

Diane M. Debinski, Jennet C. Caruthers, Dianne Cook, Jason Crowley, and Hadley Wickham. 2013. Gradient-based habitat affinities predict species vulnerability to drought. *Ecology*

## Appendix C: Single species model summary

In the following document, there are visual and numerical summaries of the model used to fit butterfly species count data by year. The species included in this document are limited to the ones that had an aggregate count of ten or higher over all years, regions and meadow types. Of the 87 total species, 60 met this criterion and are included in this document. Note that the models fit on the following pages are fit to the individual species, which is different than the mixed model fit to all the data.

To model this data, Poisson regression (a form of a Generalized linear model) was utilized, as it is natural to assume that the response variable (count) follows the Poisson distribution. The model used can be summarized as such:

$$\begin{aligned} \log_e(Y_{ijk}) = & \beta_0 + \beta_1(YEAR) + \alpha_i(REGION) + \gamma_j(MTYPE) + \alpha\gamma_{ij}(REGION * MTYPE) \\ & + \alpha\beta_{i1}(REGION * YEAR) + \gamma\beta_{j1}(MTYPE * YEAR) + \epsilon_{ijk} \end{aligned}$$

$i \in \{1, 2\}$ , representing  $REGION \in \{\text{Gallatin, Teton}\}$   
 $j \in \{1, \dots, 6\}$ , representing  $MTYPE \in \{\text{M1, M2, M3, M4, M5, M6}\}$  (C1)

In the model, year, region, and meadow type are the three explanatory variables. The year runs from 1997 to 2007, with some exceptions that are noted in the paper. There are two regions that butterflies were collected from in this study, the Gallatins and the Tetons, the latter of which is the baseline for the fitted models shown in this document. The third main effect included in this model is meadow type, which runs from M1 (hydric) to M6 (xeric). The M1 level is the baseline in the fitted model.

The model includes an interaction between region and meadow type, which allows the intercept of the regression line over year to differ between meadow types within a particular region (and vice versa). The model also includes an interaction between year/region and year/meadow type, which allows the slope of the regression line to differ among different regions and meadow types, respectively. For an example of a species where the slope of the regression over year clearly depends on region/meadow type, see *Speyeria mormonia*.

Once the model was fit to each species separately, it was determined which species' abundances showed the most significant trend over year, or between regions or meadow types. This was accomplished by considering two models for each species: the model shown above, and the model without any terms associated with year. A full vs. reduced F-test was then run to determine the difference in variation explained between the two models, and the p-value based on this test calculated. **The species are shown in order of significance, with the species showing most significant**

**trend, *Cercyonis oetus*, shown first.** The fitted model for each combination of region and meadow type is included, as well as estimated coefficients for the fitted model and some model diagnostics. Also included for each species is a plot of abundance over time, by region and meadow type, with the fitted model plotted over the data (in red).

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# 1 Cercyonis oetus

Table C1: Poisson regression fitted models for *Cercyonis oetus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.03e^{0.638(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.133e^{0.371(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 6.088e^{0.091(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 19.934e^{0.041(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 12.559e^{0.035(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 0.01e^{0.636(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.22e^{0.369(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 6.113e^{0.089(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 4.099e^{0.13(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 25.47e^{0.039(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 37.507e^{0.033(YEAR-1997)}$	***

Null deviance: 1442.29 on 80 degrees of freedom  
Residual deviance: 426.54 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 723.17

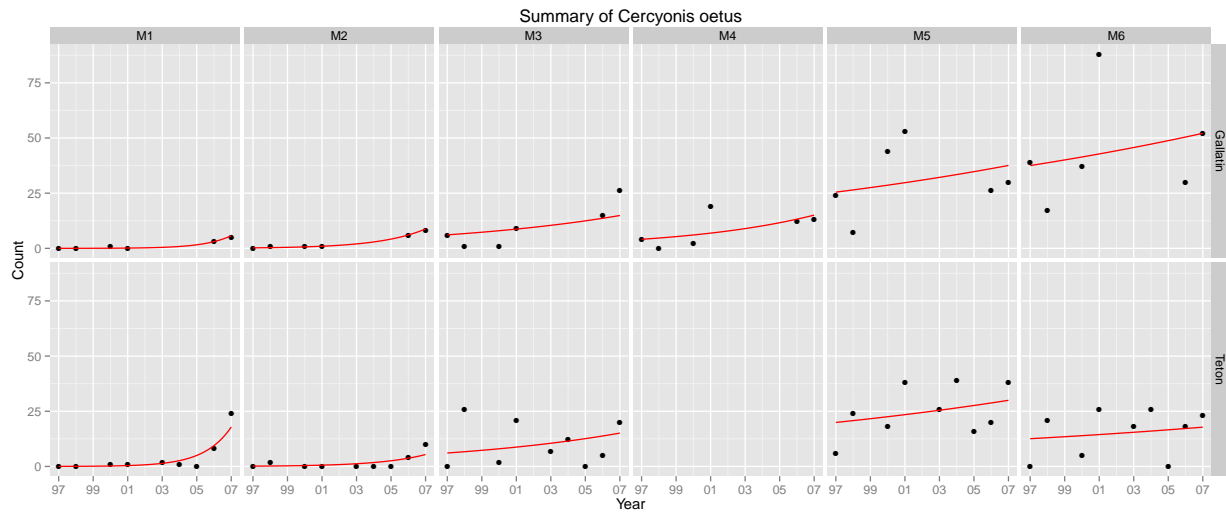


Figure C1: Time series plot of *Cercyonis oetus* by region and meadow type

# Cercyonis oetus

Table C2: Poisson regression parameter estimates for *Cercyonis oetus*

	Estimate	Std. Error	z value	P-value
(Intercept)	-3.4979	1.0171	-3.44	0.0006
Year	0.6381	0.1117	5.71	0.0000
MeadowM2	1.4772	1.2320	1.20	0.2305
MeadowM3	5.3041	1.0336	5.13	0.0000
MeadowM4	6.0248	1.1566	5.21	0.0000
MeadowM5	6.4903	1.0228	6.35	0.0000
MeadowM6	6.0283	1.0249	5.88	0.0000
RegionGallatin	-1.1163	0.4156	-2.69	0.0072
Year:MeadowM2	-0.2675	0.1368	-1.96	0.0505
Year:MeadowM3	-0.5472	0.1143	-4.79	0.0000
Year:MeadowM4	-0.5060	0.1190	-4.25	0.0000
Year:MeadowM5	-0.5973	0.1128	-5.30	0.0000
Year:MeadowM6	-0.6033	0.1130	-5.34	0.0000
Year:RegionGallatin	-0.0019	0.0188	-0.10	0.9188
MeadowM2:RegionGallatin	1.6216	0.5145	3.15	0.0016
MeadowM3:RegionGallatin	1.1205	0.4166	2.69	0.0071
MeadowM5:RegionGallatin	1.3614	0.3962	3.44	0.0006
MeadowM6:RegionGallatin	2.2104	0.3975	5.56	0.0000

## 2 Euchloe ausonides

Table C3: Poisson regression fitted models for Euchloe ausonides

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.15e^{-0.061(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 1.53e^{0.048(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 6.048e^{-0.157(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 2.998e^{-0.25(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 13.953e^{-0.642(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 3.988e^{-0.106(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 5.44e^{0.002(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 13.885e^{-0.203(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 5.32e^{-0.166(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 3.87e^{-0.296(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 3.535e^{-0.687(YEAR-1997)}$	***

Null deviance: 341.05 on 80 degrees of freedom

Residual deviance: 125.30 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 317.67

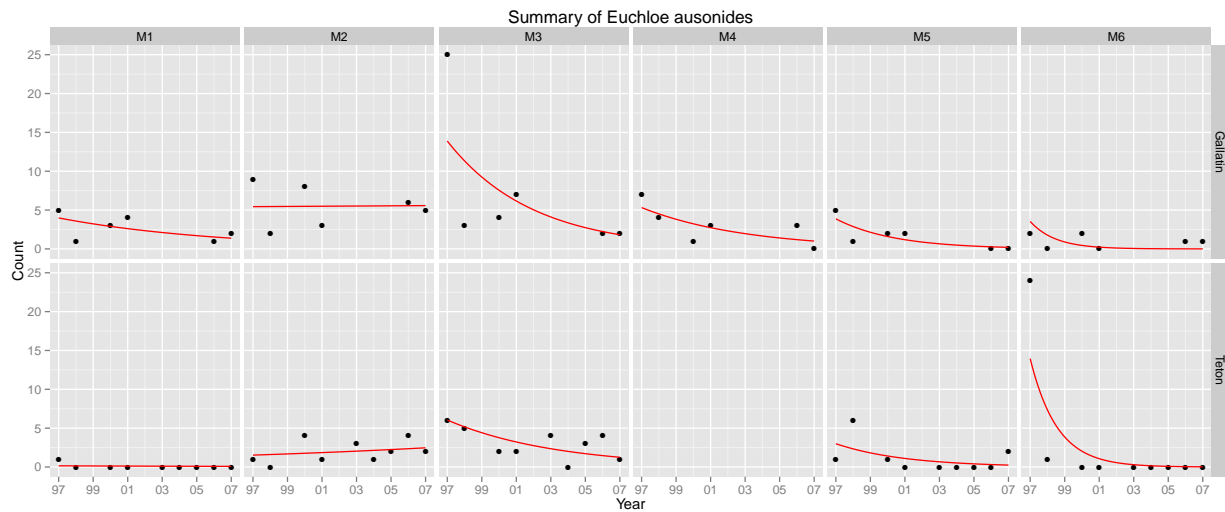


Figure C2: Time series plot of Euchloe ausonides by region and meadow type



# Euchloe ausonides

Table C4: Poisson regression parameter estimates for *Euchloe ausonides*

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.8946	1.0831	-1.75	0.0803
Year	-0.0606	0.0894	-0.68	0.4980
MeadowM2	2.3198	1.1060	2.10	0.0360
MeadowM3	3.6943	1.0919	3.38	0.0007
MeadowM4	0.2883	0.4611	0.63	0.5319
MeadowM5	2.9924	1.1422	2.62	0.0088
MeadowM6	4.5303	1.1058	4.10	0.0000
RegionGallatin	3.2778	1.0663	3.07	0.0021
Year:MeadowM2	0.1085	0.0838	1.29	0.1954
Year:MeadowM3	-0.0969	0.0866	-1.12	0.2635
Year:MeadowM4	-0.0600	0.1082	-0.55	0.5792
Year:MeadowM5	-0.1897	0.1174	-1.62	0.1060
Year:MeadowM6	-0.5814	0.1545	-3.76	0.0002
Year:RegionGallatin	-0.0454	0.0547	-0.83	0.4065
MeadowM2:RegionGallatin	-2.0093	1.0796	-1.86	0.0627
MeadowM3:RegionGallatin	-2.4467	1.0702	-2.29	0.0222
MeadowM5:RegionGallatin	-3.0223	1.1407	-2.65	0.0081
MeadowM6:RegionGallatin	-4.6506	1.1516	-4.04	0.0001

### 3 Glaucopsyche lygdamus

Table C5: Poisson regression fitted models for *Glaucopsyche lygdamus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.975e^{0.041(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 2.437e^{-0.311(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 23.317e^{-0.355(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 2.604e^{-0.202(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 3.015e^{-0.191(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 8.639e^{-0.183(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 34.424e^{-0.535(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 11.394e^{-0.579(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 22.143e^{-0.419(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 16.29e^{-0.426(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 8.266e^{-0.415(YEAR-1997)}$	***

Null deviance: 807.91 on 80 degrees of freedom

Residual deviance: 302.55 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 482.75

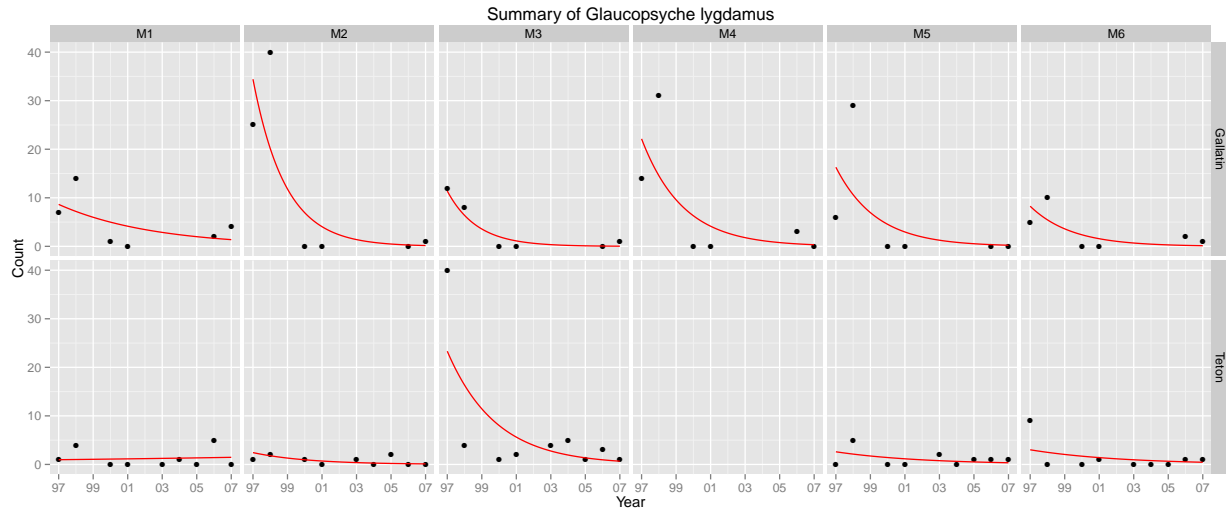


Figure C3: Time series plot of *Glaucopsyche lygdamus* by region and meadow type

# Glaucopsyche lygdamus

Table C6: Poisson regression parameter estimates for Glaucopsyche lygdamus

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.0253	0.5004	-0.05	0.9597
Year	0.0407	0.0691	0.59	0.5564
MeadowM2	0.9161	0.6159	1.49	0.1369
MeadowM3	3.1745	0.5202	6.10	0.0000
MeadowM4	0.9412	0.2941	3.20	0.0014
MeadowM5	0.9824	0.5991	1.64	0.1010
MeadowM6	1.1290	0.6052	1.87	0.0621
RegionGallatin	2.1816	0.5021	4.34	0.0000
Year:MeadowM2	-0.3515	0.0922	-3.81	0.0001
Year:MeadowM3	-0.3960	0.0823	-4.81	0.0000
Year:MeadowM4	-0.2355	0.1020	-2.31	0.0210
Year:MeadowM5	-0.2429	0.0900	-2.70	0.0069
Year:MeadowM6	-0.2317	0.0962	-2.41	0.0160
Year:RegionGallatin	-0.2241	0.0657	-3.41	0.0006
MeadowM2:RegionGallatin	0.4663	0.5999	0.78	0.4369
MeadowM3:RegionGallatin	-2.8977	0.5341	-5.43	0.0000
MeadowM5:RegionGallatin	-0.3482	0.5773	-0.60	0.5464
MeadowM6:RegionGallatin	-1.1732	0.5964	-1.97	0.0492

## 4 Lycaena helloides

Table C7: Poisson regression fitted models for Lycaena helloides

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 7.297e^{-0.05(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 2.871e^{0.129(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 19.685e^{-0.113(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 11.004e^{-0.268(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0.296e^{0.107(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 4.448e^{0.162(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 1.647e^{0.341(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 16.531e^{0.099(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 15.568e^{0.045(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 5.462e^{-0.056(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.178e^{0.319(YEAR-1997)}$	***

Null deviance: 1145.24 on 80 degrees of freedom  
Residual deviance: 413.44 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 685.83

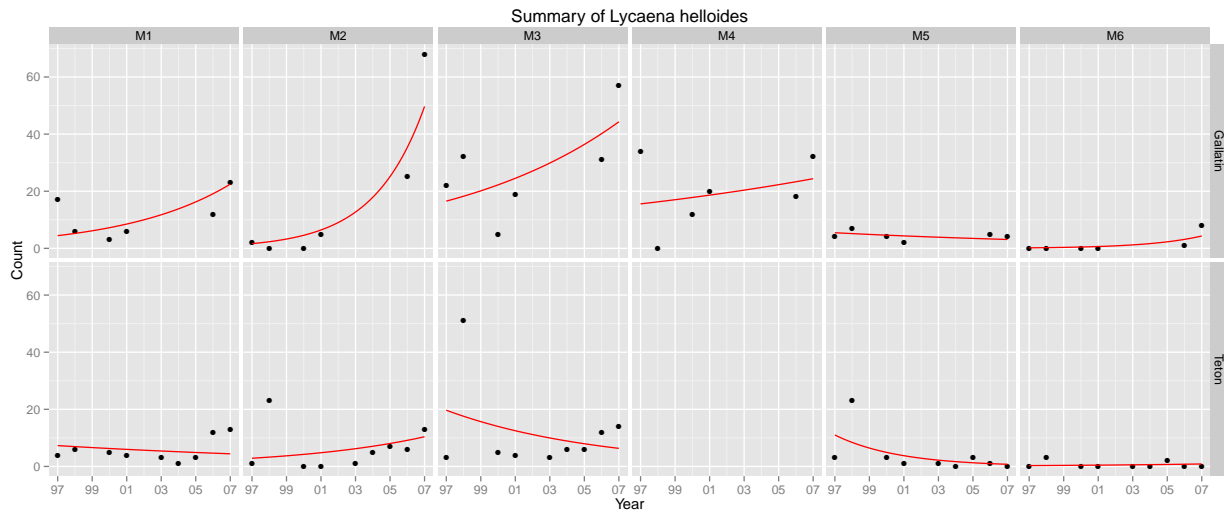


Figure C4: Time series plot of Lycaena helloides by region and meadow type

# Lycaena helloides

Table C8: Poisson regression parameter estimates for Lycaena helloides

	Estimate	Std. Error	z value	P-value
(Intercept)	1.9875	0.2012	9.88	0.0000
Year	-0.0501	0.0303	-1.65	0.0985
MeadowM2	-0.9329	0.3036	-3.07	0.0021
MeadowM3	0.9923	0.2226	4.46	0.0000
MeadowM4	1.2528	0.2753	4.55	0.0000
MeadowM5	0.4107	0.2757	1.49	0.1363
MeadowM6	-3.2055	0.7796	-4.11	0.0000
RegionGallatin	-0.4952	0.2391	-2.07	0.0384
Year:MeadowM2	0.1787	0.0395	4.52	0.0000
Year:MeadowM3	-0.0634	0.0312	-2.03	0.0422
Year:MeadowM4	-0.1171	0.0370	-3.16	0.0016
Year:MeadowM5	-0.2183	0.0482	-4.53	0.0000
Year:MeadowM6	0.1568	0.0982	1.60	0.1104
Year:RegionGallatin	0.2121	0.0251	8.44	0.0000
MeadowM2:RegionGallatin	-0.0607	0.2661	-0.23	0.8196
MeadowM3:RegionGallatin	0.3205	0.2337	1.37	0.1703
MeadowM5:RegionGallatin	-0.2053	0.3326	-0.62	0.5371
MeadowM6:RegionGallatin	-0.0101	0.6207	-0.02	0.9870

## 5 Speyeria callippe

Table C9: Poisson regression fitted models for *Speyeria callippe*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{1.701(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.014e^{0.302(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 2.489e^{0.152(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.243e^{0.414(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.782e^{0.194(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{2.091(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.001e^{0.692(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.032e^{0.543(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{1.793(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.002e^{0.804(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.014e^{0.584(YEAR-1997)}$	***

Null deviance: 390.53 on 80 degrees of freedom  
Residual deviance: 73.58 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 213.51

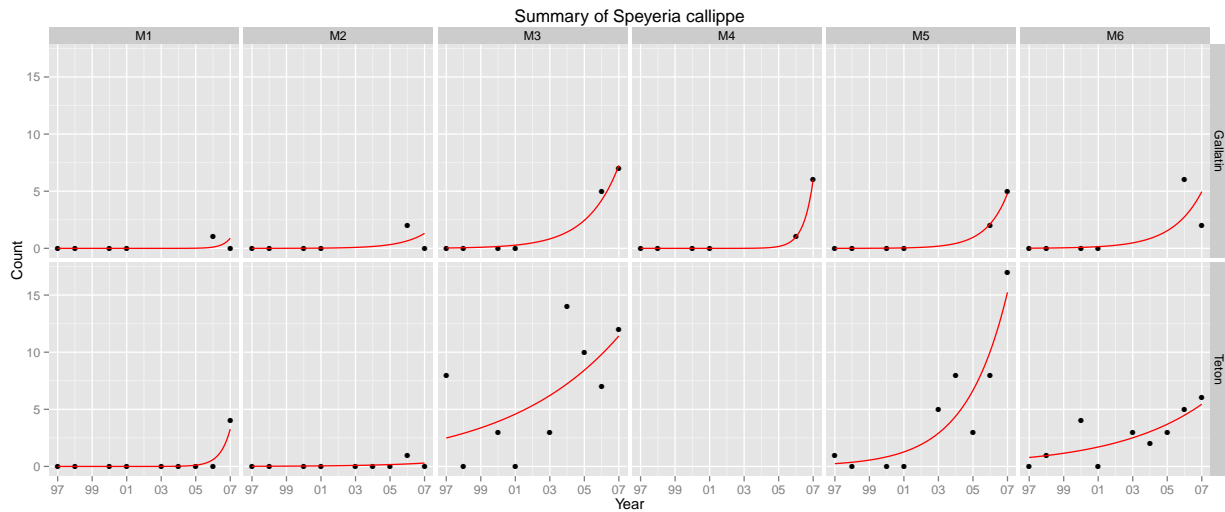


Figure C5: Time series plot of *Speyeria callippe* by region and meadow type

# Speyeria callippe

Table C10: Poisson regression parameter estimates for *Speyeria callippe*

	Estimate	Std. Error	z value	P-value
(Intercept)	-15.8229	9.0326	-1.75	0.0798
Year	1.7008	0.9224	1.84	0.0652
MeadowM2	11.5862	9.5489	1.21	0.2250
MeadowM3	16.7346	9.0381	1.85	0.0641
MeadowM4	4.8913	14.1096	0.35	0.7288
MeadowM5	14.4063	9.0580	1.59	0.1117
MeadowM6	15.5772	9.0488	1.72	0.0852
RegionGallatin	-5.2046	1.9086	-2.73	0.0064
Year:MeadowM2	-1.3992	0.9946	-1.41	0.1595
Year:MeadowM3	-1.5484	0.9234	-1.68	0.0936
Year:MeadowM4	-0.2983	1.4253	-0.21	0.8342
Year:MeadowM5	-1.2867	0.9257	-1.39	0.1645
Year:MeadowM6	-1.5068	0.9251	-1.63	0.1034
Year:RegionGallatin	0.3903	0.1562	2.50	0.0125
MeadowM2:RegionGallatin	2.7922	1.7771	1.57	0.1161
MeadowM3:RegionGallatin	0.8472	1.1765	0.72	0.4715
MeadowM5:RegionGallatin	0.1450	1.1996	0.12	0.9038
MeadowM6:RegionGallatin	1.2086	1.2091	1.00	0.3175

## 6 Speyeria mormonia

Table C11: Poisson regression fitted models for *Speyeria mormonia*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 2.393e^{-0.035(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 6.501e^{0.172(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 39.583e^{-0.051(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 30.329e^{-0.117(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 1.555e^{-0.092(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 4.695e^{0.167(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 1.418e^{0.373(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 13.079e^{0.15(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 14.389e^{0.125(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 18.911e^{0.085(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 15.072e^{0.11(YEAR-1997)}$	***

Null deviance: 1365.73 on 80 degrees of freedom  
Residual deviance: 288.49 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 652.57

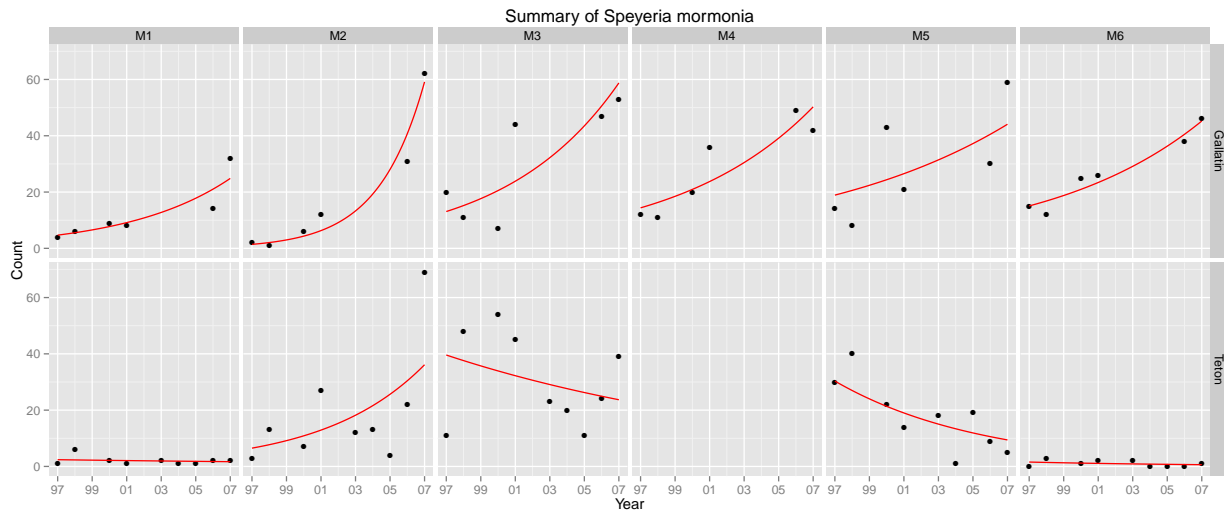


Figure C6: Time series plot of *Speyeria mormonia* by region and meadow type



# Speyeria mormonia

Table C12: Poisson regression parameter estimates for *Speyeria mormonia*

	Estimate	Std. Error	z value	P-value
(Intercept)	0.8727	0.2867	3.04	0.0023
Year	-0.0350	0.0330	-1.06	0.2901
MeadowM2	0.9992	0.3296	3.03	0.0024
MeadowM3	2.8057	0.2930	9.58	0.0000
MeadowM4	1.1199	0.2797	4.00	0.0001
MeadowM5	2.5394	0.2964	8.57	0.0000
MeadowM6	-0.4311	0.4422	-0.97	0.3297
RegionGallatin	0.6738	0.2857	2.36	0.0183
Year:MeadowM2	0.2065	0.0382	5.40	0.0000
Year:MeadowM3	-0.0163	0.0332	-0.49	0.6221
Year:MeadowM4	-0.0415	0.0361	-1.15	0.2497
Year:MeadowM5	-0.0820	0.0335	-2.45	0.0144
Year:MeadowM6	-0.0567	0.0359	-1.58	0.1143
Year:RegionGallatin	0.2016	0.0180	11.20	0.0000
MeadowM2:RegionGallatin	-2.1966	0.3025	-7.26	0.0000
MeadowM3:RegionGallatin	-1.7812	0.2872	-6.20	0.0000
MeadowM5:RegionGallatin	-1.1462	0.2923	-3.92	0.0001
MeadowM6:RegionGallatin	1.5974	0.4376	3.65	0.0003

## 7 Plebejus saepiolus

Table C13: Poisson regression fitted models for *Plebejus saepiolus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 21.732e^{0.011(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 56.38e^{-0.05(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 15.834e^{0.072(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 1.607e^{0.106(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0.86e^{0.046(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 28.379e^{-0.114(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 38.157e^{-0.176(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 4.371e^{-0.054(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 5.948e^{0.002(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 6.723e^{-0.02(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 7.999e^{-0.08(YEAR-1997)}$	***

Null deviance: 1432.23 on 80 degrees of freedom  
Residual deviance: 396.23 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 727.96

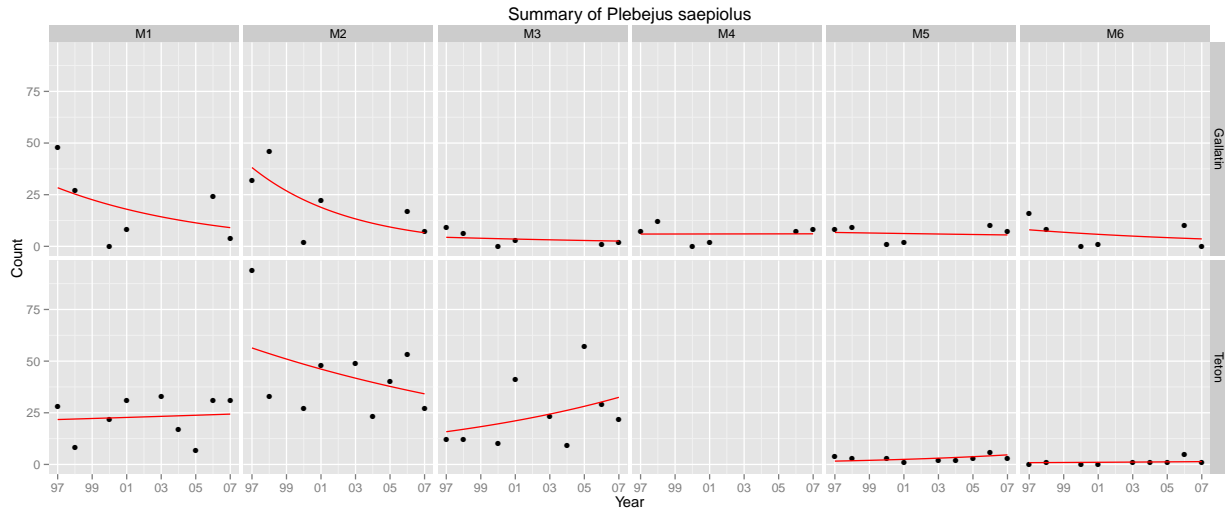


Figure C7: Time series plot of *Plebejus saepiolus* by region and meadow type

# Plebejus saepiolus

Table C14: Poisson regression parameter estimates for *Plebejus saepiolus*

	Estimate	Std. Error	z value	P-value
(Intercept)	3.0788	0.1225	25.13	0.0000
Year	0.0114	0.0185	0.62	0.5377
MeadowM2	0.9533	0.1431	6.66	0.0000
MeadowM3	-0.3166	0.1841	-1.72	0.0854
MeadowM4	-1.5627	0.2850	-5.48	0.0000
MeadowM5	-2.6047	0.3274	-7.96	0.0000
MeadowM6	-3.2299	0.4267	-7.57	0.0000
RegionGallatin	0.2669	0.1501	1.78	0.0754
Year:MeadowM2	-0.0615	0.0219	-2.81	0.0050
Year:MeadowM3	0.0605	0.0268	2.25	0.0243
Year:MeadowM4	0.1162	0.0494	2.35	0.0185
Year:MeadowM5	0.0945	0.0405	2.33	0.0197
Year:MeadowM6	0.0345	0.0479	0.72	0.4714
Year:RegionGallatin	-0.1257	0.0217	-5.80	0.0000
MeadowM2:RegionGallatin	-0.6573	0.1654	-3.98	0.0001
MeadowM3:RegionGallatin	-1.5541	0.2645	-5.87	0.0000
MeadowM5:RegionGallatin	1.1646	0.2958	3.94	0.0001
MeadowM6:RegionGallatin	1.9635	0.3949	4.97	0.0000

## 8 Coenonympha haydenii

Table C15: Poisson regression fitted models for Coenonympha haydenii

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 7.637e^{0.023(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 13.344e^{0.089(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 22.183e^{0.027(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 25.881e^{-0.032(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0.68e^{-0.004(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 40.857e^{-0.045(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 39.261e^{0.02(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 86.317e^{-0.041(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 73.108e^{-0.047(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 39.326e^{-0.1(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 35.356e^{-0.072(YEAR-1997)}$	***

Null deviance: 1725.48 on 80 degrees of freedom  
Residual deviance: 497.66 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 899.28

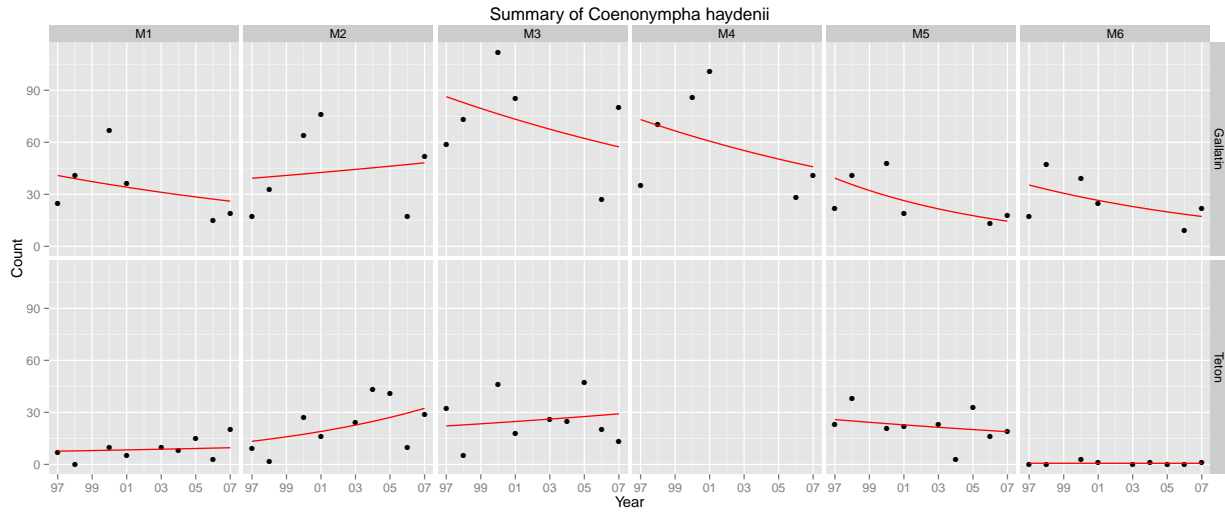


Figure C8: Time series plot of Coenonympha haydenii by region and meadow type

# Coenonympha haydenii

Table C16: Poisson regression parameter estimates for Coenonympha haydenii

	Estimate	Std. Error	z value	P-value
(Intercept)	2.0330	0.1597	12.73	0.0000
Year	0.0232	0.0202	1.15	0.2503
MeadowM2	0.5581	0.1831	3.05	0.0023
MeadowM3	1.0664	0.1729	6.17	0.0000
MeadowM4	0.5819	0.1239	4.70	0.0000
MeadowM5	1.2206	0.1838	6.64	0.0000
MeadowM6	-2.4188	0.4500	-5.38	0.0000
RegionGallatin	1.6771	0.1556	10.78	0.0000
Year:MeadowM2	0.0655	0.0215	3.05	0.0023
Year:MeadowM3	0.0042	0.0202	0.21	0.8343
Year:MeadowM4	-0.0016	0.0226	-0.07	0.9436
Year:MeadowM5	-0.0547	0.0235	-2.32	0.0201
Year:MeadowM6	-0.0269	0.0282	-0.95	0.3400
Year:RegionGallatin	-0.0682	0.0145	-4.70	0.0000
MeadowM2:RegionGallatin	-0.5979	0.1669	-3.58	0.0003
MeadowM3:RegionGallatin	-0.3184	0.1598	-1.99	0.0463
MeadowM5:RegionGallatin	-1.2588	0.1758	-7.16	0.0000
MeadowM6:RegionGallatin	2.2742	0.4394	5.18	0.0000

## 9 *Lycaena editha*

Table C17: Poisson regression fitted models for *Lycaena editha*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.147e^{-0.055(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 2.148e^{0.105(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 0.076e^{0.066(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 2.543e^{0.036(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 1.212e^{0.103(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.34e^{0.125(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.236e^{0.285(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.36e^{0.246(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.159e^{0.166(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 1.979e^{0.216(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.534e^{0.283(YEAR-1997)}$	***

Null deviance: 345.80 on 80 degrees of freedom

Residual deviance: 132.64 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 305.48

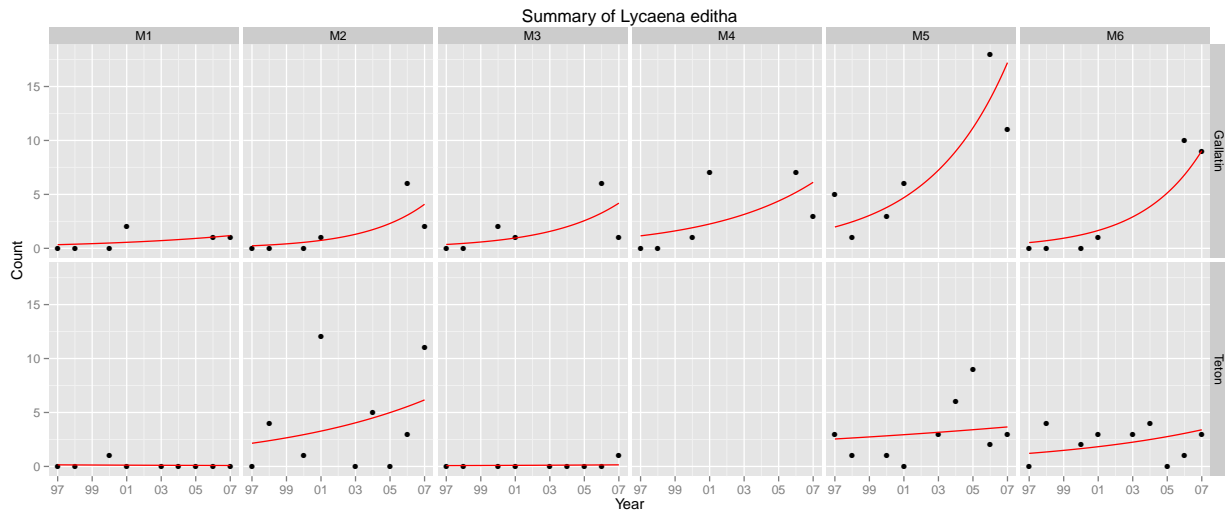


Figure C9: Time series plot of *Lycaena editha* by region and meadow type

# Lycaena editha

Table C18: Poisson regression parameter estimates for Lycaena editha

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.9196	1.1710	-1.64	0.1011
Year	-0.0553	0.1293	-0.43	0.6691
MeadowM2	2.6843	1.2150	2.21	0.0271
MeadowM3	-0.6513	1.6332	-0.40	0.6901
MeadowM4	1.2275	1.0504	1.17	0.2425
MeadowM5	2.8529	1.1856	2.41	0.0161
MeadowM6	2.1115	1.2224	1.73	0.0841
RegionGallatin	0.8399	1.1653	0.72	0.4711
Year:MeadowM2	0.1607	0.1355	1.19	0.2357
Year:MeadowM3	0.1209	0.1546	0.78	0.4342
Year:MeadowM4	0.0418	0.1384	0.30	0.7624
Year:MeadowM5	0.0917	0.1272	0.72	0.4708
Year:MeadowM6	0.1583	0.1339	1.18	0.2369
Year:RegionGallatin	0.1798	0.0530	3.39	0.0007
MeadowM2:RegionGallatin	-3.0495	1.2072	-2.53	0.0115
MeadowM3:RegionGallatin	0.7088	1.5559	0.46	0.6487
MeadowM5:RegionGallatin	-1.0904	1.1646	-0.94	0.3491
MeadowM6:RegionGallatin	-1.6592	1.1883	-1.40	0.1626

## 10 Papilio zelicaon

Table C19: Poisson regression fitted models for Papilio zelicaon

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 1.677e^{-1.686(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 2.946e^{-0.709(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 6.106e^{-0.299(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.264(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1.062e^{-0.588(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 3.395e^{-1.758(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 5.627e^{-0.781(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 1.302e^{-0.371(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.317e^{-0.38(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.825e^{-0.336(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.66(YEAR-1997)}$	

Null deviance: 157.026 on 80 degrees of freedom  
Residual deviance: 37.736 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 125.38

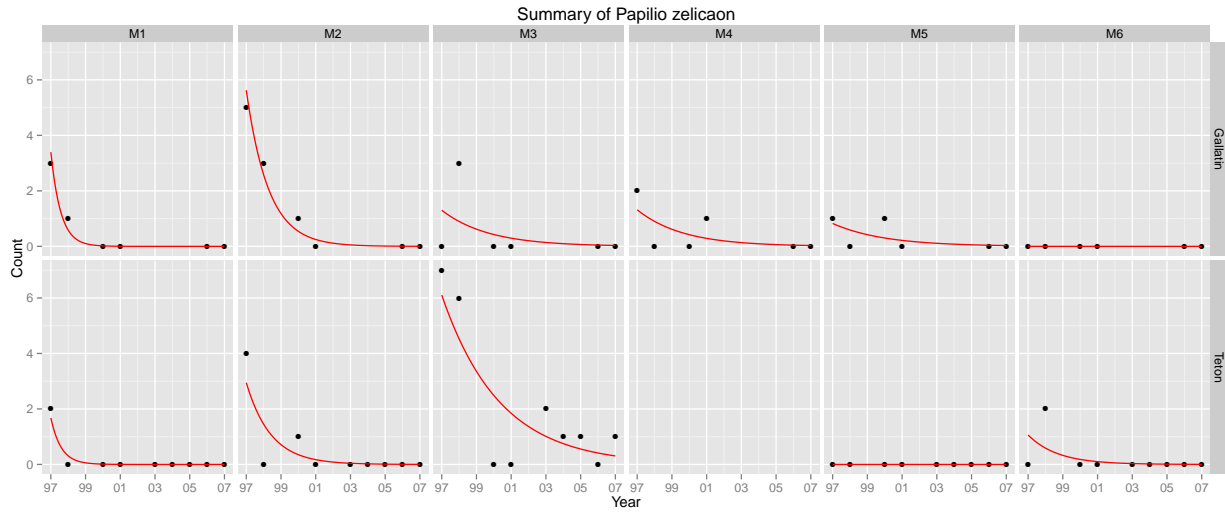


Figure C10: Time series plot of Papilio zelicaon by region and meadow type



# Papilio zelicaon

Table C20: Poisson regression parameter estimates for Papilio zelicaon

	Estimate	Std. Error	z value	P-value
(Intercept)	0.5169	0.7279	0.71	0.4776
Year	-1.6865	0.9842	-1.71	0.0866
MeadowM2	0.5635	0.8754	0.64	0.5197
MeadowM3	1.2924	0.7892	1.64	0.1015
MeadowM4	-0.9467	0.8827	-1.07	0.2835
MeadowM5	-18.6488	2928.6096	-0.01	0.9949
MeadowM6	-0.4571	1.1064	-0.41	0.6795
RegionGallatin	0.7053	0.8673	0.81	0.4161
Year:MeadowM2	0.9775	0.9994	0.98	0.3280
Year:MeadowM3	1.3870	0.9845	1.41	0.1589
Year:MeadowM4	1.3783	1.0223	1.35	0.1776
Year:MeadowM5	1.4221	1.0338	1.38	0.1690
Year:MeadowM6	1.0981	1.0784	1.02	0.3086
Year:RegionGallatin	-0.0718	0.2621	-0.27	0.7841
MeadowM2:RegionGallatin	-0.0582	1.0392	-0.06	0.9553
MeadowM3:RegionGallatin	-2.2509	1.1206	-2.01	0.0446
MeadowM5:RegionGallatin	17.2348	2928.6096	0.01	0.9953
MeadowM6:RegionGallatin	-17.9370	2469.6683	-0.01	0.9942

# 11 *Lycaena heteronea*

Table C21: Poisson regression fitted models for *Lycaena heteronea*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.044e^{0.404(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.016e^{0.376(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.626e^{0.092(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 5.693e^{0.101(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 31.314e^{0.039(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 0.436e^{0.301(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.26e^{0.273(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 1.222e^{-0.01(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 2.398e^{0.105(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 8.701e^{-0.001(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 10.347e^{-0.063(YEAR-1997)}$	***

Null deviance: 1336.13 on 80 degrees of freedom  
Residual deviance: 315.43 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 555.26

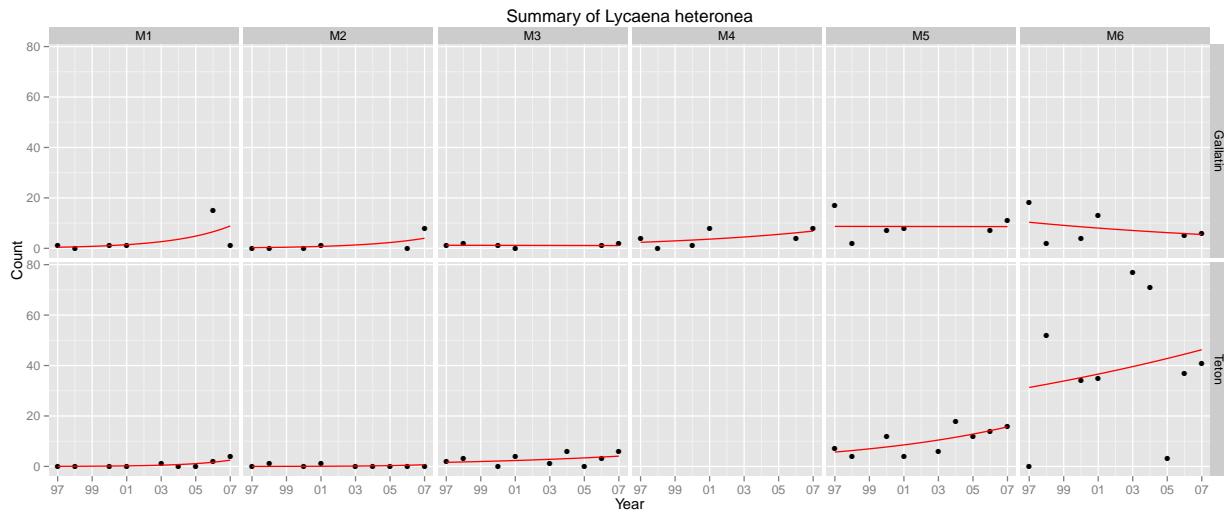


Figure C11: Time series plot of *Lycaena heteronea* by region and meadow type

# Lycaena heteronea

Table C22: Poisson regression parameter estimates for Lycaena heteronea

	Estimate	Std. Error	z value	P-value
(Intercept)	-3.1222	0.7697	-4.06	0.0000
Year	0.4038	0.0803	5.03	0.0000
MeadowM2	-1.0195	1.3479	-0.76	0.4494
MeadowM3	3.6085	0.8523	4.23	0.0000
MeadowM4	1.7057	0.7678	2.22	0.0263
MeadowM5	4.8615	0.7723	6.30	0.0000
MeadowM6	6.5663	0.7698	8.53	0.0000
RegionGallatin	2.2913	0.5135	4.46	0.0000
Year:MeadowM2	-0.0281	0.1309	-0.21	0.8300
Year:MeadowM3	-0.3119	0.0947	-3.29	0.0010
Year:MeadowM4	-0.1966	0.0923	-2.13	0.0332
Year:MeadowM5	-0.3023	0.0806	-3.75	0.0002
Year:MeadowM6	-0.3647	0.0804	-4.54	0.0000
Year:RegionGallatin	-0.1023	0.0313	-3.27	0.0011
MeadowM2:RegionGallatin	0.5021	0.8983	0.56	0.5762
MeadowM3:RegionGallatin	-2.5772	0.6332	-4.07	0.0000
MeadowM5:RegionGallatin	-1.8671	0.4863	-3.84	0.0001
MeadowM6:RegionGallatin	-3.3987	0.4891	-6.95	0.0000

## 12 Callophrys sheridanii

Table C23: Poisson regression fitted models for *Callophrys sheridanii*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.332(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{-0.332(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1e^{-19.743(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1e^{-20.596(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 10.021e^{-2.336(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{0.428(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{0.428(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-18.983(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.505e^{-0.5(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 1e^{-19.836(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-1.576(YEAR-1997)}$	

Null deviance: 96.644 on 80 degrees of freedom

Residual deviance: 2.390 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 52.547

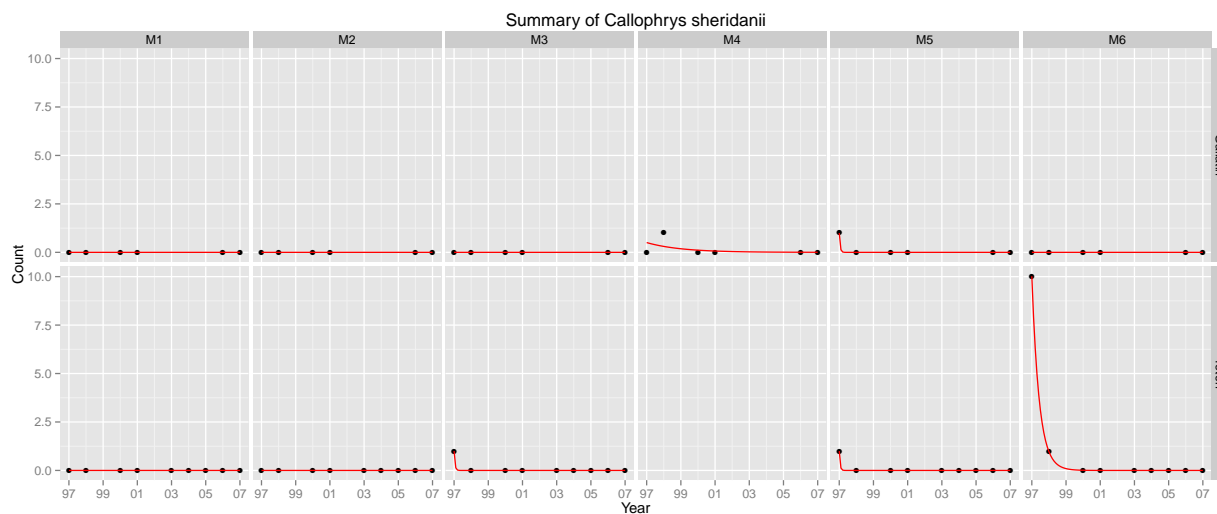


Figure C12: Time series plot of *Callophrys sheridanii* by region and meadow type

# Callophrys sheridanii

Table C24: Poisson regression parameter estimates for *Callophrys sheridanii*

	Estimate	Std. Error	z value	P-value
(Intercept)	-23.9994	73003.5384	-0.00	0.9997
Year	-0.3316	20055.3452	-0.00	1.0000
MeadowM2	0.0000	102044.7041	0.00	1.0000
MeadowM3	23.9994	73003.5384	0.00	0.9997
MeadowM4	27.5019	217000.6619	0.00	0.9999
MeadowM5	23.9994	73003.5384	0.00	0.9997
MeadowM6	26.3041	73003.5384	0.00	0.9997
RegionGallatin	-4.1866	201542.6734	-0.00	1.0000
Year:MeadowM2	-0.0000	27366.3243	-0.00	1.0000
Year:MeadowM3	-19.4112	23242.7522	-0.00	0.9993
Year:MeadowM4	-0.9289	22794.5517	-0.00	1.0000
Year:MeadowM5	-20.2643	22810.0159	-0.00	0.9993
Year:MeadowM6	-2.0043	20055.3452	-0.00	0.9999
Year:RegionGallatin	0.7601	17315.8253	0.00	1.0000
MeadowM2:RegionGallatin	0.0000	229328.8686	0.00	1.0000
MeadowM3:RegionGallatin	-18.7219	209501.2700	-0.00	0.9999
MeadowM5:RegionGallatin	4.1866	201542.6734	0.00	1.0000
MeadowM6:RegionGallatin	-20.8209	204937.0541	-0.00	0.9999

## 13 Boloria kriemhild

Table C25: Poisson regression fitted models for Boloria kriemhild

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 3.198e^{-0.239(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 4.293e^{0.024(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 6.775e^{-0.279(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.408e^{-0.132(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0e^{-0.309(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 9.261e^{-0.17(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 2.373e^{0.093(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 10.819e^{-0.21(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0.712e^{0.068(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.432e^{-0.064(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.699e^{-0.24(YEAR-1997)}$	***

Null deviance: 321.392 on 80 degrees of freedom  
Residual deviance: 99.127 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 265.45

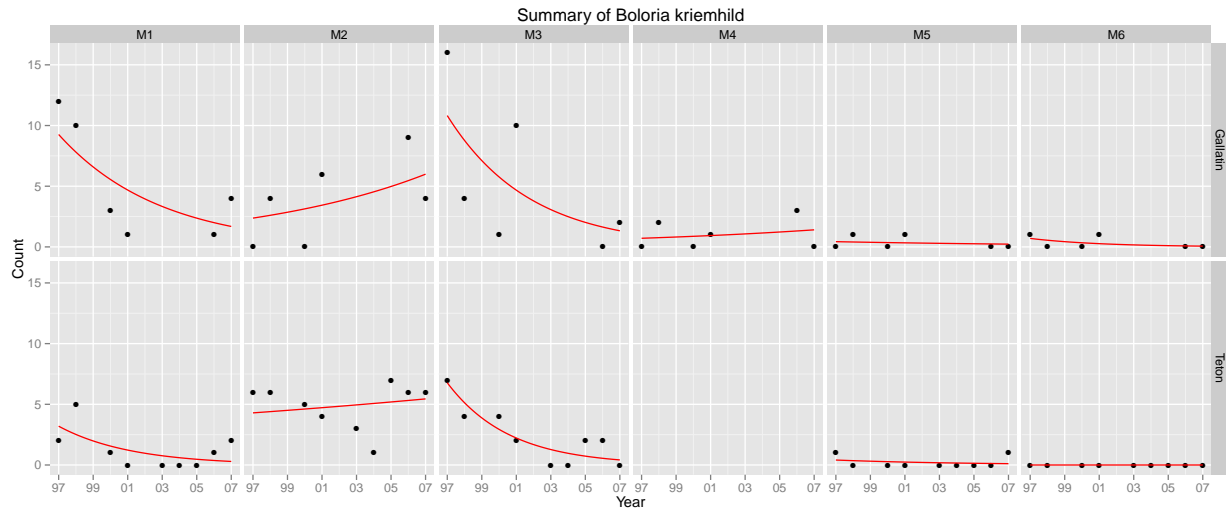


Figure C13: Time series plot of Boloria kriemhild by region and meadow type

# Boloria kriemhild

Table C26: Poisson regression parameter estimates for Boloria kriemhild

	Estimate	Std. Error	z value	P-value
(Intercept)	1.1624	0.3522	3.30	0.0010
Year	-0.2392	0.0648	-3.69	0.0002
MeadowM2	0.2947	0.4171	0.71	0.4799
MeadowM3	0.7509	0.4202	1.79	0.0739
MeadowM4	-2.5662	0.7465	-3.44	0.0006
MeadowM5	-2.0585	0.9659	-2.13	0.0331
MeadowM6	-18.1588	1751.8177	-0.01	0.9917
RegionGallatin	1.0635	0.3784	2.81	0.0050
Year:MeadowM2	0.2630	0.0653	4.03	0.0001
Year:MeadowM3	-0.0394	0.0727	-0.54	0.5877
Year:MeadowM4	0.2384	0.1190	2.00	0.0452
Year:MeadowM5	0.1067	0.1562	0.68	0.4946
Year:MeadowM6	-0.0696	0.2851	-0.24	0.8071
Year:RegionGallatin	0.0689	0.0515	1.34	0.1812
MeadowM2:RegionGallatin	-1.6564	0.4624	-3.58	0.0003
MeadowM3:RegionGallatin	-0.5954	0.4493	-1.33	0.1851
MeadowM5:RegionGallatin	-1.0075	1.0617	-0.95	0.3426
MeadowM6:RegionGallatin	15.5744	1751.8177	0.01	0.9929

## 14 Speyeria egleis

Table C27: Poisson regression fitted models for *Speyeria egleis*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{1.313(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 1e^{-16.57(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.004e^{0.683(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.826(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.698(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{1.04(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-16.843(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.063e^{0.409(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.016e^{0.425(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.005e^{0.553(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.024e^{0.425(YEAR-1997)}$	

Null deviance: 125.71 on 80 degrees of freedom  
Residual deviance: 50.75 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 112.58

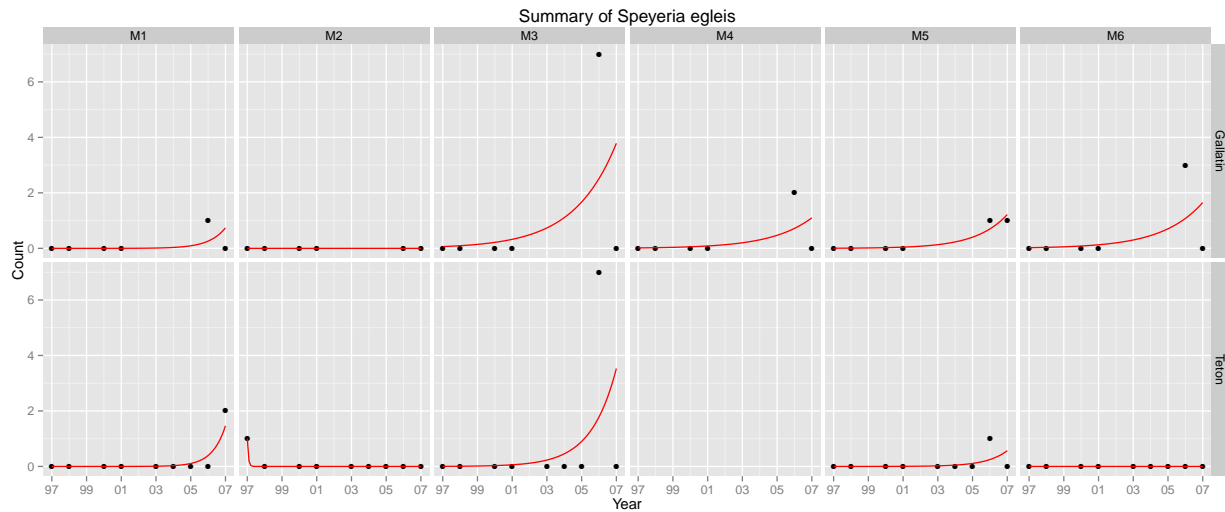


Figure C14: Time series plot of *Speyeria egleis* by region and meadow type



# Speyeria egleis

Table C28: Poisson regression parameter estimates for *Speyeria egleis*

	Estimate	Std. Error	z value	P-value
(Intercept)	-12.7476	8.7397	-1.46	0.1447
Year	1.3128	0.9039	1.45	0.1464
MeadowM2	12.7476	8.7967	1.45	0.1473
MeadowM3	7.1833	8.9489	0.80	0.4221
MeadowM4	6.5469	9.7152	0.67	0.5004
MeadowM5	3.9215	9.8208	0.40	0.6897
MeadowM6	-14.4943	10885.6421	-0.00	0.9989
RegionGallatin	2.0461	3.3707	0.61	0.5438
Year:MeadowM2	-17.8828	2404.1842	-0.01	0.9941
Year:MeadowM3	-0.6303	0.9287	-0.68	0.4973
Year:MeadowM4	-0.6147	0.9998	-0.61	0.5387
Year:MeadowM5	-0.4868	1.0201	-0.48	0.6332
Year:MeadowM6	-0.6147	0.9790	-0.63	0.5300
Year:RegionGallatin	-0.2732	0.3234	-0.84	0.3983
MeadowM2:RegionGallatin	-21.7649	11607.8104	-0.00	0.9985
MeadowM3:RegionGallatin	0.7559	1.3567	0.56	0.5774
MeadowM5:RegionGallatin	1.4479	1.7397	0.83	0.4053
MeadowM6:RegionGallatin	21.4466	10885.6381	0.00	0.9984

## 15 Plebejus shasta

Table C29: Poisson regression fitted models for Plebejus shasta

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-17.275(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{0.176(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.419e^{0.105(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.19e^{0.237(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.469e^{0.062(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.002e^{0.639(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{18.09(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{18.019(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{18.151(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{17.976(YEAR-1997)}$	

Null deviance: 150.177 on 80 degrees of freedom  
Residual deviance: 71.464 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 138.34

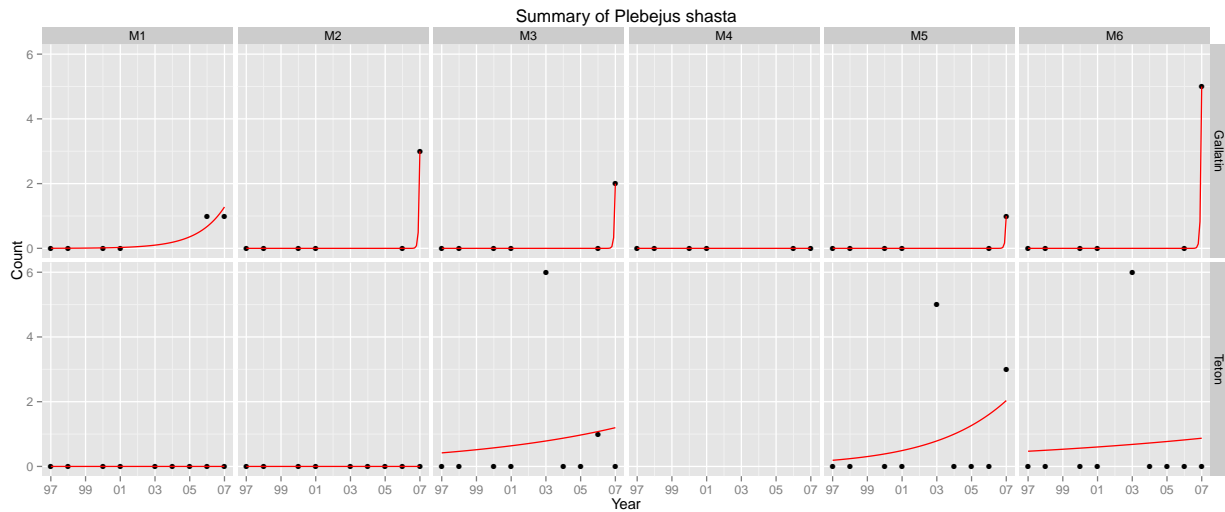


Figure C15: Time series plot of Plebejus shasta by region and meadow type

# Plebejus shasta

Table C30: Poisson regression parameter estimates for Plebejus shasta

	Estimate	Std. Error	z value	P-value
(Intercept)	-18.3980	5996.9013	-0.00	0.9976
Year	-17.2751	1665.7525	-0.01	0.9917
MeadowM2	-4.9225	24639.7292	-0.00	0.9998
MeadowM3	17.5276	5996.9014	0.00	0.9977
MeadowM4	-16.1574	26836.3891	-0.00	0.9995
MeadowM5	16.7367	5996.9014	0.00	0.9978
MeadowM6	17.6413	5996.9014	0.00	0.9977
RegionGallatin	12.2528	5996.9045	0.00	0.9984
Year:MeadowM2	17.4513	2564.2259	0.01	0.9946
Year:MeadowM3	17.3802	1665.7525	0.01	0.9917
Year:MeadowM4	-0.6390	4568.9302	-0.00	0.9999
Year:MeadowM5	17.5123	1665.7525	0.01	0.9916
Year:MeadowM6	17.3371	1665.7525	0.01	0.9917
Year:RegionGallatin	17.9141	1665.7524	0.01	0.9914
MeadowM2:RegionGallatin	-168.7363	21120.2821	-0.01	0.9936
MeadowM3:RegionGallatin	-190.8809	17704.1220	-0.01	0.9914
MeadowM5:RegionGallatin	-192.1045	17704.1221	-0.01	0.9913
MeadowM6:RegionGallatin	-189.6475	17704.1220	-0.01	0.9915

## 16 Euphilotes enoptes ancilla

Table C31: Poisson regression fitted models for Euphilotes enoptes ancilla

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.158e^{0.261(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.29e^{0.179(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.294e^{0.286(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.415e^{0.233(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.186e^{0.368(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1.052e^{0.022(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.426e^{-0.06(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.398e^{0.047(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.36e^{-0.036(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 1.197e^{-0.006(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.083e^{0.129(YEAR-1997)}$	***

Null deviance: 280.30 on 80 degrees of freedom

Residual deviance: 199.86 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 313.77

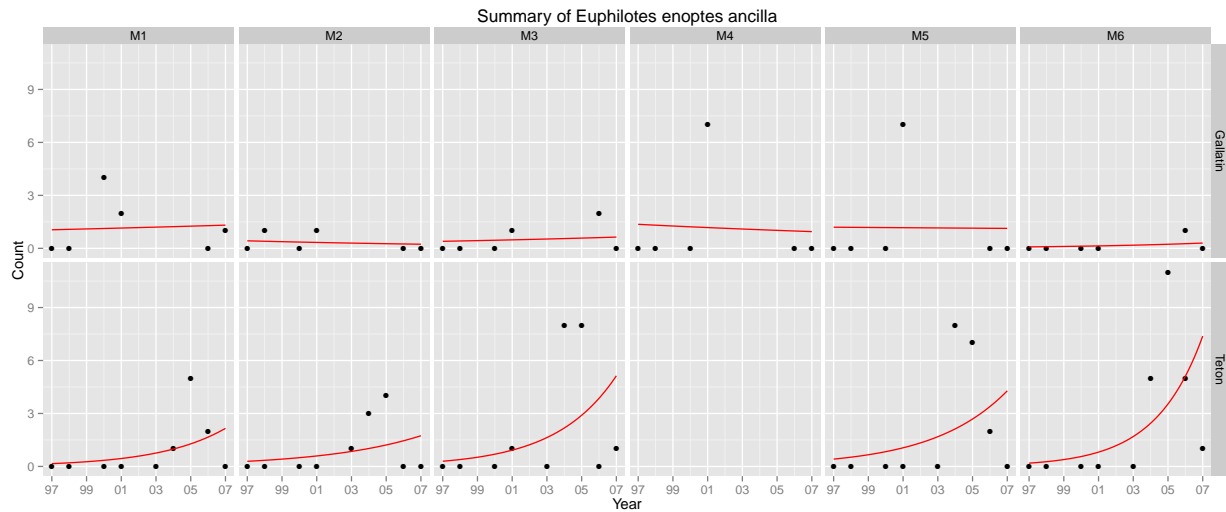


Figure C16: Time series plot of Euphilotes enoptes ancilla by region and meadow type

# Euphilotes enoptes ancilla

Table C32: Poisson regression parameter estimates for Euphilotes enoptes ancilla

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.8455	0.8319	-2.22	0.0265
Year	0.2615	0.0984	2.66	0.0079
MeadowM2	0.6069	1.1263	0.54	0.5900
MeadowM3	0.6201	1.0170	0.61	0.5421
MeadowM4	0.2573	0.7917	0.33	0.7451
MeadowM5	0.9660	0.9227	1.05	0.2952
MeadowM6	0.1642	1.1356	0.14	0.8850
RegionGallatin	1.8959	0.7924	2.39	0.0167
Year:MeadowM2	-0.0822	0.1375	-0.60	0.5497
Year:MeadowM3	0.0247	0.1197	0.21	0.8366
Year:MeadowM4	-0.0584	0.1342	-0.44	0.6633
Year:MeadowM5	-0.0280	0.1076	-0.26	0.7944
Year:MeadowM6	0.1066	0.1334	0.80	0.4241
Year:RegionGallatin	-0.2392	0.0823	-2.91	0.0037
MeadowM2:RegionGallatin	-1.5107	1.0509	-1.44	0.1506
MeadowM3:RegionGallatin	-1.5909	0.8719	-1.82	0.0680
MeadowM5:RegionGallatin	-0.8364	0.7561	-1.11	0.2686
MeadowM6:RegionGallatin	-2.7079	1.1819	-2.29	0.0220

## 17 Speyeria zerene

Table C33: Poisson regression fitted models for *Speyeria zerene*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{15.697(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{0.614(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.001e^{0.725(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.521e^{0.225(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.056e^{0.335(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{15.722(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.002e^{0.639(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{0.75(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.152e^{0.267(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.279e^{0.249(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.056e^{0.359(YEAR-1997)}$	

Null deviance: 181.18 on 80 degrees of freedom

Residual deviance: 80.79 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 162.63

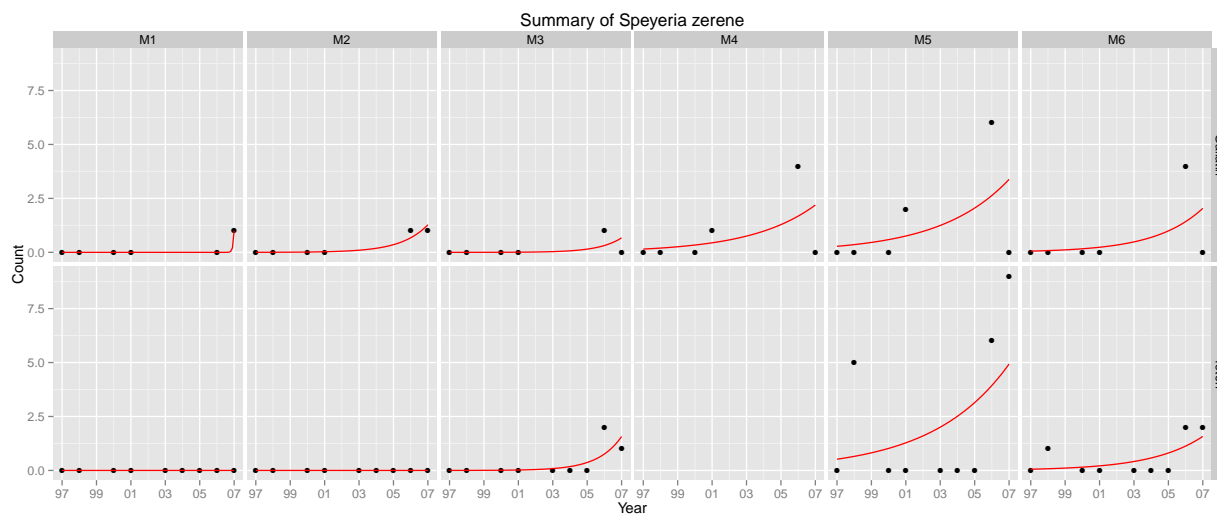


Figure C17: Time series plot of *Speyeria zerene* by region and meadow type

# Speyeria zerene

Table C34: Poisson regression parameter estimates for *Speyeria zerene*

	Estimate	Std. Error	z value	P-value
(Intercept)	-175.2654	16730.5654	-0.01	0.9916
Year	15.6972	1573.2579	0.01	0.9920
MeadowM2	149.5563	18285.7701	0.01	0.9935
MeadowM3	168.4679	16730.5659	0.01	0.9920
MeadowM4	155.3333	15732.5787	0.01	0.9921
MeadowM5	174.6124	16730.5654	0.01	0.9917
MeadowM6	172.3753	16730.5654	0.01	0.9918
RegionGallatin	18.0473	5691.9069	0.00	0.9975
Year:MeadowM2	-15.0828	1573.2581	-0.01	0.9924
Year:MeadowM3	-14.9722	1573.2580	-0.01	0.9924
Year:MeadowM4	-15.4549	1573.2579	-0.01	0.9922
Year:MeadowM5	-15.4724	1573.2579	-0.01	0.9922
Year:MeadowM6	-15.3627	1573.2579	-0.01	0.9922
Year:RegionGallatin	0.0246	0.1265	0.19	0.8457
MeadowM2:RegionGallatin	1.5167	9319.6213	0.00	0.9999
MeadowM3:RegionGallatin	-19.1449	5691.9069	-0.00	0.9973
MeadowM5:RegionGallatin	-18.6705	5691.9068	-0.00	0.9974
MeadowM6:RegionGallatin	-18.0365	5691.9068	-0.00	0.9975

## 18 Phyciodes campestris

Table C35: Poisson regression fitted models for Phyciodes campestris

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 2.714e^{-0.02(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.615e^{0.084(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 2.348e^{0.031(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1.918e^{0.044(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.313e^{-0.069(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 19.125e^{-0.097(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 12.584e^{0.007(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 50.379e^{-0.046(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 29.505e^{-0.089(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 6.535e^{-0.033(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 12.899e^{-0.146(YEAR-1997)}$	***

Null deviance: 1586.42 on 80 degrees of freedom  
Residual deviance: 655.79 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 895.84

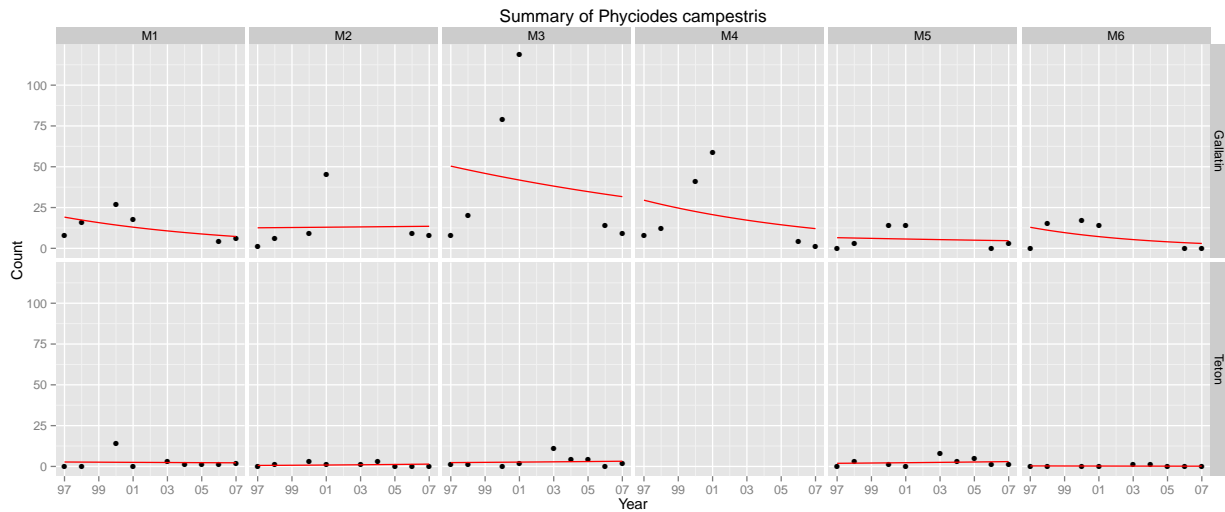


Figure C18: Time series plot of Phyciodes campestris by region and meadow type



# Phyciodes campestris

Table C36: Poisson regression parameter estimates for Phyciodes campestris

	Estimate	Std. Error	z value	P-value
(Intercept)	0.9984	0.3019	3.31	0.0009
Year	-0.0200	0.0418	-0.48	0.6324
MeadowM2	-1.4850	0.4646	-3.20	0.0014
MeadowM3	-0.1447	0.3459	-0.42	0.6756
MeadowM4	0.4335	0.1957	2.22	0.0268
MeadowM5	-0.3471	0.4034	-0.86	0.3896
MeadowM6	-2.1601	0.7834	-2.76	0.0058
RegionGallatin	1.9527	0.3045	6.41	0.0000
Year:MeadowM2	0.1041	0.0416	2.50	0.0124
Year:MeadowM3	0.0506	0.0345	1.47	0.1426
Year:MeadowM4	0.0077	0.0404	0.19	0.8491
Year:MeadowM5	0.0635	0.0484	1.31	0.1896
Year:MeadowM6	-0.0492	0.0557	-0.88	0.3766
Year:RegionGallatin	-0.0770	0.0378	-2.04	0.0415
MeadowM2:RegionGallatin	1.0665	0.4359	2.45	0.0144
MeadowM3:RegionGallatin	1.1133	0.3272	3.40	0.0007
MeadowM5:RegionGallatin	-0.7268	0.3754	-1.94	0.0529
MeadowM6:RegionGallatin	1.7662	0.7682	2.30	0.0215

## 19 Colias philodice

Table C37: Poisson regression fitted models for *Colias philodice*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.164e^{0.193(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.663e^{0.117(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.342e^{0.201(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1.933e^{-0.043(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0.338e^{-0.003(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.064e^{0.31(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.432e^{0.234(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.261e^{0.318(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.208e^{0.226(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 1.949e^{0.074(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 1.088e^{0.114(YEAR-1997)}$	***

Null deviance: 175.85 on 80 degrees of freedom

Residual deviance: 102.24 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 251.53

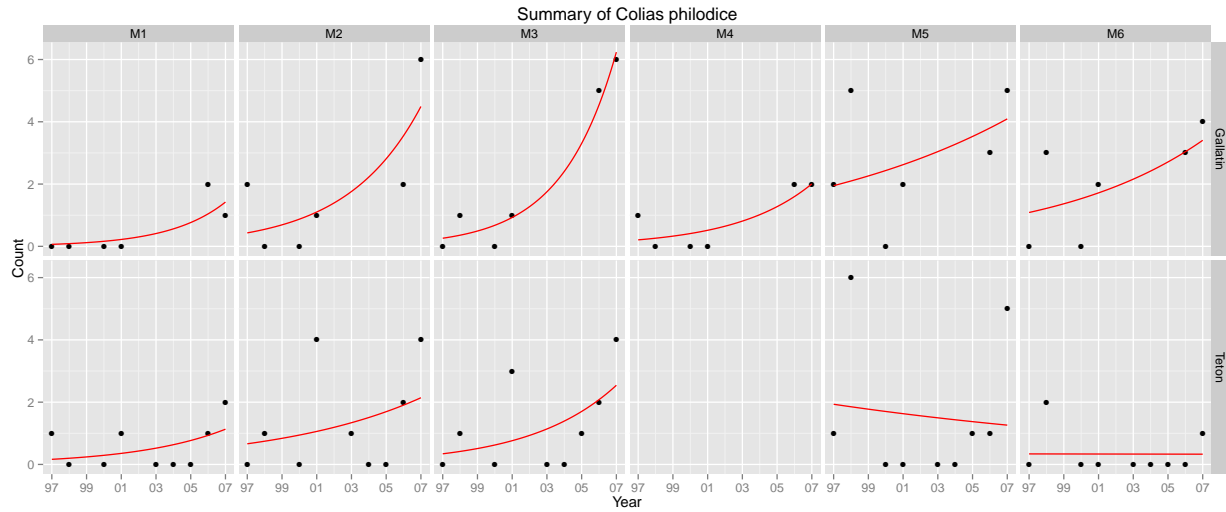


Figure C19: Time series plot of *Colias philodice* by region and meadow type

## Colias philodice

Table C38: Poisson regression parameter estimates for Colias philodice

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.8088	1.0413	-1.74	0.0824
Year	0.1933	0.1308	1.48	0.1397
MeadowM2	1.3981	1.1531	1.21	0.2253
MeadowM3	0.7348	1.2046	0.61	0.5419
MeadowM4	1.1796	1.6986	0.69	0.4874
MeadowM5	2.4677	1.0882	2.27	0.0233
MeadowM6	0.7243	1.2404	0.58	0.5593
RegionGallatin	-0.9397	0.9046	-1.04	0.2989
Year:MeadowM2	-0.0760	0.1451	-0.52	0.6004
Year:MeadowM3	0.0074	0.1496	0.05	0.9603
Year:MeadowM4	-0.0836	0.1921	-0.44	0.6635
Year:MeadowM5	-0.2359	0.1387	-1.70	0.0890
Year:MeadowM6	-0.1959	0.1495	-1.31	0.1899
Year:RegionGallatin	0.1168	0.0646	1.81	0.0708
MeadowM2:RegionGallatin	0.5121	0.8595	0.60	0.5513
MeadowM3:RegionGallatin	0.6692	0.8554	0.78	0.4340
MeadowM5:RegionGallatin	0.9482	0.8485	1.12	0.2638
MeadowM6:RegionGallatin	2.1082	1.0010	2.11	0.0352

## 20 Coenonympha tullia inornata

Table C39: Poisson regression fitted models for *Coenonympha tullia inornata*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 2.725e^{0.088(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 3.733e^{0.101(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.74e^{0.196(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 17.484e^{-0.059(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 34.71e^{0.023(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 0.424e^{0.035(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 1.985e^{0.048(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.304e^{0.142(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{15.052(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 7.389e^{-0.113(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 7.613e^{-0.031(YEAR-1997)}$	***

Null deviance: 1268.33 on 80 degrees of freedom

Residual deviance: 320.32 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 583.06

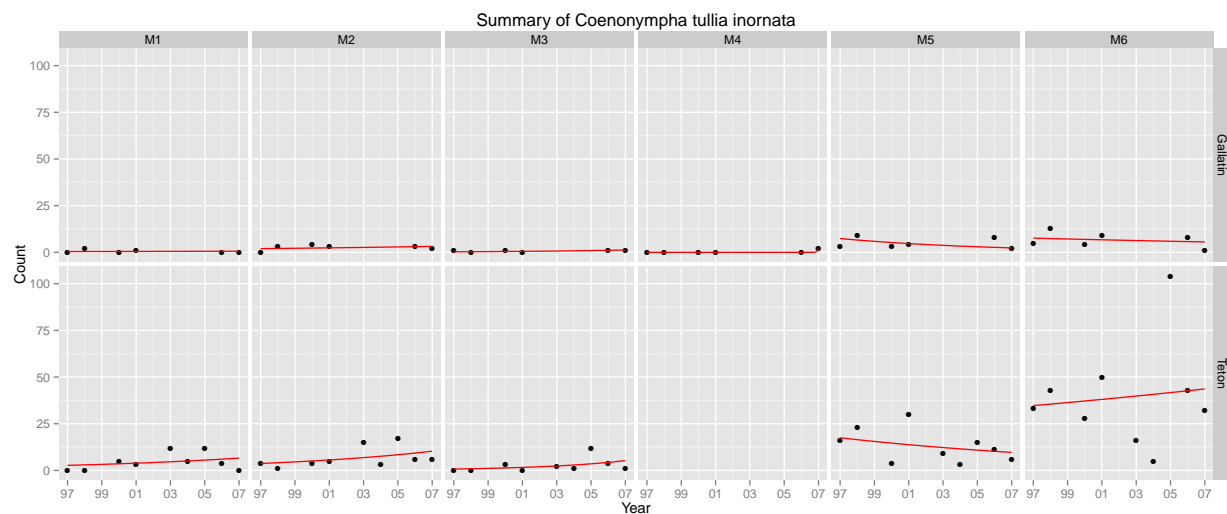


Figure C20: Time series plot of *Coenonympha tullia inornata* by region and meadow type

# Coenonympha tullia inornata

Table C40: Poisson regression parameter estimates for Coenonympha tullia inornata

	Estimate	Std. Error	z value	P-value
(Intercept)	1.0023	0.3353	2.99	0.0028
Year	0.0885	0.0473	1.87	0.0616
MeadowM2	0.3150	0.4246	0.74	0.4582
MeadowM3	-1.3038	0.6196	-2.10	0.0354
MeadowM4	-148.9713	7959.3865	-0.02	0.9851
MeadowM5	1.8590	0.3660	5.08	0.0000
MeadowM6	2.5447	0.3492	7.29	0.0000
RegionGallatin	-1.8597	0.6233	-2.98	0.0028
Year:MeadowM2	0.0130	0.0592	0.22	0.8260
Year:MeadowM3	0.1074	0.0814	1.32	0.1871
Year:MeadowM4	15.0176	795.9387	0.02	0.9849
Year:MeadowM5	-0.1477	0.0534	-2.77	0.0057
Year:MeadowM6	-0.0656	0.0496	-1.32	0.1860
Year:RegionGallatin	-0.0539	0.0321	-1.68	0.0937
MeadowM2:RegionGallatin	1.2282	0.6681	1.84	0.0660
MeadowM3:RegionGallatin	0.9694	0.8119	1.19	0.2325
MeadowM5:RegionGallatin	0.9984	0.6396	1.56	0.1185
MeadowM6:RegionGallatin	0.3425	0.6248	0.55	0.5836

## 21 Euphydryas chalcedona

Table C41: Poisson regression fitted models for Euphydryas chalcedona

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.753e^{-0.348(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.531e^{-0.588(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.991e^{-0.288(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 3.535e^{0.018(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1.593e^{-0.377(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.102e^{0.316(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0e^{0.075(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.012e^{0.375(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{0.865(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.001e^{0.681(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.26e^{0.286(YEAR-1997)}$	***

Null deviance: 258.46 on 80 degrees of freedom

Residual deviance: 124.55 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 212.81

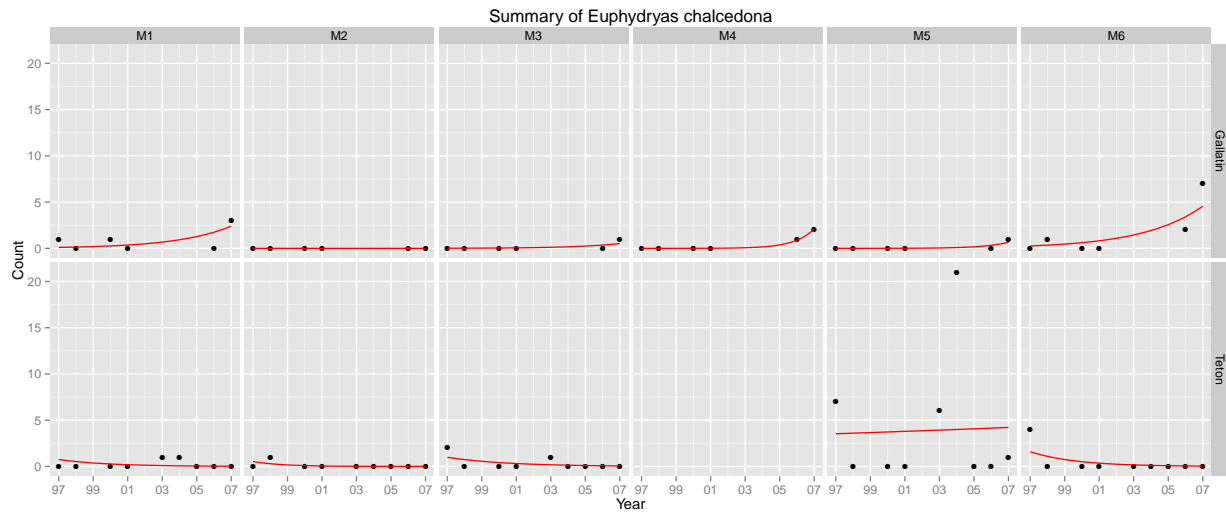


Figure C21: Time series plot of Euphydryas chalcedona by region and meadow type

# Euphydryas chalcedona

Table C42: Poisson regression parameter estimates for Euphydryas chalcedona

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.2841	0.8068	-0.35	0.7248
Year	-0.3475	0.1940	-1.79	0.0733
MeadowM2	-0.3493	1.4282	-0.24	0.8068
MeadowM3	0.2754	1.0752	0.26	0.7979
MeadowM4	-5.6199	8.5362	-0.66	0.5103
MeadowM5	1.5467	0.8705	1.78	0.0756
MeadowM6	0.7497	0.9296	0.81	0.4199
RegionGallatin	-2.0029	1.3973	-1.43	0.1517
Year:MeadowM2	-0.2409	0.6529	-0.37	0.7122
Year:MeadowM3	0.0591	0.2564	0.23	0.8176
Year:MeadowM4	0.5489	0.8830	0.62	0.5342
Year:MeadowM5	0.3651	0.2003	1.82	0.0684
Year:MeadowM6	-0.0296	0.1734	-0.17	0.8646
Year:RegionGallatin	0.6635	0.1759	3.77	0.0002
MeadowM2:RegionGallatin	-15.0003	1384.1485	-0.01	0.9914
MeadowM3:RegionGallatin	-2.3929	2.1889	-1.09	0.2743
MeadowM5:RegionGallatin	-6.4984	1.9197	-3.39	0.0007
MeadowM6:RegionGallatin	0.1884	1.5093	0.12	0.9006

## 22 *Lycaeides melissa*

Table C43: Poisson regression fitted models for *Lycaeides melissa*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{0.067(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.027e^{0.22(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 3.616e^{0.065(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.993e^{0.078(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.105(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1.033e^{0.108(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.223e^{0.261(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 1.241e^{0.106(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 1.543e^{0.178(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.967e^{0.119(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 1.769e^{0.146(YEAR-1997)}$	

Null deviance: 290.531 on 80 degrees of freedom  
Residual deviance: 98.849 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 255.00

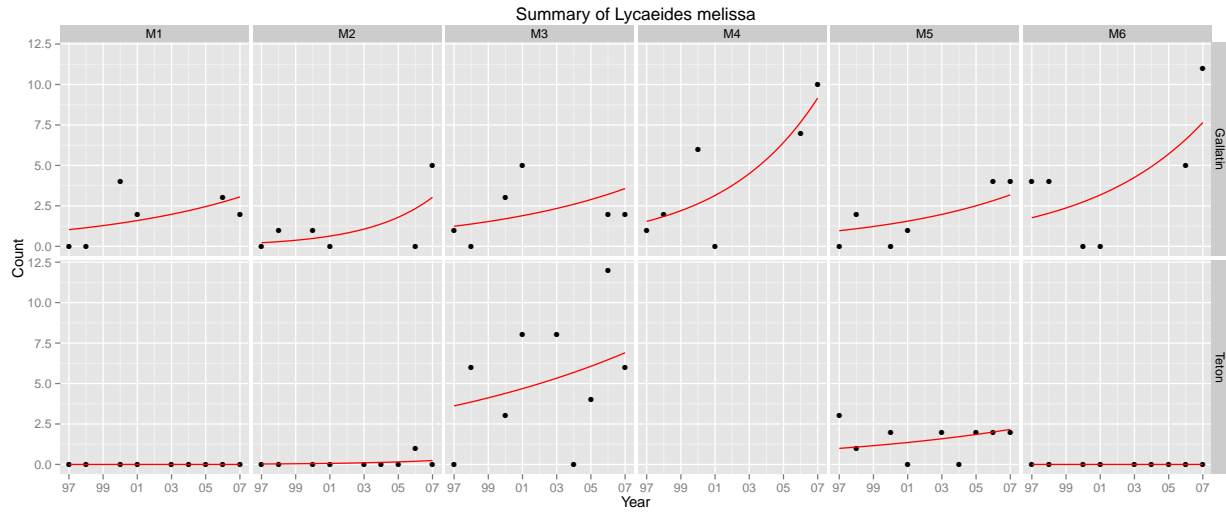


Figure C22: Time series plot of *Lycaeides melissa* by region and meadow type



# Lycaeides melissa

Table C44: Poisson regression parameter estimates for Lycaeides melissa

	Estimate	Std. Error	z value	P-value
(Intercept)	-18.6606	1881.7304	-0.01	0.9921
Year	0.0673	0.1046	0.64	0.5199
MeadowM2	15.0480	1881.7308	0.01	0.9936
MeadowM3	19.9460	1881.7304	0.01	0.9915
MeadowM4	0.4011	0.7179	0.56	0.5764
MeadowM5	18.6531	1881.7304	0.01	0.9921
MeadowM6	-0.2316	2656.8463	-0.00	0.9999
RegionGallatin	18.6931	1881.7304	0.01	0.9921
Year:MeadowM2	0.1526	0.1421	1.07	0.2827
Year:MeadowM3	-0.0026	0.1010	-0.03	0.9791
Year:MeadowM4	0.0698	0.0968	0.72	0.4709
Year:MeadowM5	0.0108	0.1035	0.10	0.9171
Year:MeadowM6	0.0381	0.0969	0.39	0.6940
Year:RegionGallatin	0.0411	0.0681	0.60	0.5463
MeadowM2:RegionGallatin	-16.5815	1881.7306	-0.01	0.9930
MeadowM3:RegionGallatin	-19.7629	1881.7303	-0.01	0.9916
MeadowM5:RegionGallatin	-18.7196	1881.7304	-0.01	0.9921
MeadowM6:RegionGallatin	0.7693	2656.8463	0.00	0.9998

## 23 Plebejus icarioides

Table C45: Poisson regression fitted models for *Plebejus icarioides*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 5.964e^{-0.006(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 3.354e^{0.011(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 14.54e^{0.034(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 73.834e^{0.008(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 34.259e^{0.034(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 6.039e^{-0.063(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 9.517e^{-0.047(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 7.744e^{-0.023(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 55.381e^{-0.065(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 41.582e^{-0.05(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 27.802e^{-0.023(YEAR-1997)}$	***

Null deviance: 2108.47 on 80 degrees of freedom

Residual deviance: 461.07 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 850.51

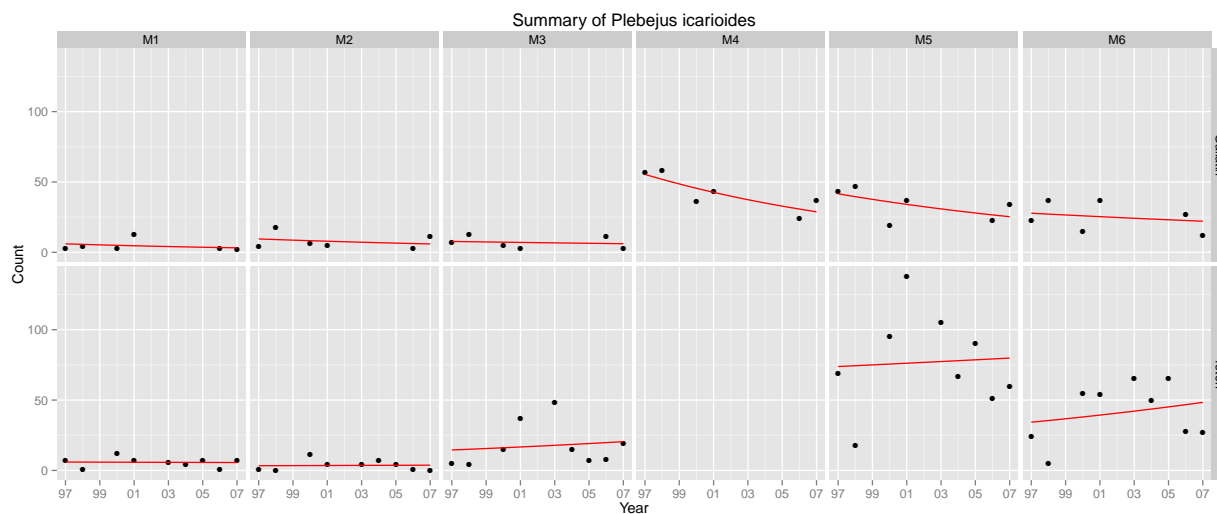


Figure C23: Time series plot of *Plebejus icarioides* by region and meadow type

# Plebejus icarioides

Table C46: Poisson regression parameter estimates for *Plebejus icarioides*

	Estimate	Std. Error	z value	P-value
(Intercept)	1.7857	0.2236	7.99	0.0000
Year	-0.0060	0.0333	-0.18	0.8574
MeadowM2	-0.5755	0.3341	-1.72	0.0850
MeadowM3	0.8912	0.2642	3.37	0.0007
MeadowM4	2.2161	0.2436	9.10	0.0000
MeadowM5	2.5161	0.2312	10.88	0.0000
MeadowM6	1.7482	0.2390	7.32	0.0000
RegionGallatin	0.0124	0.2492	0.05	0.9602
Year:MeadowM2	0.0168	0.0461	0.36	0.7159
Year:MeadowM3	0.0401	0.0390	1.03	0.3033
Year:MeadowM4	-0.0019	0.0385	-0.05	0.9601
Year:MeadowM5	0.0138	0.0343	0.40	0.6876
Year:MeadowM6	0.0405	0.0352	1.15	0.2506
Year:RegionGallatin	-0.0574	0.0154	-3.72	0.0002
MeadowM2:RegionGallatin	1.0304	0.3362	3.07	0.0022
MeadowM3:RegionGallatin	-0.6424	0.2983	-2.15	0.0312
MeadowM5:RegionGallatin	-0.5866	0.2537	-2.31	0.0208
MeadowM6:RegionGallatin	-0.2213	0.2598	-0.85	0.3943

## 24 Plebejus lupini

Table C47: Poisson regression fitted models for Plebejus lupini

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 1.095e^{-0.069(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.077e^{0.17(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 3.815e^{0.072(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 6.541e^{0.004(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 2.971e^{0.177(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 1.367e^{-0.137(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.195e^{0.102(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.98e^{0.005(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.419e^{-0.047(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 2.597e^{-0.064(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.746e^{0.11(YEAR-1997)}$	***

Null deviance: 501.90 on 80 degrees of freedom

Residual deviance: 227.01 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 418.18

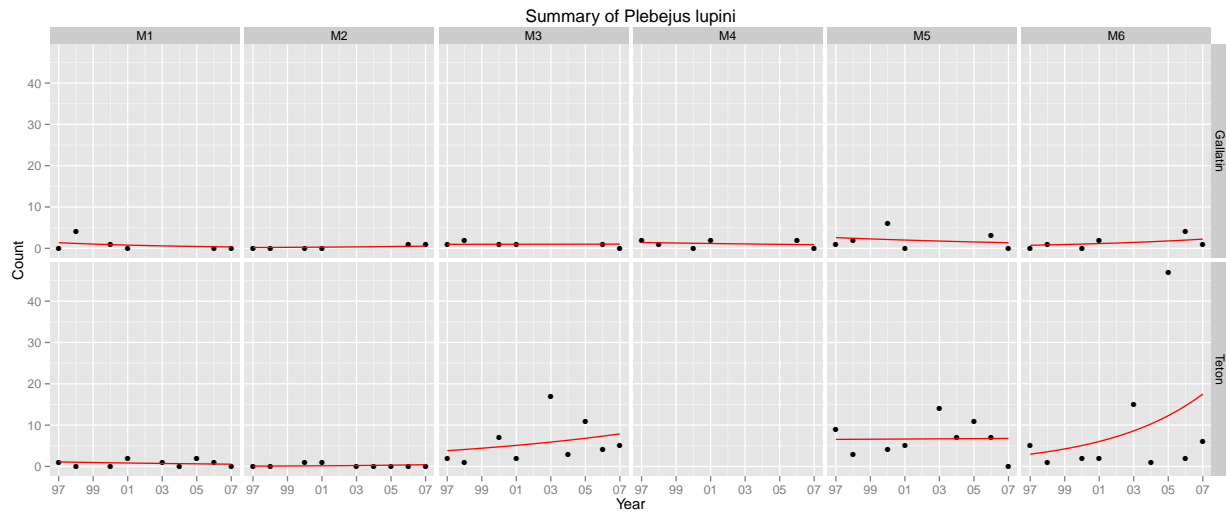


Figure C24: Time series plot of Plebejus lupini by region and meadow type

# Plebejus lupini

Table C48: Poisson regression parameter estimates for *Plebejus lupini*

	Estimate	Std. Error	z value	P-value
(Intercept)	0.0909	0.5604	0.16	0.8712
Year	-0.0692	0.0909	-0.76	0.4462
MeadowM2	-2.6499	1.3817	-1.92	0.0551
MeadowM3	1.2482	0.6223	2.01	0.0449
MeadowM4	0.0376	0.7599	0.05	0.9606
MeadowM5	1.7872	0.5990	2.98	0.0028
MeadowM6	0.9979	0.6199	1.61	0.1074
RegionGallatin	0.2218	0.6345	0.35	0.7266
Year:MeadowM2	0.2391	0.1734	1.38	0.1681
Year:MeadowM3	0.1417	0.0981	1.44	0.1486
Year:MeadowM4	0.0901	0.1411	0.64	0.5231
Year:MeadowM5	0.0728	0.0957	0.76	0.4472
Year:MeadowM6	0.2467	0.0964	2.56	0.0105
Year:RegionGallatin	-0.0679	0.0547	-1.24	0.2142
MeadowM2:RegionGallatin	0.7038	1.1909	0.59	0.5546
MeadowM3:RegionGallatin	-1.5815	0.7490	-2.11	0.0347
MeadowM5:RegionGallatin	-1.1456	0.6860	-1.67	0.0949
MeadowM6:RegionGallatin	-1.6038	0.7264	-2.21	0.0273

# 25 Speyeria atlantis hesperis

Table C49: Poisson regression fitted models for *Speyeria atlantis hesperis*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{1.483(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{1.515(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{1.437(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{1.62(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{1.435(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 4.361e^{0.048(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 1.002e^{0.079(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 6.285e^{0.002(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0.091e^{0.267(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.226e^{0.185(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 1.333e^{0(YEAR-1997)}$	***

Null deviance: 283.99 on 80 degrees of freedom  
Residual deviance: 64.66 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 181.5

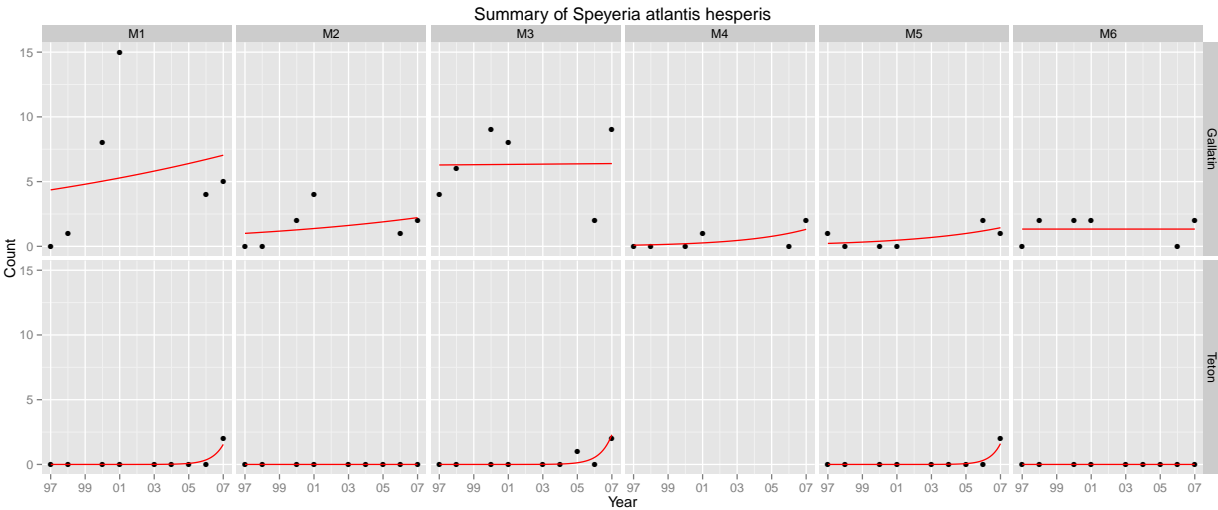


Figure C25: Time series plot of *Speyeria atlantis hesperis* by region and meadow type

# Speyeria atlantis hesperis

Table C50: Poisson regression parameter estimates for *Speyeria atlantis hesperis*

	Estimate	Std. Error	z value	P-value
(Intercept)	-14.3968	6.1649	-2.34	0.0195
Year	1.4833	0.6308	2.35	0.0187
MeadowM2	-17.3451	2149.6810	-0.01	0.9936
MeadowM3	0.8533	1.0947	0.78	0.4357
MeadowM4	-3.8683	1.6637	-2.33	0.0201
MeadowM5	-1.3342	1.7627	-0.76	0.4491
MeadowM6	-16.5399	2112.4541	-0.01	0.9938
RegionGallatin	15.8695	6.1600	2.58	0.0100
Year:MeadowM2	0.0315	0.0978	0.32	0.7474
Year:MeadowM3	-0.0462	0.0623	-0.74	0.4584
Year:MeadowM4	0.2191	0.1968	1.11	0.2658
Year:MeadowM5	0.1371	0.1490	0.92	0.3575
Year:MeadowM6	-0.0479	0.1040	-0.46	0.6452
Year:RegionGallatin	-1.4354	0.6301	-2.28	0.0227
MeadowM2:RegionGallatin	15.8748	2149.6809	0.01	0.9941
MeadowM3:RegionGallatin	-0.4879	0.9903	-0.49	0.6223
MeadowM5:RegionGallatin	-1.6247	1.2088	-1.34	0.1789
MeadowM6:RegionGallatin	15.3549	2112.4540	0.01	0.9942

# 26 Euphydryas editha

Table C51: Poisson regression fitted models for Euphydryas editha

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.12(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{-0.12(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.007e^{0.391(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.37e^{0.232(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.226e^{0.214(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1.04e^{-0.12(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.26e^{-0.12(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.021e^{0.391(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.039e^{0.425(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0e^{0.232(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.229e^{0.214(YEAR-1997)}$	

Null deviance: 156.150 on 80 degrees of freedom  
Residual deviance: 80.779 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 157.44

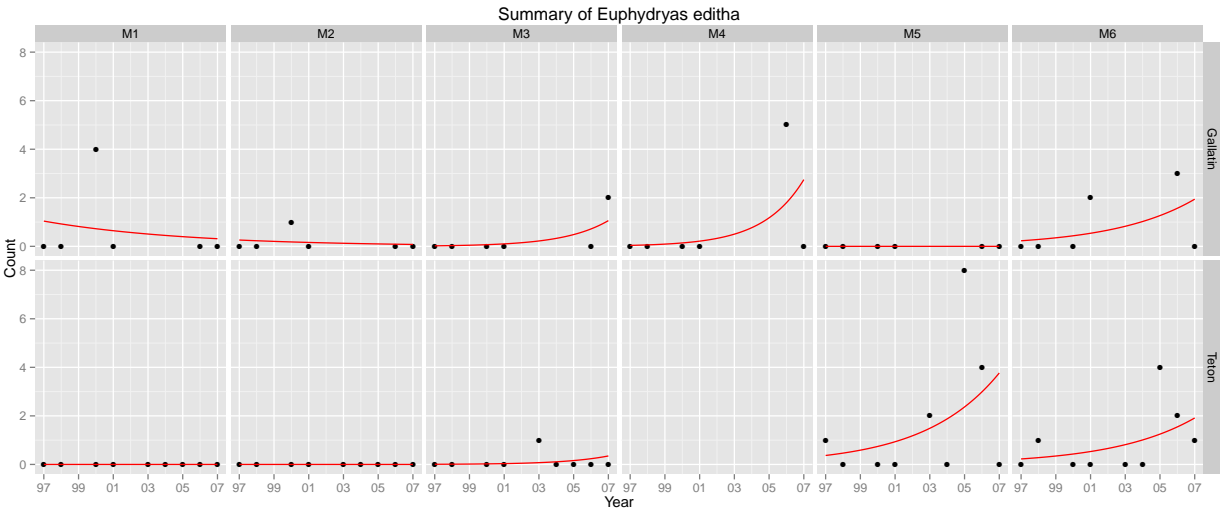


Figure C26: Time series plot of Euphydryas editha by region and meadow type



# Euphydryas editha

Table C52: Poisson regression parameter estimates for Euphydryas editha

	Estimate	Std. Error	z value	P-value
(Intercept)	-18.5721	2883.7786	-0.01	0.9949
Year	-0.1199	0.2366	-0.51	0.6123
MeadowM2	-0.1261	4213.0209	-0.00	1.0000
MeadowM3	13.6133	2883.7795	0.00	0.9962
MeadowM4	-3.2774	2.1628	-1.52	0.1297
MeadowM5	17.5765	2883.7787	0.01	0.9951
MeadowM6	17.0856	2883.7786	0.01	0.9953
RegionGallatin	18.6112	2883.7785	0.01	0.9949
Year:MeadowM2	-0.0000	0.3458	-0.00	1.0000
Year:MeadowM3	0.5106	0.3151	1.62	0.1051
Year:MeadowM4	0.5447	0.2710	2.01	0.0444
Year:MeadowM5	0.3521	0.2566	1.37	0.1700
Year:MeadowM6	0.3335	0.2024	1.65	0.0994
Year:RegionGallatin	0.0002	0.1791	0.00	0.9993
MeadowM2:RegionGallatin	-1.2602	4213.0208	-0.00	0.9998
MeadowM3:RegionGallatin	-17.5022	2883.7788	-0.01	0.9952
MeadowM5:RegionGallatin	-38.0473	4388.9182	-0.01	0.9931
MeadowM6:RegionGallatin	-18.5978	2883.7786	-0.01	0.9949

27 *Nymphalis antiopa*

Table C53: Poisson regression fitted models for *Nymphalis antiopa*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.273e^{-0.218(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 1e^{-19.215(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.269e^{0.087(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.825(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1e^{-19.525(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1e^{-18.725(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 2e^{-37.722(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-18.42(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{20.543(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{-17.682(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-38.031(YEAR-1997)}$	

Null deviance: 49.469 on 80 degrees of freedom  
Residual deviance: 12.851 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 68.078

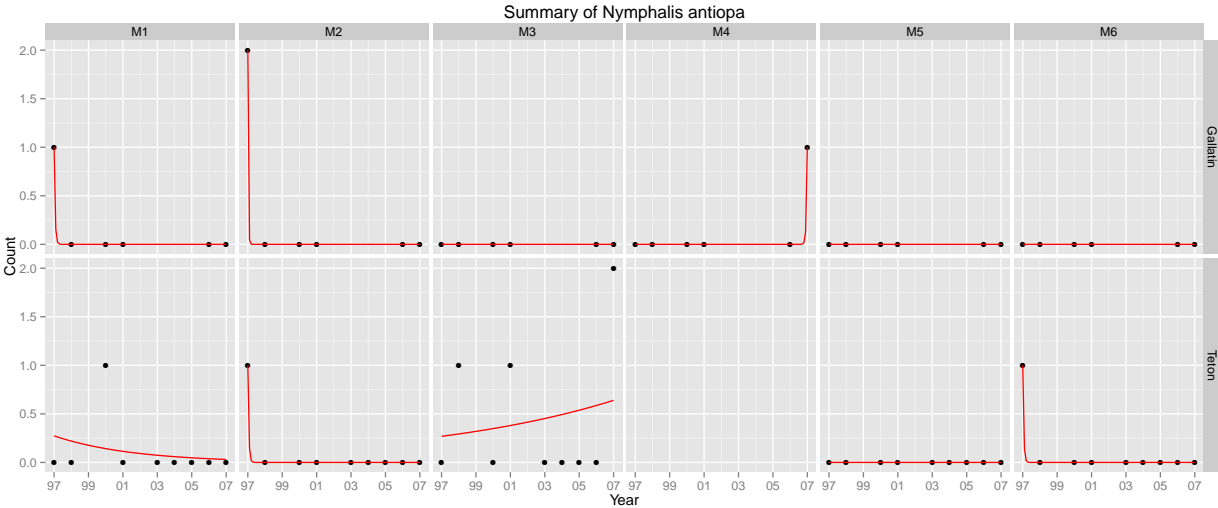


Figure C27: Time series plot of *Nymphalis antiopa* by region and meadow type

# Nymphalis antiopa

Table C54: Poisson regression parameter estimates for Nymphalis antiopa

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.2971	1.4080	-0.92	0.3569
Year	-0.2180	0.3304	-0.66	0.5094
MeadowM2	1.2971	1.7269	0.75	0.4526
MeadowM3	-0.0164	1.7943	-0.01	0.9927
MeadowM4	-205.4339	175304.7097	-0.00	0.9991
MeadowM5	-30.3720	477261.7548	-0.00	0.9999
MeadowM6	1.2971	1.7269	0.75	0.4526
RegionGallatin	1.2971	1.7269	0.75	0.4526
Year:MeadowM2	-18.9974	9024.2335	-0.00	0.9983
Year:MeadowM3	0.3046	0.3666	0.83	0.4060
Year:MeadowM4	39.2680	18898.9185	0.00	0.9983
Year:MeadowM5	1.0428	51160.3350	0.00	1.0000
Year:MeadowM6	-19.3067	10533.8377	-0.00	0.9985
Year:RegionGallatin	-18.5066	7060.5743	-0.00	0.9979
MeadowM2:RegionGallatin	-0.6039	2.1172	-0.29	0.7754
MeadowM3:RegionGallatin	-22.4689	46289.0888	-0.00	0.9996
MeadowM5:RegionGallatin	7.5025	480545.7573	0.00	1.0000
MeadowM6:RegionGallatin	-23.8568	48045.1495	-0.00	0.9996

## 28 Erebia epipsodea

Table C55: Poisson regression fitted models for *Erebia epipsodea*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 7.624e^{0.058(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 33.16e^{0.016(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 16.464e^{-0.011(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 3.924e^{0.054(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 1.242e^{0.04(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 29.502e^{-0.006(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 48.203e^{-0.048(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 19.994e^{-0.075(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 10.357e^{-0.064(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 11.302e^{-0.01(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 8.861e^{-0.024(YEAR-1997)}$	***

Null deviance: 1293.6 on 80 degrees of freedom

Residual deviance: 535.9 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 886.97

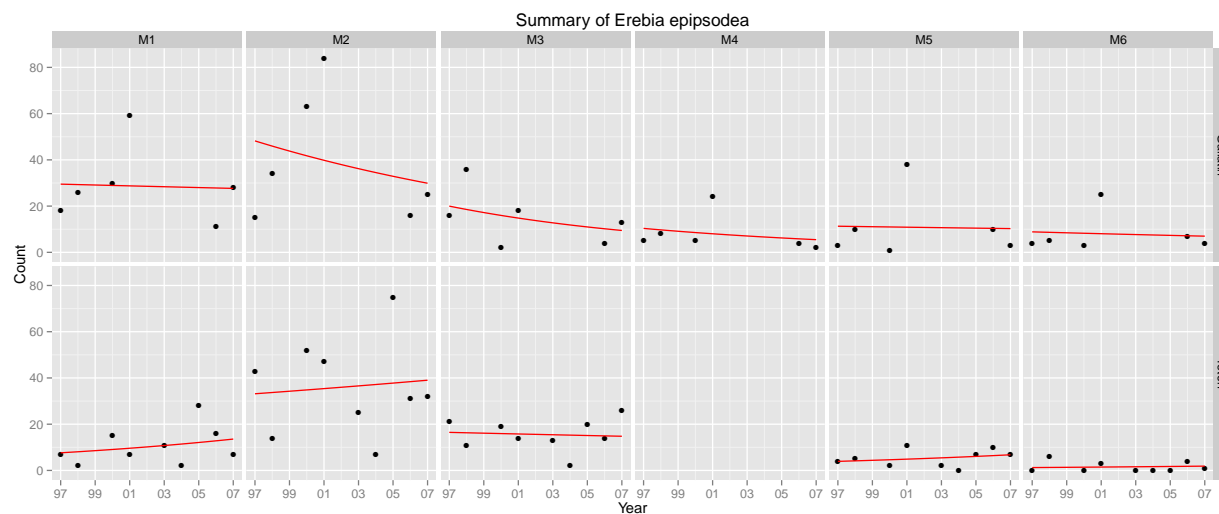


Figure C28: Time series plot of *Erebia epipsodea* by region and meadow type

# Erebia epipsodea

Table C56: Poisson regression parameter estimates for *Erebia epipsodea*

	Estimate	Std. Error	z value	P-value
(Intercept)	2.0313	0.1616	12.57	0.0000
Year	0.0576	0.0210	2.75	0.0060
MeadowM2	1.4700	0.1714	8.58	0.0000
MeadowM3	0.7699	0.1991	3.87	0.0001
MeadowM4	-1.0468	0.2345	-4.46	0.0000
MeadowM5	-0.6642	0.2580	-2.57	0.0101
MeadowM6	-1.8143	0.3656	-4.96	0.0000
RegionGallatin	1.3531	0.1608	8.41	0.0000
Year:MeadowM2	-0.0413	0.0215	-1.92	0.0543
Year:MeadowM3	-0.0684	0.0264	-2.59	0.0096
Year:MeadowM4	-0.0571	0.0446	-1.28	0.2001
Year:MeadowM5	-0.0031	0.0316	-0.10	0.9218
Year:MeadowM6	-0.0171	0.0392	-0.44	0.6617
Year:RegionGallatin	-0.0641	0.0170	-3.76	0.0002
MeadowM2:RegionGallatin	-0.9791	0.1580	-6.20	0.0000
MeadowM3:RegionGallatin	-1.1589	0.1924	-6.02	0.0000
MeadowM5:RegionGallatin	-0.2953	0.2345	-1.26	0.2080
MeadowM6:RegionGallatin	0.6115	0.3354	1.82	0.0682

## 29 Agriades glandon

Table C57: Poisson regression fitted models for Agriades glandon

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.156e^{-0.068(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.174e^{0.11(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 2.362e^{0.049(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 3.821e^{-0.243(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0.151e^{-0.061(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.833e^{0.067(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.252e^{0.246(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.34e^{0.185(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 2.235e^{-0.145(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 1.753e^{-0.108(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.459e^{0.074(YEAR-1997)}$	

Null deviance: 187.48 on 80 degrees of freedom

Residual deviance: 109.33 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 238.71

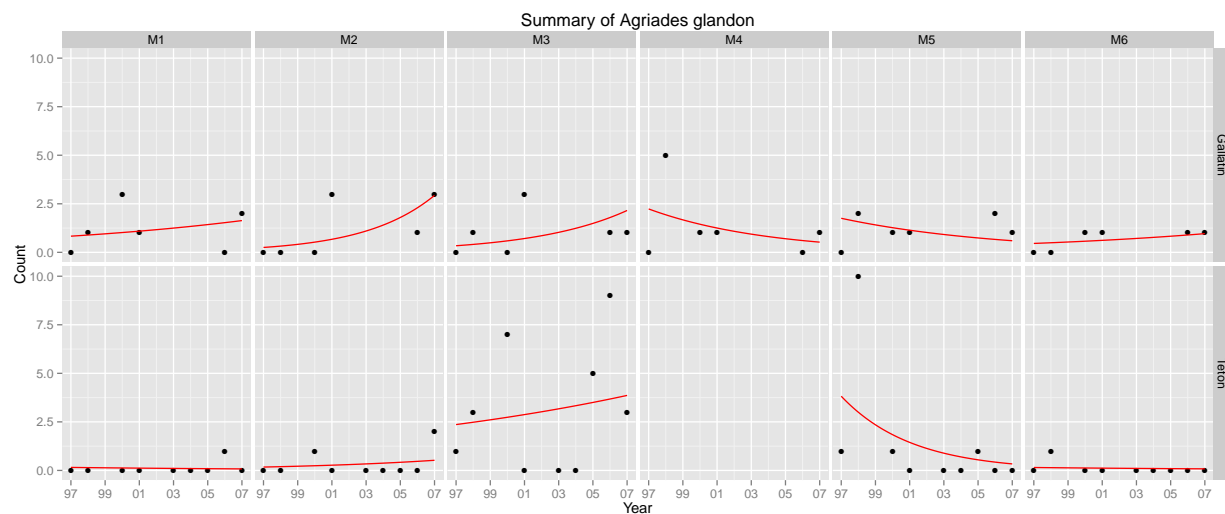


Figure C29: Time series plot of Agriades glandon by region and meadow type

# Agriades glandon

Table C58: Poisson regression parameter estimates for Agriades glandon

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.8600	1.1396	-1.63	0.1027
Year	-0.0681	0.1197	-0.57	0.5693
MeadowM2	0.1106	1.3944	0.08	0.9368
MeadowM3	2.7194	1.1706	2.32	0.0202
MeadowM4	0.9868	0.7942	1.24	0.2141
MeadowM5	3.2006	1.1666	2.74	0.0061
MeadowM6	-0.0307	1.5769	-0.02	0.9844
RegionGallatin	1.6773	1.1405	1.47	0.1414
Year:MeadowM2	0.1780	0.1384	1.29	0.1983
Year:MeadowM3	0.1173	0.1217	0.96	0.3351
Year:MeadowM4	-0.2123	0.1479	-1.44	0.1512
Year:MeadowM5	-0.1751	0.1253	-1.40	0.1624
Year:MeadowM6	0.0067	0.1513	0.04	0.9648
Year:RegionGallatin	0.1356	0.0833	1.63	0.1036
MeadowM2:RegionGallatin	-1.3070	1.2953	-1.01	0.3130
MeadowM3:RegionGallatin	-3.6162	1.1794	-3.07	0.0022
MeadowM5:RegionGallatin	-2.4566	1.1790	-2.08	0.0372
MeadowM6:RegionGallatin	-0.5659	1.5534	-0.36	0.7157

30 *Colias pelidne*

Table C59: Poisson regression fitted models for *Colias pelidne*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.718e^{-0.051(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.479e^{-0.014(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.422e^{0.079(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.802e^{0.058(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.015e^{0.299(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.246e^{0.13(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.387e^{0.166(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.032e^{0.26(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.121e^{0.267(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.076e^{0.238(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.029e^{0.479(YEAR-1997)}$	

Null deviance: 120.56 on 80 degrees of freedom  
Residual deviance: 84.59 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 185.87

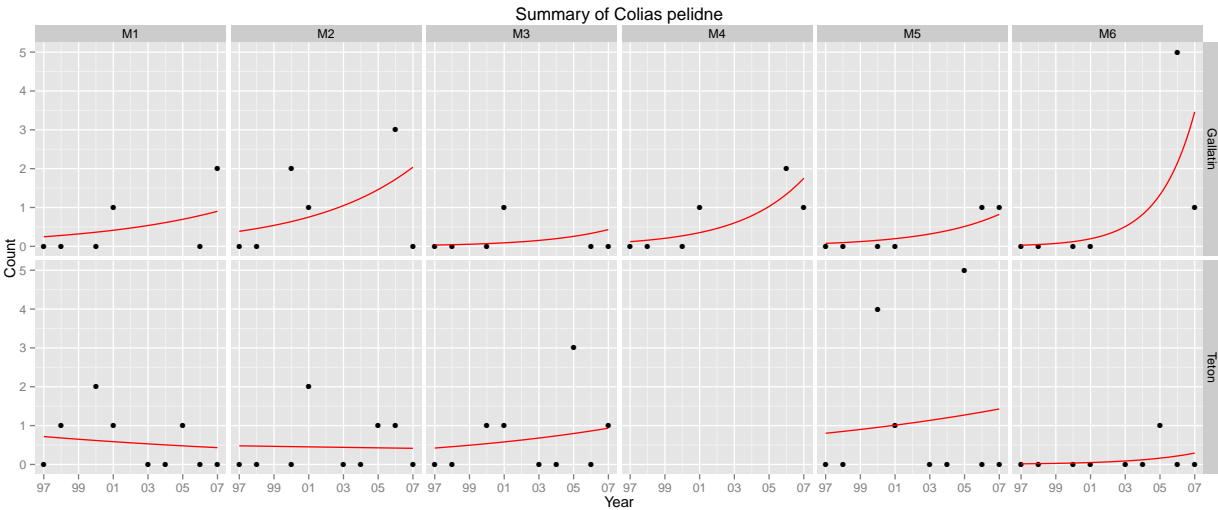


Figure C30: Time series plot of *Colias pelidne* by region and meadow type



## Colias pelidne

Table C60: Poisson regression parameter estimates for Colias pelidne

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.3318	0.6932	-0.48	0.6322
Year	-0.0507	0.1112	-0.46	0.6484
MeadowM2	-0.4037	0.9581	-0.42	0.6735
MeadowM3	-0.5311	1.0786	-0.49	0.6224
MeadowM4	-0.7075	1.7103	-0.41	0.6791
MeadowM5	0.1115	0.9104	0.12	0.9025
MeadowM6	-3.8814	2.0710	-1.87	0.0609
RegionGallatin	-1.0687	0.9784	-1.09	0.2747
Year:MeadowM2	0.0363	0.1373	0.26	0.7913
Year:MeadowM3	0.1301	0.1599	0.81	0.4160
Year:MeadowM4	0.1372	0.2042	0.67	0.5018
Year:MeadowM5	0.1084	0.1379	0.79	0.4321
Year:MeadowM6	0.3493	0.2336	1.50	0.1348
Year:RegionGallatin	0.1805	0.1105	1.63	0.1025
MeadowM2:RegionGallatin	0.8554	1.0006	0.85	0.3926
MeadowM3:RegionGallatin	-1.5061	1.3491	-1.12	0.2642
MeadowM5:RegionGallatin	-1.2855	1.1055	-1.16	0.2449
MeadowM6:RegionGallatin	1.7335	1.3699	1.27	0.2057

31 Colias gigantea

Table C61: Poisson regression fitted models for Colias gigantea

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 3.341e^{0.105(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.501e^{0.132(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 0.191e^{0.095(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 0e^{-0.047(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.047(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.096e^{0.208(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.589e^{0.234(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0e^{0.197(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0e^{0.055(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0e^{0.055(YEAR-1997)}$	***

Null deviance: 335.50 on 80 degrees of freedom  
Residual deviance: 102.37 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 193.13

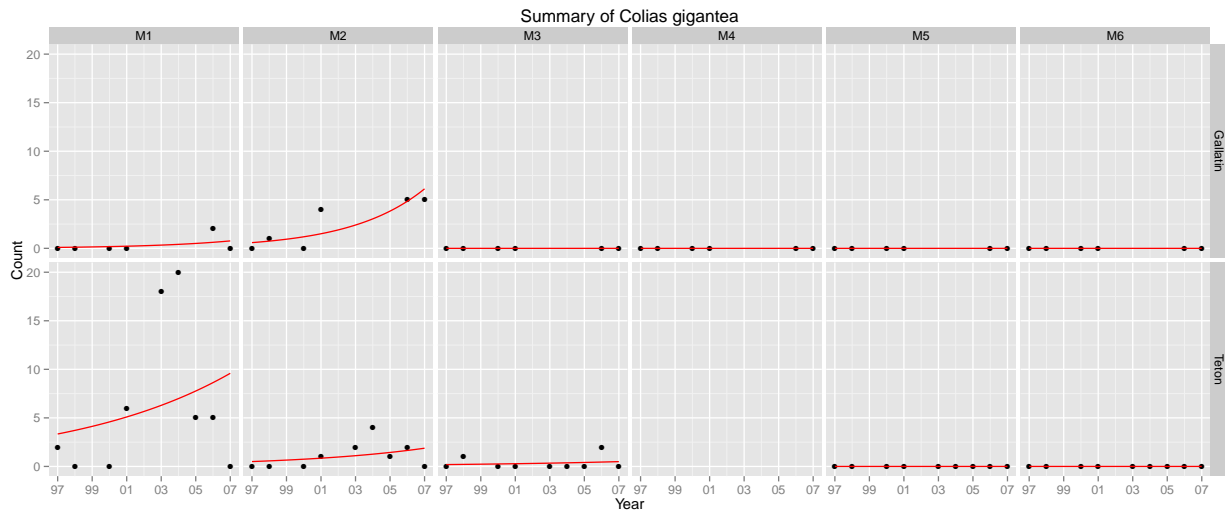


Figure C31: Time series plot of Colias gigantea by region and meadow type

# Colias gigantea

Table C62: Poisson regression parameter estimates for *Colias gigantea*

	Estimate	Std. Error	z value	P-value
(Intercept)	1.2064	0.3052	3.95	0.0001
Year	0.1054	0.0426	2.47	0.0134
MeadowM2	-1.8970	0.7577	-2.50	0.0123
MeadowM3	-2.8610	1.3418	-2.13	0.0330
MeadowM4	-16.9588	5988.0077	-0.00	0.9977
MeadowM5	-20.2641	4525.6032	-0.00	0.9964
MeadowM6	-20.2641	4525.6032	-0.00	0.9964
RegionGallatin	-3.5502	1.0977	-3.23	0.0012
Year:MeadowM2	0.0266	0.1017	0.26	0.7939
Year:MeadowM3	-0.0103	0.1899	-0.05	0.9568
Year:MeadowM4	-0.2076	1019.4661	-0.00	0.9998
Year:MeadowM5	-0.1528	679.9500	-0.00	0.9998
Year:MeadowM6	-0.1528	679.9500	-0.00	0.9998
Year:RegionGallatin	0.1022	0.1126	0.91	0.3642
MeadowM2:RegionGallatin	3.7116	0.8315	4.46	0.0000
MeadowM3:RegionGallatin	-15.1184	3572.0737	-0.00	0.9966
MeadowM5:RegionGallatin	3.0453	4962.5251	0.00	0.9995
MeadowM6:RegionGallatin	3.0453	4962.5251	0.00	0.9995

## 32 Lycaeides idas

Table C63: Poisson regression fitted models for *Lycaeides idas*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.272(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.531e^{-0.588(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 2.986e^{0.078(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1.493e^{-0.039(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.097e^{0.137(YEAR-1997)}$	***
7	Gallatin	M1	$\hat{Y} = 1.04e^{-0.12(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.436(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.081e^{0.23(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.024e^{0.425(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.091e^{0.113(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.202e^{0.289(YEAR-1997)}$	***

Null deviance: 239.270 on 80 degrees of freedom

Residual deviance: 93.462 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 192.70

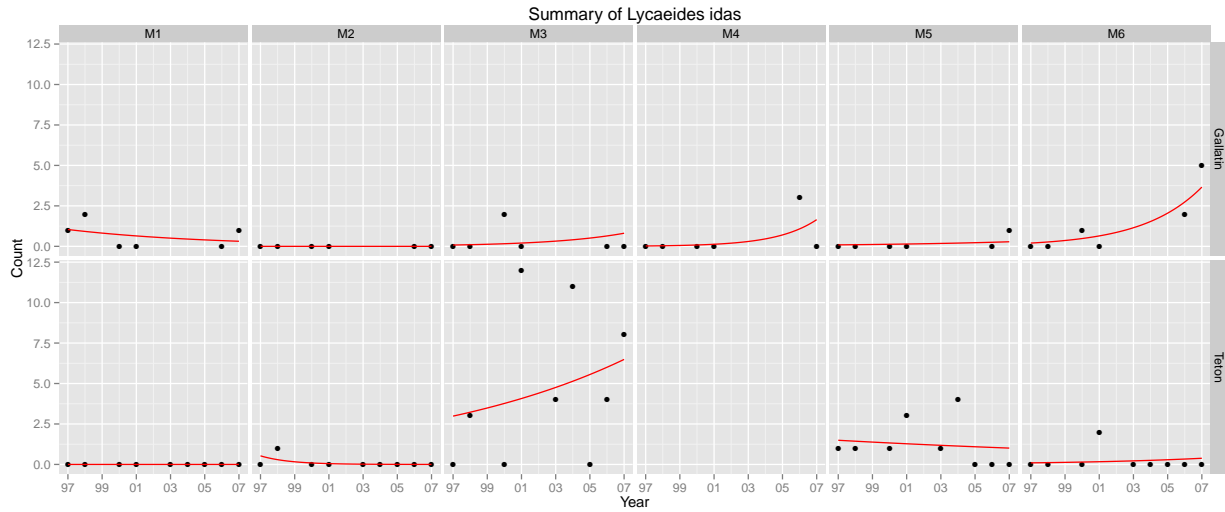


Figure C32: Time series plot of *Lycaeides idas* by region and meadow type

# Lycaeides idas

Table C64: Poisson regression parameter estimates for Lycaeides idas

	Estimate	Std. Error	z value	P-value
(Intercept)	-16.9706	1655.4835	-0.01	0.9918
Year	-0.2724	0.2127	-1.28	0.2004
MeadowM2	16.3373	1655.4839	0.01	0.9921
MeadowM3	18.0644	1655.4835	0.01	0.9913
MeadowM4	-3.7883	2.7361	-1.38	0.1662
MeadowM5	17.3713	1655.4836	0.01	0.9916
MeadowM6	14.6379	1655.4838	0.01	0.9929
RegionGallatin	17.0097	1655.4835	0.01	0.9918
Year:MeadowM2	-0.3160	0.6587	-0.48	0.6314
Year:MeadowM3	0.3500	0.2133	1.64	0.1009
Year:MeadowM4	0.5447	0.3263	1.67	0.0951
Year:MeadowM5	0.2332	0.2197	1.06	0.2884
Year:MeadowM6	0.4092	0.1920	2.13	0.0331
Year:RegionGallatin	0.1526	0.1460	1.04	0.2961
MeadowM2:RegionGallatin	-33.4243	2669.8085	-0.01	0.9900
MeadowM3:RegionGallatin	-20.6171	1655.4838	-0.01	0.9901
MeadowM5:RegionGallatin	-19.8071	1655.4839	-0.01	0.9905
MeadowM6:RegionGallatin	-16.2741	1655.4838	-0.01	0.9922

### 33 Vanessa cardui

Table C65: Poisson regression fitted models for *Vanessa cardui*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 1.042e^{0.029(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.97e^{0.129(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.798e^{0.038(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.775e^{0.046(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1.317e^{0.042(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 6.512e^{-0.12(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 2.185e^{-0.02(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 5.573e^{-0.111(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 6.186e^{-0.147(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 2.228e^{-0.104(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 2.001e^{-0.107(YEAR-1997)}$	***

Null deviance: 401.78 on 80 degrees of freedom  
Residual deviance: 347.16 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 496.36

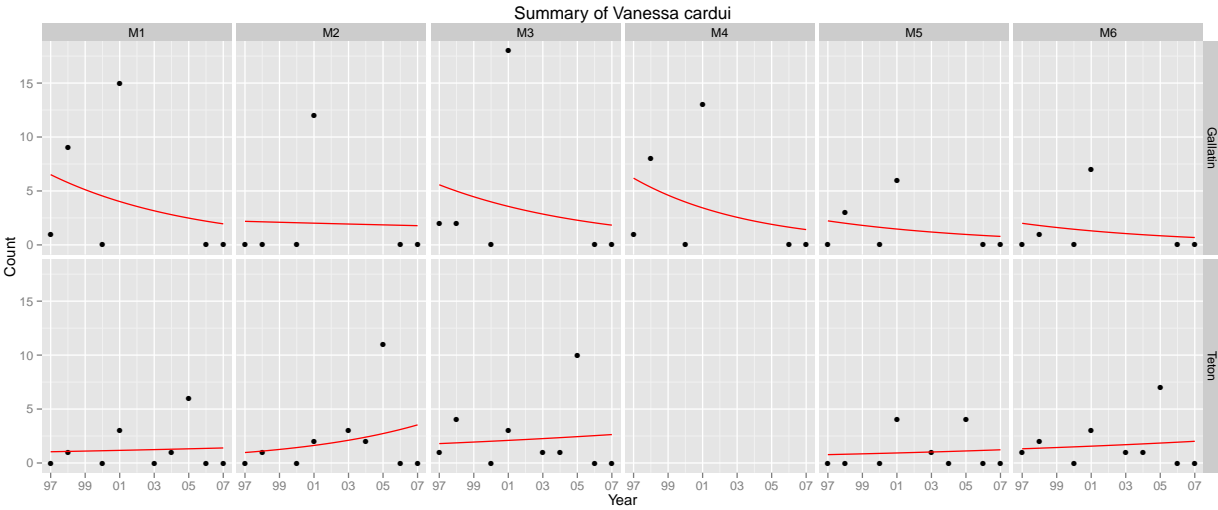


Figure C33: Time series plot of *Vanessa cardui* by region and meadow type

## Vanessa cardui

Table C66: Poisson regression parameter estimates for *Vanessa cardui*

	Estimate	Std. Error	z value	P-value
(Intercept)	0.0409	0.4630	0.09	0.9297
Year	0.0291	0.0622	0.47	0.6399
MeadowM2	-0.0712	0.6000	-0.12	0.9055
MeadowM3	0.5456	0.5481	1.00	0.3195
MeadowM4	-0.0514	0.3836	-0.13	0.8935
MeadowM5	-0.2956	0.6804	-0.43	0.6639
MeadowM6	0.2342	0.6217	0.38	0.7064
RegionGallatin	1.8328	0.4584	4.00	0.0001
Year:MeadowM2	0.1002	0.0755	1.33	0.1847
Year:MeadowM3	0.0092	0.0701	0.13	0.8961
Year:MeadowM4	-0.0268	0.0878	-0.30	0.7606
Year:MeadowM5	0.0165	0.0886	0.19	0.8519
Year:MeadowM6	0.0133	0.0835	0.16	0.8737
Year:RegionGallatin	-0.1495	0.0511	-2.93	0.0034
MeadowM2:RegionGallatin	-1.0209	0.5514	-1.85	0.0641
MeadowM3:RegionGallatin	-0.7013	0.5109	-1.37	0.1698
MeadowM5:RegionGallatin	-0.7770	0.6390	-1.22	0.2240
MeadowM6:RegionGallatin	-1.4143	0.6094	-2.32	0.0203

34 Phyciodes selenis

Table C67: Poisson regression fitted models for Phyciodes selenis

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 11.528e^{0.022(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 9.624e^{0.084(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.76e^{0.049(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 1.185e^{-0.246(YEAR-1997)}$	***
6	Teton	M6	$\hat{Y} = 0e^{-0.504(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.443e^{0.026(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.953e^{0.088(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 1.029e^{0.053(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0.721e^{-0.018(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.351e^{-0.242(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 1.009e^{-0.5(YEAR-1997)}$	***

Null deviance: 833.19 on 80 degrees of freedom  
Residual deviance: 225.35 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 384.54

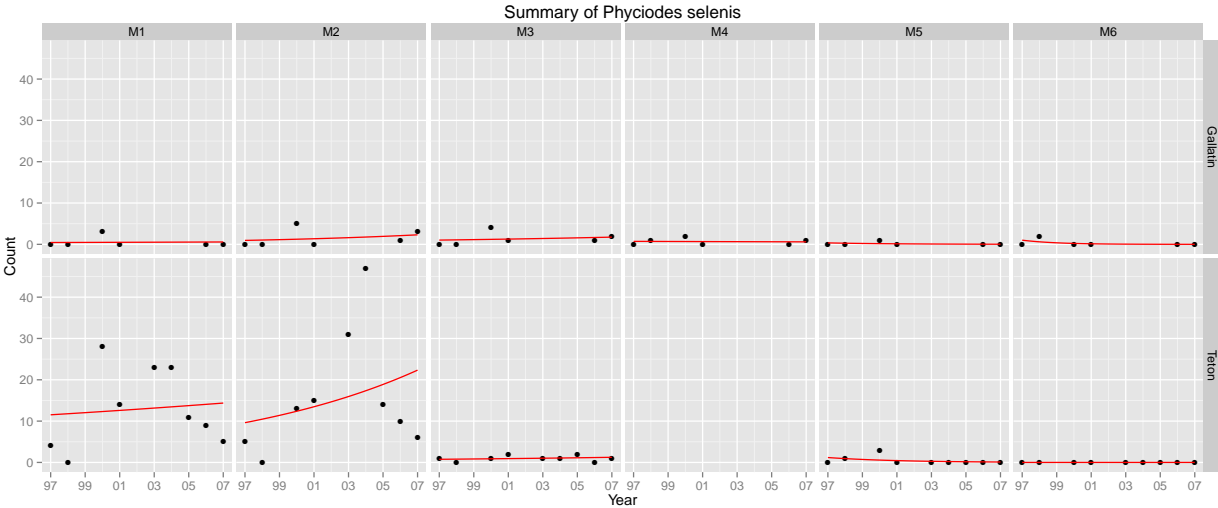


Figure C34: Time series plot of Phyciodes selenis by region and meadow type



# Phyciodes selenis

Table C68: Poisson regression parameter estimates for Phyciodes selenis

	Estimate	Std. Error	z value	P-value
(Intercept)	2.4448	0.1797	13.61	0.0000
Year	0.0220	0.0276	0.80	0.4253
MeadowM2	-0.1806	0.2550	-0.71	0.4789
MeadowM3	-2.7196	0.5891	-4.62	0.0000
MeadowM4	0.4875	1.0138	0.48	0.6306
MeadowM5	-2.2754	0.6852	-3.32	0.0009
MeadowM6	-17.9410	976.9301	-0.02	0.9853
RegionGallatin	-3.2599	0.6713	-4.86	0.0000
Year:MeadowM2	0.0622	0.0377	1.65	0.0993
Year:MeadowM3	0.0270	0.0817	0.33	0.7408
Year:MeadowM4	-0.0438	0.1517	-0.29	0.7728
Year:MeadowM5	-0.2679	0.1598	-1.68	0.0936
Year:MeadowM6	-0.5264	0.4820	-1.09	0.2747
Year:RegionGallatin	0.0040	0.0672	0.06	0.9525
MeadowM2:RegionGallatin	0.9474	0.6816	1.39	0.1645
MeadowM3:RegionGallatin	3.5632	0.7630	4.67	0.0000
MeadowM5:RegionGallatin	2.0426	1.2814	1.59	0.1109
MeadowM6:RegionGallatin	18.7652	976.9304	0.02	0.9847

35 *Lycaena hyllus*

Table C69: Poisson regression fitted models for *Lycaena hyllus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.655e^{-0.15(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 7.319e^{-0.163(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 0e^{-0.753(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.273e^{-0.218(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.194e^{-0.119(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{16.253(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{16.24(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0e^{15.649(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{16.185(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{16.284(YEAR-1997)}$	

Null deviance: 202.163 on 80 degrees of freedom  
Residual deviance: 65.891 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 130.03

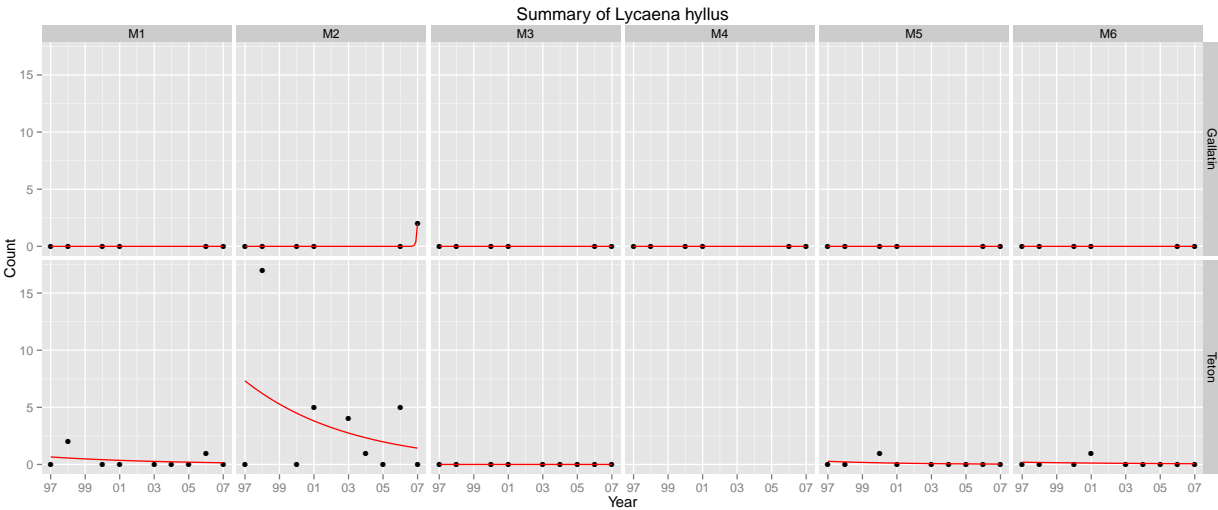


Figure C35: Time series plot of *Lycaena hyllus* by region and meadow type

# Lycaena hyllus

Table C70: Poisson regression parameter estimates for Lycaena hyllus

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.4237	0.8728	-0.49	0.6273
Year	-0.1503	0.1785	-0.84	0.4000
MeadowM2	2.4142	0.9117	2.65	0.0081
MeadowM3	-19.8509	13723.2095	-0.00	0.9988
MeadowM4	159.9714	32658.6606	0.00	0.9961
MeadowM5	-0.8733	1.6566	-0.53	0.5981
MeadowM6	-1.2182	1.7976	-0.68	0.4980
RegionGallatin	-181.8502	18611.7267	-0.01	0.9922
Year:MeadowM2	-0.0131	0.1869	-0.07	0.9442
Year:MeadowM3	-0.6032	9934.1244	-0.00	1.0000
Year:MeadowM4	-16.2526	4790.8253	-0.00	0.9973
Year:MeadowM5	-0.0677	0.3755	-0.18	0.8569
Year:MeadowM6	0.0312	0.3517	0.09	0.9293
Year:RegionGallatin	16.4029	1441.1398	0.01	0.9909
MeadowM2:RegionGallatin	18.1576	11777.4368	0.00	0.9988
MeadowM3:RegionGallatin	25.8577	94858.7491	0.00	0.9998
MeadowM5:RegionGallatin	1.4552	17067.9074	0.00	0.9999
MeadowM6:RegionGallatin	0.7925	17149.8429	0.00	1.0000

# 36 Callophrys dumetorum

Table C71: Poisson regression fitted models for Callophrys dumetorum

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.075(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{-0.075(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.273e^{-0.218(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.075(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 6.284e^{-0.339(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{0.089(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{0.089(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.054(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{0.089(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.175(YEAR-1997)}$	

Null deviance: 117.881 on 80 degrees of freedom  
Residual deviance: 28.848 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 77.263

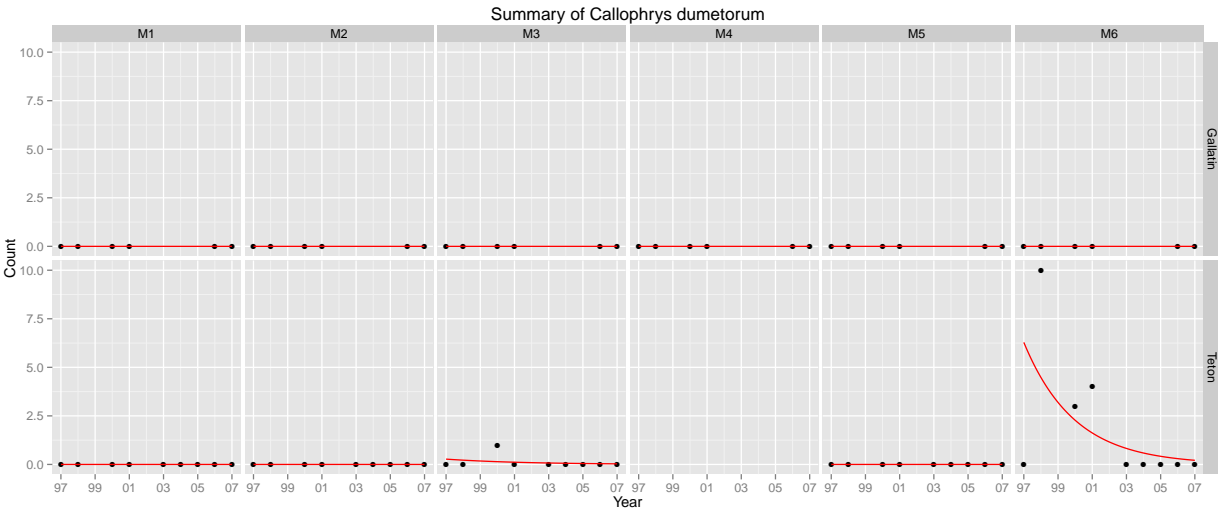


Figure C36: Time series plot of Callophrys dumetorum by region and meadow type

# Callophrys dumetorum

Table C72: Poisson regression parameter estimates for *Callophrys dumetorum*

	Estimate	Std. Error	z value	P-value
(Intercept)	-20.8842	12013.8199	-0.00	0.9986
Year	-0.0749	1928.3825	-0.00	1.0000
MeadowM2	0.0000	16406.9074	0.00	1.0000
MeadowM3	19.5871	12013.8199	0.00	0.9987
MeadowM4	0.3672	22222.7882	0.00	1.0000
MeadowM5	0.0000	16406.9074	0.00	1.0000
MeadowM6	22.7223	12013.8199	0.00	0.9985
RegionGallatin	-0.7856	15244.7874	-0.00	1.0000
Year:MeadowM2	-0.0000	2543.8242	-0.00	1.0000
Year:MeadowM3	-0.1431	1928.3825	-0.00	0.9999
Year:MeadowM4	-0.0887	3391.7315	-0.00	1.0000
Year:MeadowM5	-0.0000	2543.8242	-0.00	1.0000
Year:MeadowM6	-0.2637	1928.3825	-0.00	0.9999
Year:RegionGallatin	0.1636	1462.4100	0.00	0.9999
MeadowM2:RegionGallatin	-0.0000	18709.8311	-0.00	1.0000
MeadowM3:RegionGallatin	-18.9625	16887.2621	-0.00	0.9991
MeadowM5:RegionGallatin	-0.0000	18709.8311	-0.00	1.0000
MeadowM6:RegionGallatin	-21.3557	16238.5361	-0.00	0.9990

### 37 Pontia beckerii

Table C73: Poisson regression fitted models for Pontia beckerii

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{18.065(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{18.065(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{0.916(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.002e^{0.528(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.001e^{0.59(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{17.441(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{17.441(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.075e^{0.292(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.242e^{-0.096(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.577e^{-0.033(YEAR-1997)}$	

Null deviance: 55.193 on 80 degrees of freedom  
Residual deviance: 26.220 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 81.826

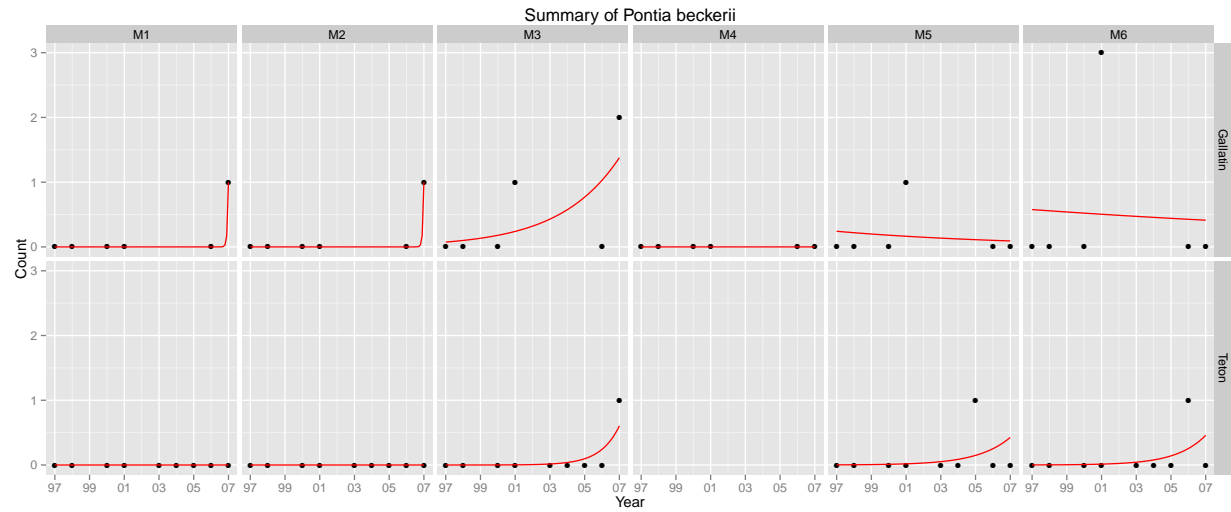


Figure C37: Time series plot of Pontia beckerii by region and meadow type

# Pontia beckerii

Table C74: Poisson regression parameter estimates for Pontia beckerii

	Estimate	Std. Error	z value	P-value
(Intercept)	-200.8488	39989.2917	-0.01	0.9960
Year	18.0648	3716.0504	0.00	0.9961
MeadowM2	-0.0000	56553.3984	-0.00	1.0000
MeadowM3	191.1883	39989.2915	0.00	0.9962
MeadowM4	151.1057	57780.5080	0.00	0.9979
MeadowM5	194.7204	39989.2915	0.00	0.9961
MeadowM6	194.1658	39989.2915	0.00	0.9961
RegionGallatin	26.4404	14772.9824	0.00	0.9986
Year:MeadowM2	0.0000	5255.2888	0.00	1.0000
Year:MeadowM3	-17.1492	3716.0503	-0.00	0.9963
Year:MeadowM4	-17.4408	8399.6129	-0.00	0.9983
Year:MeadowM5	-17.5372	3716.0503	-0.00	0.9962
Year:MeadowM6	-17.4743	3716.0503	-0.00	0.9962
Year:RegionGallatin	-0.6239	0.4446	-1.40	0.1605
MeadowM2:RegionGallatin	0.0000	20892.1514	0.00	1.0000
MeadowM3:RegionGallatin	-19.3759	14772.9818	-0.00	0.9990
MeadowM5:RegionGallatin	-21.7325	14772.9819	-0.00	0.9988
MeadowM6:RegionGallatin	-20.3078	14772.9818	-0.00	0.9989

# 38 Parnassius phoebus smintheus

Table C75: Poisson regression fitted models for Parnassius phoebus smintheus

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.841(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.329e^{-0.287(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.547e^{-0.218(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.831e^{-0.401(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1.609e^{-0.383(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.505e^{-0.5(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.256e^{0.054(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0e^{0.123(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.351e^{-0.075(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 14.953e^{-0.061(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 8.349e^{-0.042(YEAR-1997)}$	***

Null deviance: 453.993 on 80 degrees of freedom  
Residual deviance: 85.215 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 193.61

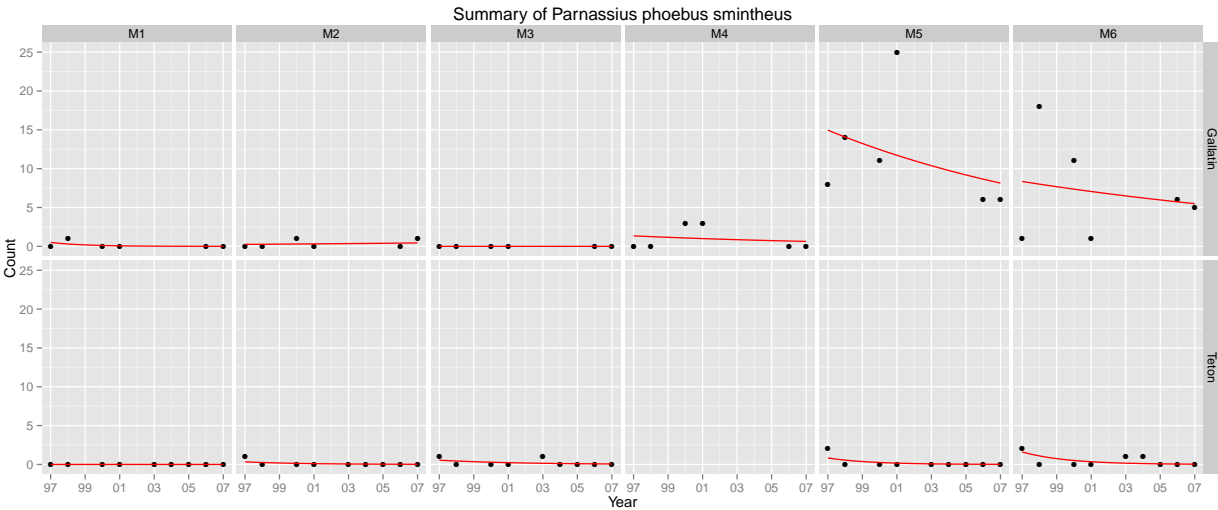


Figure C38: Time series plot of Parnassius phoebus smintheus by region and meadow type



# Parnassius phoebus smintheus

Table C76: Poisson regression parameter estimates for Parnassius phoebus smintheus

	Estimate	Std. Error	z value	P-value
(Intercept)	-16.8732	2242.0833	-0.01	0.9940
Year	-0.8411	0.6938	-1.21	0.2254
MeadowM2	15.7620	2242.0836	0.01	0.9944
MeadowM3	16.2693	2242.0835	0.01	0.9942
MeadowM4	0.9848	1.3380	0.74	0.4618
MeadowM5	16.6887	2242.0834	0.01	0.9941
MeadowM6	17.3488	2242.0834	0.01	0.9938
RegionGallatin	16.1891	2242.0835	0.01	0.9942
Year:MeadowM2	0.5543	0.6947	0.80	0.4249
Year:MeadowM3	0.6231	0.7320	0.85	0.3947
Year:MeadowM4	0.4250	0.6844	0.62	0.5346
Year:MeadowM5	0.4396	0.6751	0.65	0.5150
Year:MeadowM6	0.4585	0.6756	0.68	0.4973
Year:RegionGallatin	0.3407	0.1633	2.09	0.0369
MeadowM2:RegionGallatin	-16.4401	2242.0839	-0.01	0.9941
MeadowM3:RegionGallatin	-35.5197	4403.8892	-0.01	0.9936
MeadowM5:RegionGallatin	-13.2996	2242.0836	-0.01	0.9953
MeadowM6:RegionGallatin	-14.5425	2242.0836	-0.01	0.9948

## 39 Chlosyne palla

Table C77: Poisson regression fitted models for Chlosyne palla

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 1.458e^{-0.104(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.478e^{0.188(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 2.513e^{0.018(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.909e^{0.036(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.063(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 2.532e^{0.096(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0e^{0.388(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.31e^{0.218(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.039e^{0.236(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.157e^{0.137(YEAR-1997)}$	***

Null deviance: 250.91 on 80 degrees of freedom

Residual deviance: 136.22 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 252.53

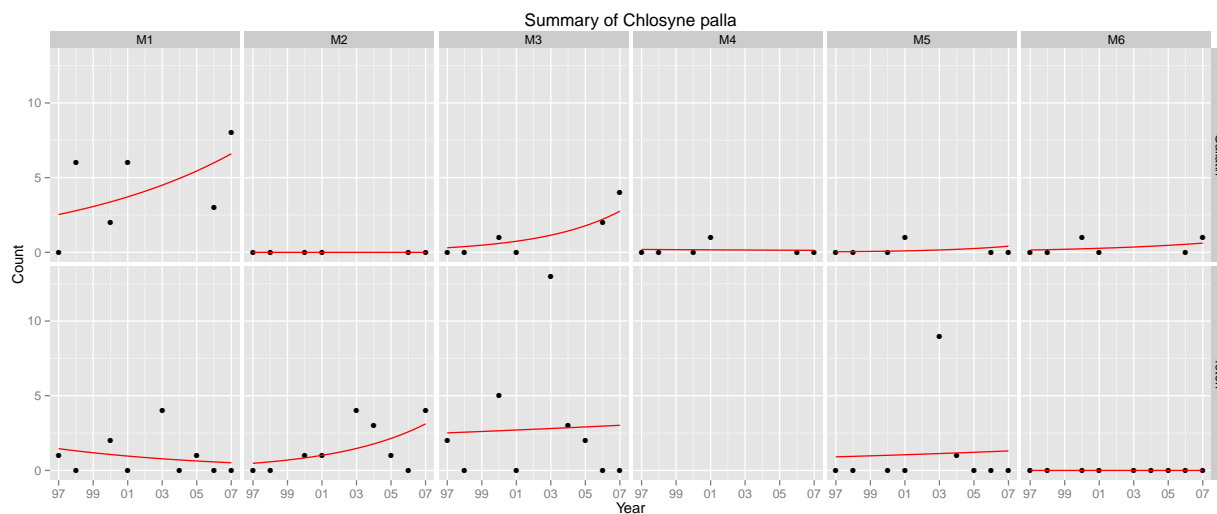


Figure C39: Time series plot of Chlosyne palla by region and meadow type

# Chlosyne palla

Table C78: Poisson regression parameter estimates for Chlosyne palla

	Estimate	Std. Error	z value	P-value
(Intercept)	0.3773	0.4930	0.77	0.4441
Year	-0.1043	0.0825	-1.26	0.2065
MeadowM2	-1.1157	0.8860	-1.26	0.2079
MeadowM3	0.5443	0.5683	0.96	0.3382
MeadowM4	-2.5671	1.5247	-1.68	0.0922
MeadowM5	-0.4725	0.7748	-0.61	0.5420
MeadowM6	-18.3445	1884.2018	-0.01	0.9922
RegionGallatin	0.5517	0.5620	0.98	0.3263
Year:MeadowM2	0.2919	0.1266	2.30	0.0212
Year:MeadowM3	0.1227	0.0866	1.42	0.1564
Year:MeadowM4	-0.1319	0.2781	-0.47	0.6352
Year:MeadowM5	0.1405	0.1199	1.17	0.2411
Year:MeadowM6	0.0415	0.1968	0.21	0.8328
Year:RegionGallatin	0.2001	0.0843	2.37	0.0176
MeadowM2:RegionGallatin	-20.4378	1909.8071	-0.01	0.9915
MeadowM3:RegionGallatin	-2.6453	0.6426	-4.12	0.0000
MeadowM5:RegionGallatin	-3.7102	1.1705	-3.17	0.0015
MeadowM6:RegionGallatin	15.5609	1884.2017	0.01	0.9934

40 *Nymphalis milberti*

Table C79: Poisson regression fitted models for *Nymphalis milberti*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.273e^{-0.218(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 1.13e^{-0.348(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1e^{-17.747(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.223(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.32e^{-0.074(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{0.267(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.157e^{0.137(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-17.261(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{18.543(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{0.262(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.411(YEAR-1997)}$	

Null deviance: 44.610 on 80 degrees of freedom  
Residual deviance: 19.857 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 74.471

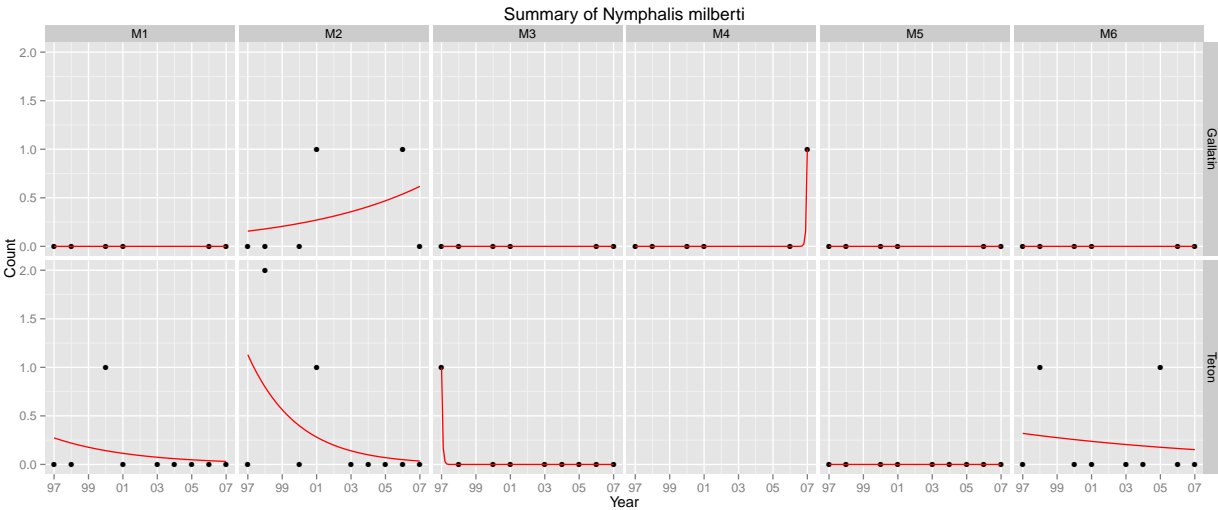


Figure C40: Time series plot of *Nymphalis milberti* by region and meadow type

# Nymphalis milberti

Table C80: Poisson regression parameter estimates for Nymphalis milberti

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.2971	1.4080	-0.92	0.3569
Year	-0.2180	0.3304	-0.66	0.5094
MeadowM2	1.4194	1.5904	0.89	0.3722
MeadowM3	1.2971	1.7269	0.75	0.4526
MeadowM4	-160.5975	69574.2524	-0.00	0.9982
MeadowM5	-20.9517	26960.7400	-0.00	0.9994
MeadowM6	0.1569	1.8390	0.09	0.9320
RegionGallatin	-23.5396	26103.4248	-0.00	0.9993
Year:MeadowM2	-0.1300	0.4032	-0.32	0.7472
Year:MeadowM3	-17.5286	4329.7980	-0.00	0.9968
Year:MeadowM4	18.2761	6449.1766	0.00	0.9977
Year:MeadowM5	-0.0055	5434.2327	-0.00	1.0000
Year:MeadowM6	0.1440	0.3919	0.37	0.7133
Year:RegionGallatin	0.4853	0.2995	1.62	0.1052
MeadowM2:RegionGallatin	21.5626	26103.4248	0.00	0.9993
MeadowM3:RegionGallatin	2.7298	32901.7814	0.00	0.9999
MeadowM5:RegionGallatin	21.0661	50253.7560	0.00	0.9997
MeadowM6:RegionGallatin	-1.1541	34961.0554	-0.00	1.0000

# 41 Anthocharis sara stella

Table C81: Poisson regression fitted models for Anthocharis sara stella

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.139e^{-0.045(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.443e^{-0.057(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.36e^{-0.216(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-16.623(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.001e^{0.645(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1.077e^{0.044(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.429e^{0.032(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.266e^{-0.127(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.459e^{-0.161(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 1e^{-16.534(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.734(YEAR-1997)}$	

Null deviance: 85.485 on 80 degrees of freedom  
Residual deviance: 46.122 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 126.22

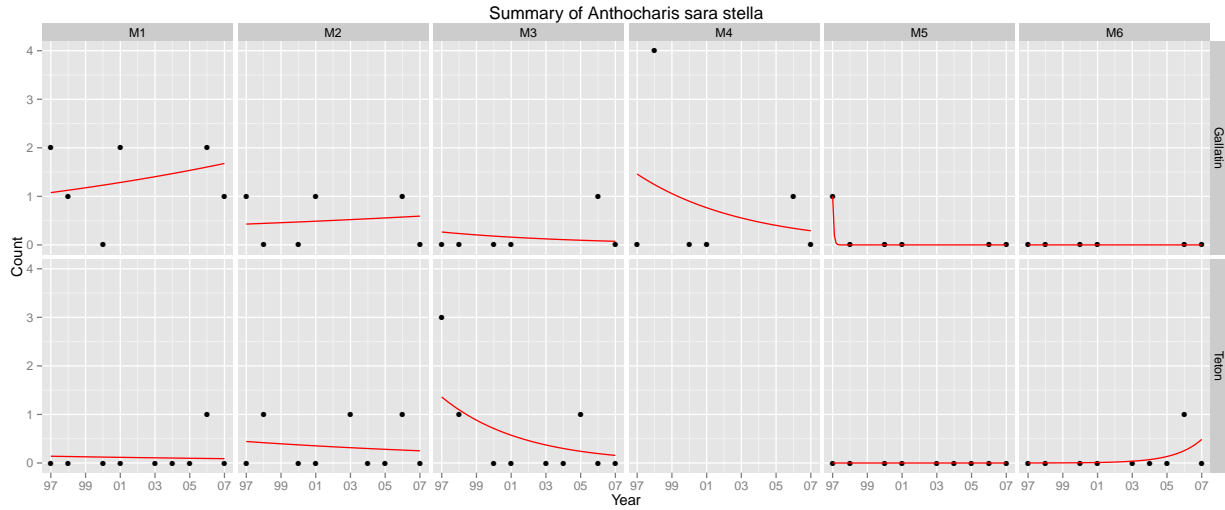


Figure C41: Time series plot of Anthocharis sara stella by region and meadow type

# Anthocharis sara stella

Table C82: Poisson regression parameter estimates for Anthocharis sara stella

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.9703	1.3015	-1.51	0.1301
Year	-0.0446	0.1724	-0.26	0.7957
MeadowM2	1.1554	1.3699	0.84	0.3990
MeadowM3	2.2775	1.3915	1.64	0.1017
MeadowM4	0.3034	0.8280	0.37	0.7141
MeadowM5	-17.3080	9312.6269	-0.00	0.9985
MeadowM6	-5.2001	6.8452	-0.76	0.4475
RegionGallatin	2.0445	1.3227	1.55	0.1222
Year:MeadowM2	-0.0119	0.1539	-0.08	0.9383
Year:MeadowM3	-0.1716	0.1991	-0.86	0.3888
Year:MeadowM4	-0.2053	0.1740	-1.18	0.2380
Year:MeadowM5	-16.5780	2361.0552	-0.01	0.9944
Year:MeadowM6	0.6896	0.7582	0.91	0.3631
Year:RegionGallatin	0.0889	0.1626	0.55	0.5843
MeadowM2:RegionGallatin	-2.0759	1.3392	-1.55	0.1211
MeadowM3:RegionGallatin	-3.6765	1.5567	-2.36	0.0182
MeadowM5:RegionGallatin	17.2338	9312.6270	0.00	0.9985
MeadowM6:RegionGallatin	-22.5880	13159.1945	-0.00	0.9986

42 *Boloria frigga*

Table C83: Poisson regression fitted models for *Boloria frigga*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 4.296e^{0.094(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.019e^{0.354(YEAR-1997)}$	***
3	Teton	M3	$\hat{Y} = 0e^{0.211(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.211(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.211(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.445e^{-0.39(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 0.803e^{-0.13(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0e^{-0.273(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0e^{-0.273(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0e^{-0.273(YEAR-1997)}$	***

Null deviance: 337.477 on 80 degrees of freedom  
Residual deviance: 57.704 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 135.27

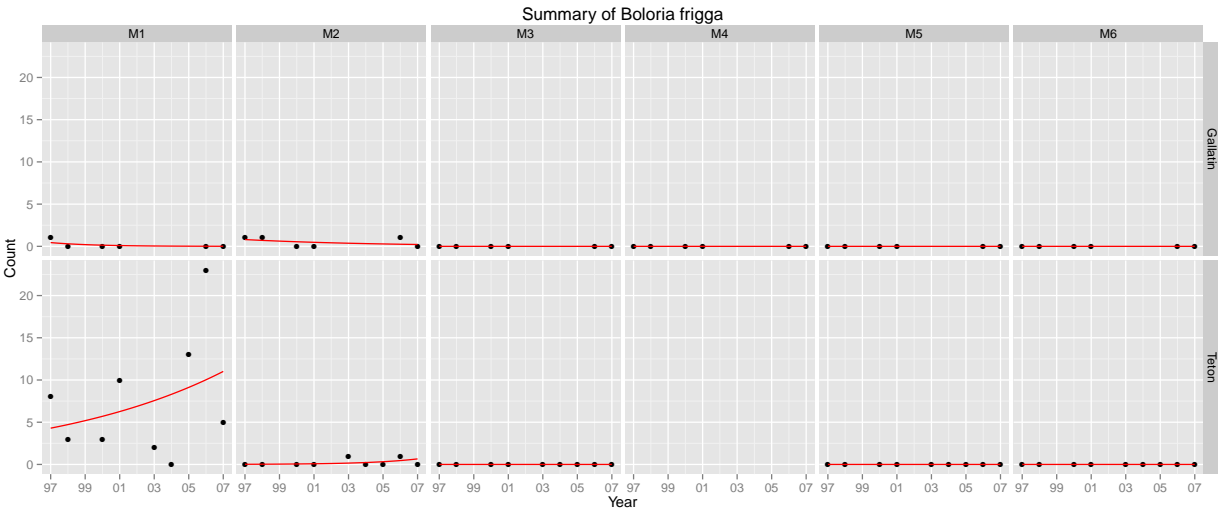


Figure C42: Time series plot of *Boloria frigga* by region and meadow type



## Boloria frigga

Table C84: Poisson regression parameter estimates for Boloria frigga

	Estimate	Std. Error	z value	P-value
(Intercept)	1.4576	0.2756	5.29	0.0000
Year	0.0942	0.0391	2.41	0.0159
MeadowM2	-5.4257	2.4611	-2.20	0.0275
MeadowM3	-23.0095	11871.1075	-0.00	0.9985
MeadowM4	-19.4924	9872.5556	-0.00	0.9984
MeadowM5	-23.0095	11871.1075	-0.00	0.9985
MeadowM6	-23.0095	11871.1075	-0.00	0.9985
RegionGallatin	-2.2677	1.1065	-2.05	0.0404
Year:MeadowM2	0.2603	0.2896	0.90	0.3687
Year:MeadowM3	0.1166	1475.8806	0.00	0.9999
Year:MeadowM4	0.3898	1680.8155	0.00	0.9998
Year:MeadowM5	0.1166	1475.8806	0.00	0.9999
Year:MeadowM6	0.1166	1475.8806	0.00	0.9999
Year:RegionGallatin	-0.4840	0.3119	-1.55	0.1207
MeadowM2:RegionGallatin	6.0160	2.3785	2.53	0.0114
MeadowM3:RegionGallatin	4.4873	11162.9412	0.00	0.9997
MeadowM5:RegionGallatin	4.4873	11162.9412	0.00	0.9997
MeadowM6:RegionGallatin	4.4873	11162.9412	0.00	0.9997

# 43 Pontia protodice

Table C85: Poisson regression fitted models for Pontia protodice

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.483e^{-0.179(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.233e^{0.063(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.375e^{-0.305(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.208e^{0.082(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.679e^{-0.039(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.884e^{-0.07(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.062e^{0.172(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 1.907e^{-0.196(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 1.227e^{-0.101(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.108e^{0.191(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.117e^{0.07(YEAR-1997)}$	

Null deviance: 88.206 on 80 degrees of freedom  
Residual deviance: 68.752 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 162.42

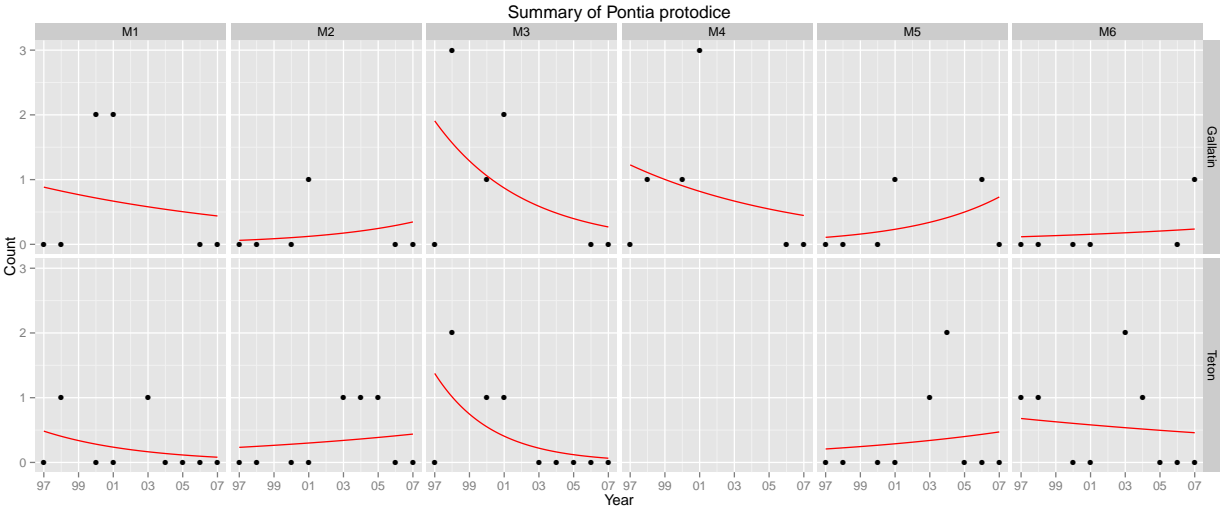


Figure C43: Time series plot of Pontia protodice by region and meadow type

## Pontia protodice

Table C86: Poisson regression parameter estimates for Pontia protodice

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.7271	0.8670	-0.84	0.4017
Year	-0.1793	0.1489	-1.20	0.2285
MeadowM2	-0.7297	1.3536	-0.54	0.5898
MeadowM3	1.0456	0.9995	1.05	0.2955
MeadowM4	0.3285	0.9133	0.36	0.7191
MeadowM5	-0.8442	1.3083	-0.65	0.5187
MeadowM6	0.3393	1.1087	0.31	0.7595
RegionGallatin	0.6034	0.9635	0.63	0.5311
Year:MeadowM2	0.2424	0.2002	1.21	0.2260
Year:MeadowM3	-0.1259	0.1672	-0.75	0.4513
Year:MeadowM4	-0.0312	0.1836	-0.17	0.8652
Year:MeadowM5	0.2611	0.1846	1.41	0.1571
Year:MeadowM6	0.1402	0.1799	0.78	0.4358
Year:RegionGallatin	0.1092	0.1231	0.89	0.3749
MeadowM2:RegionGallatin	-1.9299	1.5052	-1.28	0.1998
MeadowM3:RegionGallatin	-0.2764	1.0893	-0.25	0.7997
MeadowM5:RegionGallatin	-1.2550	1.3303	-0.94	0.3455
MeadowM6:RegionGallatin	-2.3586	1.4195	-1.66	0.0966

# 44 Glaucopsyche piasus

Table C87: Poisson regression fitted models for Glaucopsyche piasus

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.023e^{0.241(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.039e^{0.17(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.012e^{0.323(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1.02e^{0.085(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.275e^{0.23(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.302e^{-0.175(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.246(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.093(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.409e^{-0.331(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.185(YEAR-1997)}$	

Null deviance: 115.395 on 80 degrees of freedom  
Residual deviance: 51.462 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 126.92



Figure C44: Time series plot of Glaucopsyche piasus by region and meadow type

# Glaucopsyche piasus

Table C88: Poisson regression parameter estimates for Glaucopsyche piasus

	Estimate	Std. Error	z value	P-value
(Intercept)	-3.7661	2.6518	-1.42	0.1555
Year	0.2405	0.3265	0.74	0.4613
MeadowM2	0.5158	3.7481	0.14	0.8905
MeadowM3	-0.6414	4.5561	-0.14	0.8880
MeadowM4	-0.4421	1.9383	-0.23	0.8196
MeadowM5	3.7858	2.6776	1.41	0.1574
MeadowM6	2.4737	2.8044	0.88	0.3777
RegionGallatin	2.5701	2.6982	0.95	0.3408
Year:MeadowM2	-0.0709	0.4789	-0.15	0.8822
Year:MeadowM3	0.0825	0.5527	0.15	0.8813
Year:MeadowM4	0.1390	0.4074	0.34	0.7329
Year:MeadowM5	-0.1557	0.3305	-0.47	0.6375
Year:MeadowM6	-0.0101	0.3463	-0.03	0.9767
Year:RegionGallatin	-0.4157	0.3568	-1.16	0.2440
MeadowM2:RegionGallatin	-17.7882	3694.0458	-0.00	0.9962
MeadowM3:RegionGallatin	-17.0838	3805.8911	-0.00	0.9964
MeadowM5:RegionGallatin	-3.4828	2.5700	-1.36	0.1754
MeadowM6:RegionGallatin	-19.9014	3737.5979	-0.01	0.9958

45 *Limnitis weidemeyerii*

Table C89: Poisson regression fitted models for *Limnitis weidemeyerii*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.058e^{0.263(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.152e^{0.131(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.009e^{0.444(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 1.117e^{-0.157(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.259(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{-0.368(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.505e^{-0.5(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.187(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.008e^{0.425(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{-0.788(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.372(YEAR-1997)}$	

Null deviance: 62.729 on 80 degrees of freedom  
Residual deviance: 35.867 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 96.086

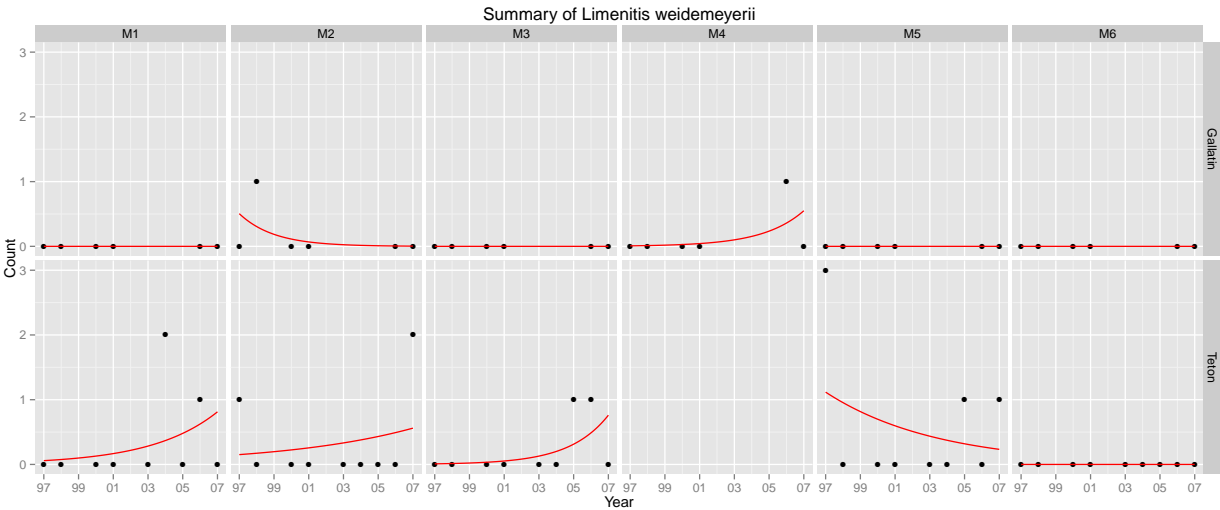


Figure C45: Time series plot of *Limnitis weidemeyerii* by region and meadow type

# Limnitis weidemeyerii

Table C90: Poisson regression parameter estimates for Limnitis weidemeyerii

	Estimate	Std. Error	z value	P-value
(Intercept)	-2.8396	1.8778	-1.51	0.1305
Year	0.2632	0.2331	1.13	0.2588
MeadowM2	0.9537	2.3465	0.41	0.6844
MeadowM3	-1.8761	3.8490	-0.49	0.6260
MeadowM4	14.2224	5515.9392	0.00	0.9979
MeadowM5	2.9500	1.9941	1.48	0.1391
MeadowM6	-19.0858	13719.1840	-0.00	0.9989
RegionGallatin	-16.2306	5515.9375	-0.00	0.9977
Year:MeadowM2	-0.1325	0.3023	-0.44	0.6612
Year:MeadowM3	0.1810	0.4513	0.40	0.6884
Year:MeadowM4	0.7929	0.8909	0.89	0.3735
Year:MeadowM5	-0.4199	0.2714	-1.55	0.1218
Year:MeadowM6	-0.0040	1673.8775	-0.00	1.0000
Year:RegionGallatin	-0.6311	0.7012	-0.90	0.3681
MeadowM2:RegionGallatin	17.4324	5515.9376	0.00	0.9975
MeadowM3:RegionGallatin	1.5444	7807.8772	0.00	0.9998
MeadowM5:RegionGallatin	-2.1541	7097.6065	-0.00	0.9998
MeadowM6:RegionGallatin	18.9672	14141.2399	0.00	0.9989

# 46 Colias interior

Table C91: Poisson regression fitted models for Colias interior

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 3.827e^{-0.218(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.547e^{-0.218(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{-0.036(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.039e^{0.17(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.036(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{-0.136(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.136(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{0.046(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{0.251(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.046(YEAR-1997)}$	

Null deviance: 129.748 on 80 degrees of freedom  
Residual deviance: 66.559 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 111.66

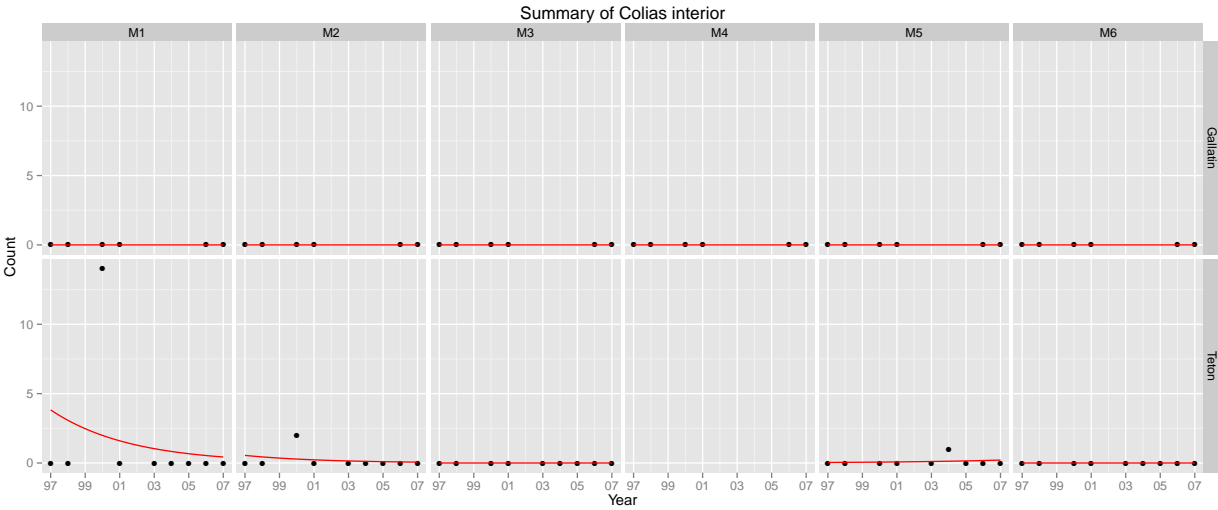


Figure C46: Time series plot of Colias interior by region and meadow type



## Colias interior

Table C92: Poisson regression parameter estimates for Colias interior

	Estimate	Std. Error	z value	P-value
(Intercept)	1.3420	0.3763	3.57	0.0004
Year	-0.2180	0.0883	-2.47	0.0136
MeadowM2	-1.9459	1.0643	-1.83	0.0675
MeadowM3	-21.3957	7531.9824	-0.00	0.9977
MeadowM4	-1.2441	11016.7073	-0.00	0.9999
MeadowM5	-4.5923	2.6754	-1.72	0.0861
MeadowM6	-21.3957	7531.9824	-0.00	0.9977
RegionGallatin	-20.4005	4888.8124	-0.00	0.9967
Year:MeadowM2	0.0000	0.2497	0.00	1.0000
Year:MeadowM3	0.1824	1139.4721	0.00	0.9999
Year:MeadowM4	0.1362	1854.0403	0.00	0.9999
Year:MeadowM5	0.3876	0.3614	1.07	0.2835
Year:MeadowM6	0.1824	1139.4721	0.00	0.9999
Year:RegionGallatin	0.0818	782.5119	0.00	0.9999
MeadowM2:RegionGallatin	1.3262	7366.4376	0.00	0.9999
MeadowM3:RegionGallatin	20.0447	9111.9602	0.00	0.9982
MeadowM5:RegionGallatin	2.2875	7641.3409	0.00	0.9998
MeadowM6:RegionGallatin	20.0447	9111.9602	0.00	0.9982

47 *Papilio rutulus*

Table C93: Poisson regression fitted models for *Papilio rutulus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.002e^{0.645(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.777e^{-0.03(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.542e^{-0.046(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.913e^{-0.256(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.304(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.52e^{-0.12(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.794(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.811(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{-1.021(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.461(YEAR-1997)}$	

Null deviance: 85.825 on 80 degrees of freedom  
Residual deviance: 37.476 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 110.53

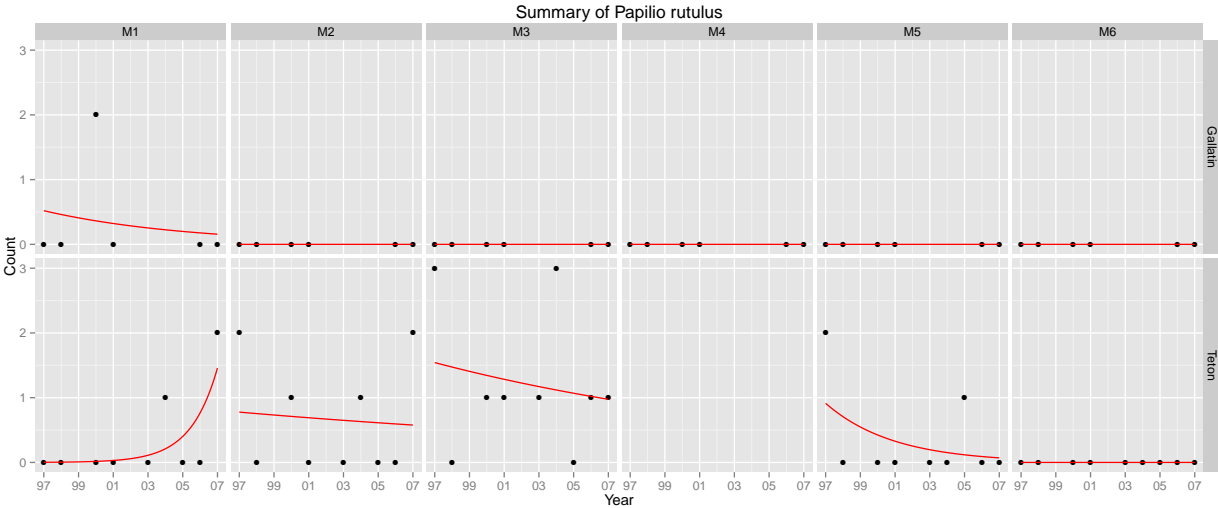


Figure C47: Time series plot of *Papilio rutulus* by region and meadow type

# Papilio rutulus

Table C94: Poisson regression parameter estimates for *Papilio rutulus*

	Estimate	Std. Error	z value	P-value
(Intercept)	-6.0717	3.8800	-1.56	0.1176
Year	0.6449	0.4263	1.51	0.1303
MeadowM2	5.8199	3.9484	1.47	0.1405
MeadowM3	6.5051	3.9156	1.66	0.0966
MeadowM4	-19.6485	9872.5556	-0.00	0.9984
MeadowM5	5.9812	3.9589	1.51	0.1308
MeadowM6	-16.1950	15369.9079	-0.00	0.9992
RegionGallatin	5.4176	3.9981	1.36	0.1754
Year:MeadowM2	-0.6747	0.4433	-1.52	0.1280
Year:MeadowM3	-0.6908	0.4356	-1.59	0.1128
Year:MeadowM4	0.1198	1680.8155	0.00	0.9999
Year:MeadowM5	-0.9011	0.4710	-1.91	0.0558
Year:MeadowM6	-0.3410	1842.0935	-0.00	0.9999
Year:RegionGallatin	-0.7647	0.4791	-1.60	0.1105
MeadowM2:RegionGallatin	-23.7856	5318.5950	-0.00	0.9964
MeadowM3:RegionGallatin	-24.4564	5304.6272	-0.00	0.9963
MeadowM5:RegionGallatin	-23.6542	4850.1450	-0.00	0.9961
MeadowM6:RegionGallatin	-2.2082	14673.9662	-0.00	0.9999

# 48 Oeneis chryxus chryxus

Table C95: Poisson regression fitted models for Oeneis chryxus chryxus

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{16.723(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0e^{0.324(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.684e^{0.113(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.078(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.097(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{16.574(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.121e^{0.175(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.389e^{-0.036(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.709e^{-0.09(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 3.537e^{-0.07(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 1.031e^{-0.051(YEAR-1997)}$	

Null deviance: 142.288 on 80 degrees of freedom  
Residual deviance: 59.003 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 141.79

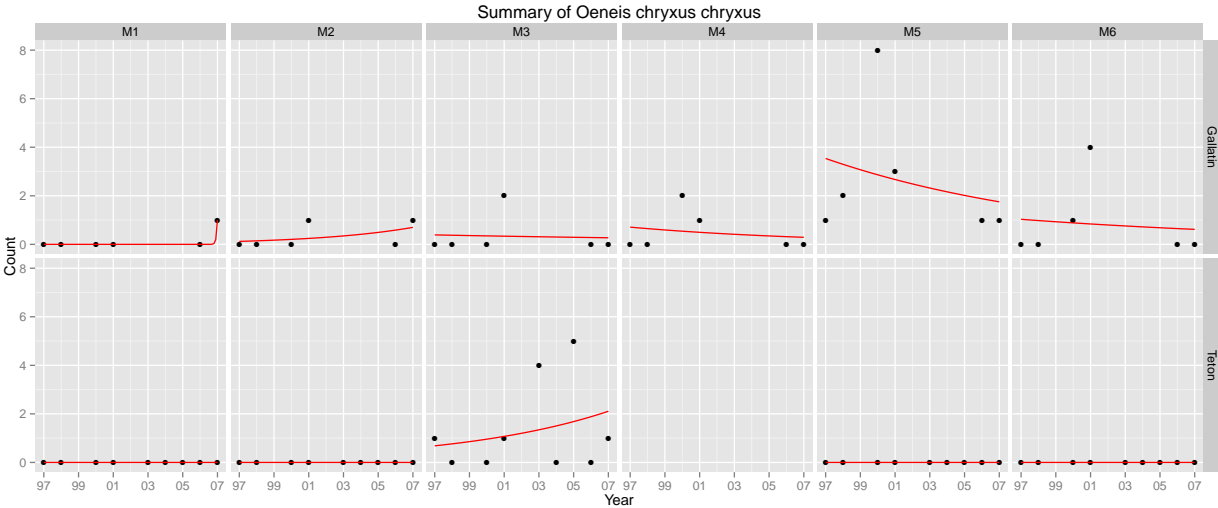


Figure C48: Time series plot of Oeneis chryxus chryxus by region and meadow type

# Oeneis chryxus chryxus

Table C96: Poisson regression parameter estimates for Oeneis chryxus chryxus

	Estimate	Std. Error	z value	P-value
(Intercept)	-186.5095	25834.4210	-0.01	0.9942
Year	16.7228	2409.1269	0.01	0.9945
MeadowM2	162.1045	29057.2226	0.01	0.9955
MeadowM3	186.1292	25834.4209	0.01	0.9943
MeadowM4	165.3960	24091.2683	0.01	0.9945
MeadowM5	163.8753	29039.4101	0.01	0.9955
MeadowM6	163.6777	29288.3464	0.01	0.9955
RegionGallatin	20.7691	9328.8900	0.00	0.9982
Year:MeadowM2	-16.3989	2409.1269	-0.01	0.9946
Year:MeadowM3	-16.6102	2409.1269	-0.01	0.9945
Year:MeadowM4	-16.6636	2409.1269	-0.01	0.9945
Year:MeadowM5	-16.6443	2409.1269	-0.01	0.9945
Year:MeadowM6	-16.6254	2409.1269	-0.01	0.9945
Year:RegionGallatin	-0.1487	0.2152	-0.69	0.4896
MeadowM2:RegionGallatin	1.5260	16246.0169	0.00	0.9999
MeadowM3:RegionGallatin	-21.3339	9328.8898	-0.00	0.9982
MeadowM5:RegionGallatin	3.1284	16214.1365	0.00	0.9998
MeadowM6:RegionGallatin	2.0934	16655.8733	0.00	0.9999

# 49 Parnassius clodius

Table C97: Poisson regression fitted models for Parnassius clodius

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.487e^{0.136(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.547e^{-0.218(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.801e^{-0.043(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.503e^{0.097(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.667e^{0(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.961e^{0.12(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.234(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.06(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 6.938e^{-0.034(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0.661e^{0.081(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.016(YEAR-1997)}$	

Null deviance: 225.30 on 80 degrees of freedom  
Residual deviance: 100.16 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 221.89

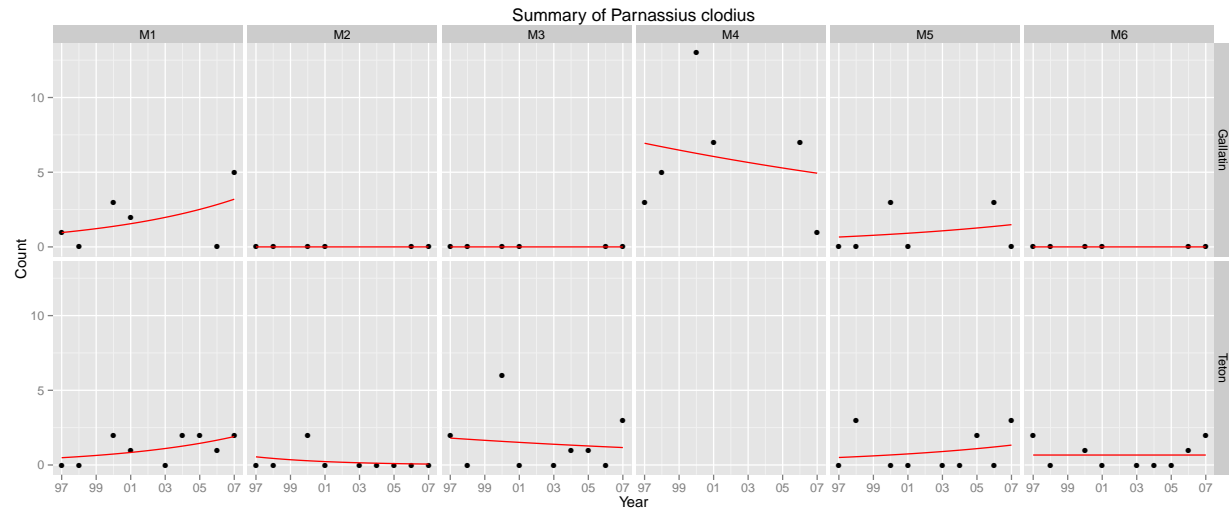


Figure C49: Time series plot of Parnassius clodius by region and meadow type

# Parnassius clodius

Table C98: Poisson regression parameter estimates for Parnassius clodius

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.7189	0.6865	-1.05	0.2950
Year	0.1362	0.0907	1.50	0.1332
MeadowM2	0.1150	1.2093	0.10	0.9242
MeadowM3	1.3074	0.8414	1.55	0.1202
MeadowM4	1.9767	0.6039	3.27	0.0011
MeadowM5	0.0310	0.8126	0.04	0.9695
MeadowM6	0.3135	1.0318	0.30	0.7613
RegionGallatin	0.6792	0.7936	0.86	0.3921
Year:MeadowM2	-0.3542	0.2506	-1.41	0.1575
Year:MeadowM3	-0.1796	0.1226	-1.46	0.1430
Year:MeadowM4	-0.1541	0.0866	-1.78	0.0750
Year:MeadowM5	-0.0389	0.1011	-0.38	0.7005
Year:MeadowM6	-0.1362	0.1524	-0.89	0.3714
Year:RegionGallatin	-0.0162	0.1010	-0.16	0.8727
MeadowM2:RegionGallatin	-17.3156	1975.1833	-0.01	0.9930
MeadowM3:RegionGallatin	-19.3141	2319.5165	-0.01	0.9934
MeadowM5:RegionGallatin	-0.4048	0.6990	-0.58	0.5626
MeadowM6:RegionGallatin	-18.4667	2289.4471	-0.01	0.9936

## 50 Pieris napi morph 1

Table C99: Poisson regression fitted models for *Pieris napi* morph 1

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 2.413e^{-0.048(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 1.49e^{0.021(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.599e^{0.02(YEAR-1997)}$	***
5	Teton	M5	$\hat{Y} = 0.724e^{-0.328(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0.6e^{-0.06(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 5.345e^{-0.015(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 2.947e^{0.054(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 2.187e^{0.053(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 1.109e^{-0.024(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 1.547e^{-0.295(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0.562e^{-0.027(YEAR-1997)}$	***

Null deviance: 246.01 on 80 degrees of freedom

Residual deviance: 147.04 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 298.99

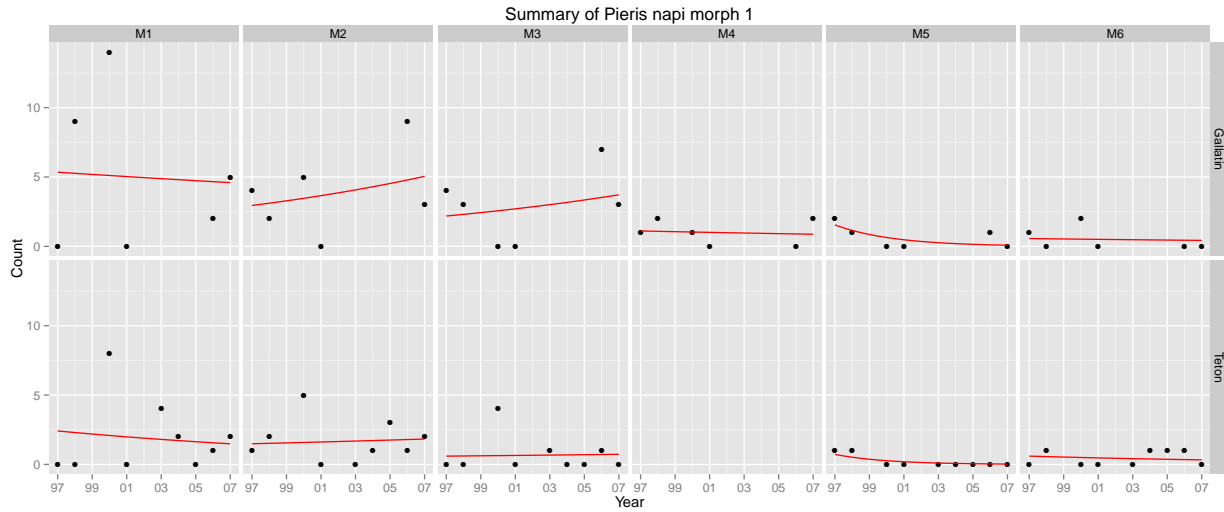


Figure C50: Time series plot of *Pieris napi* marginalis by region and meadow type



# Pieris napi morph 1

Table C100: Poisson regression parameter estimates for Pieris napi morph 1

	Estimate	Std. Error	z value	P-value
(Intercept)	0.8810	0.3601	2.45	0.0144
Year	-0.0484	0.0556	-0.87	0.3837
MeadowM2	-0.4822	0.4743	-1.02	0.3094
MeadowM3	-1.3943	0.6033	-2.31	0.0208
MeadowM4	-1.5729	0.6686	-2.35	0.0187
MeadowM5	-1.2044	0.8629	-1.40	0.1628
MeadowM6	-1.3915	0.7759	-1.79	0.0729
RegionGallatin	0.7951	0.3985	2.00	0.0460
Year:MeadowM2	0.0690	0.0602	1.15	0.2517
Year:MeadowM3	0.0682	0.0694	0.98	0.3259
Year:MeadowM4	-0.0087	0.1188	-0.07	0.9419
Year:MeadowM5	-0.2800	0.1780	-1.57	0.1157
Year:MeadowM6	-0.0117	0.1158	-0.10	0.9193
Year:RegionGallatin	0.0332	0.0556	0.60	0.5500
MeadowM2:RegionGallatin	-0.1133	0.4528	-0.25	0.8025
MeadowM3:RegionGallatin	0.5005	0.5662	0.88	0.3767
MeadowM5:RegionGallatin	-0.0356	0.9330	-0.04	0.9695
MeadowM6:RegionGallatin	-0.8617	0.8242	-1.05	0.2958

## 51 *Lycaena cupreus*

Table C101: Poisson regression fitted models for *Lycaena cupreus*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.001e^{0.645(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.012e^{0.323(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{0.083(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.146(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 2.504e^{-0.162(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{0.463(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{0.141(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.099(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.344(YEAR-1997)}$	

Null deviance: 87.484 on 80 degrees of freedom

Residual deviance: 40.719 on 63 degrees of freedom

(51 observations deleted due to missingness)

AIC: 89.792

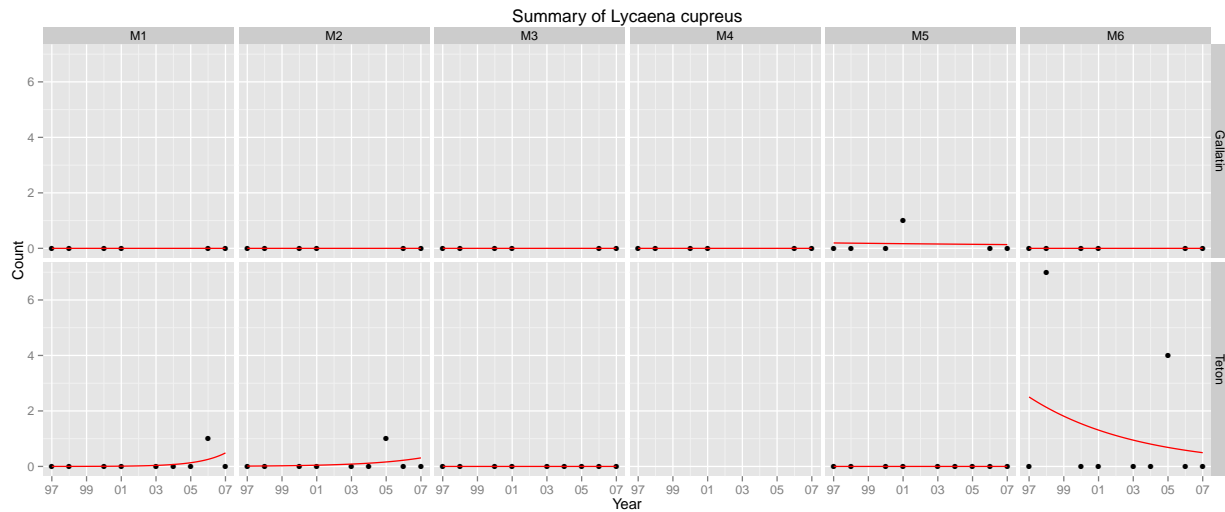


Figure C51: Time series plot of *Lycaena cupreus* by region and meadow type

# Lycaena cupreus

Table C102: Poisson regression parameter estimates for Lycaena cupreus

	Estimate	Std. Error	z value	P-value
(Intercept)	-7.1703	6.7203	-1.07	0.2860
Year	0.6449	0.7384	0.87	0.3824
MeadowM2	2.7628	7.6739	0.36	0.7188
MeadowM3	-13.5917	9521.3696	-0.00	0.9989
MeadowM4	3.0855	14154.2022	0.00	0.9998
MeadowM5	-13.9908	8171.5234	-0.00	0.9986
MeadowM6	8.0881	6.7353	1.20	0.2298
RegionGallatin	-16.2177	10142.6846	-0.00	0.9987
Year:MeadowM2	-0.3219	0.8626	-0.37	0.7091
Year:MeadowM3	-0.5624	1291.2438	-0.00	0.9997
Year:MeadowM4	-0.4631	1925.0686	-0.00	0.9998
Year:MeadowM5	-0.4993	938.4819	-0.00	0.9996
Year:MeadowM6	-0.8069	0.7444	-1.08	0.2784
Year:RegionGallatin	-0.1818	938.4817	-0.00	0.9998
MeadowM2:RegionGallatin	-0.3206	8381.4899	-0.00	1.0000
MeadowM3:RegionGallatin	17.0882	11269.5845	0.00	0.9988
MeadowM5:RegionGallatin	35.7406	7759.3888	0.00	0.9963
MeadowM6:RegionGallatin	-3.7642	10504.6345	-0.00	0.9997

52 Pontia occidentalis

Table C103: Poisson regression fitted models for Pontia occidentalis

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.116e^{0.11(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.308e^{-0.261(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.012e^{0.323(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.329e^{-0.286(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.049(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.33e^{0.002(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.432e^{-0.369(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{0.215(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.195e^{0.102(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.894e^{-0.394(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{-0.058(YEAR-1997)}$	

Null deviance: 48.602 on 80 degrees of freedom  
Residual deviance: 33.174 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 91.788



Figure C52: Time series plot of Pontia occidentalis by region and meadow type

## Pontia occidentalis

Table C104: Poisson regression parameter estimates for *Pontia occidentalis*

	Estimate	Std. Error	z value	P-value
(Intercept)	-2.1533	1.5018	-1.43	0.1516
Year	0.1097	0.2047	0.54	0.5921
MeadowM2	0.9769	1.8748	0.52	0.6023
MeadowM3	-2.2543	3.9977	-0.56	0.5728
MeadowM4	-0.5271	1.6904	-0.31	0.7552
MeadowM5	1.0406	1.8003	0.58	0.5633
MeadowM6	-17.4185	5249.3337	-0.00	0.9974
RegionGallatin	1.0460	1.7162	0.61	0.5422
Year:MeadowM2	-0.3706	0.3325	-1.11	0.2650
Year:MeadowM3	0.2134	0.4907	0.43	0.6636
Year:MeadowM4	0.1002	0.2541	0.39	0.6934
Year:MeadowM5	-0.3958	0.3046	-1.30	0.1937
Year:MeadowM6	-0.0603	717.9730	-0.00	0.9999
Year:RegionGallatin	-0.1078	0.2397	-0.45	0.6529
MeadowM2:RegionGallatin	-0.7080	2.0260	-0.35	0.7267
MeadowM3:RegionGallatin	-17.0441	3483.4888	-0.00	0.9961
MeadowM5:RegionGallatin	-0.0450	1.8811	-0.02	0.9809
MeadowM6:RegionGallatin	-0.5247	5179.4500	-0.00	0.9999

53 *Speyeria cybele*

Table C105: Poisson regression fitted models for *Speyeria cybele*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 3.901e^{-0.078(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 2.622e^{-0.08(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.194e^{-0.119(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.031(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.031(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{-0.009(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.011(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0e^{-0.051(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.008e^{0.425(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{0.037(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.037(YEAR-1997)}$	

Null deviance: 216.878 on 80 degrees of freedom  
Residual deviance: 99.723 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 163.34

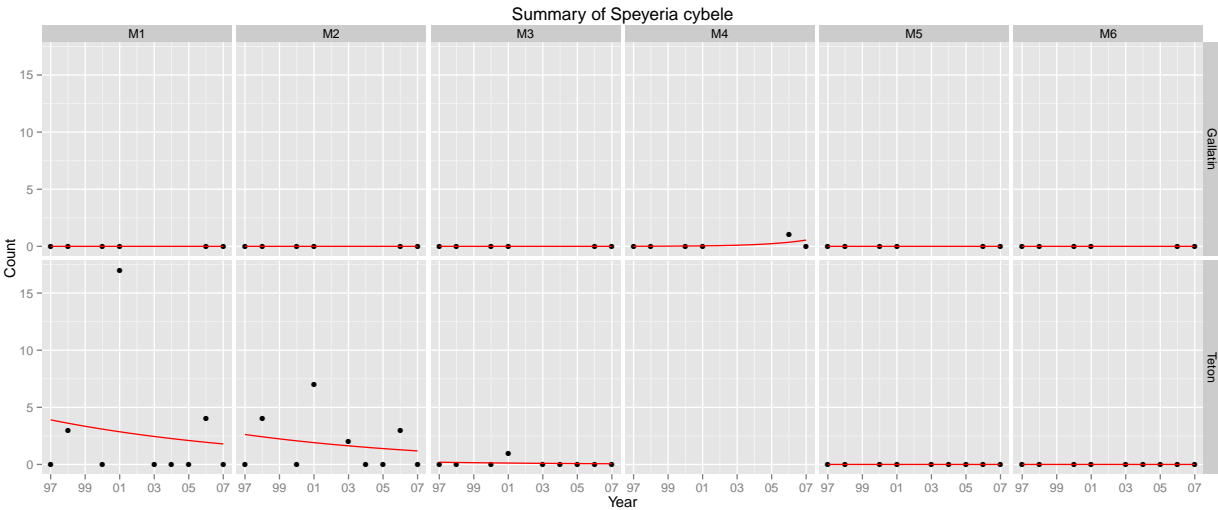


Figure C53: Time series plot of *Speyeria cybele* by region and meadow type

# Speyeria cybele

Table C106: Poisson regression parameter estimates for *Speyeria cybele*

	Estimate	Std. Error	z value	P-value
(Intercept)	1.3613	0.3397	4.01	0.0001
Year	-0.0777	0.0609	-1.28	0.2019
MeadowM2	-0.3972	0.5362	-0.74	0.4588
MeadowM3	-3.0033	1.6077	-1.87	0.0618
MeadowM4	14.4127	4440.5050	0.00	0.9974
MeadowM5	-20.4938	4760.1158	-0.00	0.9966
MeadowM6	-20.4938	4760.1158	-0.00	0.9966
RegionGallatin	-20.6219	4440.5027	-0.00	0.9963
Year:MeadowM2	-0.0019	0.0963	-0.02	0.9846
Year:MeadowM3	-0.0413	0.3091	-0.13	0.8936
Year:MeadowM4	0.4342	507.7862	0.00	0.9993
Year:MeadowM5	0.0463	720.0791	0.00	0.9999
Year:MeadowM6	0.0463	720.0791	0.00	0.9999
Year:RegionGallatin	0.0684	507.7860	0.00	0.9999
MeadowM2:RegionGallatin	0.4046	5440.9777	0.00	0.9999
MeadowM3:RegionGallatin	3.2089	5398.2168	0.00	0.9995
MeadowM5:RegionGallatin	20.2895	6269.3564	0.00	0.9974
MeadowM6:RegionGallatin	20.2895	6269.3564	0.00	0.9974

54 *Speyeria hydaspe*

Table C107: Poisson regression fitted models for *Speyeria hydaspe*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.709e^{-0.098(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.29e^{-0.053(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.145e^{-0.053(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0.206e^{-0.135(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.285(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.215e^{0.151(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.104e^{0.196(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.052e^{0.196(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.091e^{0.114(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	

Null deviance: 64.036 on 80 degrees of freedom  
Residual deviance: 49.248 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 111.47

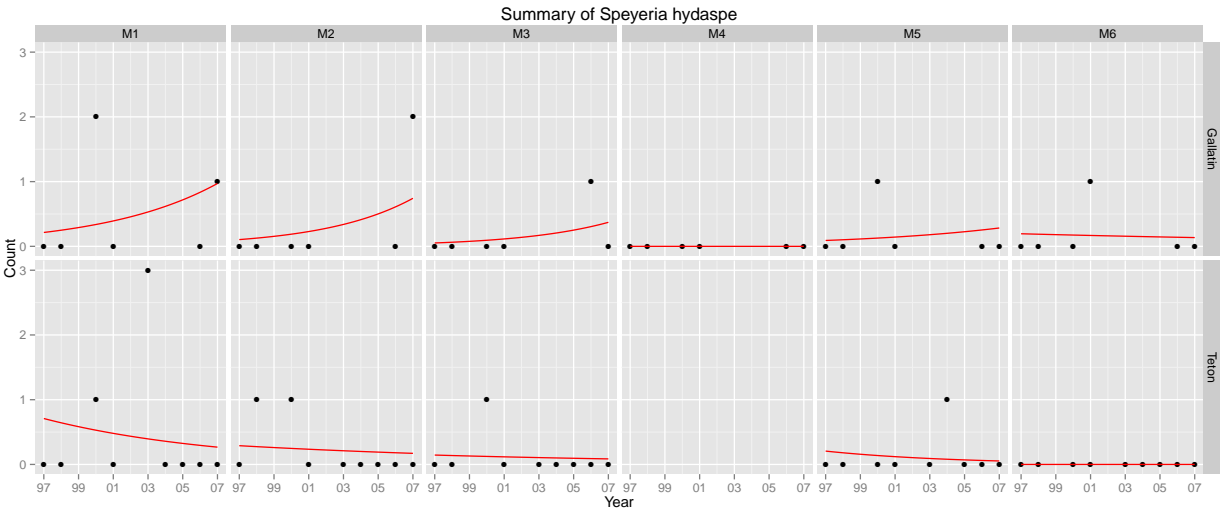


Figure C54: Time series plot of *Speyeria hydaspe* by region and meadow type



# Speyeria hydaspe

Table C108: Poisson regression parameter estimates for Speyeria hydaspe

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.3438	0.7435	-0.46	0.6438
Year	-0.0976	0.1299	-0.75	0.4523
MeadowM2	-0.8957	1.2046	-0.74	0.4571
MeadowM3	-1.5888	1.5608	-1.02	0.3087
MeadowM4	-17.7632	5988.0077	-0.00	0.9976
MeadowM5	-1.2365	1.4316	-0.86	0.3877
MeadowM6	-17.7202	2904.4904	-0.01	0.9951
RegionGallatin	-1.1956	1.1567	-1.03	0.3013
Year:MeadowM2	0.0451	0.1828	0.25	0.8050
Year:MeadowM3	0.0451	0.2345	0.19	0.8474
Year:MeadowM4	-0.1510	1019.4661	-0.00	0.9999
Year:MeadowM5	-0.0371	0.2281	-0.16	0.8706
Year:MeadowM6	-0.1872	0.3048	-0.61	0.5391
Year:RegionGallatin	0.2487	0.1497	1.66	0.0968
MeadowM2:RegionGallatin	0.1754	1.3399	0.13	0.8959
MeadowM3:RegionGallatin	0.1754	1.7122	0.10	0.9184
MeadowM5:RegionGallatin	0.3768	1.6982	0.22	0.8244
MeadowM6:RegionGallatin	17.6214	2904.4906	0.01	0.9952

55 Euphydryas gillettii

Table C109: Poisson regression fitted models for Euphydryas gillettii

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.209e^{0.126(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.179e^{0.039(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{-0.503(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.331e^{0.129(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 1.77e^{0.042(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.505e^{-0.5(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0e^{0.003(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.003(YEAR-1997)}$	

Null deviance: 94.798 on 80 degrees of freedom  
Residual deviance: 32.463 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 99.932

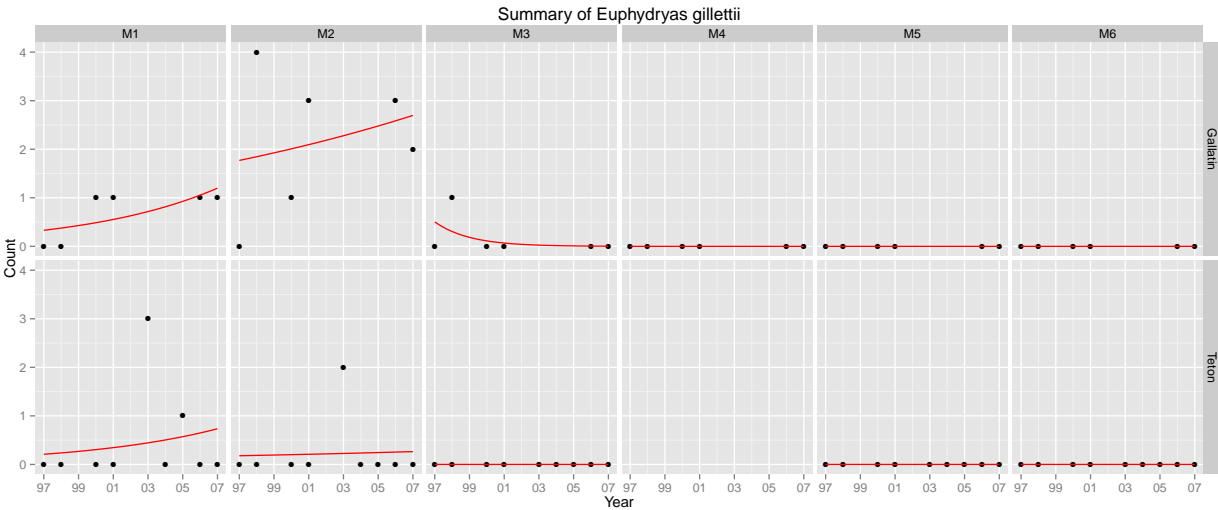


Figure C55: Time series plot of Euphydryas gillettii by region and meadow type

# Euphydryas gillettii

Table C110: Poisson regression parameter estimates for Euphydryas gillettii

	Estimate	Std. Error	z value	P-value
(Intercept)	-1.5643	1.0554	-1.48	0.1383
Year	0.1256	0.1404	0.89	0.3710
MeadowM2	-0.1564	1.1885	-0.13	0.8953
MeadowM3	-17.0204	4573.7491	-0.00	0.9970
MeadowM4	-19.1968	9872.5556	-0.00	0.9984
MeadowM5	-18.7073	7842.5481	-0.00	0.9981
MeadowM6	-18.7073	7842.5481	-0.00	0.9981
RegionGallatin	0.4585	1.2376	0.37	0.7110
Year:MeadowM2	-0.0866	0.1326	-0.65	0.5140
Year:MeadowM3	-0.6291	0.6850	-0.92	0.3584
Year:MeadowM4	-0.1287	1680.8155	-0.00	0.9999
Year:MeadowM5	-0.1257	1116.9675	-0.00	0.9999
Year:MeadowM6	-0.1257	1116.9675	-0.00	0.9999
Year:RegionGallatin	0.0031	0.1556	0.02	0.9842
MeadowM2:RegionGallatin	1.8330	1.0470	1.75	0.0800
MeadowM3:RegionGallatin	17.4421	4573.7492	0.00	0.9970
MeadowM5:RegionGallatin	-0.4498	8061.9500	-0.00	1.0000
MeadowM6:RegionGallatin	-0.4498	8061.9500	-0.00	1.0000

56 *Colias christina*

Table C111: Poisson regression fitted models for *Colias christina*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{-0.096(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.359e^{-0.014(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.104e^{0.012(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.244(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.226(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{0.112(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.106e^{0.194(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.044e^{0.22(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.699e^{-0.24(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.389e^{-0.036(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.721e^{-0.018(YEAR-1997)}$	

Null deviance: 56.137 on 80 degrees of freedom  
Residual deviance: 33.770 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 96.997

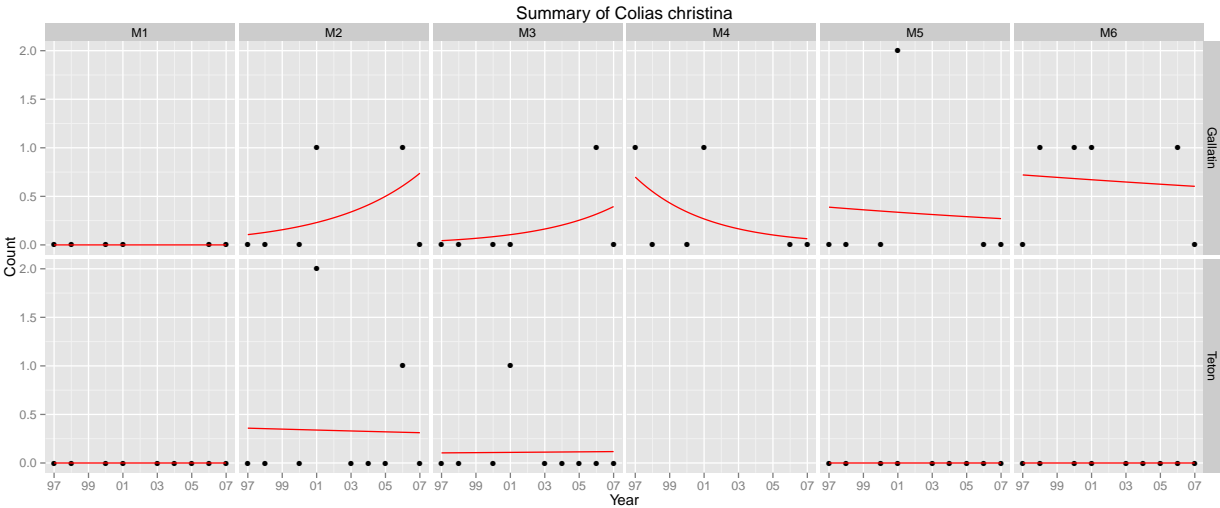


Figure C56: Time series plot of *Colias christina* by region and meadow type

## Colias christina

Table C112: Poisson regression parameter estimates for *Colias christina*

	Estimate	Std. Error	z value	P-value
(Intercept)	-19.8117	6971.3336	-0.00	0.9977
Year	-0.0965	1116.9903	-0.00	0.9999
MeadowM2	18.7864	6971.3337	0.00	0.9978
MeadowM3	17.5489	6971.3338	0.00	0.9980
MeadowM4	20.4867	9233.8208	0.00	0.9982
MeadowM5	0.5942	8524.1021	0.00	0.9999
MeadowM6	0.5481	8515.3759	0.00	0.9999
RegionGallatin	-1.0336	8294.1078	-0.00	0.9999
Year:MeadowM2	0.0825	1116.9903	0.00	0.9999
Year:MeadowM3	0.1086	1116.9903	0.00	0.9999
Year:MeadowM4	-0.3516	1116.9904	-0.00	0.9997
Year:MeadowM5	-0.1478	1116.9903	-0.00	0.9999
Year:MeadowM6	-0.1294	1116.9903	-0.00	0.9999
Year:RegionGallatin	0.2081	0.2267	0.92	0.3587
MeadowM2:RegionGallatin	-0.1864	8294.1078	-0.00	1.0000
MeadowM3:RegionGallatin	0.1652	8294.1079	0.00	1.0000
MeadowM5:RegionGallatin	19.3060	9636.0287	0.00	0.9984
MeadowM6:RegionGallatin	19.9695	9628.3102	0.00	0.9983

# 57 Pieris napi morph 2

Table C113: Poisson regression fitted models for Pieris napi morph 2

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.581e^{-0.119(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.581e^{-0.119(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.194e^{-0.119(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{-0.119(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.119(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 1.166e^{-0.036(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 1.36e^{-0.036(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 2.138e^{-0.036(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.194e^{-0.036(YEAR-1997)}$	

Null deviance: 173.71 on 80 degrees of freedom  
Residual deviance: 125.93 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 187.63

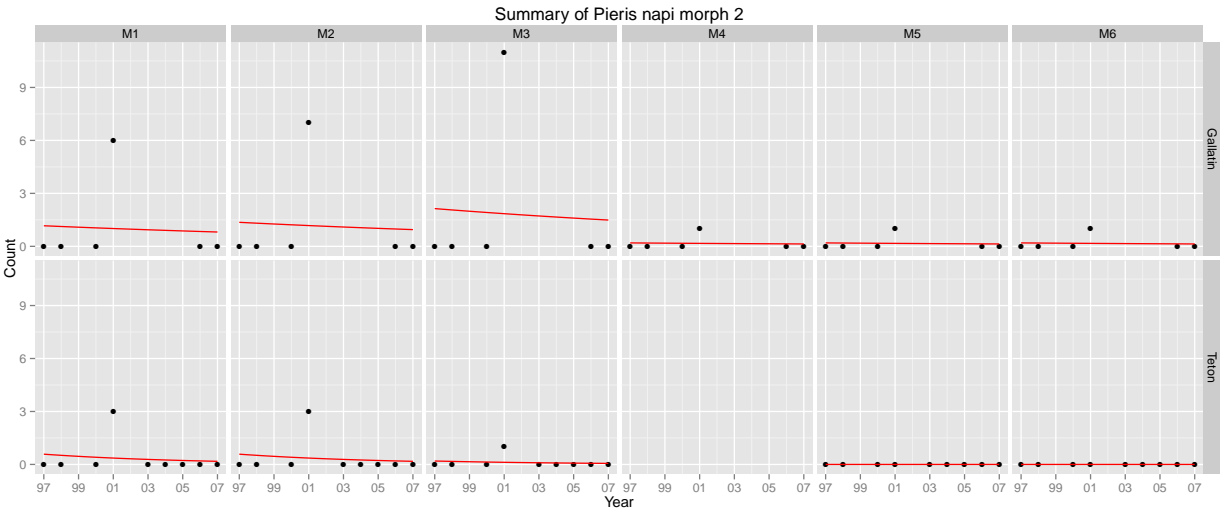


Figure C57: Time series plot of Pieris napi morph 2 by region and meadow type

## Pieris napi morph 2

Table C114: Poisson regression parameter estimates for Pieris napi morph 2

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.5433	0.7845	-0.69	0.4886
Year	-0.1191	0.1328	-0.90	0.3700
MeadowM2	-0.0000	0.9673	-0.00	1.0000
MeadowM3	-1.0986	1.2610	-0.87	0.3836
MeadowM4	-1.7918	1.5906	-1.13	0.2600
MeadowM5	-17.1761	1879.4264	-0.01	0.9927
MeadowM6	-17.1761	1879.4264	-0.01	0.9927
RegionGallatin	0.6969	0.8821	0.79	0.4295
Year:MeadowM2	0.0000	0.1297	0.00	1.0000
Year:MeadowM3	0.0000	0.1267	0.00	1.0000
Year:MeadowM4	-0.0000	0.2919	-0.00	1.0000
Year:MeadowM5	0.0000	0.2919	0.00	1.0000
Year:MeadowM6	-0.0000	0.2919	-0.00	1.0000
Year:RegionGallatin	0.0829	0.1318	0.63	0.5294
MeadowM2:RegionGallatin	0.1542	0.9880	0.16	0.8760
MeadowM3:RegionGallatin	1.7047	1.2613	1.35	0.1765
MeadowM5:RegionGallatin	15.3843	1879.4264	0.01	0.9935
MeadowM6:RegionGallatin	15.3843	1879.4264	0.01	0.9935

## 58 *Lycaena nivalis*

Table C115: Poisson regression fitted models for *Lycaena nivalis*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0e^{0.008(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.581e^{-0.119(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 1.288e^{-0.029(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 3.836e^{-0.009(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 1.812e^{0.053(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0e^{-0.009(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0e^{-0.137(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.202e^{-0.046(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0.972e^{-0.036(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.187e^{-0.026(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0e^{0.035(YEAR-1997)}$	

Null deviance: 212.26 on 80 degrees of freedom  
Residual deviance: 87.72 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 190.85

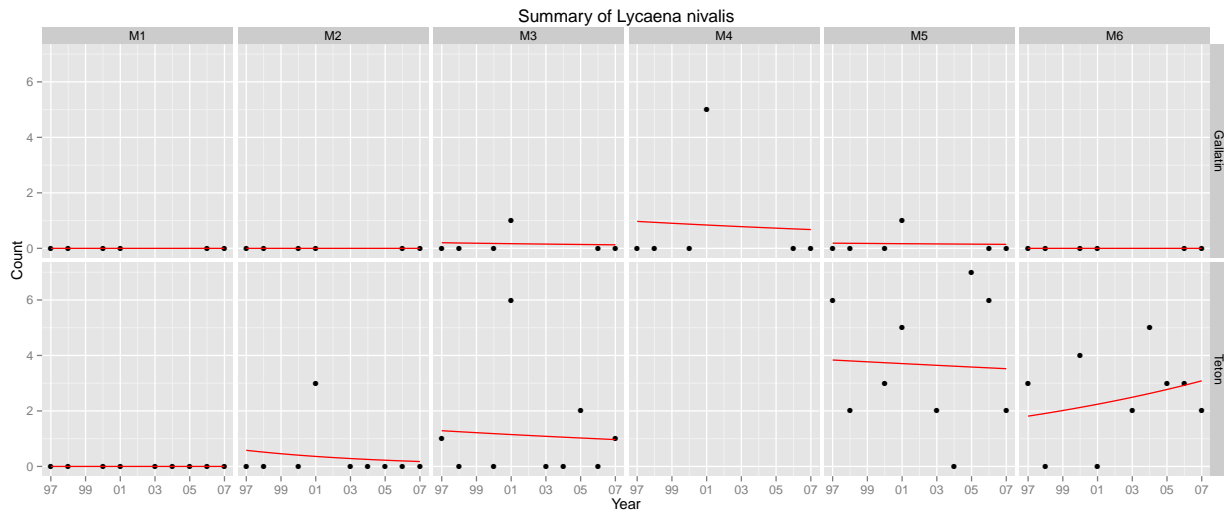


Figure C58: Time series plot of *Lycaena nivalis* by region and meadow type



# Lycaena nivalis

Table C116: Poisson regression parameter estimates for *Lycaena nivalis*

	Estimate	Std. Error	z value	P-value
(Intercept)	-19.3446	4903.3686	-0.00	0.9969
Year	0.0083	694.4784	0.00	1.0000
MeadowM2	18.8013	4903.3687	0.00	0.9969
MeadowM3	19.5977	4903.3687	0.00	0.9968
MeadowM4	19.2276	4892.9002	0.00	0.9969
MeadowM5	20.6889	4903.3686	0.00	0.9966
MeadowM6	19.9393	4903.3687	0.00	0.9968
RegionGallatin	0.0883	5013.5831	0.00	1.0000
Year:MeadowM2	-0.1273	694.4784	-0.00	0.9999
Year:MeadowM3	-0.0368	694.4784	-0.00	1.0000
Year:MeadowM4	-0.0267	694.4784	-0.00	1.0000
Year:MeadowM5	-0.0168	694.4784	-0.00	1.0000
Year:MeadowM6	0.0449	694.4784	0.00	0.9999
Year:RegionGallatin	-0.0177	0.2006	-0.09	0.9296
MeadowM2:RegionGallatin	-18.1185	6070.0221	-0.00	0.9976
MeadowM3:RegionGallatin	-1.9397	5013.5831	-0.00	0.9997
MeadowM5:RegionGallatin	-3.1111	5013.5831	-0.00	0.9995
MeadowM6:RegionGallatin	-20.1432	6307.4825	-0.00	0.9975

59 Boloria selene

Table C117: Poisson regression fitted models for Boloria selene

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 12.881e^{-0.029(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 7.858e^{-0.01(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0e^{0.025(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.007(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{0.007(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.796e^{-0.042(YEAR-1997)}$	***
8	Gallatin	M2	$\hat{Y} = 5.914e^{-0.024(YEAR-1997)}$	***
9	Gallatin	M3	$\hat{Y} = 0.474e^{0.012(YEAR-1997)}$	***
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	***
11	Gallatin	M5	$\hat{Y} = 0e^{-0.007(YEAR-1997)}$	***
12	Gallatin	M6	$\hat{Y} = 0e^{-0.007(YEAR-1997)}$	***

Null deviance: 569.32 on 80 degrees of freedom  
Residual deviance: 102.22 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 233.16

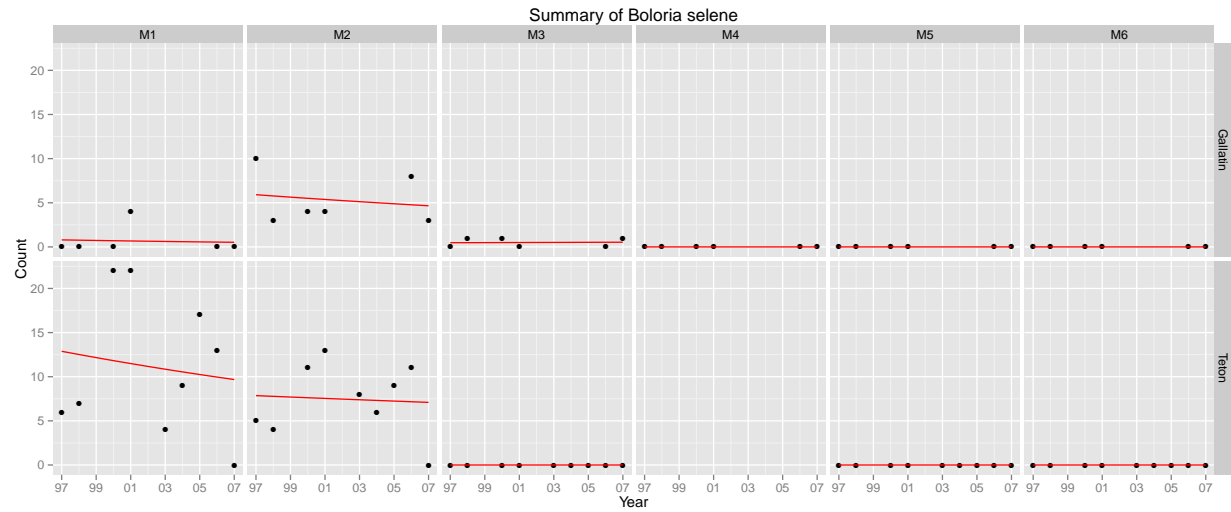


Figure C59: Time series plot of Boloria selene by region and meadow type

## Boloria selene

Table C118: Poisson regression parameter estimates for Boloria selene

	Estimate	Std. Error	z value	P-value
(Intercept)	2.5558	0.1773	14.41	0.0000
Year	-0.0286	0.0292	-0.98	0.3280
MeadowM2	-0.4942	0.2793	-1.77	0.0768
MeadowM3	-21.9754	3109.3473	-0.01	0.9944
MeadowM4	-19.0746	5988.0077	-0.00	0.9975
MeadowM5	-21.8874	4878.8899	-0.00	0.9964
MeadowM6	-21.8874	4878.8899	-0.00	0.9964
RegionGallatin	-2.7838	0.5561	-5.01	0.0000
Year:MeadowM2	0.0183	0.0448	0.41	0.6828
Year:MeadowM3	0.0538	0.1634	0.33	0.7419
Year:MeadowM4	0.0422	1019.4661	0.00	1.0000
Year:MeadowM5	0.0351	691.8904	0.00	1.0000
Year:MeadowM6	0.0351	691.8904	0.00	1.0000
Year:RegionGallatin	-0.0136	0.0553	-0.25	0.8055
MeadowM2:RegionGallatin	2.4996	0.5560	4.50	0.0000
MeadowM3:RegionGallatin	21.4570	3109.3473	0.01	0.9945
MeadowM5:RegionGallatin	2.8550	4994.9315	0.00	0.9995
MeadowM6:RegionGallatin	2.8550	4994.9315	0.00	0.9995

60    *Phyciodes tharos*

Table C119: Poisson regression fitted models for *Phyciodes tharos*

	Region	Meadow	Model	Sig
1	Teton	M1	$\hat{Y} = 0.41e^{-0.133(YEAR-1997)}$	
2	Teton	M2	$\hat{Y} = 0.22e^{0.002(YEAR-1997)}$	
3	Teton	M3	$\hat{Y} = 0.097e^{0.024(YEAR-1997)}$	
5	Teton	M5	$\hat{Y} = 0e^{0.009(YEAR-1997)}$	
6	Teton	M6	$\hat{Y} = 0e^{-0.078(YEAR-1997)}$	
7	Gallatin	M1	$\hat{Y} = 0.238e^{-0.091(YEAR-1997)}$	
8	Gallatin	M2	$\hat{Y} = 0.27e^{0.044(YEAR-1997)}$	
9	Gallatin	M3	$\hat{Y} = 0.36e^{0.066(YEAR-1997)}$	
10	Gallatin	M4	$\hat{Y} = 0e^{0(YEAR-1997)}$	
11	Gallatin	M5	$\hat{Y} = 0.519e^{0.051(YEAR-1997)}$	
12	Gallatin	M6	$\hat{Y} = 0.583e^{-0.036(YEAR-1997)}$	

Null deviance: 72.875 on 80 degrees of freedom  
Residual deviance: 53.731 on 63 degrees of freedom  
(51 observations deleted due to missingness)  
AIC: 116.94

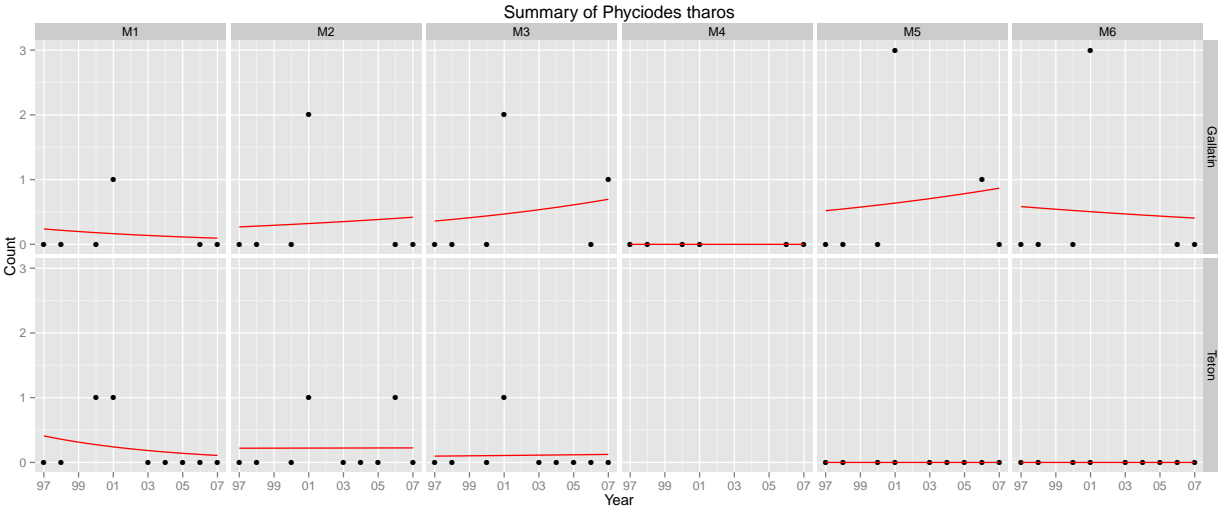


Figure C60: Time series plot of *Phyciodes tharos* by region and meadow type

# Phyciodes tharos

Table C120: Poisson regression parameter estimates for Phyciodes tharos

	Estimate	Std. Error	z value	P-value
(Intercept)	-0.8923	1.0057	-0.89	0.3749
Year	-0.1334	0.1860	-0.72	0.4732
MeadowM2	-0.6231	1.4509	-0.43	0.6676
MeadowM3	-1.4359	1.6908	-0.85	0.3957
MeadowM4	-17.8661	5988.0078	-0.00	0.9976
MeadowM5	-18.4280	3091.7226	-0.01	0.9952
MeadowM6	-17.9987	3096.7112	-0.01	0.9954
RegionGallatin	-0.5441	1.3899	-0.39	0.6954
Year:MeadowM2	0.1356	0.2267	0.60	0.5499
Year:MeadowM3	0.1574	0.2357	0.67	0.5043
Year:MeadowM4	0.0915	1019.4661	0.00	0.9999
Year:MeadowM5	0.1428	0.2487	0.57	0.5660
Year:MeadowM6	0.0553	0.2645	0.21	0.8344
Year:RegionGallatin	0.0420	0.1860	0.23	0.8215
MeadowM2:RegionGallatin	0.7485	1.6179	0.46	0.6437
MeadowM3:RegionGallatin	1.8508	1.7295	1.07	0.2845
MeadowM5:RegionGallatin	19.2092	3091.7226	0.01	0.9950
MeadowM6:RegionGallatin	18.8956	3096.7112	0.01	0.9951