Jellyfish Domination

New Mexico
Supercomputing Challenge
Final Report
April 7, 2010

Team Number 62
Jackson Middle School

Team Members
Brendyn Toersbijns
Thomas Hughey
Spenser Gomez-Nelson

Teacher
Mrs. Glennon

Project Mentor

Nick Bennett

TABLE OF CONTENTS

SUMMARY

Our project is on the overpopulation of the many jellyfish species around the world. The overpopulation of the jellyfish has led to extreme drops in the profits of fishing organizations. Also, there has been a dramatic increase in the number of accidental stings. Our project is on discovering a way to put a handle on the jellyfish populations.

PROBLEM STATEMENT

Our project is on the overpopulation of the many jellyfish species around the world. The overpopulation of the jellyfish has led to extreme drops in the profits of fishing organizations in Japan and China. Also, there has been a dramatic increase in the number of accidental stings around the world increasing the need for anti-venom. Our project is on discovering a way to relinquish most of the jellyfish populations.

Our purpose for choosing this problem as our topic was that instead of doing a viral infection, like most others, we wanted to research something outside of the box. The overpopulation of the jellyfish doesn't have much significance in our lives but would impact the lives of those who fished, provided fish to restaurants, grocery stores, or wholesalers around the world.

BACKGROUND

There was a great deal of reading to do and we each took part of the information to summarize to each other about jellyfish. It was interesting to learn about the different types of jellyfish and understand the ways they defended themselves. It was amazing to know the way they reproduced and took up so much room in an area. Jellyfish can almost deplete the fish population in an area by their reproduction.

We did a lot of brainstorming to come up with a way to decrease the population of the jellyfish. Working with the StarlogoTNG model was fun and difficult at the same time. Our research allowed us to find different ways to harvest jellyfish, some successful and some not. There was a lot of discussion about a way to sell jellyfish in the place of the usual fish caught and distributed around the country but we realized it was not profitable.

The thing we found to be the most useful was to remove the jellyfish from the water, dry them out on land, and destroy them. The problem was how to get past their stingers and the ability to cut nets to get out of being captured.

We were limited by the fact that we don't live near a stretch of ocean where the jellyfish have overpopulated. We also didn't have any transportation that allowed us to reach these areas. It would have been really interesting to have seen some of the areas that we viewed only in pictures or video on the computer. The materials that we used are the computers at Jackson Middle School, and many websites; some with videos.

This is a much larger problem than we could solve during a school year. This is a problem that scientists and fishermen will be working on for years to come.

APPROACH

After reading, discussing, and finding that some of our methods had already been tried we decided to make a model in StarlogoTNG to work with nets to remove the jellyfish from an area. The ability of jellyfish to reproduce so easily would mean cleaning areas most affected on a rotating basis just to keep up.

ALGORITHM

We understand that there are math formulas that govern the program we used.

The speed at which the jellyfish travel at is half of what the fish travel at.

The jellyfish also move in a random path.

When the jellyfish collide with the nets they die immediately.

When the fish collide with the jellyfish they die.

When the fish collide with the humans they die.

The humans can move twice as fast as the fish.

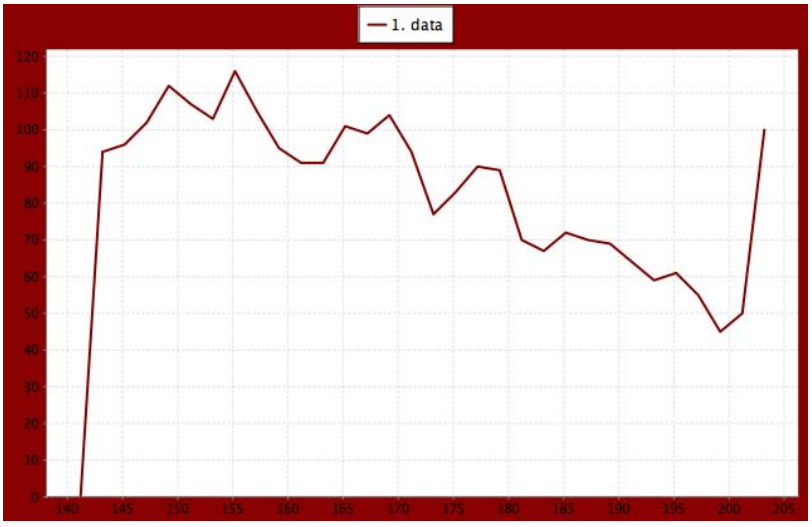
IMPLEMENTATION

The way we built our code was first we created our breeds, which were the Jellyfish, fish, net, and the humans. Then we established the speed at which each breed traveled around in space land. The speed for the jellyfish was .5 steps per second, for the fish and nets the speed was 1 step per second, and for the humans it was 2 steps per second. We then determined the direction at which the jellyfish, fish, and humans would travel and we found that a random heading of 30 degrees left or right would be adequate. After that we determined the position of each net in space land. After we did that we decided the reproduction rate of the Jellyfish and fish which was random 100 greater than 99.5 for the jellyfish and random 100 greater than 96 for the fish. After that we did a setup block, which gave the fish a distinct color and made 3000 fish, 100 jellyfish, and 1 human. We also created another setup block that created each of the nets. After that we created graphs to monitor the amount of jellyfish and fish. Then lastly we created some collision boxes and a forever button, which had all of the moves.

RESULTS

The results for our project was the StarlogoTNG program we came up with as a method to move the jellyfish to land and harvest them for candies and other profitable items. We found that when we ran our model we reduced the jellyfish population in our part of space land and the number of fish increased dramatically. In the real world there would be humans to keep the fish under control and they would be able to continue to solve the problem of keeping the jellyfish under control.

An example of the graphs:



CONCLUSION

Our conclusion is that we have found the best way possible to catch and then kill the jellyfish and still be able to make some money off of this. In investigating the jellyfish population we found that the best way to decrease it would be to build a net and drag them to land and kill them there. So we answered our own question of how to put a handle on the jellyfish population.

ACHIEVEMENT

Our greatest achievement on our original problem was that we found a way to get the jellyfish population down.

NEXT STEP

If we had another couple of years to work on this we might really be able to help. It would be nice if we could visit some of those areas we read about to see first hand what the real problem looks like.

ACKNOWLEDGEMENTS

Nick Bennett for helping push us with our programming.

Karen Glennon for being our sponsor and bringing good snacks.

Jackson Middle School PTA for funding our program.

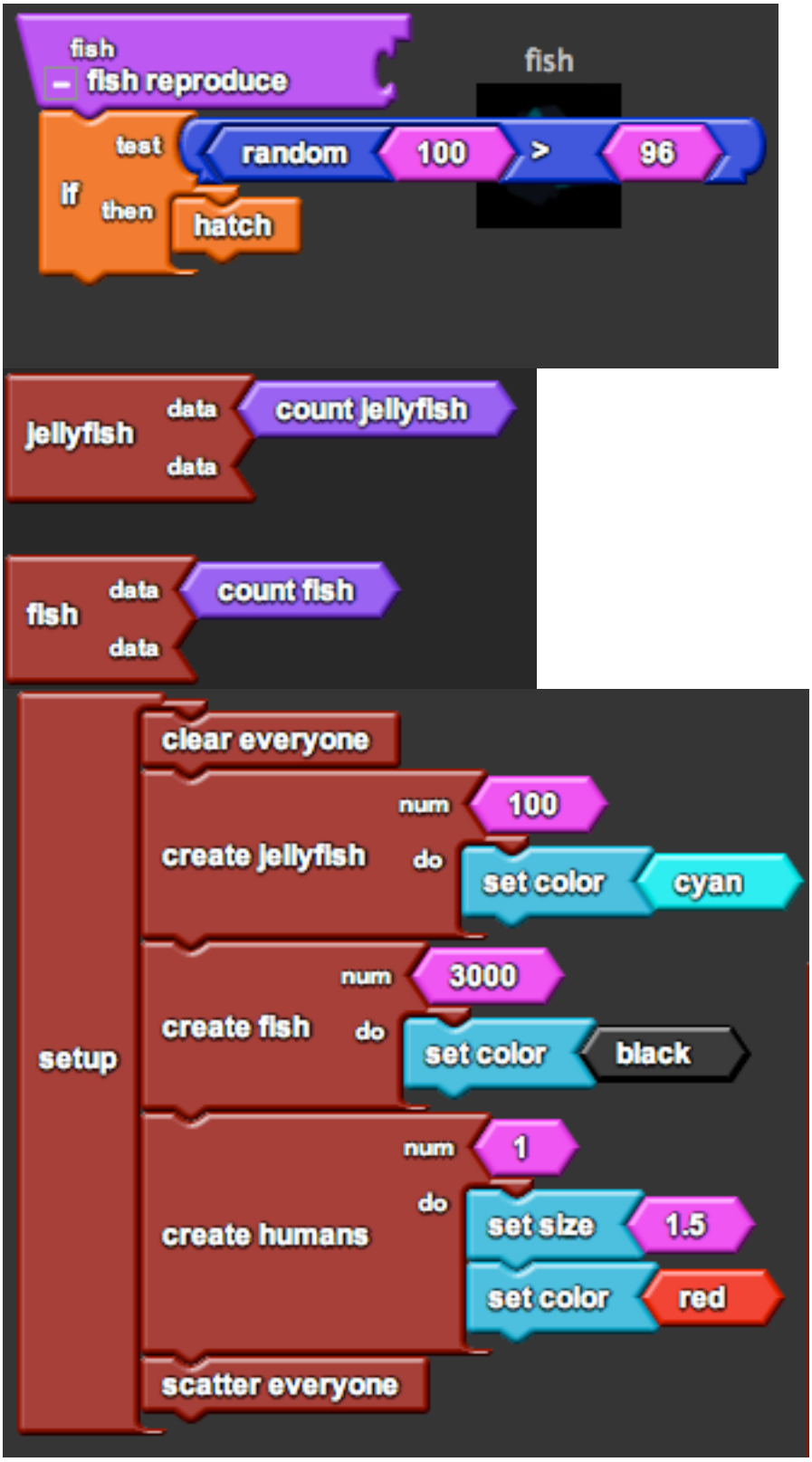
James Hoebing for providing support and driving us to places.

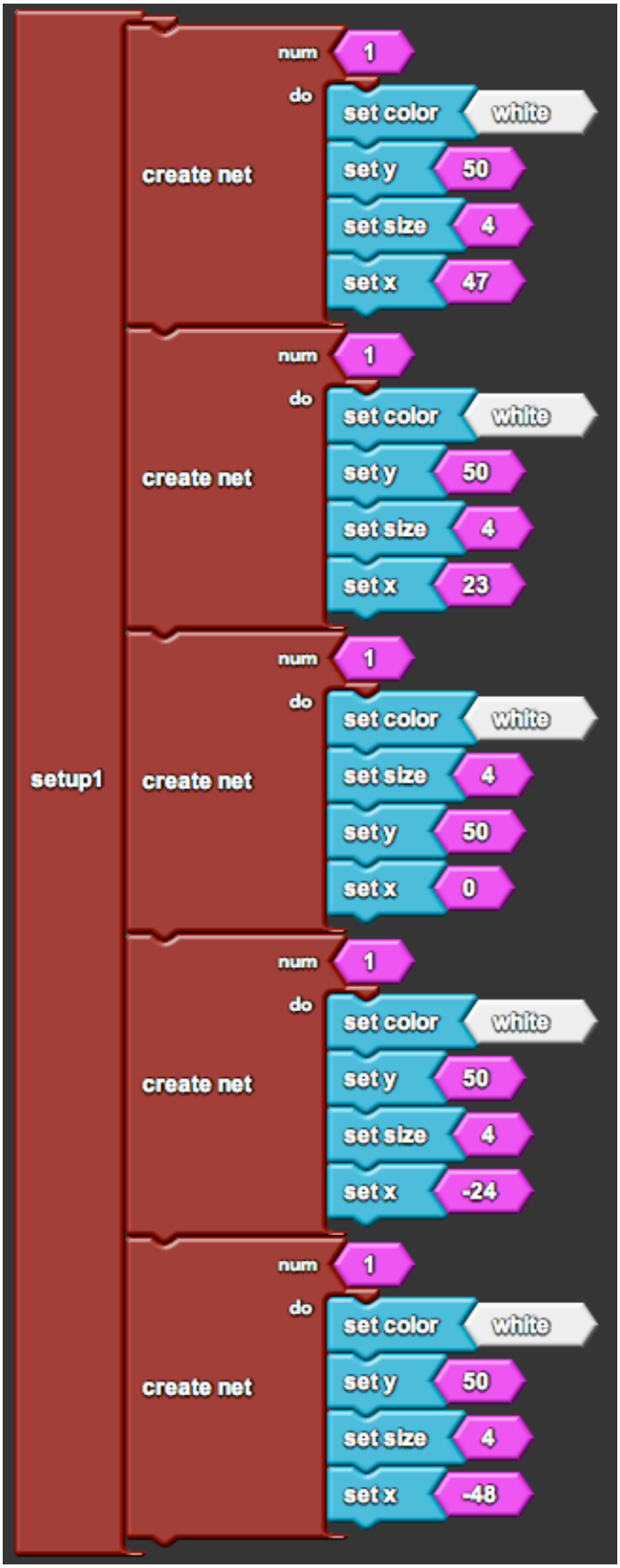
BIBLIOGRAPHY

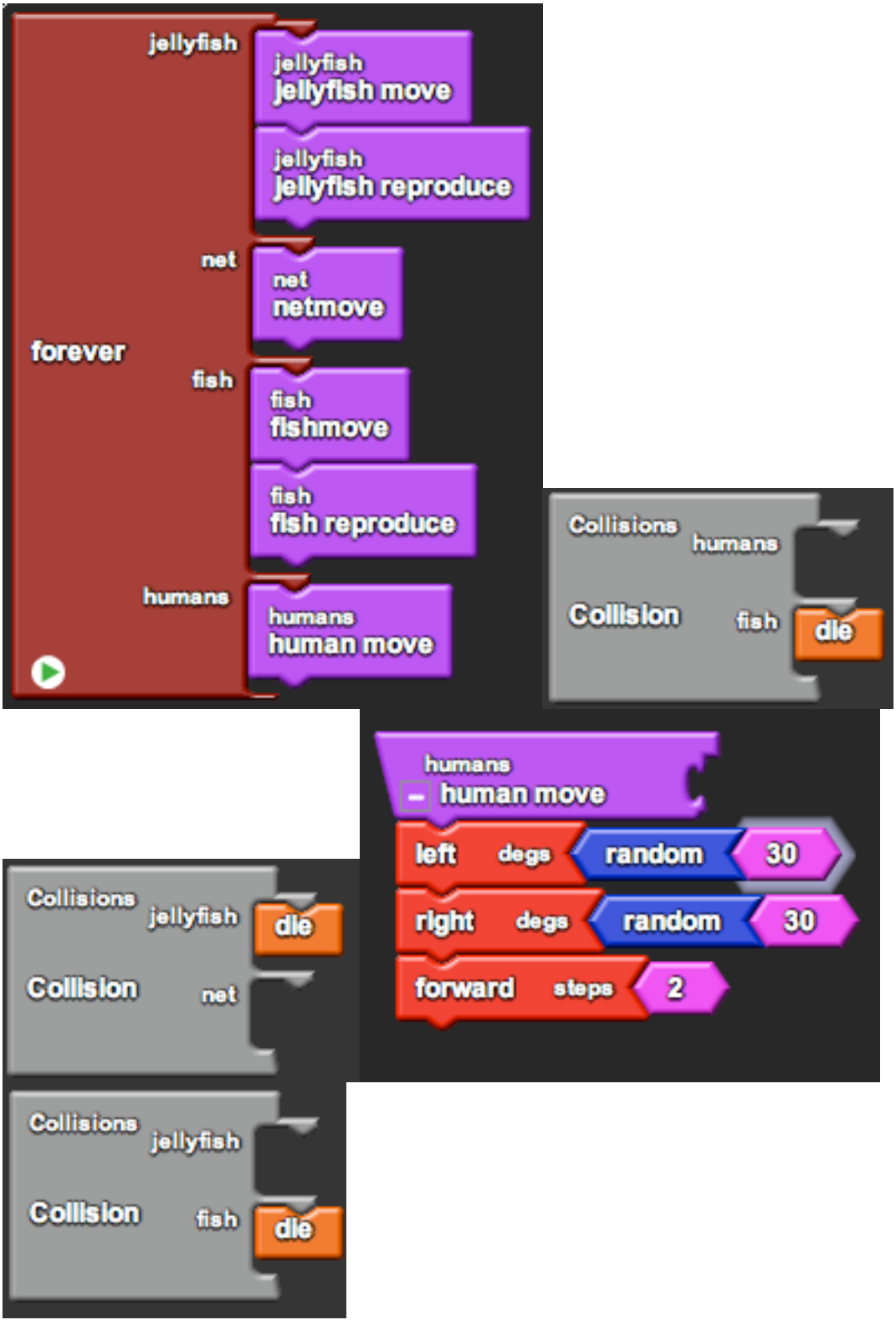
1) Jessica Le Masurier, Invasion of the Floating Stingers, http://news.sky.com
2) Author Unknown, Jellyfish Problems, **http://www.jellyfishfacts.net/jellyfish-problems.html**
3) Elizebeth Rosenthal, Oceans' Alarm, **http://www.nytimes.com**
4) Brian Williams, Jellyfish Taking Over the Seas, http://www.couriermail.com.au
5) Rich Bowden, Scientists claim increasing world jellyfish population is bad sign for planet, http://www.thetechherald.com

APPENDIX


jellyfish
jellyfish move
left degs random 30
right degs random 30
forward steps .5
fish
fishmove
left degs random 30
right degs random 30
forward steps 1
net
netmove
forward steps 2
jellyfish
jellyfish reproduce
test random 100 > 99.5
if then
hatch


fish
fish reproduce
fish
test
random
100
>
96
if
then
hatch
jellyfish
data
count jellyfish
data
fish
data
count fish
data
setup
clear everyone
num
100
create jellyfish
do
set color
cyan
num
3000
create fish
do
set color
black
num
1
create humans
do
set size
1.5
set color
red
scatter everyone


setup1
create net
num 1
do
set color white
set y 50
set size 4
set x 47
create net
num 1
do
set color white
set y 50
set size 4
set x 23
create net
num 1
do
set color white
set size 4
set y 50
set x 0
create net
num 1
do
set color white
set y 50
set size 4
set x -24
create net
num 1
do
set color white
set y 50
set size 4
set x -48


jellyfish
jellyfish
jellyfish move
jellyfish
jellyfish reproduce
net
net
netmove
forever
fish
fish
fishmove
fish
fish reproduce
humans
humans
human move
Collisions
humans
Collision
fish
die
humans
human move
left
degs
random
30
right
degs
random
30
forward
steps
2
Collisions
jellyfish
die
Collision
net
Collisions
jellyfish
Collision
fish
die