

# *Set Fire To the Rain*

New Mexico

Supercomputing Challenge

Final Report

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Team #35

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## **Table of Contents**

Executive summary . . . . .	Page 3
Statement of research . . . . .	Page 4
Method for Solving . . . . .	Page 5
Verification and Validation . . . . .	Page 6
Results . . . . .	Page 7
Conclusions . . . . .	page 8
Software/references . . . . .	Page 9
Most Significant Achievement . . . . .	page 10
Acknowledgements . . . . .	Page 11

# **Executive Summary**

We plan to investigate how fires spread and how to stop them.

There are many ways of stopping a fire so we are trying to figure out which is best. We attempted to find out the best way to stop a fire. Some of the ways fighting fire are firebreaks, controlled burns, and retardant. This is our executive summary.

# Statement of research

Fire spreads quick and fast, trying to control the fire is important to stopping the damage to forest and personal property. One method we used to solve our problem, what is the most effective way to stop a forest fire, is firebreaks. Fire breaks are a trenches dug that a fire doesn't spread across because denies the fire fuel. It contains the fire spread and aides putting out the fire. There are many ways of stopping a fire. Another method we tried in the program is shaping the "trees" to slow the fire by not giving it a straight path. The reason we chose firebreaks is because the pattern would take a too long to create and fire breaks did not take long at all. We simulated tree shape because this would show how an apple farm or some other tree farm would be shaped. Which would change how the fire moves.

# Method for Solving

We attempted to stop fires or slow them down. We are trying to find the best way of stopping or slowing them down. Our variables were the size of the trees, and where the fire starts. We chose these variables because we wanted the ability of random starting fires. One method we used to solve our problem, what is the most effective way to stop a forest fire, is firebreaks. What fire breaks are is basically a trench dug that a fire cannot cross because there is no fuel for it to use, containing the fire so that people can put the fire out. Another method we tried in the program is shaping the “trees” to slow the fire by not giving it a straight path. The reason we chose firebreaks is because the pattern would take a too long to create and fire breaks did not take long at all.

# Verification and Validation

We plan to verify our research by running our model 100 times consecutively with the same circumstances in order to make sure that nothing will change other than the trial number. This will help us to show that the research we have conducted is true. Another way we will validate our model is that we have an appointment with Stephen Guerin to see his fire sandbox and see how fire reacts to fire breaks in more realistic settings. This will allow us to see and figure out what real firebreaks look like.

# Results

Due to the fact that our research is not yet complete, we do not have any results, but what we expect to get from our results are as follows. If you place a firebreak in the direct path of a fire, it will slow in the time in which the fire goes around the break. Also, that if wind is blowing in a certain direction, the fire will tend to go in that direction. Further, if the wind is blowing in a way that the fire cannot go, the fire will be slowed or, if the wind is strong enough, go out. This can be shown in the program when we give the fire a fuel source in one direction and have the wind blow in the other.

# Achievement

Brendan Kuncel's Most Significant Achievement:

Our most significant achievement is that we were able to code the firebreaks to slow down fires. We are hoping to code wind into our design. This would allow us to simulate the real world where fire direction is controlled by wind.

Ivan MacKenzie's Most Significant Achievement:

My most significant achievement is finding out that wind effects a fire. I was looking for any thing to benefit our research and found this fact out then told Brendan to put wind into the program and he said yes. This is my most significant achievement.



# Software/references

We altered a program from the Netlogo models library, the “Fire” program. We modified it so that we could start the fire at a certain place of our choice. Then we programmed in a way that could represent a town, which stops the program immediately. This represent that the town had burnt down. We used this event to start the tick counter and compared it to the tick count prior to the event to see if the fire was faster or slower than the other trials.

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