<u>Mustangs of America</u>

<u>Supercomputing Challenge</u>

<u>Final report</u>

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Team Number: 49

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Executive summary:

Our project is about the lives of the wild horses of America. When we were starting to think of ideas for our Netlogo program, we acknowledged the fact that we both loved horses and that we wanted to do a project that was based on their situation. As we begin to progress with our project, we needed to find out more about wild horses and what issues we could possibly model with the Netlogo program that could be a help to these animals.

Some of our major problems that we discovered about mustangs was that they suffer from overpopulation, genetic diseases, and an often bad history after adoption or being sold. We were saddened to discover this, but decided to use this information in our project to show others what these magnificent creatures live through and how they can be helped. We continue making our project, which included making a presentation board to show the public, we made a model on Netlogo of horses that resembles what it's like on a preserve and we were able to use this model to find out what is specifically needed for these horses to survive and prosper in changing situations.

Problem Statement:

Our team as always had great enthusiasm and love for horses, and when we began our project, we found that they have quite an amount of problems to battle with. Some of the major problems the mustangs deal with include overpopulation, starvation, and genetic defects or deformity. These issues greatly affect the majority of the horses in a herd.

Other situations that negatively affect them are diseases, droughts, floods, and other various weather variables. But with our model, we narrowed the situation to the over population and starvation that plagues the wild mustang's population. We can then attempt to correct these issues. A horse's population is a very tricky thing to replicate, considering all of the variables. A well represented model would help to identify and respond to all of the things that affect the environment and horse population.

Method:

Our model is the main component of our project and holds most of the information going into this. It has a lot of variables. The variables control the horse's motion, the horse's direction, the horse's numbers, much more on the environment, and its' factors which affect forage growth and horse population changes. We have even included two graphs to represent horse population, and vegetation types.

The variables affecting the horses include-

-Population

- Rain Amounts

-Direction

- Reproduction of Grass and Shrub

-Speed

-Motion

-Health

-Fatalities

-Reproduction Rate

-Death Rate

-Visual Representation

-Round Up

-Added Horses Mid-run

-Flock Intensity (Borrowed from another Netlogo open to all users.)

The variables controlling the environment include-

-Rain Amounts   -Reproduction of Grass and Shrub

-Water Hole amount   -Grass, Shrub, and Dirt energy

-Reservation Size

With such a large amount of controls, the possibilities are endless.

Validation:

This model on Netlogo that we have created follows one of the basic rules of life based on what the weather brings. If the amount of rainfall is plentiful, the grass will grow and the horse's population will increase as they will have more to eat, and more energy to where they can reproduce at a set amount. If the rainfall amount is very large, then the grass will grow at a higher speed which will lead to the population being unsustainable and then they shall start to slowly die off because there are too many horses and not enough grass.

If this does happen though, we will take away some of the horses so that the grass can grow back enough for all of them. Another situation that can occur is if the rainfall amount is too little, and the grass is not growing at a fast enough rate to feed all of the horses which will lead to them dying off. In this situation, we have created a command in the program that rounds up all of the horses to a new pasture temporarily where they can be fed or moved away when the grass won't support them. Based upon this information, the population of horses basically follow the grass amount whatever they may be on our population table.

Conclusion:

We conclude that it is indeed possible to model a representative horse population and their environment to help maintain makes and correct how many horses can be sustained. This project makes a realistic representation range where the horses may roam fairly free in a pasture similar to a pasture preserve you might find in the western regions of the USA like Wyoming or Nevada.

To elaborate, it is plausible to control horse populations. With this goal, we create d a model that achieved just that. After information was acquired, we set forth to create the model, which did just as we wished. It worked well and showed basic biology population trends and assisted significantly in our plan. Even as the model is the main priority of our project, a board to present all our date might also play a large role in our success in educating the public.

Significant Achievements;

In summary, we have created our model after gathering enough information to assist us in our plan to deliver our project that will be able to assist the wild mustangs' caretakers in the process of raising them, With the project that we have created, this won't only help the caretakers on the reserve do a better job at helping the wild mustangs survive, but it will also help other ordinary people have a better understanding of what the lifestyle of the wild mustangs looks like and what needs to change in order for their survival.

Acknowledgements:

➢ Horse care Illustrated – Guide to Holistic Care for Horses: An Owner's Manual. Denise Bean-Raymond. Published by Quary Books. February 1, 2009

➢ "Must Adopt Habitat for Horses" https://www.habitatforhorses.org/hfm-adoptions/

➢ Personal Interview. Dr. Wyatt Young-A vet tech working in Oklahoma. Fall, 2018

➢ Internet Search. Wild Horse Site www.wildhorsesite.com