CS 475 - Project 2: Functional Decomposition

Name: Luke Scovel
Email: scovell@oregonstate.edu
Project Number: 2
Project Name: Functional Decomposition
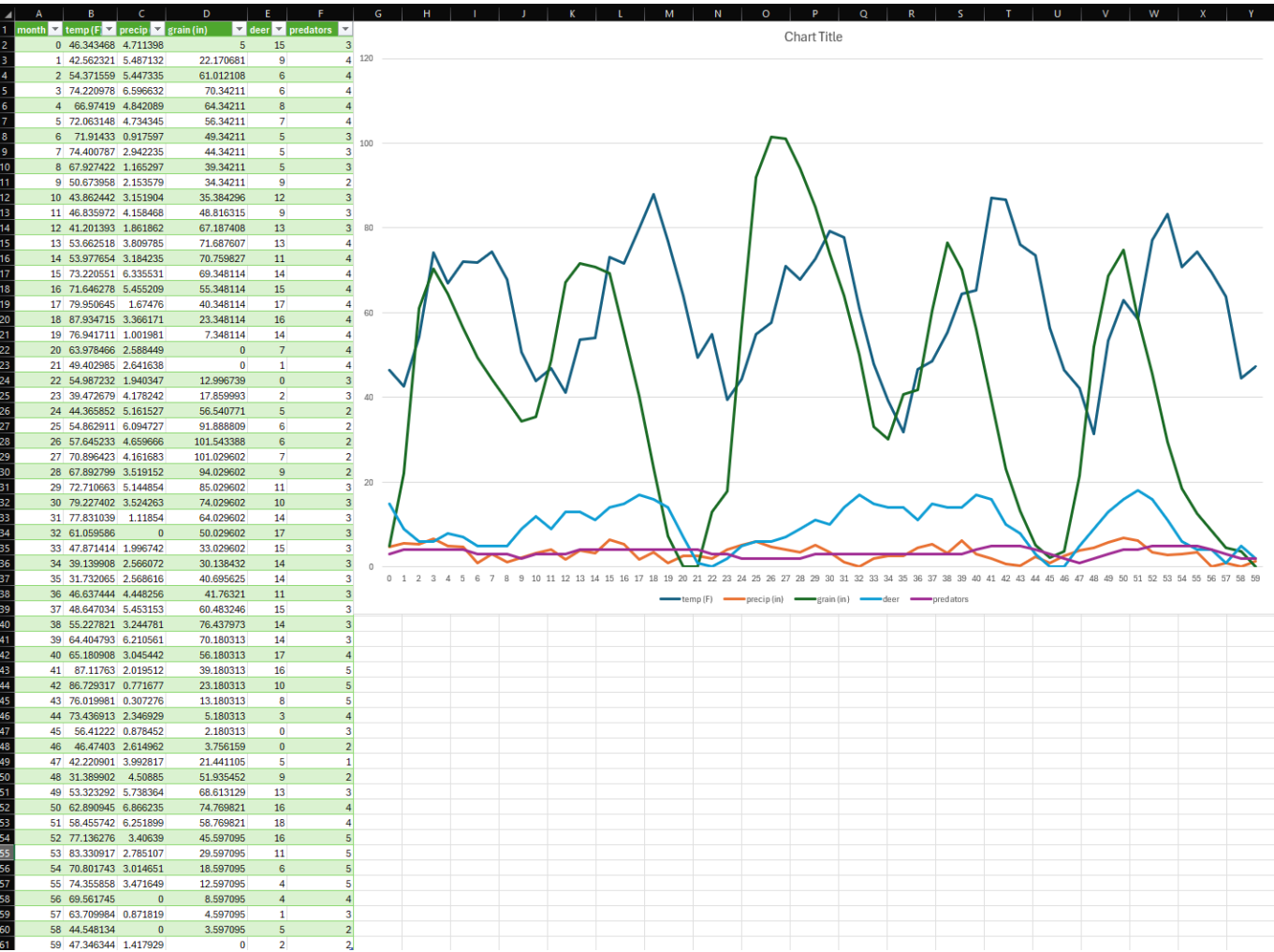
Own-Choice Quantity: Predator Population

For my own-choice quantity, I implemented predators in the ecosystem.

1. Each predator eats approximately 1 deer per month
2. Predator population growth depends on the deer-to-predator ratio:
   - If the ratio is <= 4.0 (abundant food), the predator population increases by 0-2
   - If the ratio is >= 2.0 (sufficient food), the predator population changes by -1 to +1
   - If the ratio is < 2.0 (scarce food), the predator population decreases by 0-2

The predator population fits into the simulation by creating a balancer for the deer population.

Simulation Data

month	temp (F)	precip (in)	grain (in)	deer	predators
0	46.343468	4.711398	5	15	3
1	42.562321	5.487132	22.170681	9	4
2	54.371559	5.447335	61.012108	6	4
3	74.220978	6.596632	70.34211	6	4
4	66.97419	4.842089	64.34211	8	4
5	72.063148	4.734345	56.34211	7	4
6	71.91433	0.917597	49.34211	5	3
7	74.400787	2.942235	44.34211	5	3
8	67.927422	1.165297	39.34211	5	3
9	50.673958	2.153579	34.34211	9	2
10	43.862442	3.151904	35.384296	12	3
11	46.835972	4.158468	48.816315	9	3
12	41.201393	1.861862	67.187408	13	3
13	53.662518	3.809785	71.687607	13	4
14	53.977654	3.184235	70.759827	11	4
15	73.220551	6.335531	69.348114	14	4
16	71.646278	5.455209	55.348114	15	4
17	79.950645	1.67476	40.348114	17	4
18	87.934715	3.366171	23.348114	16	4
19	76.941711	1.001981	7.348114	14	4
20	63.978466	2.588449	0	7	4
21	49.402985	2.641638	0	1	4
22	54.987232	1.940347	12.996739	0	3
23	39.472679	4.178242	17.859993	2	3
24	44.365852	5.161527	56.540771	5	2
25	54.862911	6.094727	91.888809	6	2
26	57.645233	4.659666	101.543388	6	2
27	70.896423	4.161683	101.029602	7	2
28	67.892799	3.519152	94.029602	9	2
29	72.710663	5.144854	85.029602	11	3
30	79.227402	3.524263	74.029602	10	3
31	77.831039	1.11854	64.029602	14	3
32	61.059586	0	50.029602	17	3
33	47.871414	1.996742	33.029602	15	3
34	39.139908	2.566072	30.138432	14	3
35	31.732065	2.568616	40.695625	14	3
36	46.637444	4.448256	41.76321	11	3
37	48.647034	5.453153	60.483246	15	3
38	55.227821	3.244781	76.437973	14	3
39	64.404793	6.210561	70.180313	14	3
40	65.180908	3.045442	56.180313	17	4
41	87.11763	2.019512	39.180313	16	5
42	86.729317	0.771677	23.180313	10	5
43	76.019981	0.307276	13.180313	8	5
44	73.436913	2.346929	5.180313	3	4
45	56.41222	0.878452	2.180313	0	3
46	46.47403	2.614962	3.756159	0	2
47	42.220901	3.992817	21.441105	5	1
48	31.389902	4.50885	51.935452	9	2
49	53.323292	5.738364	68.613129	13	3
50	62.890945	6.866235	74.769821	16	4
51	58.455742	6.251899	58.769821	18	4
52	77.136276	3.40639	45.597095	16	5
53	83.330917	2.785107	29.597095	11	5
54	70.801743	3.014651	18.597095	6	5
55	74.355858	3.471649	12.597095	4	5
56	69.561745	0	8.597095	4	4
57	63.709984	0.871819	4.597095	1	3
58	44.548134	0	3.597095	5	2
59	47.346344	1.417929	0	2	2

Chart Title — temp (F), precip (in), grain (in), deer, predators

Commentary on Results

The simulation shows that the deer population would decimate the grain population if the deer population was not kept in check. Whenever the deer population was low, the height of the grain population increased rapidly which allowed for more deer to survive. The predator population was more stable since there were fewer of them. The temperature and rainfall had more random curves to introduce noise into the simulation.

Whenever the deer population increased, the predator population increased as well. This would then result in a decrease in the deer population. This showed that my quatity was affecting the simulation correctly.