

# **Fire On the Boulder**

New Mexico

Super Computing Challenge

Final Report

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Team Number: 51

Jackson Middle School

Area of Science

Environment.

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## **Executive summary**

In our project, Fire On The Boulder, we had one main goal to start. We had originally wanted to show the animals reacting to the environment of the fire and the amount of trees in their ecosystem. As the year went by we thought that we should broaden our focus and now are showing how the fire moves through the ecosystem, how the events take place depending on the number of fires, which are all added on to the focus of showing the animal's reaction. We have completed the fire section of our project. We are still working to complete our animal portion of the project

## **Statement of Problem**

We created our project, Fire On The Boulder, in order to possibly show how animals would react to one side of an area (in the Four Mile Canyon in Colorado, modeled in Spaceland) that would recover slowly from the fire that happened and how they would react with the land recovering fast. Our model shows a fire that moves through two separate areas in Spaceland and shows the ground and trees growing back after a fire. We hoped to include the animals in the ecosystem but unfortunately we were not able to have it ready for our final presentation. We had decided to chose this as a project as we both found it interesting and would give us an opportunity to explore how to program fire. There are some aspects to this where we were not able to make it realistic, such as how quickly the trees grow back and how the ground comes back. We used Starlogo TNG to program this model.

## **Description of Method**

From the beginning of making our project we had decided that Spaceland was split in to two areas by a river. From there we started to add the trees and added a procedure that clears all objects from the water. After this, we created the landscape and colored the terrain, which would affect the speed of the fire. From here we started to add in fires that moved randomly without going into the water and burning trees. After this we had gotten the recommendation from Nick Bennet to make the fire not move randomly and to make it move in a pattern where it would move by creating more fires. After we incorporated this into our project we were on winter break. Once we came back in January we started adjusting the rate of the fires moving and how quickly the ground grows back. After this, Nick Bennet told us to make the fire burn the ground by dividing the color number by ten, rounding that number to the nearest number, and multiplying that by ten. When this was done, we removed the original colors of the landscape. This would ensure that the process of our burning would run more fluently. After this we also got the idea to add in a slider, which would set the total amount of fires that could be present in Spaceland at one time. This is where we were last at the time of creating this report.

## **Results**

So far our results are based on how many fires can be in Spaceland at the same time and how long it would take in order to completely burn all the trees in Spaceland. The results of the project we have gathered are averages that were rounded to the nearest number. The intervals that we set the amount of fires are by 25. We found that, due to the amount of days that the fire seemed to last, the 50 fires run would be the most realistic compared to the Colorado Four Mile Canyon fire.

25 Fires: About 203 ticks until fire died out. Only one side was burned and the other only partially burned.

50 Fires: This took about 75 ticks in order for the fires to completely burn Spaceland. Both sides of land were almost equally burned.

75 Fires: This took about 63 ticks to burn all of Spaceland, and like the previous, it was almost equally burned.

100 Fires: This took approximately 57 ticks to completely burn Spaceland.

## **Conclusions**

Though we only kept our results to a smaller scale we were not able to create an actual conclusion due to not having the animals in the model, which was the main point of our project. However, we were able to draw some conclusions on the fire moving through the ecosystem. We found that there was a certain point where the fire would go through Spaceland and a point where it would die out. The number that was on the brink of burning Spaceland completely is around 20 total fires on Spaceland.

## **Next Steps**

For the fire spreading: There would be several variables to make this realistic such as the conditions of trees, types of trees, the soil conditions, wind, atmospheric levels, the current weather, past weather such as drought or floods, and even surrounding area.

Also, we would have liked to add in the animals in the model by the final report, but we were unable to accomplish this.

We had also hoped that we could have the ground reset (in terms of colors) by the final report as well so we could easily run the project without having to go in and manually reset the colors every time we want to run the model a second time.

## **Achievements**

Alberto Ortega: I think that my biggest achievement for this year would have to be that I was able to learn how to model fire in Starlogo TNG. This would be my personal achievement because modeling fire is a hard thing to do as the pattern that fire moves in is, usually, hard to figure out. This likely will help in the future should I happen to need to model something similar or relating to fire.

Dante Di Paolo: I feel that my biggest achievement this year was making the landscape for our project and programming the fire. I think this is my biggest achievement because the fire had many complications causing us to do it many times. Also, a fire is almost random so it was very complicated making it act like a fire.

## **Acknowledgments**

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