

ABSTRACT

The goal of this project was to create a geographic search tool to show where data was collected in the archipelago for the Charles Darwin Research Station, Galapagos, Ecuador. First, I efficiently updated about 28,000 records in the database by assigning coordinates to them using Structured Query Language (SQL) statements. The tool was then created allowing scientists to search the database using taxonomic family, genus, and species. This update and database tool empowers scientists to visualize the distribution of species on the islands, whether the species occupy the ocean, a rocky beach or the rainforest. The tool allows easy access to data as a result of a streamlined downloading process from the database. I used SQL statements along with common web development coding practices to accomplish the project. Currently, this search tool is in use only by scientists with security clearance due to the sensitive nature of the species data associated with Galapagos National Park - UNESCO World Heritage Site. My hope is that this new data access tool will continue to facilitate research for species found nowhere else on earth.



Fig.1 - Two of the members of the Knowledge Management Department and me in the project area

Goals

Goal 1

Many records in the database were missing Latitude and Longitude coordinates. Since the Charles Darwin Foundation is still bringing its database up to international scientific standards, the records needed to be given coordinates as part of the process. Using MySQL queries, all targeted records could be updated in a matter of seconds during run time. About 28,000 records could be updated this way by running queries. A total of 3 queries were needed complete the update.

Goal 2

The interactive map needed to be a web application so that all scientists with security clearance could access it by logging onto the Charles Darwin Foundation's website. MapBox and Leaflet, two open source web application, were used for convenience. The functions of the map and database interactions were added to this map using JavaScript, PHP, CSS, and HTML.

Results

Goal 1 Results

Latitude and Longitude coordinates were successfully assigned to about 28,000 records. The coordinates given to each record were taken from the Major Locality coordinates. Major Localities are significant parts of a large island, or a whole island if the island is small. This breaks up the terrain into pieces that have a similar environment. The records were also marked with a note detailing that these coordinates were assigned coordinates after the record was in the database and how the coordinates were assigned.

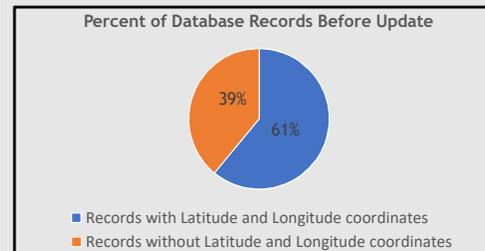


Fig. 2 - A pie chart showing the percent of records in the database with and without coordinates before the update

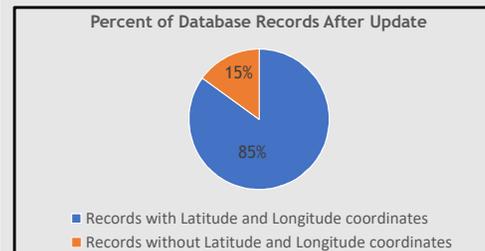


Fig. 3 - A pie chart showing the percent of records in the database with and without coordinates after the update.

Goal 2 Results

The map was implemented with taxonomic family, genus, and species dropdown boxes for the user to select which species they want to records to be retrieved from the database. The database filters which records are returned based on the selected information and information pre-programmed into the query. The pre-programmed information excludes records that do not have accepted taxonomic information as indicated in the database.

The information from each record is used to create a marker on the map. Each marker can be selected for quick information about the record. Two links are provided. The first link directs the user to the full record information on the website. The second link directs the user to information about the taxonomy the species falls into. The map has a zoom feature to allow the user to see specifically where markers are and, to show separation between markers with close coordinates.

Results Cont.

Goal 2 Results cont.

The user can also download all the records returned from the database as a CSV file. The CSV file allows for large amounts of record information to be available relatively quickly. The scientists can then scan through all the relevant records without having to individually search each individual record in the website.



Fig. 4 - A screen capture of the online Geographic Search Tool. On the selection panel on the right side, dropdown boxes can be seen with selected information for taxonomic family, genus, and species. The "Reset Map View" button lets the user quick zoom to the original view after they have adjusted the map zoom. The "Download Data as a CSV File" button downloads all the records on the map as a CSV file. Markers on the map are individually blue or are clustered in green with the amount of markers if they are relatively close together in the current map zoom. The map shows a selected marker with a popup for quick information and links to the full individual record or taxonomic info about the species.

Impact

This project is important because the Charles Darwin Research Station has copious amounts of scientific data and records to share with scientists around the world. This specific project allow for facilitation in research by providing scientists more information about where records were collected and helps them visualize the spread of data collection sites. Moreover, it facilitates their research by giving them a quick way to search and download information relevant to their studies. My hope is that this can improve the speed of studies where location of data collection is crucial.

Acknowledgements

I would like to thank the Charles Darwin Research Station and the Biology Department at UWEC for the opportunity to be an internship at the research station. I would also like to thank the Knowledge Management Department for letting me accomplish a project for them.

Additionally I would like to thank the International Fellows Program for their funding and support in this abroad experience and others.