Project 2: Functional Decomposition

By Caleb Knight

knightca@oregonstate.edu

1. **What your own-choice quantity was and how it fits into the simulation.**

I chose to use hunters as my simulation agent. I have it set up so that everytime there is more than 5 rabbits, a hunter is added. If there gets to be more than 10, 2 will be added. Each month the number of hunters starts over so if one month had 7 rabbits, the next month will have 1 hunter, BUT even if there is 7 rabbits left at the end of that month, another hunter IS NOT added. 1 hunter will remain. If the rabbit population goes under 5, all hunters will be removed from the simulation. I wanted to change the numbers up a ton, but I couldn't seem to keep a realistic proportion between the Ryegrass, rabbits, and hunters, so I left the numbers somewhat low.

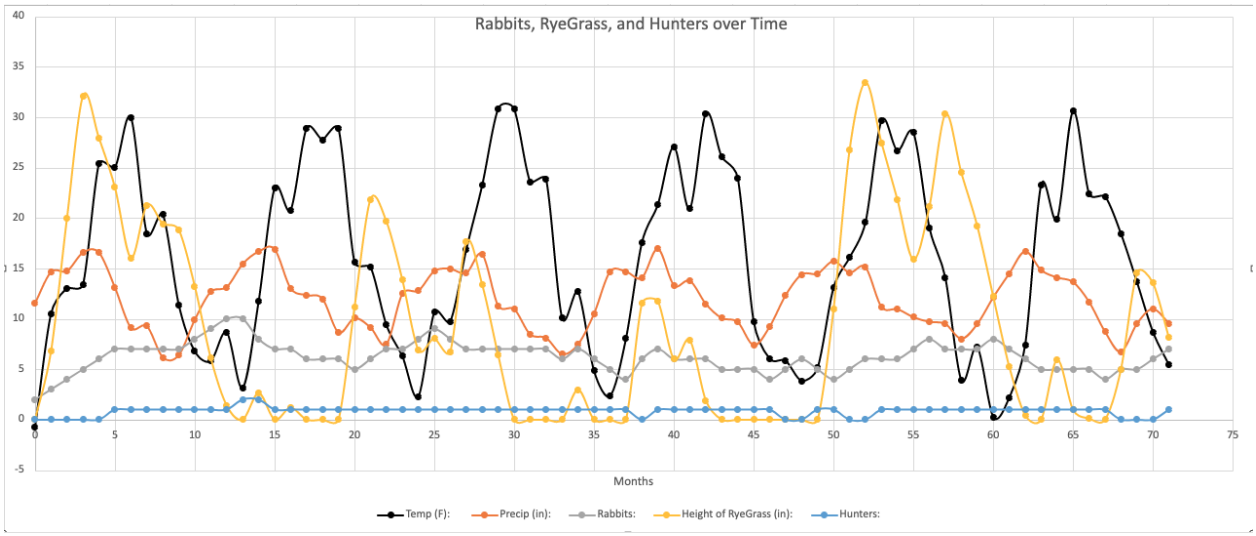
Table:

Month	Temp (F):	Precip (in):	Rabbits:	Height of RyeGrass (in):	Hunters:
0	-0.732422	11.561428	2	0.003485	0
1	10.538873	14.663028	3	6.813789	0
2	13.04387	14.739539	4	20.027636	0
3	13.398486	16.579163	5	32.121788	0
4	25.404481	16.5672	6	27.929932	0
5	24.993642	13.112942	7	23.037041	1
6	29.965456	9.103012	7	16.055882	1
7	18.450758	9.290375	7	21.266956	1
8	20.332981	6.167089	7	19.436045	1
9	11.384407	6.403666	7	18.827606	1
10	6.781993	9.918663	8	13.225765	1

11	5.811674	12.68647	9	6.132703	1
12	8.669345	13.142992	10	1.40428	1
13	3.16509	15.444103	10	0	2
14	11.746449	16.668465	8	2.639729	2
15	22.990443	16.912495	7	0	1
16	20.772887	13.018286	7	1.20012	1
17	28.911192	12.348213	6	0	1
18	27.761824	11.990366	6	0	1
19	28.868268	8.632929	6	0	1
20	15.620641	10.066498	5	11.130674	1
21	15.153794	9.149721	6	21.855652	1
22	9.382356	7.462317	7	19.65036	1
23	6.285653	12.503553	7	13.858608	1
24	2.297603	12.780922	8	6.924868	1
25	10.659866	14.739354	9	8.074467	1
26	9.766172	14.96333	8	6.763721	1
27	16.867602	14.529732	7	17.625746	1
28	23.26249	16.419052	7	13.378925	1
29	30.834817	11.277534	7	6.38856	1
30	30.784209	10.982815	7	0	1
31	23.593318	8.447705	7	0	1
32	23.838454	8.112203	7	0	1
33	10.081395	6.499229	6	0	1
34	12.673976	7.466569	7	2.972603	1
35	4.830901	10.501293	6	0	1
36	2.346179	14.690546	5	0	1
37	8.02934	14.686211	4	0	1
38	17.579566	14.064039	6	11.513306	0
39	21.337039	16.944521	7	11.722572	1
40	27.054715	13.329889	6	5.99701	1
41	20.908813	13.789098	6	7.896424	1

42	30.379698	11.482897	6	1.911605	1
43	26.037013	10.073221	5	0	1
44	23.980853	9.690585	5	0	1
45	9.715288	7.361585	5	0	1
46	6.04343	9.224668	4	0	1
47	5.835419	12.348651	5	0	0
48	3.846166	14.40132	6	0	0
49	5.135672	14.490005	5	0	1
50	13.094277	15.735373	4	10.948126	1
51	16.067017	14.577014	5	26.713413	0
52	19.564743	15.115047	6	33.447697	0
53	29.648124	11.167492	6	27.477322	1
54	26.670837	10.958644	6	21.810268	1
55	28.471862	10.164744	7	15.887831	1
56	19.037806	9.699246	8	21.109905	1
57	14.067003	9.504456	7	30.318207	1
58	3.918455	8.022579	7	24.492113	1
59	7.208712	9.486433	7	19.199062	1
60	0.278494	12.133629	8	12.209105	1
61	2.176586	14.4856	7	5.269544	1
62	7.422858	16.702982	6	0.450384	1
63	23.296848	14.823346	5	0	1
64	19.866698	14.098585	5	5.951215	1
65	30.587959	13.643511	5	0.964421	1
66	22.402895	11.690108	5	0.115084	1
67	22.143572	8.722475	4	0	1
68	18.428442	6.726428	5	5.018438	0
69	13.648529	9.5186	5	14.56089	0
70	8.700023	10.993208	6	13.546055	0
71	5.446892	9.557331	7	8.145088	1

Graph:



Commentary:

As I mentioned before, I would have liked to be able to upscale the entire simulation so I could have, say, 50 rabbits at a time. That would have allowed me to have up to 10 hunters and could have started to show a big difference. But, I didn't so this is what we are working with. As you can see, as the rabbit count rises, my hunters rise the following month. Same goes as the hunters rise, the rabbits lower, which then will lower the hunters. Because of this, as we see rabbits rise, the height of the ryegrass dips fairly consistently. Sometimes it doesn't follow the curve but that is due to the temperature and precipitation levels being ideal for growth.

We can see specifically in between month 10 and 15 that the rabbit count rose about 10, which allowed for two hunters. We also see the ryegrass height drop as the temperature lowers and rabbit count increases. Immediately after 2 hunters join the simulation, the rabbit count dies back down and doesn't reach 10 the rest of the simulation.

Overall, multiple points throughout the graph, we can see that my hunters have a direct effect on the rabbits' population, which will then have some effect on the ryegrass as it isn't being eaten quite as much.

Again, the numbers are low but I am glad I have this fun little simulation. I am going to keep messing with it and see how I could go about altering it to produce bigger, more accurate numbers on a much larger scale.