Thomas Sugimoto
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Functional Decomposition
Project #3

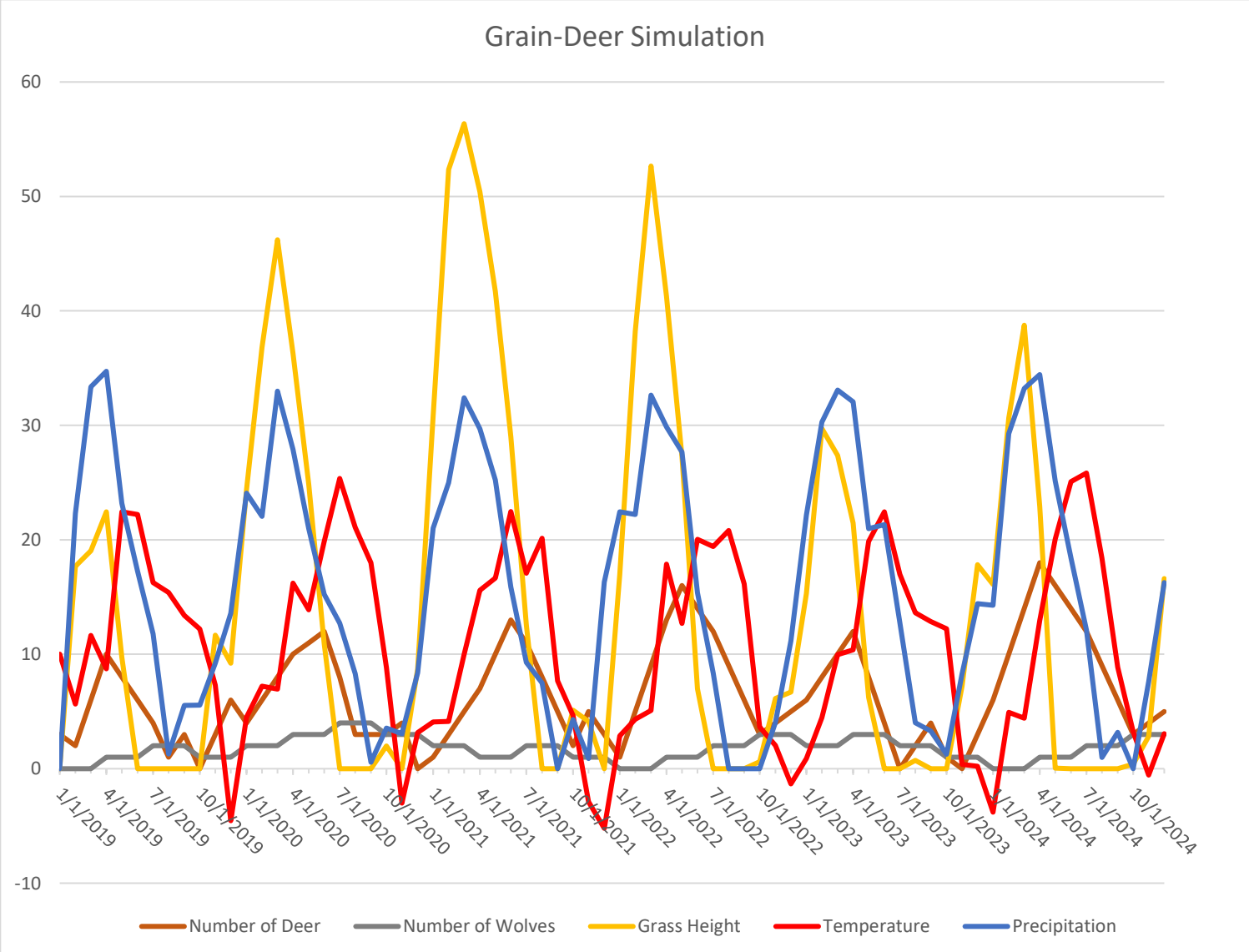
MyAgent – Predator Wolves

As the fourth agent to the grain-deer simulation, I chose the wolves as a predator of the deer. Starting with a single wolf, their population increases by one every three months if there are more than 5 deer. If not then they starve and decrease by one.

They affect the deer population as a predator. For every five wolves they consume 1 deer every month.

I also had to tweak some of the deer stats. So now the deer population increases by 4 every month if they are less than the grass height. The grass also grows at 9 inches per month compared to 8 before.

For the data we converted all length measurement from inches to centimeters and from Fahrenheit to Celsius.



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Date	Temp	Height	Precip	NumDeer	NumWolv
1/1/2019	10	0	0	3	0
2/1/2019	5.64019	17.6951	22.3128	2	0
3/1/2019	11.633	19.0387	33.3644	6	0
4/1/2019	8.73118	22.4335	34.7244	10	1
5/1/2019	22.4498	9.73416	23.182	8	1
6/1/2019	22.2032	0	17.2354	6	1
7/1/2019	16.2607	0	11.7754	4	2
8/1/2019	15.3956	0	1.29765	1	2
9/1/2019	13.3967	0	5.52696	3	2
10/1/2019	12.2076	0	5.56334	0	1
11/1/2019	7.30869	11.6765	9.21547	3	1
12/1/2019	-4.53681	9.21597	13.5901	6	1
1/1/2020	4.4963	24.3916	24.0725	4	2
2/1/2020	7.22289	36.8063	22.0525	6	2
3/1/2020	6.96174	46.2133	32.9895	8	2
4/1/2020	16.2122	36.3081	27.8985	10	3
5/1/2020	13.8777	24.8493	20.9849	11	3
6/1/2020	19.8632	10.8881	15.247	12	3
7/1/2020	25.3518	0	12.7156	8	4
8/1/2020	21.1035	0	8.30855	3	4
9/1/2020	17.9812	0	0.556503	3	4
10/1/2020	8.85469	1.99628	3.54624	3	3
11/1/2020	-3.0155	0	3.05444	4	3
12/1/2020	3.14671	8.72766	8.36875	0	3
1/1/2021	4.08964	30.8297	21.027	1	2
2/1/2021	4.1292	52.3402	24.9875	3	2
3/1/2021	9.98801	56.3575	32.4057	5	2
4/1/2021	15.5772	50.4081	29.7043	7	1
5/1/2021	16.6593	41.6999	25.2247	10	1
6/1/2021	22.46	29.0004	15.8709	13	1
7/1/2021	17.079	12.5771	9.28303	11	2
8/1/2021	20.1461	0	7.48406	8	2
9/1/2021	7.67391	0	0	5	2
10/1/2021	4.6456	5.1025	4.30317	2	1
11/1/2021	-2.89928	4.13326	0.898689	5	1
12/1/2021	-5.20882	0	16.3153	3	1

Date	Temp	Height	Precip	NumDeer	NumWolv
1/1/2022	2.86147	16.9859	22.4549	1	0
2/1/2022	4.30802	38.2042	22.2082	5	0
3/1/2022	5.09201	52.6457	32.6404	9	0
4/1/2022	17.8782	41.2797	29.8651	13	1
5/1/2022	12.6839	27.2834	27.6785	16	1
6/1/2022	20.0519	6.9707	15.3835	14	1
7/1/2022	19.4165	0	8.35132	12	2
8/1/2022	20.8069	0	0	9	2
9/1/2022	16.1558	0	0	6	2
10/1/2022	3.64504	0.617391	0	3	3
11/1/2022	2.02953	6.13559	4.03686	4	3
12/1/2022	-1.33711	6.71025	11.1693	5	3
1/1/2023	0.89319	15.3089	22.1712	6	2
2/1/2023	4.46953	29.7159	30.2924	8	2
3/1/2023	9.95408	27.3573	33.0852	10	2
4/1/2023	10.3872	21.4549	32.0514	12	3
5/1/2023	19.8534	6.22506	20.9649	8	3
6/1/2023	22.4558	0	21.3252	4	3
7/1/2023	16.9837	0	12.7582	0	2
8/1/2023	13.6234	0.734094	4.01699	2	2
9/1/2023	12.8576	0	3.30229	4	2
10/1/2023	12.2325	0	1.26864	1	1
11/1/2023	0.369767	7.21048	8.29155	0	1
12/1/2023	0.214912	17.8348	14.4267	3	1
1/1/2024	-3.80127	16.1102	14.285	6	0
2/1/2024	4.93511	30.6494	29.2802	10	0
3/1/2024	4.40307	38.7407	33.2205	14	0
4/1/2024	12.942	22.9021	34.4319	18	1
5/1/2024	20.0687	0.0505008	25.129	16	1
6/1/2024	25.0759	0	18.4038	14	1
7/1/2024	25.8357	0	12.1181	12	2
8/1/2024	18.3814	0	0.989558	9	2
9/1/2024	8.86048	0	3.17848	6	2
10/1/2024	3.2275	0.39573	0	3	3
11/1/2024	-0.551092	2.82158	7.61059	4	3
12/1/2024	3.05324	16.6039	16.259	5	3

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Commentary

With the addition of wolves, you can see that when there are a peak amount of wolves, there is a sharp decrease in the deer population (as seen in July 2020, 2021, 2022, and 2023). It is also a sign, that I needed to increase the deer population factors such as: the growth of the deer, and growth of the grain as well.

Also you can see that when the wolf population is high, the deer population steeply drops in July 2020. This year though, coincides with a drop in temperature and precipitation. And when the precipitation and temperature rise in the spring, there is very little deer population, so it grows unchecked. This leads to the tallest season of grass in April 2021.

Running Information

The following data was run on my personal computer:

OS - Windows 10 Version 10.0.17134 Build 17134

CPU - Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz, 2808 Mhz, 4 Cores, 8 Logical Processors

GPU - NVIDIA GeForce GTX 1060 1 GB RAM