Process Book

Project: Endangered Animals
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Overview:

Our visualization represents data on endangered animals worldwide. Specifically, we visualize datasets gathered from the "IUCN Red List of Threatened Species Red List," http://www.iucnredlist.org/. The data from this site contains data specific to types of animals, such as mammals, amphibians, or birds and then is further divided by country. Our visualization takes the the data organization into account and implements both a map and list of countries to allow potential users to explore available data via geography. The data about the animals is displayed in a stacked bar chart that is updated based upon user selection.

Motivation:

The authors of the visualization love animals and hope to create greater awareness of threat of extinction to the public. We also both come from a mathematical background and appreciate working on data that gives us a new point of view.

Datasource:

As noted earlier, our data is derived from the "IUCN Red List of Threatened Species Red List," http://www.iucnredlist.org/. This data was already organized via tables and csv files.

Table 6a: Red List Category summary country totals (Animals)

IUCN Red List Categories: **EX** - Extinct, **EW** - Extinct in the Wild, **CR** - Critically Endangered, **EN** - Endangered, **VU** - Vulnerable, **LR/cd** - Lower Risk/conservation dependent, **NT** - Near Threatened (includes LR/nt - Lower Risk/near threatened), **DD** - Data Deficient, **LC** - Least Concern (includes LR/lc - Lower Risk, least concern).

AFRICA

North Africa	EX	EW	Subtotal	CR	EN	VU	Subtotal	NT	LR/cd	DD	LC	Total
Algeria	2	1	**3**	15	36	64	**115**	55	0	123	889	**1,185**
Egypt	1	1	**2**	5	27	120	**152**	142	2	143	1,354	**1,795**
Libya	0	1	**1**	5	17	37	**59**	29	0	63	662	**814**
Morocco	2	0	**2**	27	56	83	**166**	81	0	170	1,340	**1,759**
Tunisia	11	0	**11**	11	26	51	**88**	45	0	91	817	**1,052**
Western Sahara	0	1	**1**	4	13	31	**48**	33	0	109	843	**1,034**

Sub-Saharan Africa	EX	EW	Subtotal	CR	EN	VU	Subtotal	NT	LR/cd	DD	LC	Total
Angola	0	0	**0**	10	32	66	**108**	59	0	228	2,395	**2,790**
Benin	0	0	**0**	8	16	46	**70**	44	0	113	1,601	**1,828**
Botswana	0	0	**0**	4	5	15	**24**	30	0	11	995	**1,060**
Burkina Faso	0	1	**1**	5	6	18	**29**	21	0	3	762	**816**
Burundi	0	0	**0**	5	15	32	**52**	40	0	35	1,040	**1,167**
Cameroon	0	0	**0**	51	108	125	**284**	82	0	219	2,543	**3,128**
Cape Verde	1	0	**1**	5	21	36	**62**	30	0	102	840	**1,035**
Central African Republic	0	0	**0**	8	5	22	**35**	24	0	48	1,348	**1,455**
Chad	0	1	**1**	11	5	20	**36**	20	0	12	810	**879**
Comoros	0	0	**0**	7	16	79	**102**	110	0	83	869	**1,164**
Congo	0	0	**0**	8	19	61	**88**	41	0	159	1,911	**2,199**
Congo, The Democratic Republic of the	0	0	**0**	29	70	137	**236**	89	0	439	3,467	**4,231**
Côte d'Ivoire	0	0	**0**	14	34	86	**134**	101	0	153	1,975	**2,363**
Djibouti	0	0	**0**	4	12	79	**95**	130	0	98	964	**1,287**
Equatorial Guinea	0	0	**0**	9	29	52	**90**	39	0	123	1,545	**1,797**
Eritrea	0	0	**0**	9	14	93	**116**	142	0	103	1,197	**1,558**
Ethiopia	0	0	**0**	18	33	57	**108**	41	0	63	1,322	**1,534**
Gabon	0	0	**0**	9	30	69	**108**	39	0	178	1,901	**2,226**
Gambia	0	0	**0**	8	13	41	**62**	43	0	120	1,449	**1,674**
Ghana	0	0	**0**	12	29	78	**119**	81	0	144	2,047	**2,391**
Guinea	0	0	**0**	15	33	91	**139**	96	0	176	1,943	**2,354**
Guinea-Bissau	0	0	**0**	7	15	50	**72**	48	0	120	1,444	**1,684**
Kenya	2	0	**2**	39	55	152	**246**	186	2	242	2,711	**3,389**
Lesotho	0	0	**0**	0	5	9	**14**	13	0	2	368	**397**

This made loading and processing our data simple and straightforward. However, as will be seen in future sections, the predefined attributes within the tables would present a challenge in our design decisions:

"CR - Critically Endangered, **EN** - Endangered, **VU** - Vulnerable, **NT** - Near Threatened, **DD** - Data Deficient, **LC** - Least Concern."

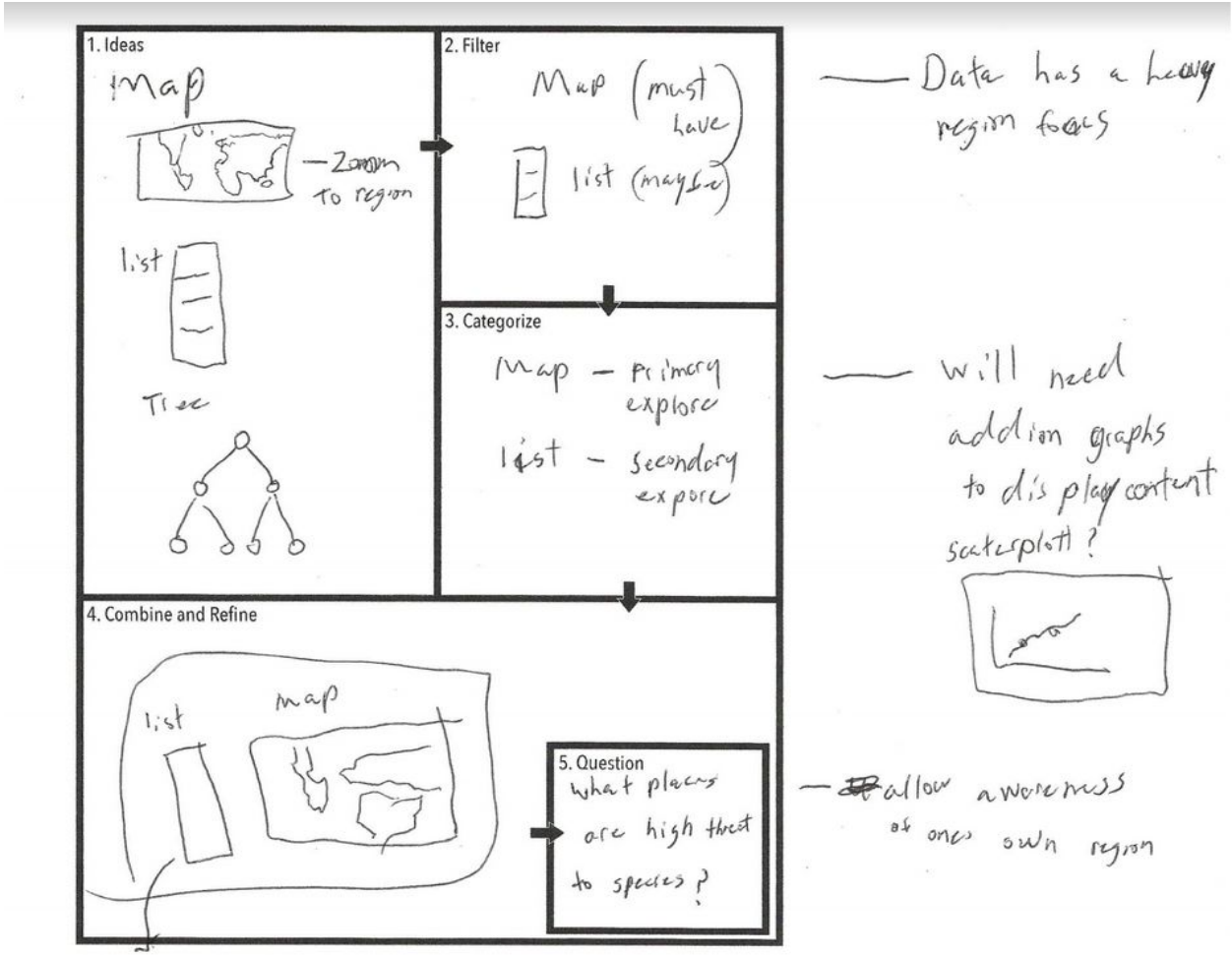
Questions:

The primary question we hope to answer for users of our visualization is "what is the condition of wildlife around the world?" However, from the point of view of the developers, our question quickly became how do we present our data accurately relative to country by country, as certain countries have more diverse species of animals, while others have more research collected.

Design Evolution:

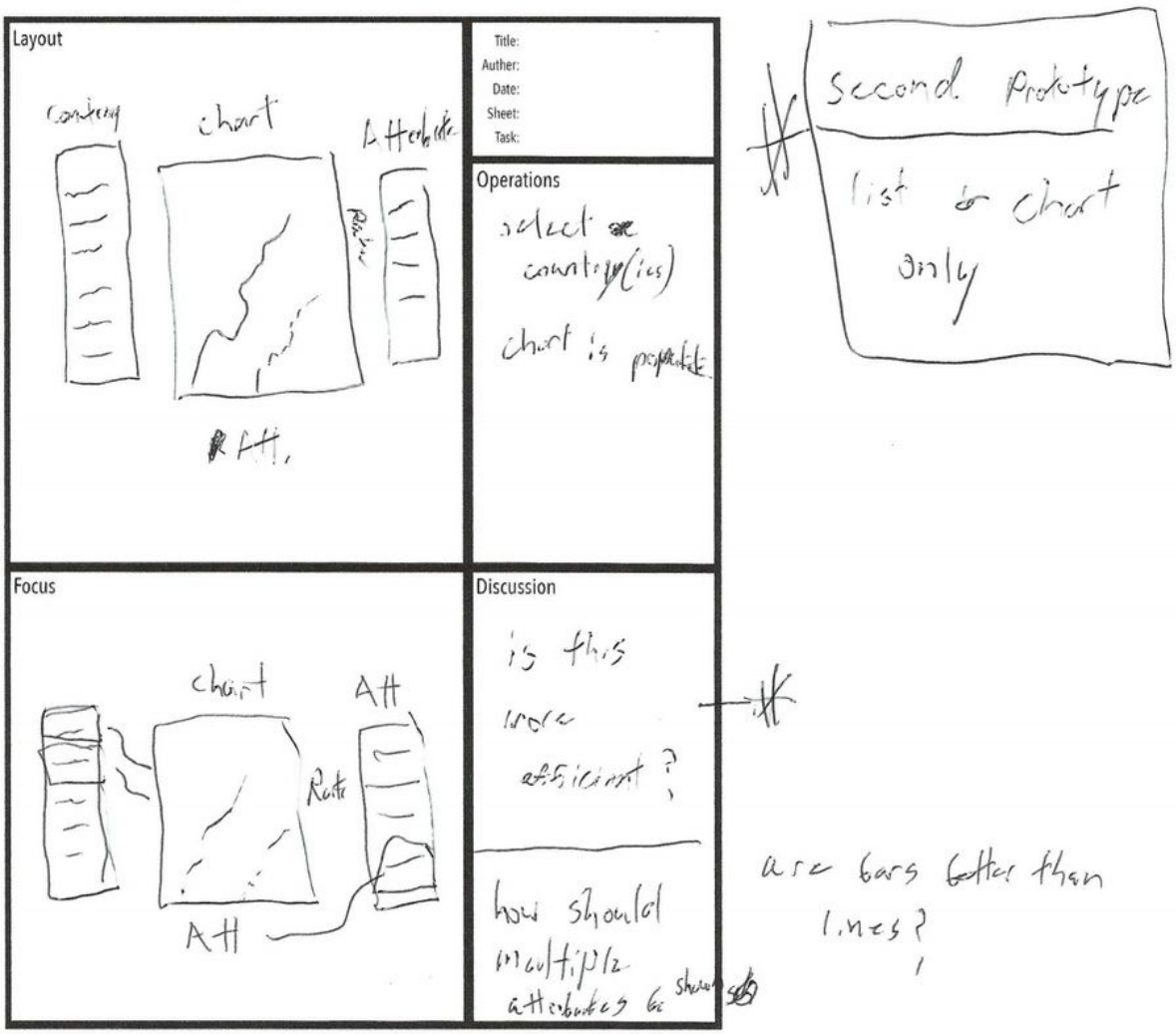
While developing our project proposal, we created 3 different designs:

1. Map/List Oriented:



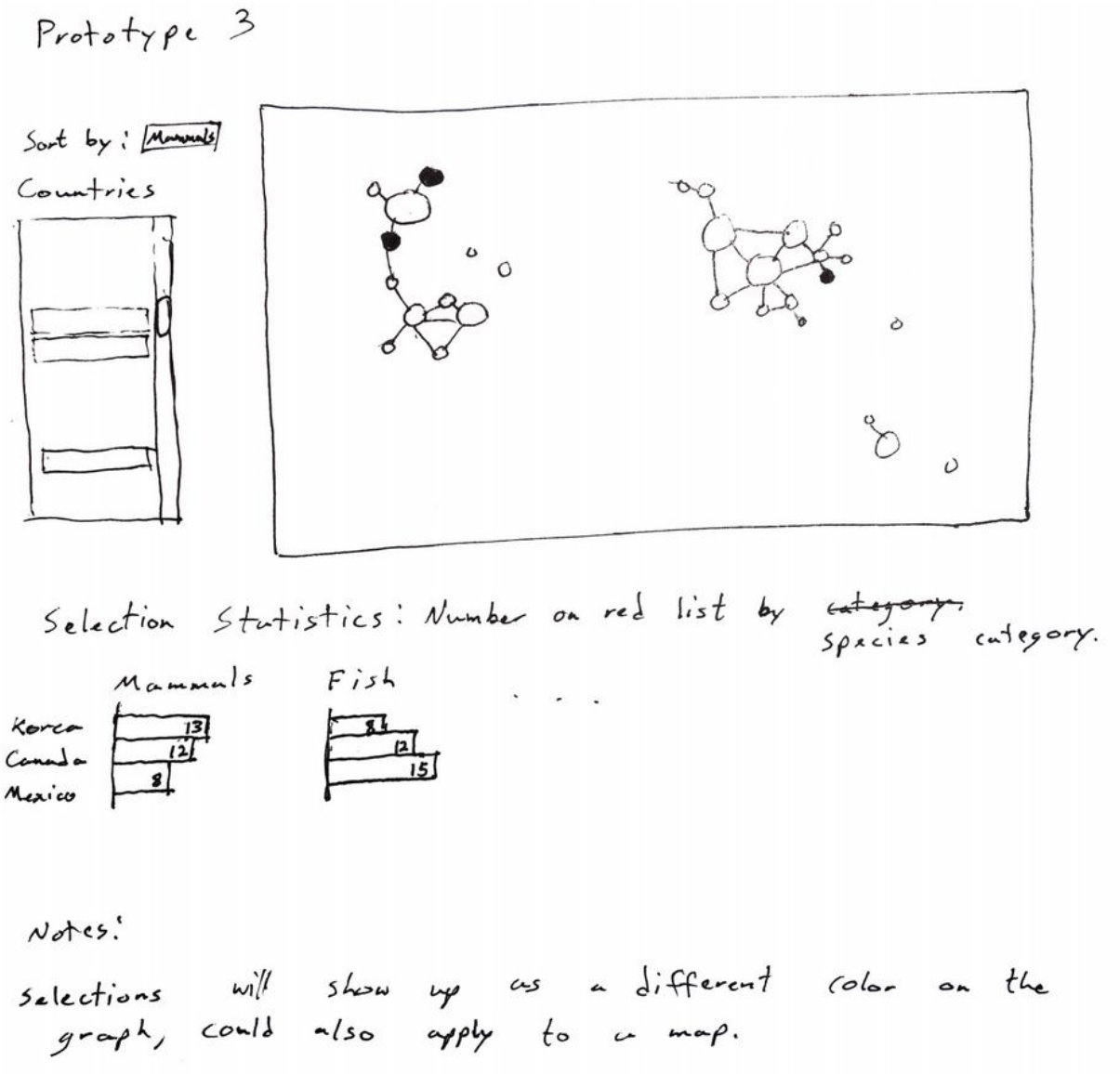
This was our first idea and the one our current vis draws most inspiration from. We developed this idea mainly because our data organized via geography. At this point we knew we have to have a 3rd component to display the data per country but we had not determined what it would be, an early idea seen above involved a scatterplot.

2. List Only



This designed recognized that the main focus of the data should be on the chart and not the map. While the map provided a nice means to explore, we didn't want the users to be distracted by it. Here we put a line chart (intended with a different color for each line) as the focal point and with two list for the user to chose their areas of interest. Countries & attributes.

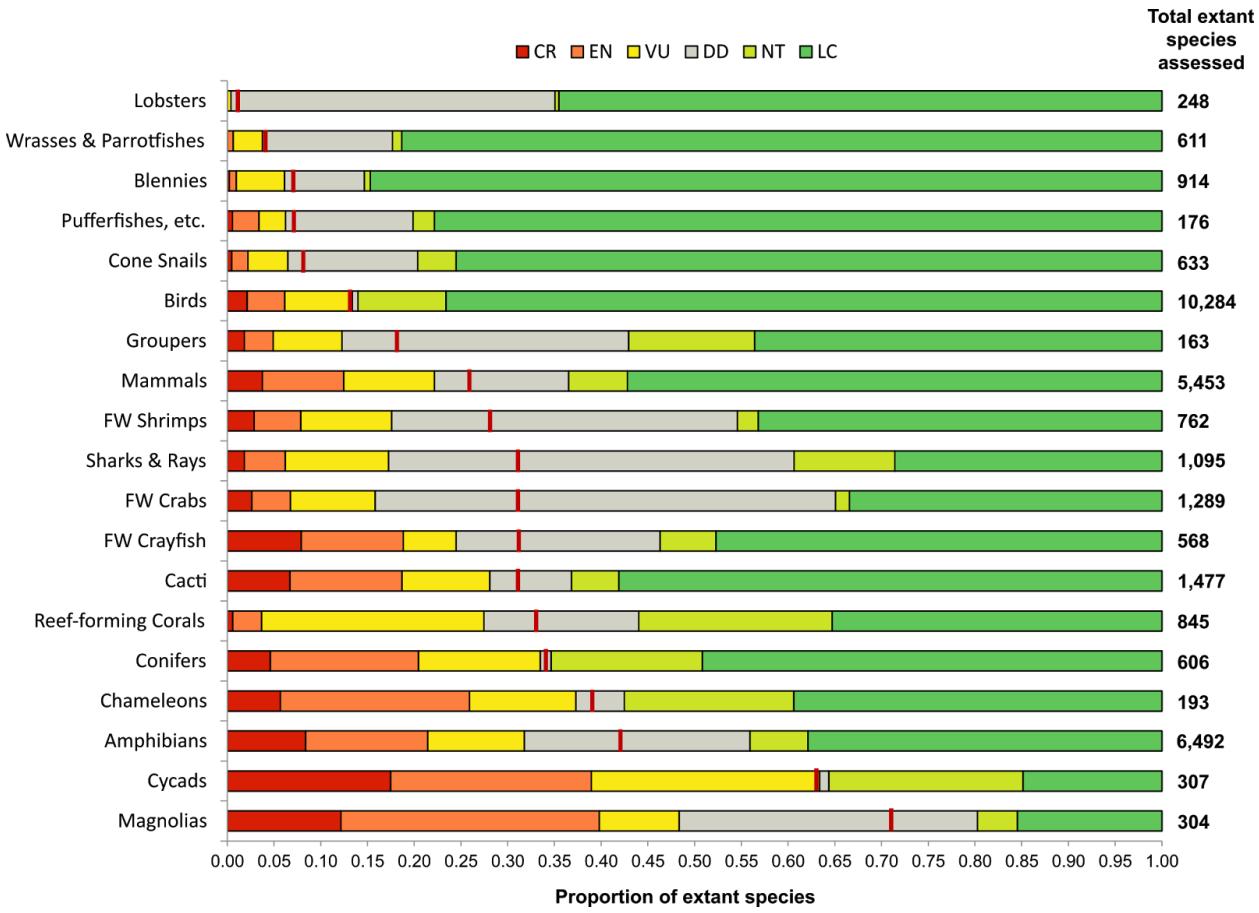
3. Tree based



This design would represent countries as a node and each link would represent a boundary. This would allow use to show attributes about the countries view size of the node or color. The data on endangered species would be represented as through a combination of bar and line charts.

Related Work/Exploratory Data Analysis:

Before showing what current design implementation looks like, we first need to show some of the other visualizations that helped us. Naming how the IUCN Red List displays data on threatened species.



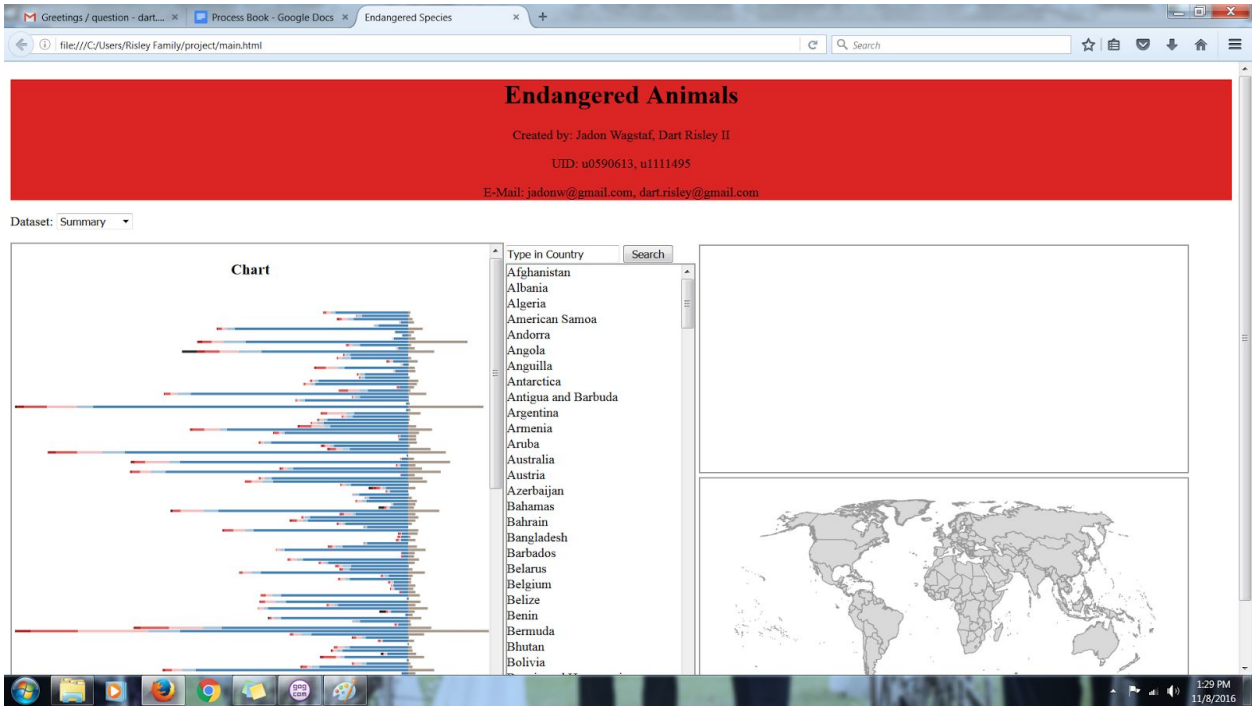
As noted in our data section, the IUCN data contains challenging data to display:

"CR - Critically Endangered, **EN** - Endangered, **VU** - Vulnerable, **NT** - Near Threatened, **DD** - Data Deficient, **LC** - Least Concern."

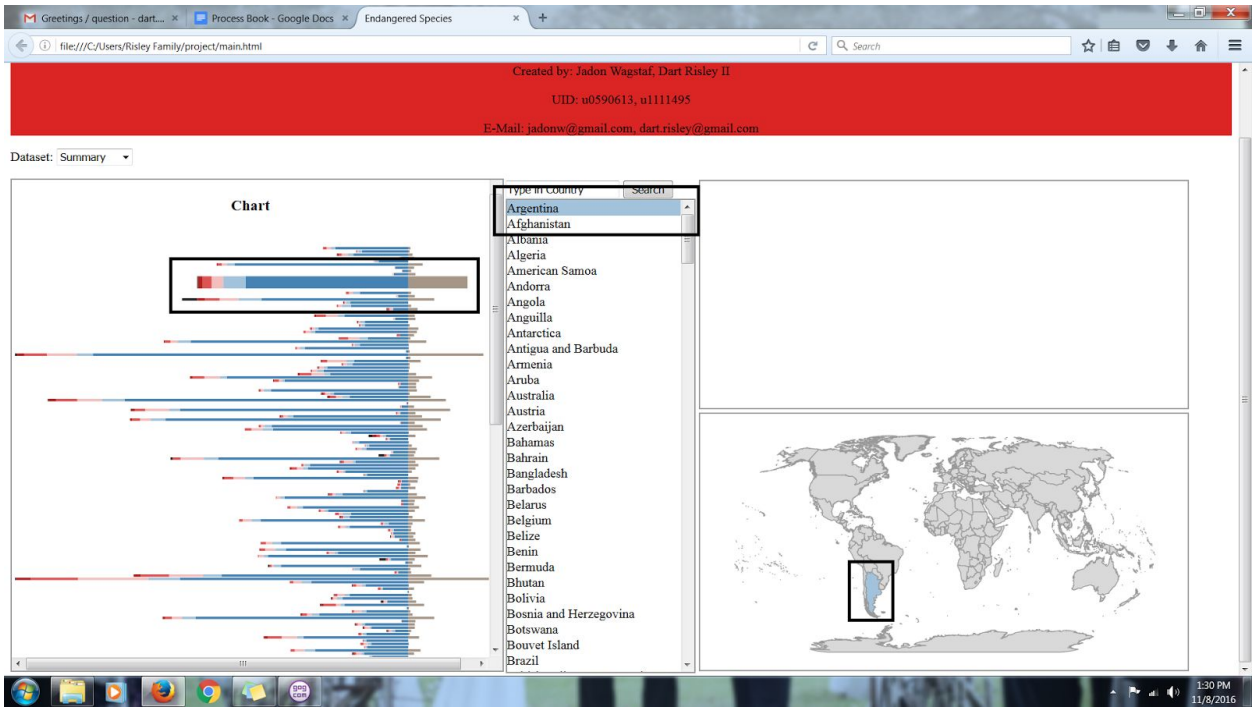
The reason is the key marked "DD - Data Deficient" can have an adverse effect on the user if they are not made aware of it. Moreover as you can see in IUCN own view, the "total number of species assessed" varies greatly. We believed that no matter what display we use, data deficient (meaning, data that is not collected) should be noticeable while not focal. IUCN's own use of stack bars does a fair job to accommodate this problem.

Implementation and Current State of Project: **note: not all planned features are ready for use*

Utilizing the stacked bar chart design via HTML, Javascript and D3, we made our own variation where each data type is stack in one direction, while the "DD" category is in another direction, see below:



In addition, we also added new features and made a few more design decisions. The biggest of these decisions is the layout. With the map and chart next to the chart rather than one on top and the other below. We have also shrunk the map to make room for another possible feature, currently in development. Most notably, however, is the is the stack bar chart will display data from every country initially and change depending upon user selection:



When a user selects a country from the list, we move that selection to the top of the list, highlight in both the list and map, then increase the size of the bars in the chart. For the milestone we will have added an axis and key.

Evaluation:

We believe we have found an optimal solution to our data challenges and have implemented a visual structure that is clear with room to grow. We intend to add tooltips for each bar and we are contemplating pulling country specific data to give user context about the countries they select which we have made room for in our design. Completing our axis, filters, and chart legend will strengthen our current model.

At its current state the visualization is functional, but when finalized will provide an accurate interactive expression of the current state of endangered wildlife.