Group ERA: Wild Guard

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I. Project Goal

The websites of endangered animal conservation usually display information about numerous endangered animals, such as IUCN red list [1], WWF [2], and ESI [3]. However, it is time-consuming to check each animal's information page to get an overview of the situation of endangered animals all over the world. Therefore, in addition to displaying the information of each endangered animal individually, we conduct statistics and analysis based on the IUCN database, so that people can have a general understanding of the current status of endangered animals around the world in a short time. We aim to raise awareness about the protection of endangered species among people (mainly students) through some interactive components of our website.

II. Design, Sketches, and Tools

For our data visualizations, we have selected React and D3.js. React allows us to build interactive user interfaces efficiently, crucial for handling the dynamic nature of data visualization. D3.js enhances this by enabling precise control over the graphical elements, essential for depicting complex data patterns effectively.

We have mainly three pages: a data visualization page, an information display page, and a game page.

1. Data visualization page: serves as the hub of our wildlife conservation site. This page provides a statistical analysis of IUCN data, giving visitors a quick overview of the current status of endangered animals around the world.

2. Information display page: presents detailed profiles of wildlife, outlining their habitat, conservation status, and other vital statistics. This resource is a tool for visitors to learn about endangered animals.

3. Game page: offers interactive and educational games that highlight the importance of conservation. Through gameplay, visitors can learn about and contribute to real-world conservation efforts, promoting awareness and understanding of wildlife preservation.

As shown in Figure 1, the data visualization page is our home page, and a visitor can jump to the information display page when he/she searches for an animal through the search bar. A visitor can also jump to the EcoSurvival game.

In milestone 2, we focused on the core visualization which is the data visualization page. We will implement the information display page in the next milestone. We consider the game page a bonus feature and will complete it in the next milestone if time permits. Here we will present our design of the data visualization page with sketches.

In the data visualization page, We further broke down it into independent elements to implement. In addition to the navigation bar and footer, we designed seven main sections: a search bar, conservation status, global distribution, habitat, threats, conservation actions and about.

The sketches of these components are appended to the end of the report. They can also be accessed via [1]. Here we will introduce the goal of each component and list the tools that we used for each visualization.

[1] https://github.com/com-480-data-visualization/project-2024-group-era/blob/main/Project%20sketches.pdf

1. The search bar: helps users to find more detailed information about animals they are interested in learning more about. We plan to display this information on a page with the animal's name, its conservation status, population trend, and other information.

2. The conservation status section: represents in a bar chart how many animals belong to each conservation category, highlighting the number of species that are close to facing extinction. The more intense the red color, the higher the likelihood of extinction for those species. The chart in this section aims to reflect the importance of addressing immediate conservation actions. We are going to improve the interactivity of this chart by displaying meaningful information when a user hovers his cursor over a bar. See Figure 2.

3. The global distribution section: displays the distribution of endangered species around the world. Each point represents an animal, and the darker the red point, the more severe the conservation status of the animal. When a visitor hovers over a point, the information about the animal, such as its name and conservation status, will show up. We provide both 3D and 2D views and also create a toggle that allows a visitor to switch between them. We used the `react-globe.gl` for the 3D globe and `leaflet` for the 2D world map with the Mercator projection. We learned the ways to create maps from lecture 8. We have implemented this component, and will further improve it by adding legends and text descriptions in milestone 3. See Figure 3.

4. The habitat section: allows users to explore how species are distributed across different habitats. This section is a tree map (inspired by lecture 5) to visualize the proportions and that provides detailed information about the habitats, giving users a better understanding of the ecosystems and environments that support these animals. To improve visualization we plan that users can select categories such as "endangered" or "critically endangered" and visualize the habitat distribution of species within those categories. See Figure 4.

5. The threat section: shows the top five threats to endangered animals in an ordered horizontal bar chart, displaying the most important factors contributing to the destruction of animal habitats and their disappearance. Users can use this information to create plans to protect animals and reduce negative impacts on their habitats. We plan to add a description of each threat that will be displayed when a user hovers over a bar. See Figure 5.

6. The conservation action section: presents packed circles categorizing the various conservation actions undertaken to protect endangered species. Each circle represents a different category of action, with its size reflecting the number of animals that benefit from that type of action. This visualization is challenging because the original action data in our dataset are textual descriptions, not categories. To solve this problem, we first utilized a large language model to classify action data and then counted each category. To implement circle packing, we used `D3.js`. Currently, it is a static visualization, we will make it interactive, such as allowing visitors to zoom in and out, in the next milestone. See Figure 6.

7. About section: contains a brief introduction about the goal of our site.

Lectures 5 and 6 inspired our design choices, leading us to create a histogram for conservation statuses, a treemap for habitats, a bar chart for threats, and packed circles for conservation actions. Besides, we followed the instructions in lecture 7 (Do and don't in viz) to make clear and just visualizations. For instance, we ensured graphical integrity by making the size of the visual elements accurately reflect the data's magnitude. Moreover, we show all the data starting at zero and avoid using pie charts to facilitate the interpretation of data.

With all these lectures, we completed this milestone by designing effective data visualizations to present information about endangered species.

III. Functional Project Prototype Review

Our website can be accessed via [2]. These visualizations are not fully finished now.

[2]https://com-480-data-visualization.github.io/project-2024-group-era/

REFERENCES

[1] "IUCN Red List of Threatened Species." [Online]. Available: https://www.iucnredlist.org/
[2] "Endangered, Vulnerable, and Threatened Animals — WWF." [Online]. Available: https://www.worldwildlife.org/species/directory?direction=desc&sort=extinction_status
[3] "Endangered Species International." [Online]. Available: https://www.endangeredspeciesinternational.org/

IV. Appendix

This appendix contains the initial sketches and design concepts that were developed during the planning phase of our project. These sketches provide a visual representation of our ideas and help to illustrate the evolution of our design.

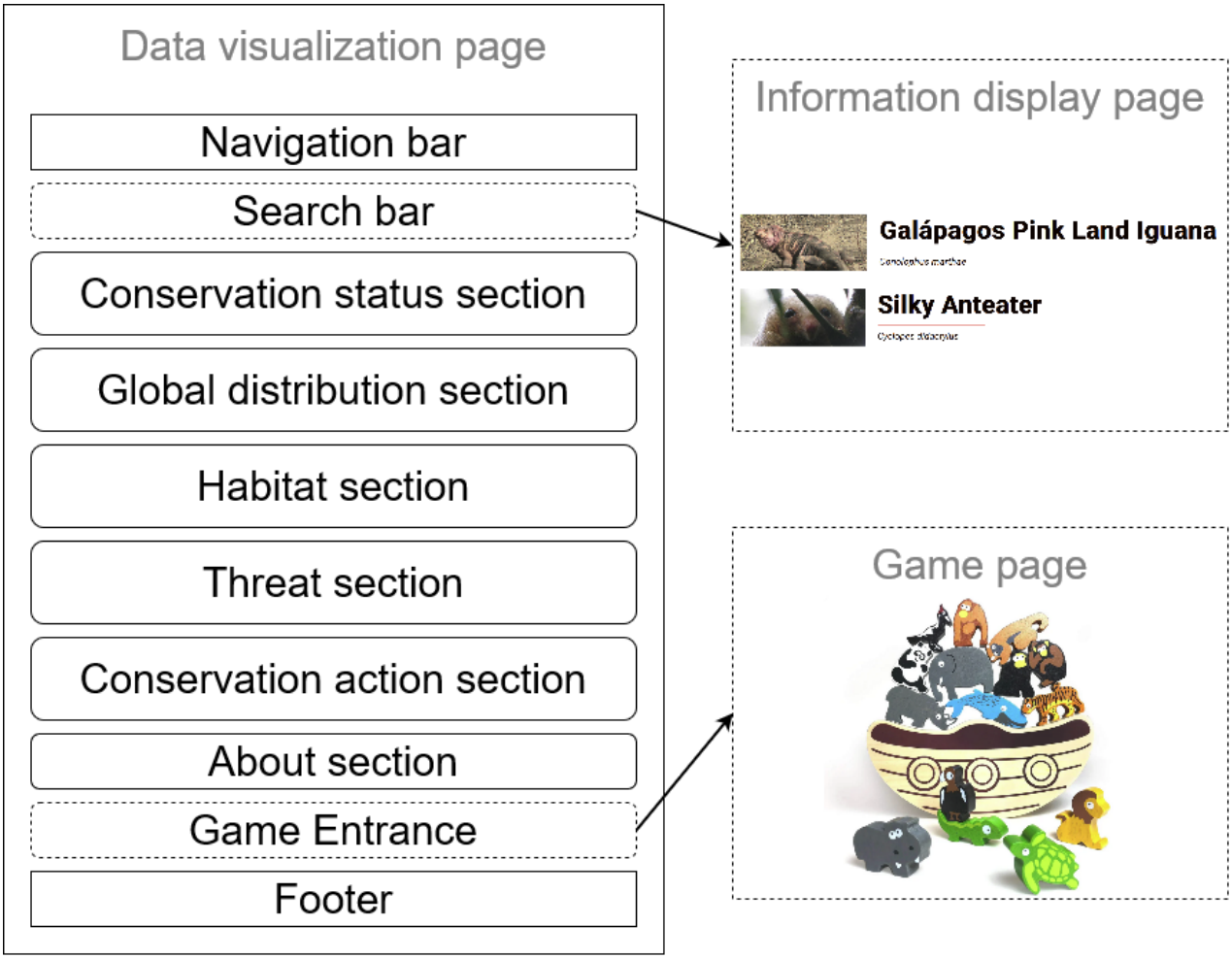

Fig. 1: Sketch of the entire site.

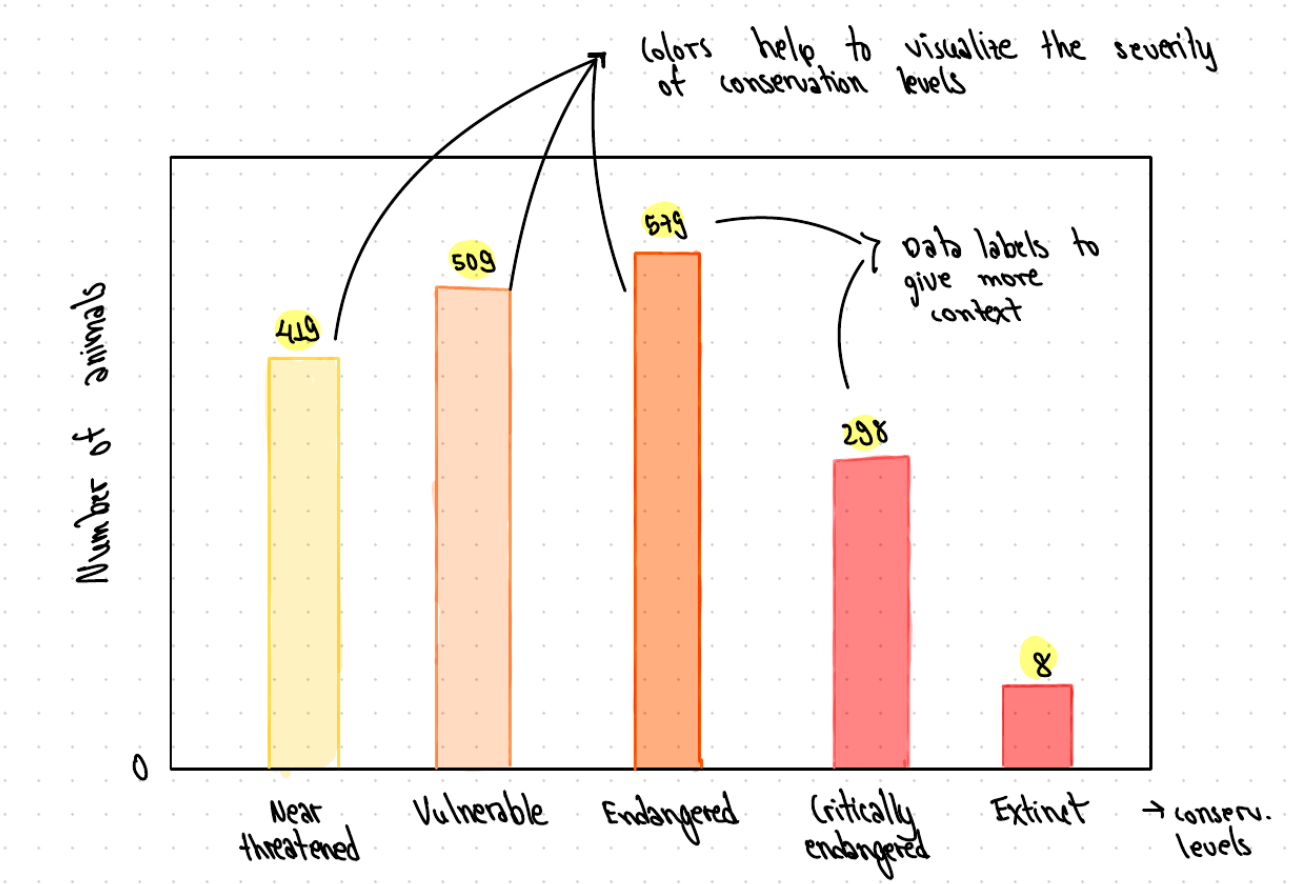

Fig. 2: Sketch of the conservation status of species.

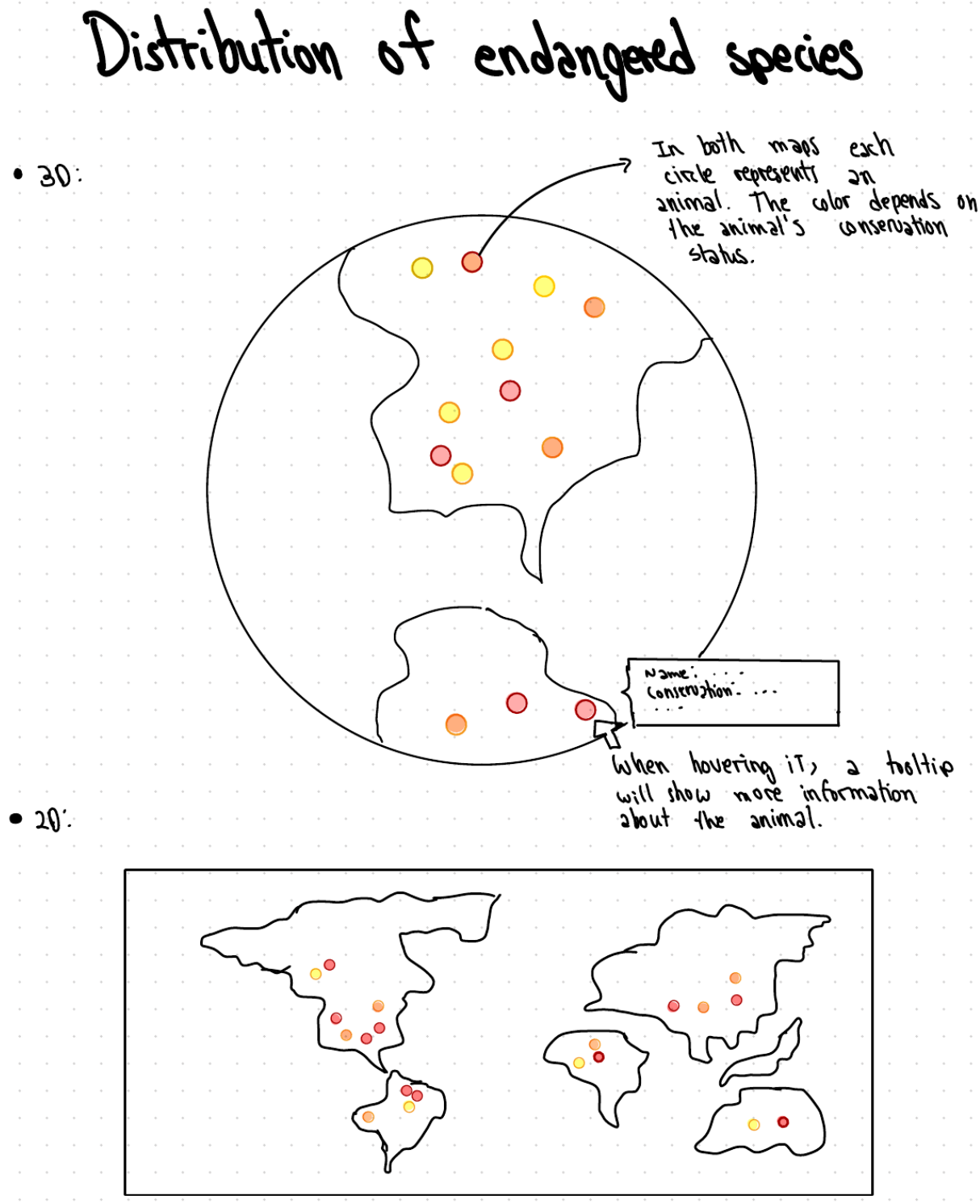

Fig. 3: Sketch of species distribution.

Fig. 4: Sketch of habitat distribution.

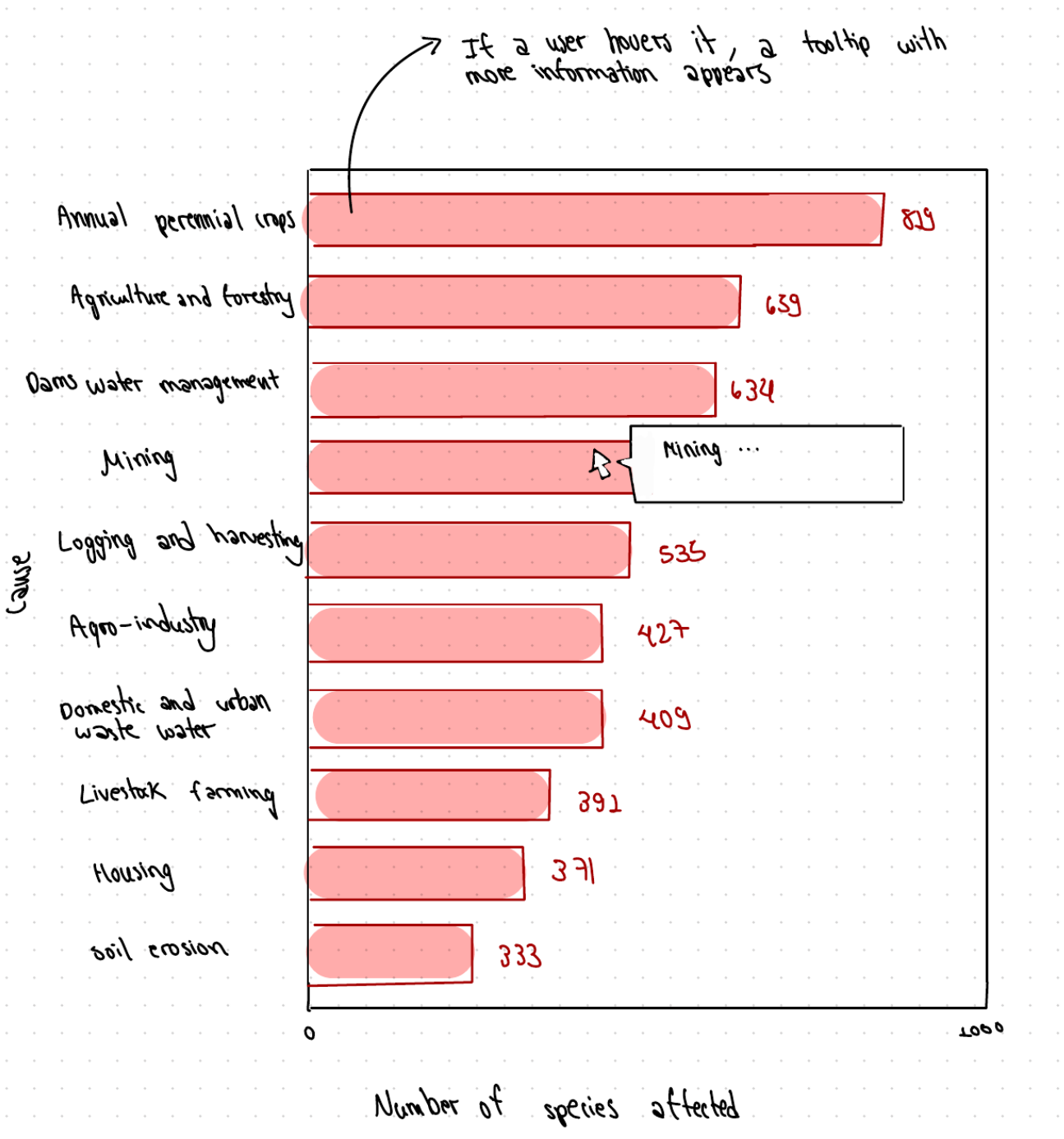

Fig. 5: Sketch of threats.

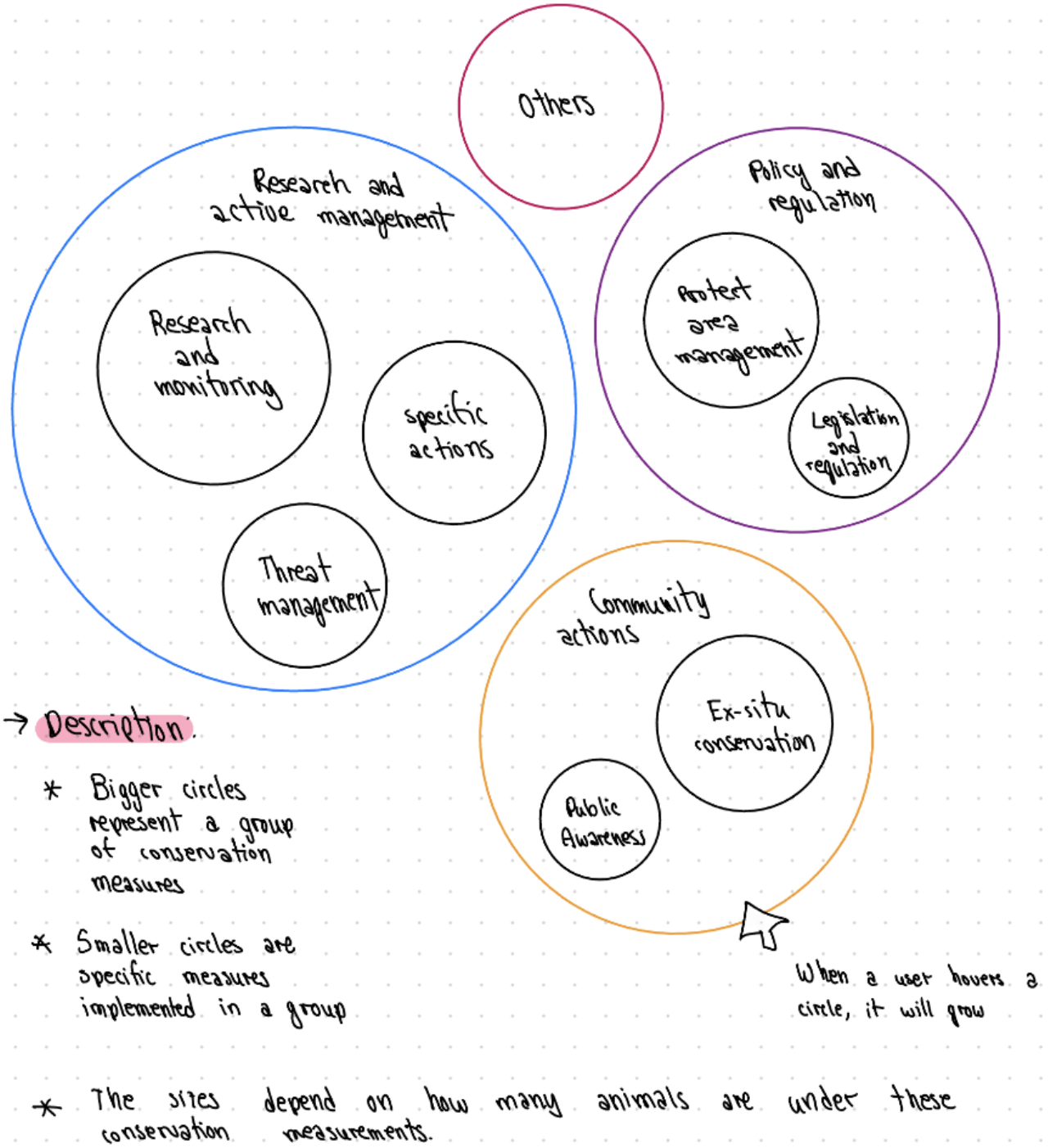

Fig. 6: Sketch of conservation actions to protect endangered animals.