Supplementary material

for

Greyson-Gaito, C.J.*, McCann, K.S., Fründ, J., Lucarotti, C.J., Smith, M.A., and Eveleigh, E.S. 2021. Parasitoid community responds indiscriminately to fluctuating spruce budworm and other caterpillars on balsam fir. The Canadian Entomologist.

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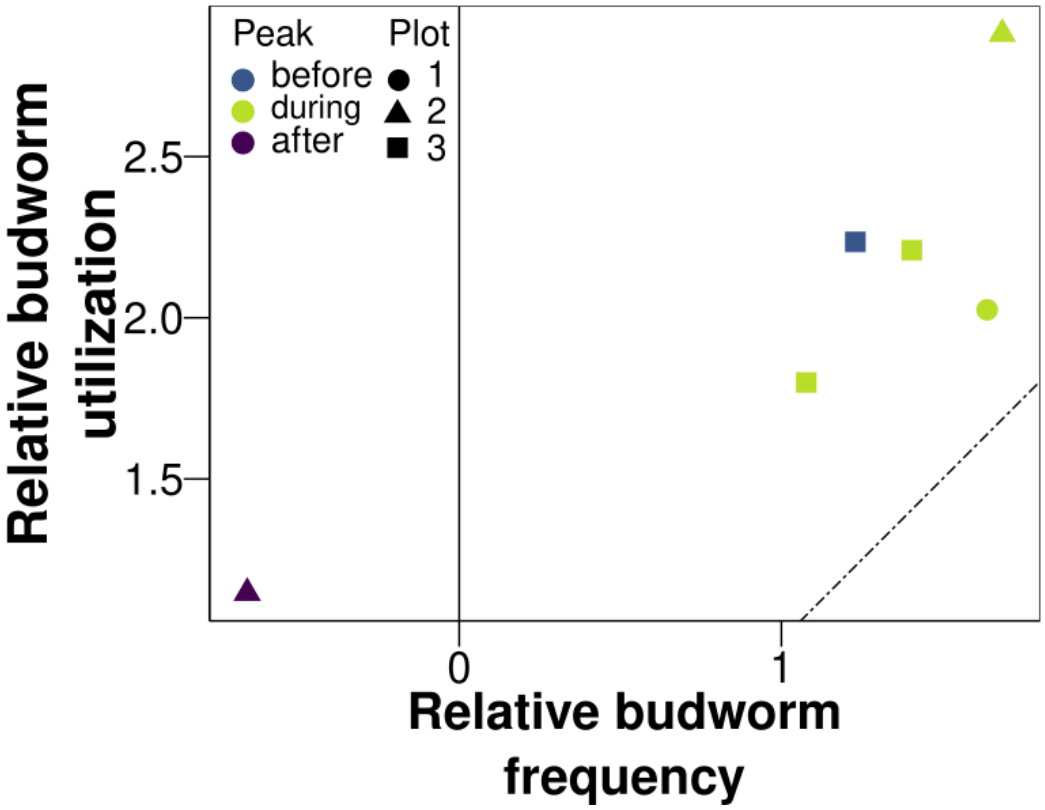

Fig. S1. Relative budworm utilisation by *Apanteles fumiferanae* (log10 ratio of *Apanteles fumiferanae* emergences from budworm to other caterpillar species) as a function of the relative budworm frequency (log10 ratio of all sampled budworm and other caterpillars). Each point is a single relative year and a single plot. The thin dashed line is the y = x line.

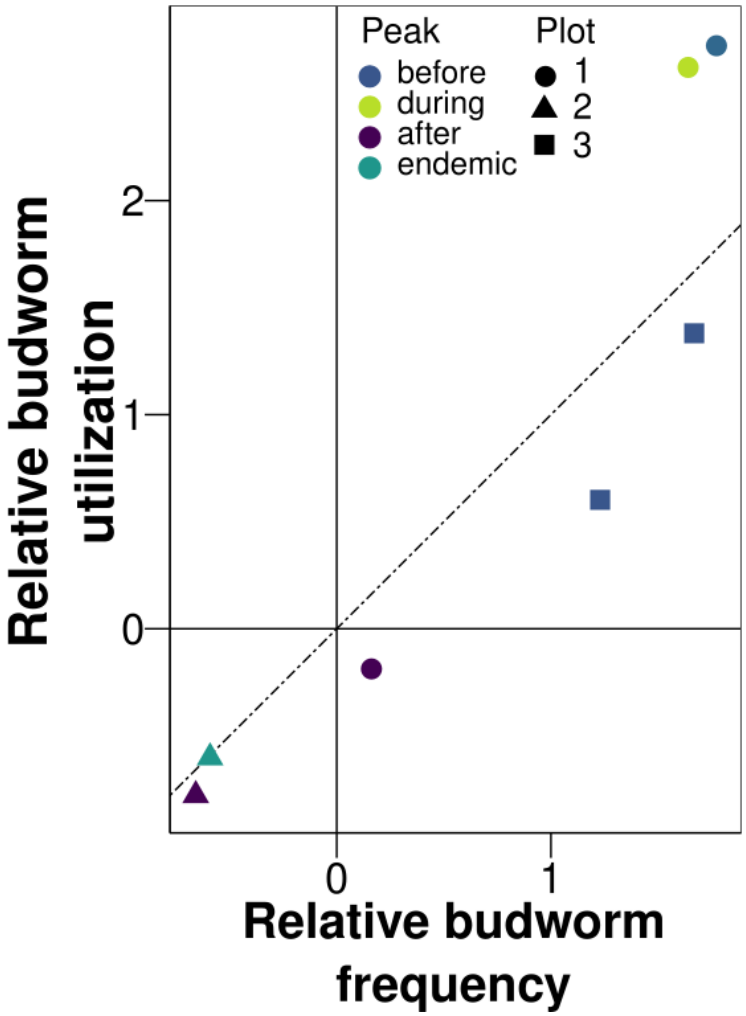

Fig. S2. Relative budworm utilisation by *Glypta fumiferanae* (log10 ratio of *Glypta fumiferanae* emergences from budworm to other caterpillar species) as a function of the relative budworm frequency (log10 ratio of all sampled budworm and other caterpillars). Each point is a single relative year and a single plot. The thin dashed line is the y = x line.

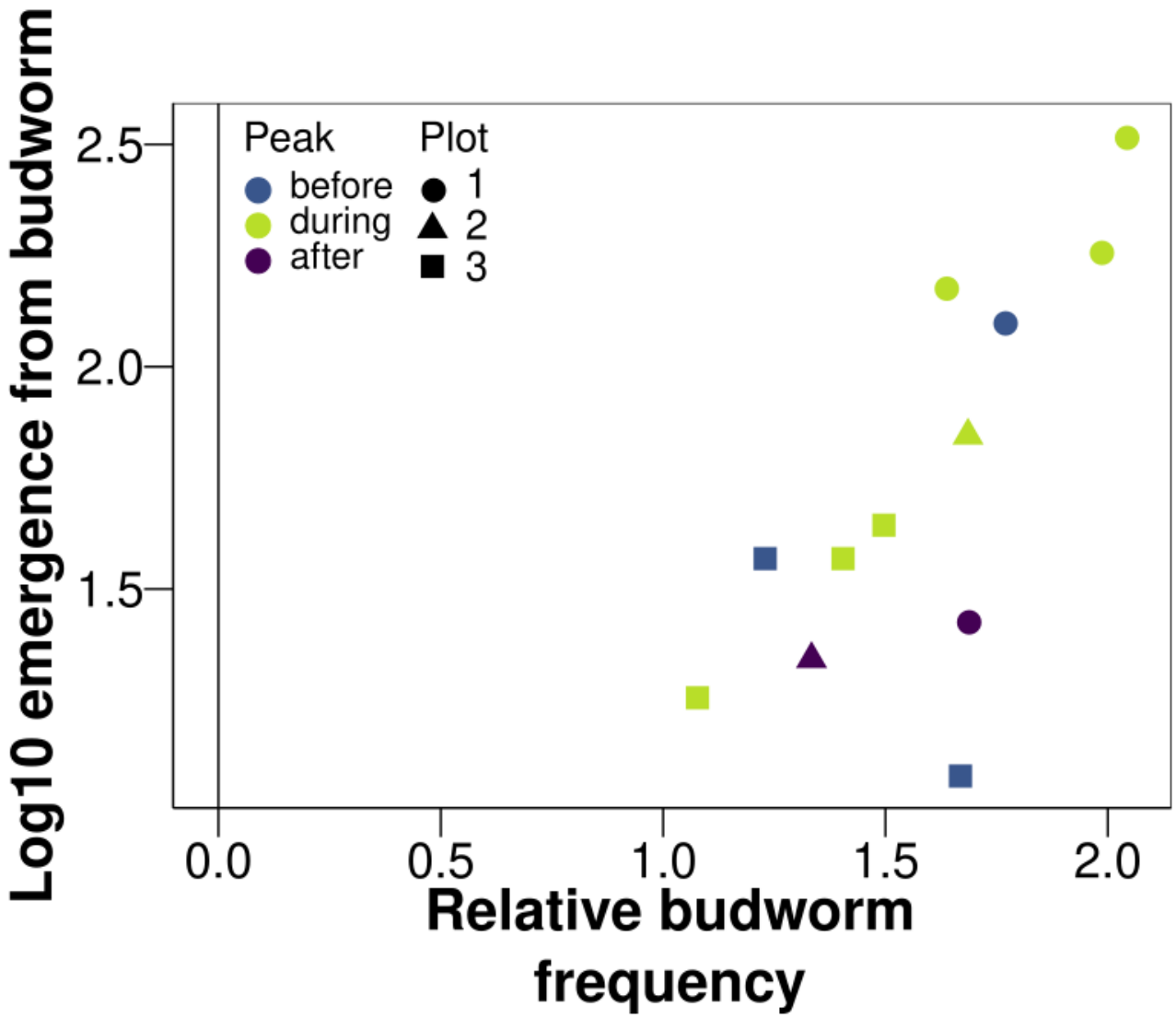

Fig. S3. Log10 of *Smidtia fumiferanae* emergences from budworm as a function of the relative budworm frequency (log10 ratio of all sampled budworm and other caterpillars). Each point is a single relative year and a single plot. Note in this dataset, *Smidtia fumiferanae* did not emerge from other caterpillar species and so a ratio of emergences from budworm to other caterpillar species cannot be calculated.

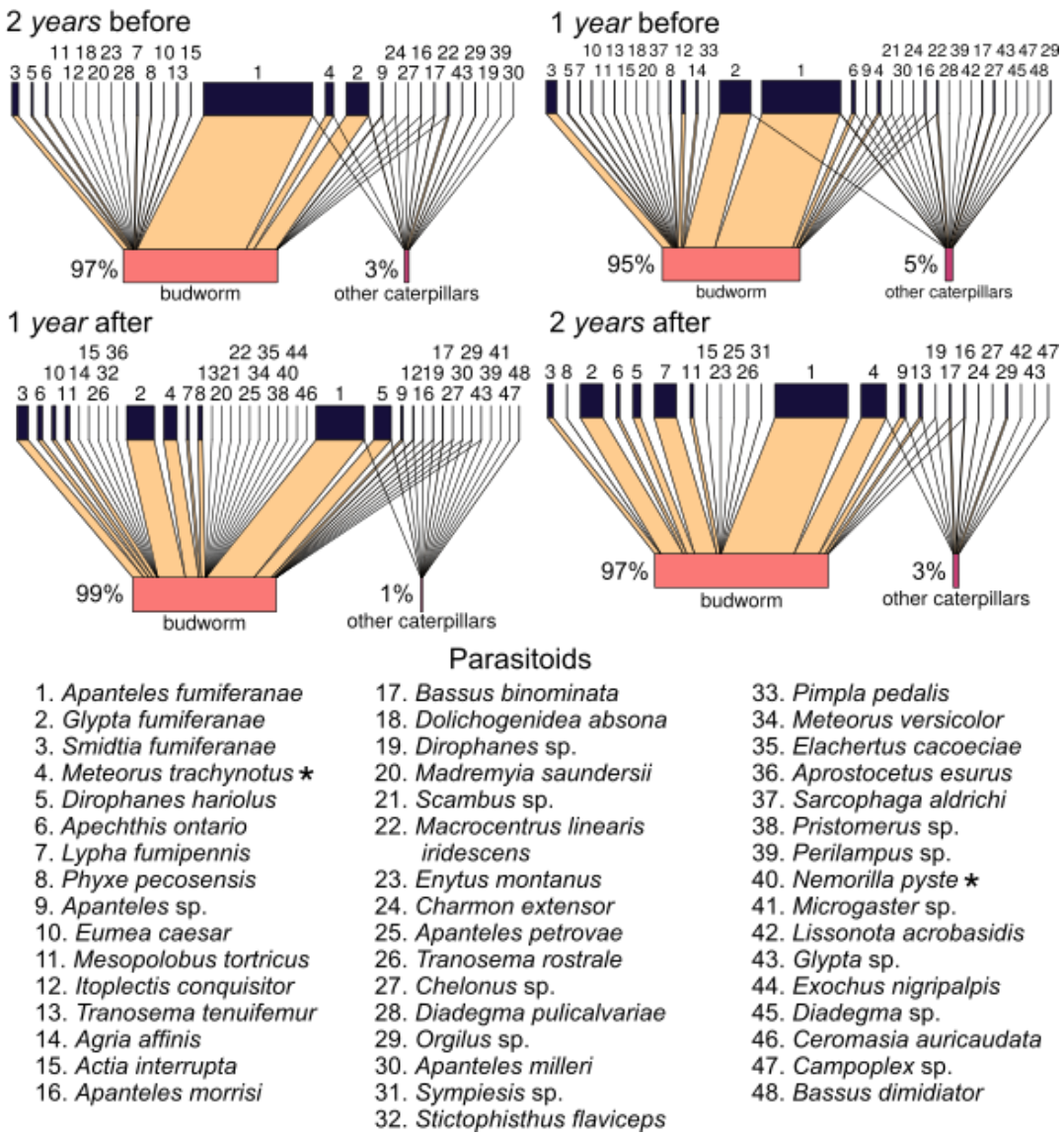

Fig. S4. Graphical representations of the number of emergences of each parasitoid taxon (top boxes) from budworm and other caterpillar species (bottom boxes) over time. The width of links is proportional to the fraction of emergences of each parasitoid taxon from either budworm or other caterpillars. The width of the bottom boxes is proportional to the number of emergences from budworm versus other caterpillars, and the percentages show this quantitatively. Four different relative years are shown, where all plots were combined within a relative year: two relative years before the peak, one relative year before the peak, one relative year after the peak, and two relative years after the peak. A star denotes a species that requires an alternate caterpillar host to overwinter in. To find the corresponding species in Eveleigh *et al.* (2007), see Table S2.

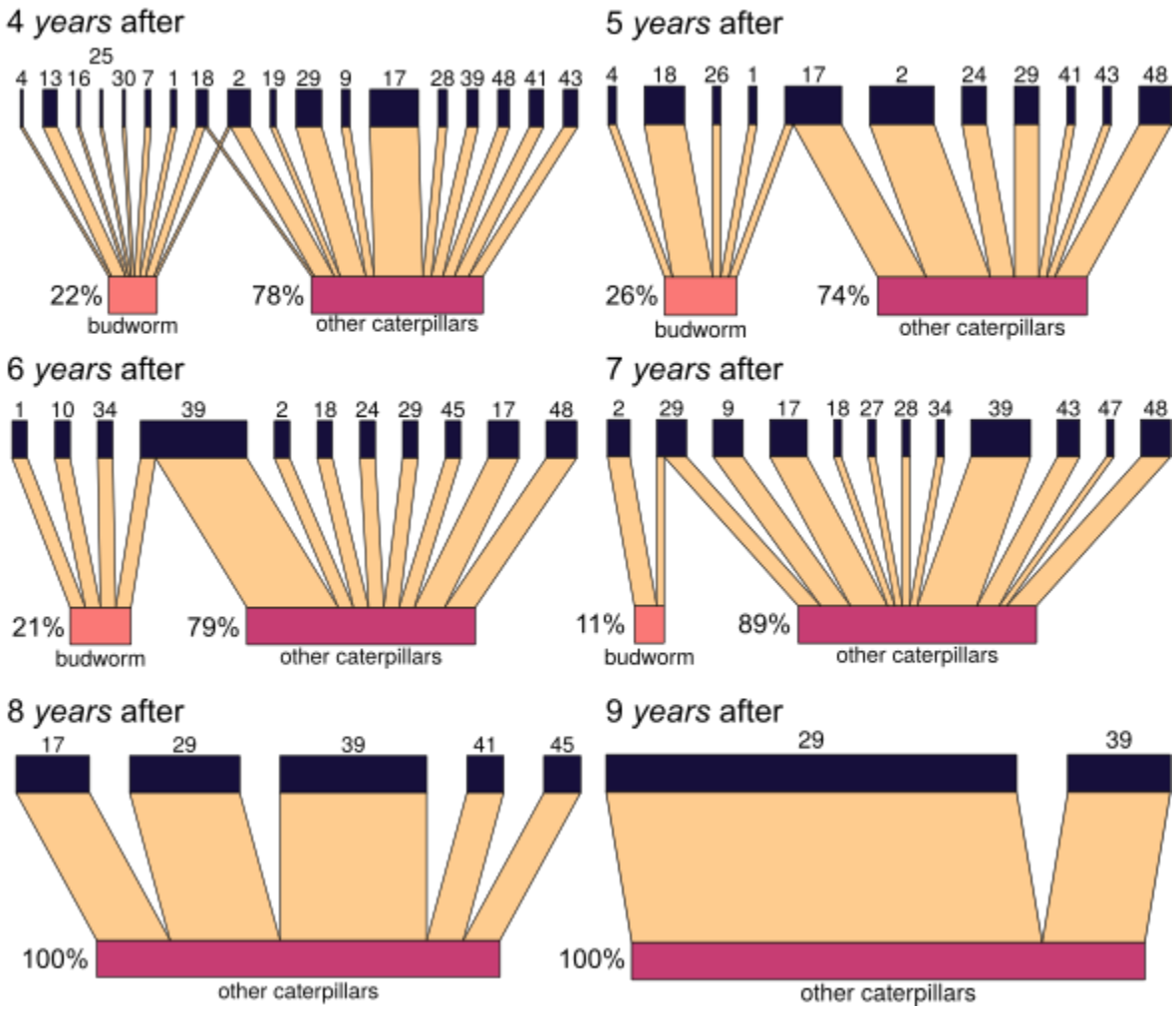

Fig. S5. Graphical representations of the number of emergences of each parasitoid taxon (top boxes) from budworm and other caterpillar species (bottom boxes) over time. Six different relative years are shown: four relative years after the peak, five relative years after the peak, six relative years after the peak, seven relative years after the peak, eight relative years after the peak, and nine relative years after the peak.

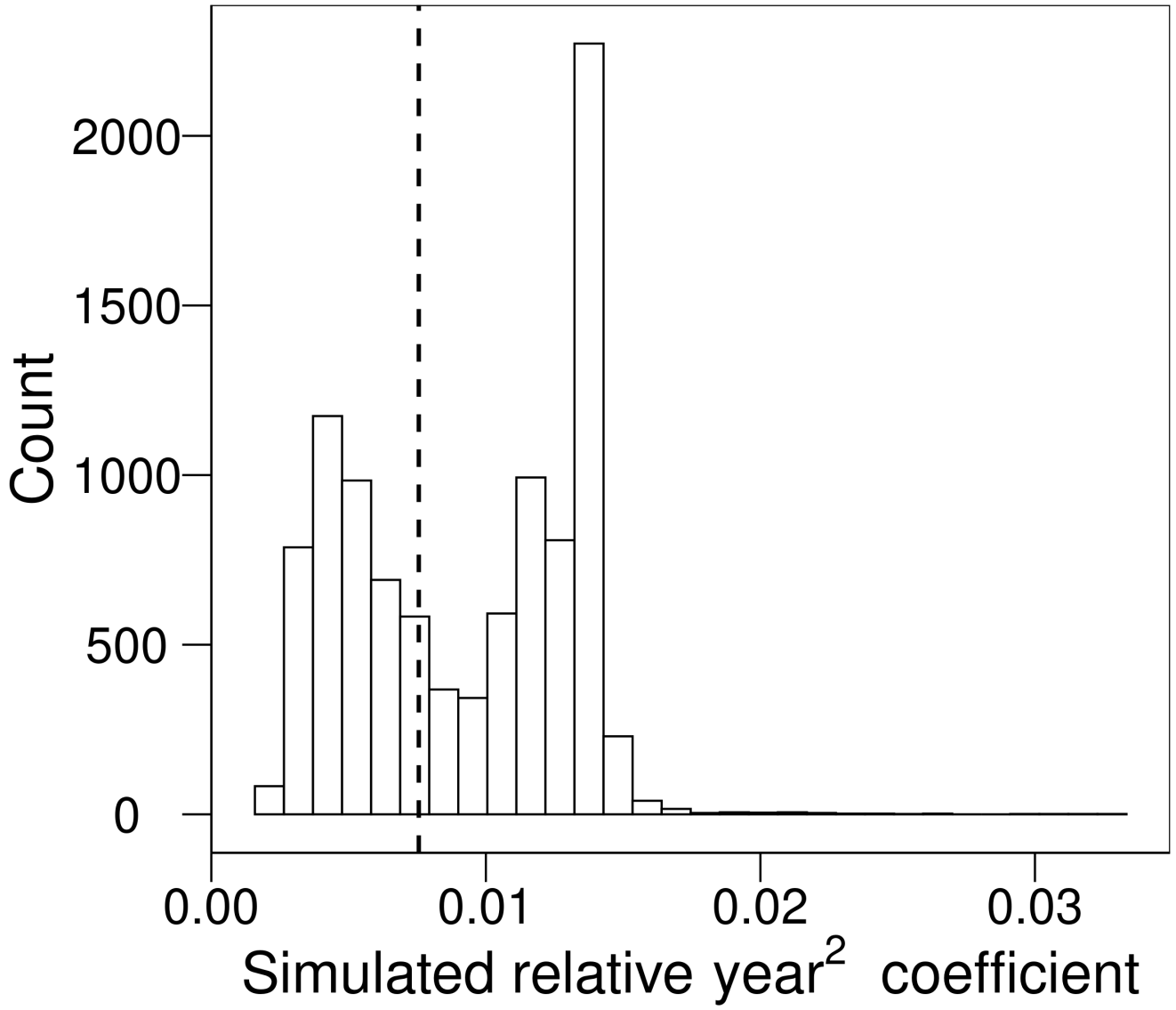

Fig. S6. Histogram of 10–000 simulations to calculate the relative year^2 coefficient of a linear model with median:maximum interaction strengths as the response variable and relative year, relative year^2, and plot as the explanatory variables. The dashed line is our observed relative year^2 coefficient. In these 10000 simulations, a parasitoid community of 50 taxa attacked budworm each year where budworm "populations" were taken from our observed sampling frequency (Table S1). The parasitoid community attacked 17.85% of the budworm "population" each year. Seven parasitoid taxa attacked 9.1%, 2.8%, 0.91%, 0.34%, 0.17%, 0.12%, and 0.11% of the budworm population, respectively. The rest of the parasitoid taxa attacked 0.1% of the budworm population each.

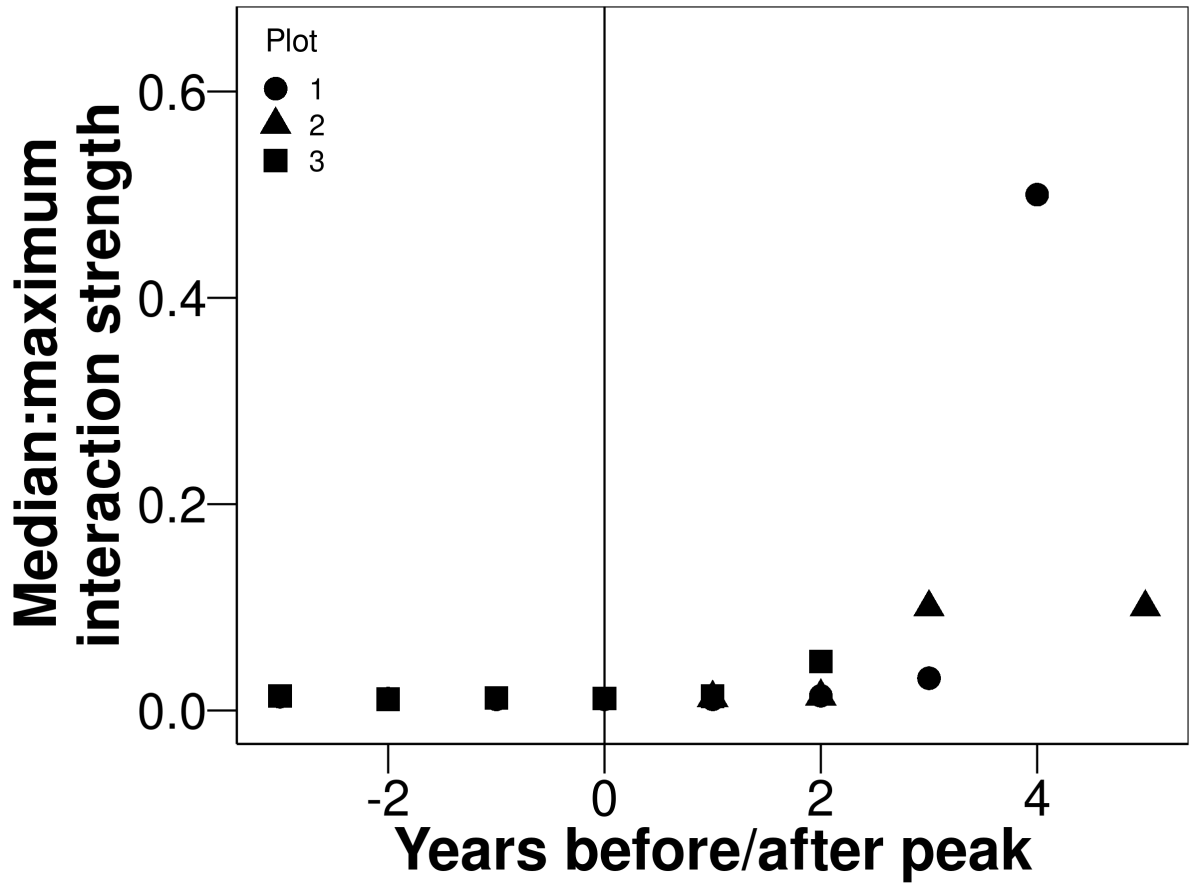

Fig. S7. An example of one simulation of a parasitoid community attacking a declining population of budworm. Similar to Fig. 4, median:maximum interaction strength increases after two years after the peak.

Table S1. Total budworm and other caterpillar individuals sampled for each relative year and plot. Total parasitoids that emerged from budworm or other caterpillars and parasitism rates of budworm and other caterpillars.

Relative Year	Plot	Total budworm sampled	Total other caterpillars sampled	Total # parasitoids emerged from budworm	Total # parasitoids emerged from other caterpillars	Budworm parasitism rate	Other Caterpillars parasitism rate
-3	1	5095	0	1109	0	0.22	NA
-3	3	6481	139	886	17	0.14	0.12
-2	1	12230	209	3313	29	0.27	0.14
-2	3	5378	317	814	96	0.15	0.30
-1	1	10877	252	1783	52	0.16	0.21
-1	3	4708	394	456	69	0.10	0.18
0	1	16802	153	2623	19	0.16	0.12
0	3	6369	203	1170	34	0.18	0.17
1	1	8192	85	1417	5	0.17	0.06
1	2	5431	112	1588	19	0.29	0.17
1	3	4088	161	660	12	0.16	0.07
2	1	3392	70	548	14	0.16	0.20
2	2	2739	127	886	19	0.32	0.15
2	3	214	453	34	12	0.16	0.03
3	1	310	216	79	35	0.25	0.16
3	2	111	505	37	66	0.33	0.13
3	3	3	40	1	2	0.33	0.05
4	1	54	115	10	28	0.19	0.24
4	2	30	117	7	32	0.23	0.27
5	2	102	101	9	26	0.09	0.26
6	2	19	64	4	15	0.21	0.23
7	2	22	104	4	32	0.18	0.31
8	2	2	72	0	11	0.00	0.15
9	2	1	87	0	5	0.00	0.06
10	2	0	29	0	3	NA	0.10

Table S2. Parasitoid taxa found to attack budworm and other caterpillar species on balsam fir from this study compared to the corresponding parasitoid taxon found to attack budworm in Eveleigh *et al.* (2007)

Our parasitoids	**Eveleigh *et al.* (2007) PNAS parasitoids**
1. *Apanteles fumiferanae*	9. *Apanteles fumiferanae*
2. *Glypta fumiferanae*	10. *Glypta fumiferanae*
3. *Smidtia fumiferanae*	1. *Smidtia fumiferanae*
4. *Meteorus trachynotus*	11. *Meteorus trachynotus*
5. *Dirophanes hariolus*	14. *Dirophanes hariolus*
6. *Apechthis ontario*	15. *Apechthis ontario*
7. *Lypha fumipennis*	2. *Lypha fumipennis*
8. *Phyxe pecosensis*	3. *Phyxe pecosensis*
9. *Apanteles* sp.	67. *Apanteles* sp.
10. *Eumea caesar*	4. *Eumea caesar*
11. *Mesopolobus tortricus*	13. *Mesopolobus tortricus*
12. *Itoplectis conquisitor*	16. *Itoplectis conquisitor*
13. *Tranosema tenuifemur*	66. *Synetaeris* sp.
14. *Agria affinis*	8. *Agria affinis*
15. *Actia interrupta*	6. *Actia interrupta*
16. *Apanteles morrisi*	19. *Apanteles morrisi*
17. *Bassus binominata*	20. *Bassus binominata*
18. *Dolichogenidea absona*	18. *Dolichogenidea absona*
19. *Dirophanes* sp.	48. *Phaeogenes* sp.
20. *Madremyia saundersii*	7. *Madremyia saundersii*
21. *Scambus* sp.	80. *Scambus* sp.
22. *Macrocentrus linearis iridescens*	41. *Macrocentrus linearis iridescens*
23. *Enytus montanus*	27. *Enytus montanus*
24. *Charmon extensor*	22. *Charmon extensor*
25. *Apanteles petrovae*	17. *Apanteles petrovae*
26. *Tranosema rostrale*	45. *Tranosema rostrale*
27. *Chelonus* sp.	29. *Chelonus* sp.
28. *Diadegma pulicalvariae*	50. *Diadegma pulicalvariae*
29. *Orgilus* sp.	21. *Orgilus* sp.

30. *Apanteles milleri*	38. *Apanteles milleri*
31. *Sympiesis* sp.	36. *Sympiesis* sp.
32. *Stictophisthus flaviceps*	93. *Stictophisthus* sp.
33. *Pimpla pedalis*	44. *Pimpla pedalis*
34. *Meteorus versicolor*	60. *Meteorus* sp. (versicolor?)
35. *Elachertus cacoeciae*	98. *Elachertus*
36. *Aprostocetus esurus*	35. *Aprostocetus*
37. *Sarcophaga aldrichi*	47. *Sarcophaga aldrichi*
38. *Pristomerus* sp.	30. *Pristomerus* sp.
39. *Perilampus* sp.	54. *Perilampus* sp.
40. *Nemorilla pyste*	5. *Nemorilla pyste*
41. *Microgaster* sp.	49. *Microgaster* sp. & 74. *Microgasterinae*
42. *Lissonota acrobasidis*	62. *Lissonota acrobasidis*
43. *Glypta* sp.	56. *Glypta* sp.
44. *Exochus nigripalpis*	37. *Bathythrix nigripalpis*
45. *Diadegma* sp.	39. *Diadegma* sp.
46. *Ceromasia auricaudata*	Not in Eveleigh *et al.* (2007) PNAS parasitoids
47. *Campoplex* sp.	24. *Campoplex* sp.
48. *Bassus dimidiator*	40. *Bassus dimidiator*