

FINAL REPORT
Clark Waldram Fund



**Upscaling habitat restoration efforts for the
conservation of *Heloderma charlesbogerti*
and *Abronia campbelli***



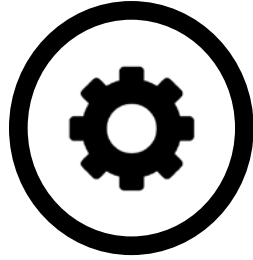
Introduction

Campbell's Alligator Lizard (*Abronia campbelli*) and the Guatemalan Beaded Lizard (*Heloderma charlesbogerti*), are critically endangered due to the decline in extent, connectivity, and quality of habitat due to unsustainable agricultural practices. Our investigations have culminated in the discovery of new distribution areas for both species. Campbell's Alligator Lizard presents two new distribution zones that are completely disconnected from the original distribution zone; therefore, it is urgent to increase and connect these three known distribution zones for the species. We recently discovered a new population of *H. charlesbogerti* and subsequently established a new natural reserve the "Dry Forest Biotiopo" to conserve the forest harboring this population. This area requires habitat restoration within and around the reserve borders.

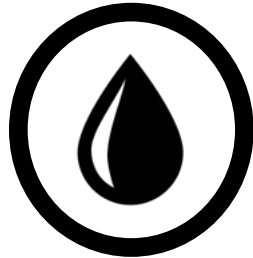
The pressing need for broadening current habitat restoration efforts for both species, ignited by new scientific advancements, matches the increased involvement of local people. This situation creates a momentous turning point and opportunity for the program to expand habitat restoration efforts. To meet the project needs we will increase our efficiency through the application of technical tools to improve nursery irrigation and the planting processes. With the support of the Clark Waldram Conservation Fund, we are ensuring results at the desired scale, quality, and time needed for the conservation of Campbell's Alligator Lizard and the Guatemalan Beaded Lizard.



Achievements



The strategic acquisition of an Earth Auger, complemented by comprehensive staff training, leading to its successful and proficient use.



The effective installation of two irrigation systems, a pivotal enhancement that amplifies the efficiency and productivity of our nurseries.



Successful germination and planting of 20,000 seedlings of key forest species for the conservation of *A. campbelli*.



Successful germination and planting of 5,000 seedlings of key forest species for the conservation of *H. charlesbogerti*.



Doubling the capacity of our *Abronia* nursery in terms of tree production, with a projection to produce an impressive 40,000 seedlings by 2024.



Achieving a remarkable threefold increase in our planting capacity, while upholding the same investment of resources (both time and money), and furthermore, ensuring that the quality of our work is maintained and even elevated. This achievement stands as a testament to the effectiveness of the Earth Auger.

Results & Discussion

Endemic Guatemalan reptile species are quietly edging towards extinction due to habitat loss. Our mission is to ensure that these species and their ecosystems do not fade away, but rather, transform into embodiments of resilience and wellsprings of hope for the conservation of Guatemala's biodiversity.

Among these distinctive reptiles are Campbell's Alligator Lizard and the Guatemalan Beaded Lizard. Urgent actions are required to boost their populations and facilitate genetic flow, securing their long-term survival. Accomplishing this necessitates the availability of suitable habitats to accommodate viable populations.

This project prioritized the protection and restoration of their current habitat and the expansion and connectivity of new habitat sites. Recent scientific breakthroughs concerning both species have unveiled novel distribution zones.

In light of the extensive habitat loss that these species have endured, these zones assume paramount importance in the realm of species conservation. This not only ignited hope for their preservation but also compelled us to

intensify our habitat restoration work. To achieve this, we needed to extend our reach to encompass new areas and establish partnerships with additional local actors. The urgency of these actions necessitated not only an augmentation in the quantity of trees planted but also called for swiftness and unwavering commitment to quality.

Through this project different aspects of the tree production and the planting process to use new equipment and techniques, to plant more trees in less time and optimize our production for the conservation of Campbell's Alligator Lizard and the Guatemalan Beaded Lizard.

In this way, activities that were previously carried out manually, such as irrigation, will now be carried out automatically. This concept will also be applied to the creation of holes in the ground for planting trees, a process previously carried out manually by local families or farm staff.

Through the use of an earth auger, we will be able to streamline and standardize the tree planting process in our habitat restoration efforts.

For the conservation of *H. charlesbogerti* we are creating a network of protected areas around the Dry Forest Biotope, an area of 600 ha of well-preserved mature forest which houses a recently discovered population of this species.

Past research projects indicated that the Guatemalan Beaded Lizard needs large patches of undisturbed land to thrive, requires several years to reach maturity and reproduces at low rates. Species with lower reproductive rates are more sensitive to habitat loss than species with higher reproductive rates, making the recovery of these areas a priority.

Within the range of the Guatemalan Beaded Lizard, land is being abandoned due to human migration to other areas, providing an opportunity to initiate habitat restoration. These areas that are no longer exploited for agricultural practices show poor soil quality with slow natural succession.

To enrich and buffer the habitat within, but specifically around the Dry Forest Biotope, we created a volunteer-managed community nursery in the area. Through this project we installed an electric automatic irrigation system to facilitate the nursery management, allowing the operation to be maintained by groups of local volunteers. In this way, the community is involved in the

enrichment of the habitat from the collection and germination of the seeds to the final planting of the seedlings.

Our nursery grows five nitrogen-fixing native forest species, that when planted will enhance the soil and provide conditions for eventual colonization by other tree species typical of more mature habitat.

Habitat restoration data from previous years reflected another great advantage of the forest species we use; these native species exhibit fast growth and reproduce naturally in just a few years. This allows us to rapidly fill-in forest gaps created by past agricultural activities. The relatively easy care of these tree species coupled with rapid seedling growth makes the program suited for volunteers.

Volunteers helping in the nursery



The ongoing operation of the community nursery provides a steady stream of suitable native trees to restore *H. charlesbogerti* habitat. The maintenance of our habitat restoration capacity will take on an increasing role as we continue to add protected areas in the region. To upgrade, increase and connect habitat for the conservation of *H. charlesbogerti* we germinated and planted 5,000 trees, using the earth auger acquired through the support of the Clark Waldram Conservation Fund.

We also used the earth auger for the construction of a fence inside the Dry Forest Biotope. This fence has been built around our facilities for the in situ captive breeding facilities, that are part of our comprehensive conservation program for *H. charlesbogerti*. This fence will serve to keep the specimens of our breeding colony safe. In addition, it served as the ideal occasion to train our staff to use this newly acquired device.



For the conservation of *A. campbelli* we are creating biological corridors to connect, expand and protect habitat for the species. To date only 3% of the historic Campbell's Alligator Lizard habitat remains.

Amongst a matrix of subsistence crops, cattle, pig livestock, human communities, small and medium-scale agriculture, floriculture, and forest plantations; we have discovered two new distribution zones harboring *A. campbelli*. This information provides great hope for the conservation of *A. campbelli*, but also prompted us to scale up our biological corridors program to fully encompass the species' range.

In previous years we have started habitat restoration efforts to connect the new distribution areas with the original one. To achieve this, we have transformed the problem into a solution, allying ourselves with local families and farmers, designing habitat conservation and restoration areas in a manner compatible with their land production activities.

Converting the people who were previously responsible for the loss of *A. campbelli* habitat, in those, that are now responsible for voluntarily restoring habitat on their lands by actively implementing conservation strategies.

Of the remaining 1,018ha of habitat, 143ha represent habitat under our habitat restoration management, which means that 14% of the species' habitat corresponds to our habitat conservation efforts. That is why we are focusing not only on restoring the habitat, but on restoring it as quickly as possible.

For this reason, the automation of irrigation in the nursery and the use of the earth auger is crucial to increase the number of trees we produce and plant each year. Previous research shows that *A. campbelli* can inhabit trees at relatively high densities and reproduces at high rates. Making the remaining habitat still significant and making each tree that we add important for the species survival.

Take a look at the irrigation system



Click for video





Take a look at the new and improved nursery

We have effectively implemented a gas-powered semi-automatic irrigation system within the nursery. This innovation has enabled us to increase our annual tree production twofold, in 2024 we will be able to produce 40,000 trees.

The growth of our nursery also made it necessary to move it to a new area, for which we found ourselves in need of creating a fence to keep the seedlings safe from farm animals. Once again, we made use of the earth auger, helping to quickly install the fence and training more personnel in its use.

The nursery grows two key forest species *Quercus tristis* and *Liquidambar styraciflua*. The oak species *Quercus tristis*, is a species that generally produces limited seeds. This species is the most important for *A. campbelli* conservation; previous research revealed that 57% of individuals found during *A. campbelli* surveys occupied this tree species.

The other species that harbors *A. campbelli*, with which we will work is *Liquidambar styraciflua*. This is a very important species since unlike the local oak species that have a slow growth rate, this species is characterized by having rapid growth and being a high resistant species necessary for restoration of this extremely degraded habitat.

By germinating and planting 20,000 trees of essential native species, we have accomplished the establishment of biological corridors, reducing the gap between two of the three recognized *A. campbelli* distribution zones by a remarkable 90%. Furthermore, we have achieved the restoration of 33 hectares of land while collaboratively engaging with 38 families in the conservation efforts for Campbell's Alligator Lizard.






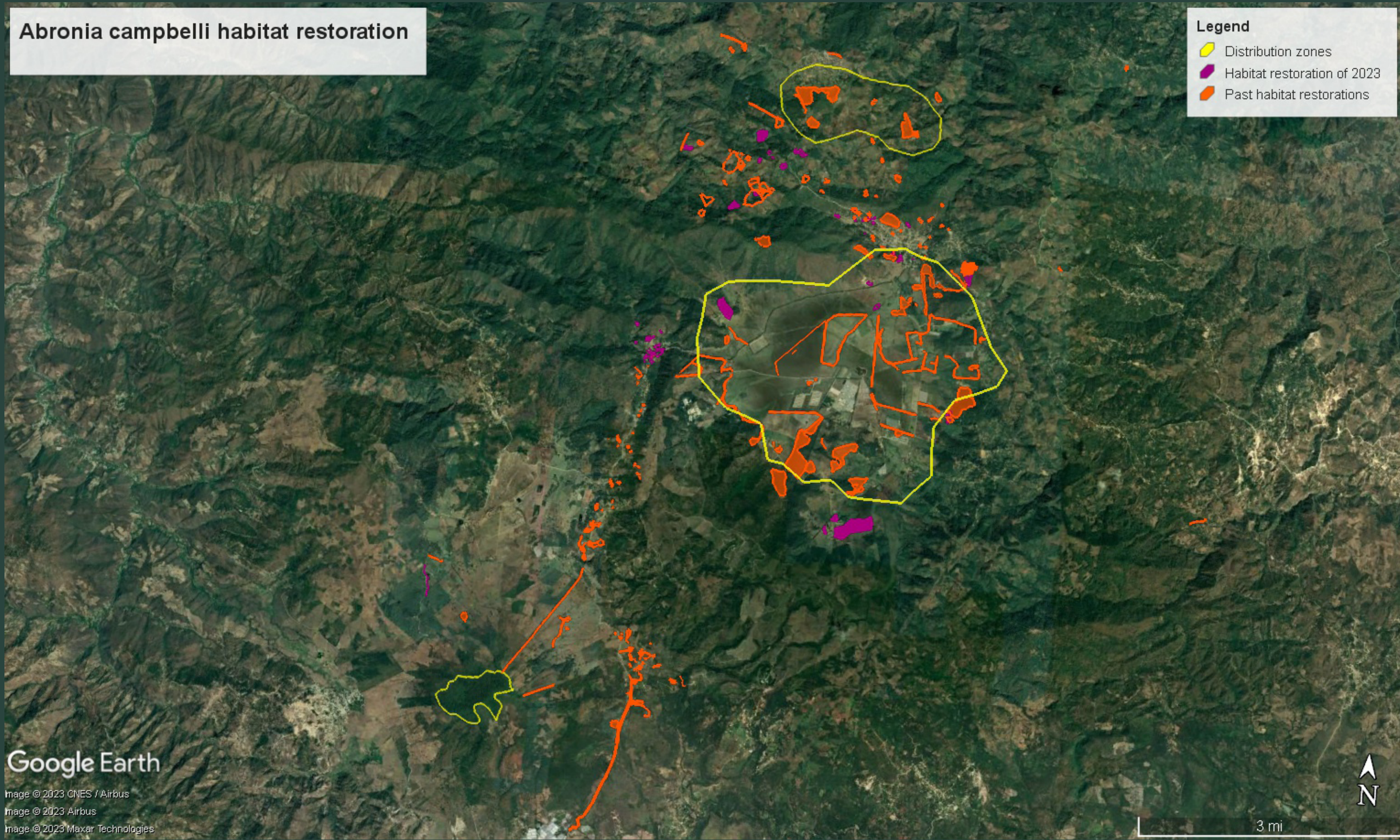
Take a look at the families receiving the trees
Click for video →



Abronia campbelli habitat restoration

Legend

-  Distribution zones
-  Habitat restoration of 2023
-  Past habitat restorations



Google Earth

Image © 2023 CNES / Airbus

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Earth Auger Impact

This project had allowed for the continuation and acceleration of our habitat restoration program, critical for the conservation of Campbell's Alligator Lizard (*Abronia campbelli*) and the Guatemalan Beaded Lizard (*Heloderma charlesbogerti*).

Investing an equivalent number of resources and time now allows us to increase our tree planting efforts by a factor of 3.3. Remarkably, this expansion doesn't compromise the quality of our plantations; in fact, it even enhances it. The incorporation of the earth auger ensures consistent hole quality for each tree.

The earth auger presents a transformative opportunity, enabling us to triple our impact while utilizing the same resources. It proved to be an indispensable asset for our habitat restoration endeavors, a domain set to witness growth in the forthcoming years, driven by the strong need to augment and enhance the habitat of both the Guatemalan Beaded Lizard and Campbell's Alligator Lizard.

Furthermore, this equipment positions us in a novel stance in relation to local farms and companies. Frequently, they

express the desire to contribute to our conservation initiatives but face staff and/or financial constraints when engaging with extensive projects. By virtue of our heightened planting capacity facilitated by the earth auger, our dynamics with these entities have shifted. We are now equipped to offer strong support in tree planting as well. This has unlocked unprecedented opportunities for expansive habitat restoration initiatives empowering us to achieve our ambitious conservation goals.

Finally, we also experienced a pleasant unforeseen outcome, the implementation of the earth auger sparked intrigue among local laborers, managers, and even farm proprietors. This curiosity about the equipment has enabled us to initiate dialogues with a wider array of individuals in the vicinity.

These conversations have even led to our involvement in the construction of minor fences on other farms. Initiating an interpersonal relationship is often best commenced through the act of extending a favor to the individual. While this might appear minor or perhaps unrelated to our primary objectives, it actually serves as an

alternative method of conducting public relations within the community. This facet is integral to sustaining our operations in the region and fostering the expansion of our partnerships with vital local stakeholders.

Take a look at the construction of a living fence

[Click for video](#)

