Adam Wright

wrighada

CS-475

Project 3

1. What was you own-choice quantity and how does it fit into the simulation?

The quantity that I chose to add to the simulation was a pack of wolves. It fits into the simulation by growing in size as the number of deer increases in size and then decreasing in size as the number of deer decreases. The pack starts off with only one wolf and then after three deer are in the group, then one will be captured. Next after three deer are captured, then another wolf will be born. Finally, if the number of wolves grows larger than the number of deer, then a member of the wolf pack will leave until the pack decreases to one or the wolf population becomes smaller than the deer population. The wolves will grow and shrink along with the deer population, which is being affected by the grain growth cycle

2. A table showing values for temperature, precipitation, number of graindeer, height of the grain, and your own-choice quantity as a function of month number. – (Values listed in metric units)

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          **********************************
          **  Grain Growing Simulation  **
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Year  Month    Precip   Temp  Grain_ht Deer  Wolves

2020    1       24.77   -0.73   14.68   2       1
2020    2       31.60   2.15    27.76   3       1
2020    3       28.51   16.40   20.36   4       1
2020    4       33.87   21.36   10.20   5       1
2020    5       33.63   22.61   0.00    4       1
2020    6       20.04   28.20   0.00    3       1
2020    7       14.44   23.52   0.00    2       1
2020    8       5.33    20.56   0.00    1       1
2020    9       0.80    18.92   0.00    0       1
2020    10      1.53    15.85   0.14    0       1
2020    11      11.72   5.02    17.06   1       1
2020    12      10.29   8.81    23.17   2       1
2021    1       19.23   8.40    31.06   3       1
2021    2       33.11   12.84   25.57   4       1
2021    3       37.36   11.17   19.63   5       2
2021    4       36.16   23.20   6.93    6       2
2021    5       32.24   27.99   0.00    5       2
2021    6       26.53   26.79   0.00    4       2
2021    7       9.55    21.39   0.00    3       3
2021    8       7.10    27.79   0.00    2       3
2021    9       0.00    19.53   0.00    1       2
2021    10      3.76    17.16   0.00    0       1
2021    11      8.21    9.13    7.09    0       1
2021    12      18.75   6.27    26.26   1       1
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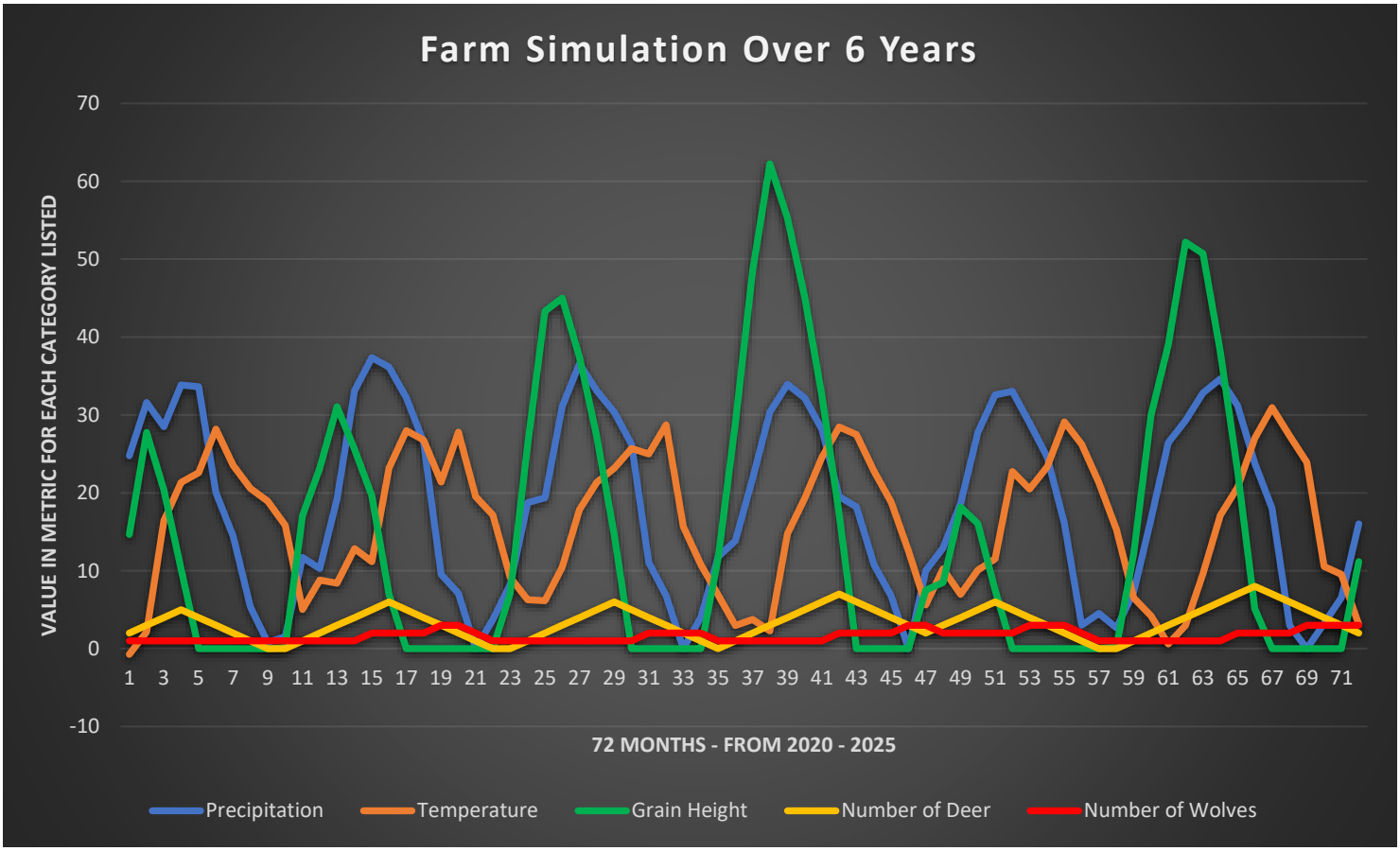
2022	1	19.37	6.17	43.33	2	1
2022	2	31.08	10.46	44.99	3	1
2022	3	36.56	17.86	37.43	4	1
2022	4	33.12	21.36	27.27	5	1
2022	5	30.37	23.19	14.57	6	1
2022	6	26.26	25.69	0.00	5	1
2022	7	11.05	25.00	0.00	4	2
2022	8	6.80	28.73	0.00	3	2
2022	9	0.00	15.68	0.00	2	2
2022	10	4.03	10.78	0.00	1	2
2022	11	11.79	6.89	11.60	0	1
2022	12	13.85	2.99	28.95	1	1
2023	1	21.85	3.75	48.49	2	1
2023	2	30.35	2.26	62.26	3	1
2023	3	33.92	14.74	55.30	4	1
2023	4	32.18	19.27	45.16	5	1
2023	5	28.16	24.56	32.46	6	1
2023	6	19.53	28.44	17.22	7	2
2023	7	18.20	27.49	0.00	6	2
2023	8	10.77	22.77	0.00	5	2
2023	9	6.73	18.77	0.00	4	2
2023	10	0.00	12.54	0.00	3	3
2023	11	10.00	5.60	7.53	2	3
2023	12	12.90	10.25	8.48	3	2
2024	1	18.63	6.97	18.17	4	2
2024	2	27.76	10.09	16.07	5	2
2024	3	32.57	11.51	7.56	6	2
2024	4	33.03	22.75	0.00	5	2
2024	5	28.98	20.50	0.00	4	3
2024	6	24.60	23.32	0.00	3	3
2024	7	16.06	29.11	0.00	2	3
2024	8	3.00	26.24	0.00	1	2
2024	9	4.51	21.31	0.00	0	1
2024	10	2.67	15.30	0.23	0	1
2024	11	7.28	6.49	12.23	1	1
2024	12	16.61	4.22	29.94	2	1
2025	1	26.44	0.60	38.99	3	1
2025	2	29.26	2.97	52.18	4	1
2025	3	32.84	9.66	50.71	5	1
2025	4	34.64	17.11	38.12	6	1
2025	5	31.20	20.70	22.88	7	2
2025	6	23.79	27.02	5.10	8	2
2025	7	17.99	30.95	0.00	7	2
2025	8	2.97	27.35	0.00	6	2
2025	9	0.00	23.91	0.00	5	3
2025	10	3.26	10.54	0.00	4	3
2025	11	6.54	9.54	0.00	3	3
2025	12	16.01	3.08	11.16	2	3

3. A graph showing temperature, pecipitation, number of graindeer, height of the grain, and your own-choice quentity as a function of month number. – (Values listed in metric units)



4. A commentary about the patterns in the graph and why they turned out that way. What evidence in the curves proves that your own quantity is actually affecting the simulation correctly?

The patterns in the precipitation and temperature both influence the growth of grain in the simulation. When there is a significant amount of precipitation and temperature, then there will be more grain. Also, the deer eat a certain amount of grain per month and that influences the grain height , by reducing it more quickly when there are more deer. The grain is the food source for the graindeer, thus when there is more grain, there are more graindeer. The cyclical nature of the algorithms representing precipitation and temperature display themselves in the curves for those quantities in the graph. The cyclical response of the grain height lags in the growth phase and then falls as the grain deer eat the existing grain and grow in population to consume the grain more quickly.

The quantity which I added is a pack of wolves. The quantity of wolves grows once the deer population is greater than three, because the wolf pack will take a deer as food. After three deer have

been taken, then another wolf will be born into the pack. Finally, if the wolf pack population is greater than the deer population, then the wolf population will fall.

The proof of that my agent had an effect in the graph is that as the deer population grows, due to the increase in grain height, the population of wolves also grows, due to the larger deer population. Then, as the deer population falls, due to the season changing and the grain height decreasing, and the wolves hunting the deer, the wolf population will then fall, as the deer population falls. The wolf population gorwth lags the grain deer population growth because it takes the capture of three deer before the wolf population grows by one. The wolf population has the smallest change shown on the graph, but it also has the smallest quantity displayed, because they are the apex predator. Despite the small change in the curve, there is a strong corolation between the wolf pack increase and decrease, and the deer pack increase and decrease. That is just as one would expect based on the algorithm which represents the wolf pack.