home range. This provides a real opportunity for the genetic health of the species and increasing the population number of the species. By making families part of this activity they were able to experience firsthand and right now what the biological corridors are about, helping reinforce that the reforestation is to support wildlife.

● Boy interacting with a “mom” (female *A. campbelli*)

Also because of the negative myths that abound about the species the majority of local people fear them and kill them, direct interaction with *A. campbelli* neonates and their moms is key as it completely changes the perception that local people have of the species. The

“cute factor” of an *A. campbelli* neonate lures them to engage with the species in a new way, without the fear there is room for amazement and empathy. It is through these types of activities that families are positively connected to local biodiversity, which is vital since the long-term success of biological corridors depends on successfully linking people with nature.

FINAL THOUGHTS

This project is a real example of how conservation can be accomplished in scenarios in which there seems to be no room for habitat protection, much less generating new habitat and connecting it. In the national and global context of the environmental impact of food production, this type of project deserves to be implemented and replicated.

Due to the widespread agricultural land use in the country, reconciling biodiversity conservation and food production in Guatemalan agricultural landscapes, has enormous conservation potential, this project can become a model to replicate in other areas of the country to protect more endangered species. Through these habitat restoration efforts smallholdings that in the past were the reason for habitat destruction to grow food for a family, now will harbor wildlife again; reconciling local support of families with conservation.