

Taylor Kirkpatrick

Project 4

1. I added a kidnapping Santa to my assignment. Santa kidnaps a few graindeer every December to make up for the reindeer that usually pulled him around. I total up how well the grain grew over the past year, and if grain didn't grow so well, I assume that slave driver Santa neglected feeding his reindeer, so some of them died out. Thus, he has to grab a few graindeer to fill in. The number of reindeer that died is random based on what I found was an average annual yield. Santa is also doing this last minute, so he only grabs deer in December.

I had figured this would go pretty well, but in the end I found that only one or two graindeer were actually left in December, since they ALSO eat the same grain that I'm calculating the dead reindeer off of. So Santa pretty much makes the graindeer go extinct every year. While this isn't the best result (shows I wouldn't be the best game designer), I still went with it since it shouldn't throw off the graph too much and I still do some neat stuff like total the annual grain and such.

Had I the time to redo the custom element in this scenario, I would have done a heatwave or something that could have a more prominent effect on the numbers.

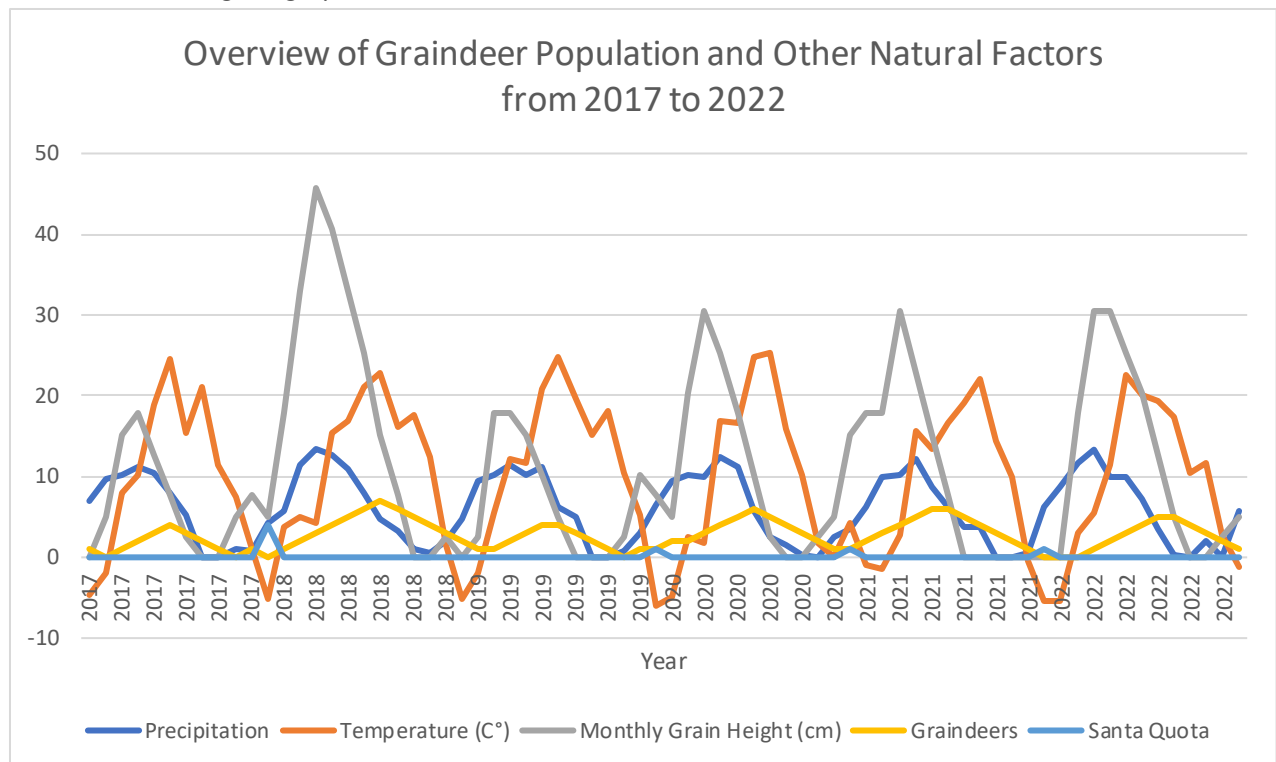
2. Note that Santa Quota is 0 for all months except December, as Santa does not recruit until then. January is month 0.

Year	Month	Precipitation	Temperature (C°)	Monthly Grain Height (cm)	Annual Grain Yield (cm)	Graindeer	Santa Quota
2017	0	6.964651	-4.69133	0	0	1	0
2017	1	9.654377	-1.81557	5.08	5.08	0	0
2017	2	10.19465	7.922217	15.24	20.32	1	0
2017	3	11.11978	10.08357	17.78	38.1	2	0
2017	4	10.46446	18.9573	12.7	50.8	3	0
2017	5	8.067654	24.59047	7.62	58.42	4	0
2017	6	5.14347	15.36538	2.54	60.96	3	0
2017	7	0	21.16659	0	60.96	2	0
2017	8	0	11.31581	0	60.96	1	0
2017	9	1.128651	7.500869	5.08	66.04	0	0
2017	10	0.683439	0.985629	7.62	73.66	1	0
2017	11	4.214096	-5.24515	5.08	78.74	0	4
2018	0	5.761065	3.683111	17.78	17.78	1	0

2018	1	11.32438	4.938176	33.02	50.8	2	0
2018	2	13.31159	4.326596	45.72	96.52	3	0
2018	3	12.66727	15.48302	40.64	137.16	4	0
2018	4	10.98821	16.78078	33.02	170.18	5	0
2018	5	7.903064	21.16148	25.4	195.58	6	0
2018	6	4.837926	22.76349	15.24	210.82	7	0
2018	7	3.21091	16.06368	7.62	218.44	6	0
2018	8	0.994463	17.52328	0	218.44	5	0
2018	9	0.483814	12.52458	0	218.44	4	0
2018	10	1.969651	1.452374	2.54	220.98	3	0
2018	11	4.812877	-5.07404	0	220.98	2	0
2019	0	9.395621	-1.90239	2.54	2.54	1	0
2019	1	10.09344	5.471747	17.78	20.32	1	0
2019	2	11.42715	12.06897	17.78	38.1	2	0
2019	3	10.31582	11.72035	15.24	53.34	3	0
2019	4	11.26687	20.75378	10.16	63.5	4	0
2019	5	6.270696	24.76641	5.08	68.58	4	0
2019	6	5.000331	19.54739	0	68.58	3	0
2019	7	0	15.174	0	68.58	2	0
2019	8	0	18.20157	0	68.58	1	0
2019	9	0.674013	10.46593	2.54	71.12	0	0
2019	10	3.119259	5.346504	10.16	81.28	1	0
2019	11	6.425041	-6.00253	7.62	88.9	1	1
2020	0	9.397831	-5.0062	5.08	5.08	2	0
2020	1	10.11438	2.578551	20.32	25.4	2	0
2020	2	9.989612	1.771406	30.48	55.88	3	0
2020	3	12.41997	16.90456	25.4	81.28	4	0
2020	4	11.30153	16.69074	17.78	99.06	5	0
2020	5	5.67525	24.85853	10.16	109.22	6	0
2020	6	2.617811	25.31914	2.54	111.76	5	0
2020	7	1.465268	15.95808	0	111.76	4	0
2020	8	0.26211	10.31108	0	111.76	3	0
2020	9	0	1.742927	2.54	114.3	2	0
2020	10	2.416764	0.026476	5.08	119.38	1	0
2020	11	3.606444	4.219178	15.24	134.62	1	1
2021	0	6.345929	-1.00027	17.78	17.78	2	0
2021	1	9.841992	-1.37626	17.78	35.56	3	0
2021	2	10.31207	2.810232	30.48	66.04	4	0
2021	3	12.26722	15.68038	22.86	88.9	5	0
2021	4	8.586074	13.42531	15.24	104.14	6	0

2021	5	6.171674	16.69456	7.62	111.76	6	0
2021	6	3.796419	19.13287	0	111.76	5	0
2021	7	3.695586	22.02067	0	111.76	4	0
2021	8	0	14.50215	0	111.76	3	0
2021	9	0	9.936083	0	111.76	2	0
2021	10	0.500206	-0.38689	0	111.76	1	0
2021	11	6.352232	-5.34419	0	111.76	0	1
2022	0	8.81146	-5.34576	0	0	0	0
2022	1	11.78376	3.133572	17.78	17.78	0	0
2022	2	13.33089	5.393312	30.48	48.26	1	0
2022	3	9.826777	11.34353	30.48	78.74	2	0
2022	4	9.850142	22.60571	25.4	104.14	3	0
2022	5	7.117867	20.07303	20.32	124.46	4	0
2022	6	3.504043	19.34444	12.7	137.16	5	0
2022	7	0.276034	17.41014	5.08	142.24	5	0
2022	8	0	10.49849	0	142.24	4	0
2022	9	2.049849	11.63795	0	142.24	3	0
2022	10	0.133372	2.698309	2.54	144.78	2	0
2022	11	5.830009	-1.14769	5.08	149.86	1	0

- Annual grain yield and months were not plotted due to providing little information or skewing the graph too much from the more relevant information.



- Obviously, the precipitation, temperature, grain height, and graindeer population are interdependent. The drier it is the less grain grows, and the wetter it is the more it grows. Grain height is far more dependent on precipitation than on temperature, but a few spikes can be seen that are probably attributed to the temperature. For example, the odd shape the grain height line makes in early 2011 or the drop the height has at the beginning of 2020. Oddly, graindeer population seems to coincide more with the temperature than with grain height. This is an incidental connection though, as the two are not linked. The late decrease in graindeer population is a result of the more gradual decrease of the reindeer; only one graindeer can be born or die each month, while the grain height can rise and drop far more within one month. By the time the reindeer finally reach the limit, the grain is already almost gone entirely.

As mentioned in question one, my change ended up having little effect. It is still visible, but not as clear as some of the other patterns. Perhaps the most notable instance is in the first December in 2017, where Santa sought to kidnap 4 graindeers. There was only 1 around though, and the population seemed to be ready to increase and catch up to the grain height, but Santa delayed the growth of them a bit. Santa is usually trying to find graindeer at a time when most or all of the existing graindeer have already starved, but he managed to get at least one most years that he needed replacements. He did not get any

in 2021, as a seemingly earlier dry season than usual caused grain to grow far less than usual, and the population recovered from the winter famine later than it did most years, so there weren't any graindeer for Santa to take.