

Supplemental materials: False spring damage on temperate tree seedlings is amplified with winter warming

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Supplemental Materials and Methods: Data analysis and model equations

Using Bayesian hierarchical models, we estimated the effects of chilling duration, false spring treatment and all two-way interactions as predictors with species modeled hierarchically as grouping factors. False spring treatment is written as ‘tx’ in the equation below and chilling was split into two binary predictors: ‘chill1’, which is denoted as ‘0’ for 4 weeks of chilling or ‘1’ for 6 weeks of chilling and ‘chill2’ which is ‘1’ for 8 weeks of chilling:

$$y_i = \alpha_{species[i]} + \beta_{tx_{species[i]}} X_{tx} + \beta_{chill1_{species[i]}} X_{chill1} + \beta_{chill2_{species[i]}} X_{chill2} + \beta_{txchill1_{species[i]}} X_{txchill1} + \beta_{txchill2_{species[i]}} X_{txchill2} + \epsilon_i \quad (1)$$

$$\epsilon_i \sim N(0, \sigma_y)$$

The α and each of the five β coefficients are modeled at the species level, as follows:

$$\begin{aligned} \alpha_{species} &\sim N(\mu_\alpha, \sigma_\alpha) \\ \beta_{tx_{species}} &\sim N(\mu_{tx}, \sigma_{tx}) \\ \beta_{chill1_{species}} &\sim N(\mu_{chill1}, \sigma_{chill1}) \\ \beta_{chill2_{species}} &\sim N(\mu_{chill2}, \sigma_{chill2}) \\ \beta_{txchill1_{species}} &\sim N(\mu_{txchill1}, \sigma_{txchill1}) \\ \beta_{txchill2_{species}} &\sim N(\mu_{txchill2}, \sigma_{txchill2}) \end{aligned}$$

where i represents each unique observation, $species$ is the species, α represents the intercept, β terms represent slope estimates, and y is the phenology or growth measurement.

23 For the shoot apical meristem model, we used a Bernoulli distribution, which is modeled as:

$$\begin{aligned}
y_i &\sim \text{Binomial}(1, p) \\
\text{logit}(p) &= \alpha_{\text{species}[i]} + \beta_{tx_{\text{species}[i]}} X_{tx} + \beta_{chill1_{\text{species}[i]}} X_{chill1} + \beta_{chill2_{\text{species}[i]}} X_{chill2} \\
&\quad + \beta_{txchill1_{\text{species}[i]}} X_{txchill1} + \beta_{txchill2_{\text{species}[i]}} X_{txchill2} + \epsilon_i
\end{aligned}
\tag{2}$$

24 The α and each of the five β coefficients are modeled the same as the other models:

$$\begin{aligned}
\alpha_{\text{species}} &\sim N(\mu_{\alpha}, \sigma_{\alpha}) \\
\beta_{tx_{\text{species}}} &\sim N(\mu_{tx}, \sigma_{tx}) \\
\beta_{chill1_{\text{species}}} &\sim N(\mu_{chill1}, \sigma_{chill1}) \\
\beta_{chill2_{\text{species}}} &\sim N(\mu_{chill2}, \sigma_{chill2}) \\
\beta_{txchill1_{\text{species}}} &\sim N(\mu_{txchill1}, \sigma_{txchill1}) \\
\beta_{txchill2_{\text{species}}} &\sim N(\mu_{txchill2}, \sigma_{txchill2})
\end{aligned}$$

25 Model estimates for the shoot apical meristem model were modeled on the logit scale (shown in all tables)
26 and were converted to probability percentages in all figures for easier interpretation by following the ‘divide
27 by four’ rule (Gelman & Hill, 2006).

28 References

29 Gelman A , Hill J. 2006. *Data analysis using regression and multilevel/hierarchical models*. Cambridge
30 university press.

31 Supplemental tables and figures

Table S1: Summary of simple linear regression model of day of budburst across chilling treatments.

term	mean	std.err
Intercept	28.58	1.22
Chilling 6 Wks	-2.79	1.74
Chilling 8 Wks	-7.63	1.76

Table S2: Summary of simple linear regression model of duration of vegetative across chilling treatments.

term	mean	std.err
Intercept	18.35	0.54
Chilling 6 Wks	-2.07	0.77
Chilling 8 Wks	-2.72	0.78

Table S3: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on duration of vegetative risk (days between budburst to leafout).

	mean	2%	10%	25%	75%	90%	98%
Intercept	16.02	12.46	13.60	15.08	16.90	18.52	20.23
Tx	2.97	1.13	1.68	2.45	3.49	4.26	4.87
Chill 6 Wks	-0.53	-3.83	-2.73	-1.38	0.32	1.72	2.99
Chill 8 Wks	-2.67	-5.54	-4.56	-3.35	-1.94	-0.85	0.03
Tx:Chill 6 Wks	-0.91	-3.59	-2.78	-1.65	-0.17	0.92	1.85
Tx:Chill 8 Wks	0.62	-1.97	-1.14	-0.08	1.34	2.38	3.25
<i>Acer saccharinum</i> ,Intercept	-3.06	-7.74	-5.82	-4.12	-1.93	-0.40	0.75
<i>Alnus incana rugosa</i> ,Intercept	4.39	0.17	1.66	3.33	5.44	7.19	8.51
<i>Betula papyrifera</i> ,Intercept	0.96	-3.52	-1.86	-0.06	2.02	3.69	4.85
<i>Betula populifolia</i> ,Intercept	0.20	-4.12	-2.47	-0.86	1.27	2.93	4.19
<i>Cornus racemosa</i> ,Intercept	0.48	-3.87	-2.35	-0.54	1.57	3.10	4.26
<i>Salix purpurea</i> ,Intercept	-5.49	-10.38	-8.46	-6.57	-4.33	-2.69	-1.40
<i>Sorbus americana</i> ,Intercept	-1.14	-5.56	-3.88	-2.20	-0.07	1.60	2.79
<i>Viburnum dendatum</i> ,Intercept	3.57	-0.78	0.80	2.51	4.67	6.29	7.69
<i>Acer saccharinum</i> ,Tx	-0.36	-2.80	-1.82	-0.72	0.05	0.63	1.27
<i>Alnus incana rugosa</i> ,Tx	0.37	-1.36	-0.73	-0.06	0.76	1.91	2.86
<i>Betula papyrifera</i> ,Tx	0.45	-1.17	-0.54	-0.03	0.84	2.03	3.08
<i>Betula populifolia</i> ,Tx	-0.43	-3.09	-1.97	-0.80	0.04	0.55	1.12
<i>Cornus racemosa</i> ,Tx	0.00	-1.93	-1.15	-0.29	0.32	1.13	1.91
<i>Salix purpurea</i> ,Tx	-0.14	-2.48	-1.59	-0.55	0.25	1.21	2.14
<i>Sorbus americana</i> ,Tx	-0.21	-2.43	-1.57	-0.54	0.15	0.84	1.57
<i>Viburnum dendatum</i> ,Tx	0.35	-1.38	-0.75	-0.10	0.74	1.93	2.86
<i>Acer saccharinum</i> ,Chill 6 Wks	-0.13	-4.23	-2.82	-1.21	0.92	2.61	4.04
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-0.66	-4.71	-3.50	-1.71	0.41	2.10	3.53
<i>Betula papyrifera</i> ,Chill 6 Wks	1.50	-2.35	-1.14	0.40	2.54	4.30	5.65
<i>Betula populifolia</i> ,Chill 6 Wks	-0.59	-4.77	-3.43	-1.62	0.50	2.10	3.22
<i>Cornus racemosa</i> ,Chill 6 Wks	0.46	-3.46	-2.14	-0.56	1.48	3.11	4.43
<i>Salix purpurea</i> ,Chill 6 Wks	4.60	0.55	1.62	3.26	5.84	7.88	9.27
<i>Sorbus americana</i> ,Chill 6 Wks	-2.20	-6.59	-5.11	-3.27	-1.02	0.45	1.44
<i>Viburnum dendatum</i> ,Chill 6 Wks	-3.19	-7.67	-6.24	-4.28	-2.01	-0.48	0.62
<i>Acer saccharinum</i> ,Chill 8 Wks	0.94	-2.40	-1.30	-0.02	1.85	3.42	4.57
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-1.32	-5.07	-3.77	-2.23	-0.38	1.04	2.09
<i>Betula papyrifera</i> ,Chill 8 Wks	0.21	-3.49	-2.22	-0.68	1.12	2.52	3.77
<i>Betula populifolia</i> ,Chill 8 Wks	-1.36	-5.28	-3.90	-2.25	-0.39	0.82	1.82
<i>Cornus racemosa</i> ,Chill 8 Wks	0.61	-2.76	-1.58	-0.30	1.48	2.94	4.23
<i>Salix purpurea</i> ,Chill 8 Wks	3.91	0.30	1.23	2.72	5.00	6.79	8.30
<i>Sorbus americana</i> ,Chill 8 Wks	-0.51	-4.16	-2.86	-1.41	0.41	1.76	2.89
<i>Viburnum dendatum</i> ,Chill 8 Wks	-2.54	-6.43	-5.09	-3.50	-1.50	-0.18	0.69
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-0.46	-4.34	-2.80	-0.98	0.16	1.15	2.08
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.35	-2.54	-1.42	-0.27	0.89	2.66	4.38
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.33	-2.71	-1.36	-0.22	0.85	2.44	3.77
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	-0.54	-4.45	-2.83	-1.05	0.11	1.06	2.03
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.23	-2.65	-1.45	-0.26	0.69	2.25	3.58
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	1.07	-1.87	-0.80	0.02	1.84	4.03	5.96
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.44	-3.99	-2.60	-0.97	0.16	1.13	2.24
<i>Viburnum dendatum</i> ,Tx:Chill 6 Wks	-0.58	-4.61	-2.97	-1.16	0.10	1.07	2.17
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	-0.05	-2.85	-1.67	-0.45	0.33	1.47	2.79
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	0.12	-2.75	-1.46	-0.30	0.54	1.87	3.40

Table S3: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on duration of vegetative risk (days between budburst to leafout).

	mean	2%	10%	25%	75%	90%	98%
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	0.31	-1.95	-1.01	-0.16	0.72	2.14	3.56
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.06	-2.98	-1.62	-0.43	0.33	1.43	2.66
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	0.40	-1.62	-0.83	-0.10	0.75	2.28	3.86
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-0.09	-3.49	-2.09	-0.58	0.43	1.75	2.95
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	-0.48	-4.01	-2.61	-0.90	0.08	0.80	1.61
<i>Viburnum dentatum</i> ,Tx:Chill 8 Wks	-0.25	-3.57	-2.24	-0.67	0.26	1.25	2.36

Table S4: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on growing season length.

	mean	2%	10%	25%	75%	90%	98%
Intercept	283.95	249.62	263.13	276.95	291.73	302.64	310.98
Tx	-0.32	-14.91	-9.61	-3.88	3.30	8.70	13.24
Chill 6 Wks	2.48	-8.70	-5.40	-0.78	5.64	10.60	14.02
Chill 8 Wks	-9.66	-21.36	-17.91	-12.97	-6.36	-1.56	2.78
Tx:Chill 6 Wks	-14.87	-30.38	-25.87	-19.39	-10.39	-4.08	0.58
Tx:Chill 8 Wks	-8.57	-26.11	-20.52	-13.22	-3.93	2.97	8.55
<i>Acer saccharinum</i> ,Intercept	-10.08	-38.20	-29.41	-18.27	-2.60	11.77	24.62
<i>Alnus incana rugosa</i> ,Intercept	34.87	6.79	15.33	26.40	42.61	56.76	71.28
<i>Betula papyrifera</i> ,Intercept	8.84	-18.52	-10.75	0.69	16.27	30.38	43.52
<i>Betula populifolia</i> ,Intercept	33.10	6.24	13.92	24.78	40.58	54.73	67.96
<i>Cornus racemosa</i> ,Intercept	-22.76	-50.18	-42.58	-30.94	-15.15	-1.52	10.97
<i>Salix purpurea</i> ,Intercept	38.58	10.89	19.10	30.08	45.87	60.65	73.96
<i>Sorbus americana</i> ,Intercept	-38.34	-66.08	-58.11	-46.41	-30.66	-17.21	-5.41
<i>Viburnum dentatum</i> ,Intercept	10.47	-17.45	-8.43	2.20	17.88	32.32	45.39
<i>Acer saccharinum</i> ,Tx	0.48	-13.31	-8.48	-2.65	3.50	9.98	15.99
<i>Alnus incana rugosa</i> ,Tx	3.43	-10.16	-5.56	-0.26	6.82	14.28	20.26
<i>Betula papyrifera</i> ,Tx	2.81	-10.46	-5.48	-0.60	5.92	13.47	19.93
<i>Betula populifolia</i> ,Tx	3.94	-9.87	-4.75	-0.05	7.44	15.08	20.93
<i>Cornus racemosa</i> ,Tx	-4.95	-22.59	-16.02	-8.55	-0.62	3.61	8.59
<i>Salix purpurea</i> ,Tx	5.07	-8.45	-3.61	0.57	8.73	16.44	22.97
<i>Sorbus americana</i> ,Tx	-9.46	-30.44	-22.95	-14.30	-3.43	0.68	3.58
<i>Viburnum dentatum</i> ,Tx	4.80	-7.73	-3.57	0.42	8.43	16.24	22.77
<i>Acer saccharinum</i> ,Chill 6 Wks	1.16	-8.90	-5.20	-0.93	2.94	9.46	14.87
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-3.09	-20.08	-13.31	-5.34	0.10	2.94	6.95
<i>Betula papyrifera</i> ,Chill 6 Wks	0.24	-10.97	-6.27	-1.58	1.99	7.16	12.24
<i>Betula populifolia</i> ,Chill 6 Wks	-0.95	-15.17	-8.97	-2.88	1.09	5.84	10.95
<i>Cornus racemosa</i> ,Chill 6 Wks	2.10	-7.28	-3.91	-0.36	4.11	11.14	17.59
<i>Salix purpurea</i> ,Chill 6 Wks	-2.49	-18.32	-12.13	-4.73	0.26	3.66	8.14
<i>Sorbus americana</i> ,Chill 6 Wks	2.48	-8.47	-4.22	-0.38	4.85	12.27	18.17
<i>Viburnum dentatum</i> ,Chill 6 Wks	-0.86	-14.00	-8.25	-2.71	1.06	5.52	10.41
<i>Acer saccharinum</i> ,Chill 8 Wks	2.26	-7.25	-3.68	-0.34	4.17	12.18	18.81
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-1.09	-16.13	-9.56	-3.06	1.06	5.89	11.52
<i>Betula papyrifera</i> ,Chill 8 Wks	-0.91	-14.89	-8.74	-2.59	1.12	5.12	10.29
<i>Betula populifolia</i> ,Chill 8 Wks	-0.95	-15.15	-9.10	-2.78	1.07	5.71	10.63
<i>Cornus racemosa</i> ,Chill 8 Wks	-0.85	-15.44	-9.03	-2.70	1.25	5.75	10.64
<i>Salix purpurea</i> ,Chill 8 Wks	-2.05	-18.54	-11.57	-4.14	0.54	4.45	9.19
<i>Sorbus americana</i> ,Chill 8 Wks	1.65	-10.95	-5.72	-0.87	3.86	11.56	18.34
<i>Viburnum dentatum</i> ,Chill 8 Wks	1.14	-10.13	-5.30	-0.98	2.88	9.66	15.57
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-1.83	-20.16	-11.95	-3.63	0.73	5.03	9.99
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.00	-15.03	-8.42	-2.10	2.09	8.55	15.36
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-0.27	-14.41	-8.15	-2.15	1.62	7.46	13.60
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	0.93	-12.03	-6.77	-1.41	2.96	10.16	17.80
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.11	-14.72	-8.28	-2.04	2.17	8.70	15.64
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	-0.04	-15.83	-8.51	-2.13	2.11	8.46	15.94
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.64	-15.11	-7.97	-2.03	3.01	10.74	17.88
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	0.83	-12.37	-6.44	-1.32	2.63	10.09	17.67
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	2.41	-12.37	-6.29	-0.88	5.15	14.84	22.85
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	1.07	-16.64	-9.14	-1.88	3.93	12.31	20.49

Table S4: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on growing season length.

	mean	2%	10%	25%	75%	90%	98%
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	2.65	-11.25	-5.91	-0.76	5.52	15.06	22.65
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	0.32	-16.97	-10.49	-2.47	3.00	11.13	18.57
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	-0.64	-18.64	-11.44	-3.57	2.09	9.71	17.07
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	0.80	-17.89	-9.83	-2.16	3.62	12.46	21.20
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	-6.00	-33.31	-23.19	-10.33	-0.07	3.65	8.57
<i>Viburnum dentatum</i> ,Tx:Chill 8 Wks	2.04	-14.08	-7.10	-1.10	4.83	14.10	22.46

Table S5: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on shoot apical meristem damage.

	mean	2%	10%	25%	75%	90%	98%
Intercept	-1.68	-4.65	-3.49	-2.25	-1.03	-0.13	0.68
Tx	2.07	-0.42	0.61	1.51	2.60	3.58	4.61
Chill 6 Wks	-0.53	-5.64	-3.63	-1.53	0.51	2.33	4.17
Chill 8 Wks	-0.18	-3.35	-2.07	-0.82	0.51	1.61	2.75
Tx:Chill 6 Wks	-0.21	-4.25	-2.41	-0.98	0.60	1.92	3.34
Tx:Chill 8 Wks	0.28	-2.60	-1.60	-0.51	0.99	2.40	3.99
<i>Acer saccharinum</i> ,Intercept	-0.45	-3.53	-2.38	-1.18	0.27	1.44	2.54
<i>Alnus incana rugosa</i> ,Intercept	0.44	-2.16	-1.28	-0.27	1.09	2.36	3.64
<i>Betula papyrifera</i> ,Intercept	0.32	-2.31	-1.43	-0.37	0.96	2.23	3.43
<i>Betula populifolia</i> ,Intercept	-2.15	-6.79	-4.94	-3.02	-1.08	0.04	1.05
<i>Cornus racemosa</i> ,Intercept	0.94	-1.78	-0.86	0.15	1.62	2.98	4.28
<i>Salix purpurea</i> ,Intercept	1.56	-0.95	-0.14	0.79	2.25	3.57	4.83
<i>Sorbus americana</i> ,Intercept	-2.48	-8.23	-5.93	-3.42	-1.19	-0.05	0.81
<i>Viburnum dendatum</i> ,Intercept	1.84	-0.89	-0.00	1.03	2.58	3.90	5.11
<i>Acer saccharinum</i> ,Tx	-0.08	-2.98	-1.75	-0.54	0.40	1.52	2.86
<i>Alnus incana rugosa</i> ,Tx	0.42	-2.10	-0.97	-0.09	0.87	2.27	3.77
<i>Betula papyrifera</i> ,Tx	-0.21	-3.24	-1.89	-0.62	0.24	1.21	2.54
<i>Betula populifolia</i> ,Tx	-1.23	-7.03	-4.50	-1.95	-0.05	0.53	1.26
<i>Cornus racemosa</i> ,Tx	0.83	-1.70	-0.73	-0.01	1.35	3.52	6.42
<i>Salix purpurea</i> ,Tx	-0.41	-3.57	-2.15	-0.86	0.09	0.93	2.06
<i>Sorbus americana</i> ,Tx	-0.62	-5.42	-3.30	-1.24	0.12	1.30	2.71
<i>Viburnum dendatum</i> ,Tx	1.43	-1.26	-0.56	0.07	2.12	5.51	9.44
<i>Acer saccharinum</i> ,Chill 6 Wks	-3.92	-16.21	-10.63	-5.39	-1.57	0.23	1.52
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-0.17	-5.50	-3.35	-1.29	0.95	3.00	5.13
<i>Betula papyrifera</i> ,Chill 6 Wks	-1.96	-8.74	-5.81	-3.14	-0.57	1.27	3.23
<i>Betula populifolia</i> ,Chill 6 Wks	2.17	-3.16	-1.27	0.68	3.48	6.17	8.67
<i>Cornus racemosa</i> ,Chill 6 Wks	0.86	-4.19	-2.22	-0.36	1.99	4.30	6.56
<i>Salix purpurea</i> ,Chill 6 Wks	-0.46	-5.74	-3.59	-1.55	0.63	2.69	4.98
<i>Sorbus americana</i> ,Chill 6 Wks	-2.90	-17.31	-10.27	-4.52	-0.34	1.95	3.78
<i>Viburnum dendatum</i> ,Chill 6 Wks	5.87	-0.04	0.97	2.95	7.48	14.25	21.82
<i>Acer saccharinum</i> ,Chill 8 Wks	-1.58	-7.47	-4.63	-2.37	-0.42	0.53	1.60
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-1.42	-6.46	-4.32	-2.22	-0.33	0.56	1.59
<i>Betula papyrifera</i> ,Chill 8 Wks	-0.43	-4.14	-2.58	-1.12	0.28	1.57	2.83
<i>Betula populifolia</i> ,Chill 8 Wks	0.56	-3.60	-2.12	-0.43	1.46	3.66	5.55
<i>Cornus racemosa</i> ,Chill 8 Wks	-0.09	-3.92	-2.40	-0.79	0.67	2.07	3.20
<i>Salix purpurea</i> ,Chill 8 Wks	0.06	-3.17	-1.99	-0.63	0.74	2.18	3.48
<i>Sorbus americana</i> ,Chill 8 Wks	-0.37	-6.14	-3.60	-1.34	0.68	2.62	4.40
<i>Viburnum dendatum</i> ,Chill 8 Wks	3.26	-0.28	0.20	1.59	4.35	7.91	11.92
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-0.65	-8.36	-4.47	-1.24	0.23	1.96	4.00
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.12	-3.75	-2.05	-0.45	0.66	2.39	4.50
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.18	-4.05	-2.06	-0.47	0.69	2.91	5.48
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	1.30	-2.09	-0.92	0.00	2.10	5.41	8.54
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	-1.06	-7.96	-4.78	-1.80	0.03	0.94	2.28
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.22	-3.42	-1.74	-0.38	0.73	2.70	4.64
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.37	-9.27	-4.39	-0.99	0.57	2.71	5.35
<i>Viburnum dendatum</i> ,Tx:Chill 6 Wks	0.11	-7.38	-3.87	-0.87	0.87	4.60	9.62
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	0.35	-3.25	-1.77	-0.32	0.82	3.00	5.96
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	-0.09	-4.24	-2.25	-0.63	0.41	1.96	4.23

Table S5: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on shoot apical meristem damage.

	mean	2%	10%	25%	75%	90%	98%
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	0.07	-3.48	-1.82	-0.40	0.55	1.97	3.60
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-1.34	-10.73	-5.87	-1.96	0.02	0.92	2.05
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	0.81	-2.28	-1.16	-0.10	1.32	4.28	7.73
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-0.38	-4.53	-2.76	-0.87	0.21	1.33	2.53
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	0.73	-3.06	-1.55	-0.19	1.28	4.38	7.63
<i>Viburnum dentatum</i> ,Tx:Chill 8 Wks	-0.06	-6.79	-3.54	-0.95	0.61	3.57	8.46

Table S6: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on total season growth.

	mean	2%	10%	25%	75%	90%	98%
Intercept	54.03	19.77	30.82	44.95	63.22	77.68	88.97
Tx	5.06	-5.39	-1.90	2.24	7.79	12.11	15.41
Chill 6 Wks	2.92	-7.38	-3.78	0.23	5.58	9.54	12.68
Chill 8 Wks	11.00	1.51	4.47	8.38	13.59	17.62	20.87
Tx:Chill 6 Wks	-8.40	-23.96	-18.63	-12.47	-4.27	2.04	6.88
Tx:Chill 8 Wks	-11.33	-23.91	-20.44	-15.01	-7.63	-2.35	1.62
<i>Acer saccharinum</i> ,Intercept	1.28	-33.73	-23.06	-8.28	10.85	25.03	36.28
<i>Alnus incana rugosa</i> ,Intercept	16.28	-19.47	-7.82	6.99	25.58	39.89	51.14
<i>Betula papyrifera</i> ,Intercept	-17.33	-52.49	-41.43	-26.58	-7.98	6.77	17.33
<i>Betula populifolia</i> ,Intercept	14.94	-20.58	-8.73	5.58	24.26	38.69	49.95
<i>Cornus racemosa</i> ,Intercept	-36.89	-73.12	-60.99	-46.21	-27.51	-12.98	-2.26
<i>Salix purpurea</i> ,Intercept	77.74	42.27	53.50	68.33	87.21	101.66	113.37
<i>Sorbus americana</i> ,Intercept	-57.75	-93.73	-82.01	-67.20	-48.15	-34.18	-22.42
<i>Viburnum dendatum</i> ,Intercept	-1.58	-36.76	-25.23	-10.72	7.79	22.17	32.68
<i>Acer saccharinum</i> ,Tx	-3.07	-18.11	-12.61	-5.61	0.08	3.49	7.64
<i>Alnus incana rugosa</i> ,Tx	5.01	-4.64	-1.72	0.51	8.30	16.58	22.75
<i>Betula papyrifera</i> ,Tx	0.37	-12.64	-7.68	-2.00	2.81	8.52	13.53
<i>Betula populifolia</i> ,Tx	-0.05	-12.57	-7.50	-2.27	2.18	7.54	11.97
<i>Cornus racemosa</i> ,Tx	-0.01	-13.89	-8.63	-2.48	2.58	8.10	12.88
<i>Salix purpurea</i> ,Tx	-5.43	-22.80	-16.75	-9.16	-0.78	2.04	5.04
<i>Sorbus americana</i> ,Tx	1.17	-11.81	-6.70	-1.44	3.82	9.75	14.82
<i>Viburnum dendatum</i> ,Tx	1.78	-9.55	-4.99	-0.77	4.12	10.63	16.16
<i>Acer saccharinum</i> ,Chill 6 Wks	1.05	-8.99	-4.60	-0.87	2.70	8.36	14.05
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-3.36	-20.06	-13.74	-5.85	0.03	2.55	5.58
<i>Betula papyrifera</i> ,Chill 6 Wks	-1.13	-14.13	-8.89	-2.99	0.84	5.21	9.26
<i>Betula populifolia</i> ,Chill 6 Wks	0.92	-8.65	-4.71	-0.96	2.50	8.03	13.57
<i>Cornus racemosa</i> ,Chill 6 Wks	2.71	-6.74	-3.46	-0.20	4.94	12.46	19.97
<i>Salix purpurea</i> ,Chill 6 Wks	0.29	-11.79	-7.01	-1.79	2.25	8.24	13.14
<i>Sorbus americana</i> ,Chill 6 Wks	0.46	-10.54	-6.26	-1.47	2.24	7.99	13.69
<i>Viburnum dendatum</i> ,Chill 6 Wks	-0.61	-12.34	-7.66	-2.18	1.20	5.38	9.63
<i>Acer saccharinum</i> ,Chill 8 Wks	0.22	-8.74	-4.92	-1.18	1.52	5.74	10.82
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-1.20	-14.35	-8.61	-2.64	0.66	4.05	7.73
<i>Betula papyrifera</i> ,Chill 8 Wks	1.19	-7.86	-3.75	-0.60	2.60	8.08	12.93
<i>Betula populifolia</i> ,Chill 8 Wks	0.67	-7.84	-4.27	-0.85	1.87	6.93	12.13
<i>Cornus racemosa</i> ,Chill 8 Wks	0.13	-10.11	-5.92	-1.33	1.66	6.24	10.78
<i>Salix purpurea</i> ,Chill 8 Wks	-1.87	-15.77	-10.41	-3.59	0.42	3.68	7.34
<i>Sorbus americana</i> ,Chill 8 Wks	-0.52	-13.41	-7.28	-1.96	1.23	5.16	8.91
<i>Viburnum dendatum</i> ,Chill 8 Wks	0.97	-7.33	-3.92	-0.66	2.22	7.67	12.63
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-1.97	-22.39	-14.47	-5.51	1.56	8.69	15.28
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-6.55	-31.17	-22.08	-11.38	-0.50	4.22	9.53
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-7.28	-31.70	-23.07	-12.32	-0.91	3.17	7.48
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	2.09	-14.47	-7.83	-1.56	5.51	14.28	21.42
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	8.74	-6.89	-2.22	1.52	14.16	25.76	35.10
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.72	-18.38	-11.73	-3.54	4.82	13.89	21.05
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	1.80	-15.69	-9.78	-2.04	5.79	14.35	22.80
<i>Viburnum dendatum</i> ,Tx:Chill 6 Wks	2.85	-12.75	-7.76	-1.04	6.51	15.59	23.44
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	0.18	-12.07	-6.72	-1.67	1.92	7.53	13.60
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	-0.06	-14.29	-8.33	-2.00	1.90	8.07	14.34

Table S6: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on total season growth.

	mean	2%	10%	25%	75%	90%	98%
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	1.58	-9.94	-4.97	-0.70	3.55	10.38	17.16
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.10	-12.32	-6.99	-1.86	1.58	6.75	11.71
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	1.52	-9.59	-5.34	-0.87	3.45	10.73	17.62
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-1.93	-19.13	-12.65	-4.38	0.87	5.90	11.29
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	1.44	-10.84	-6.16	-0.98	3.64	10.95	17.83
<i>Viburnum dentatum</i> ,Tx:Chill 8 Wks	-2.43	-20.46	-12.36	-4.36	0.29	3.57	7.60

Table S7: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on total biomass.

	mean	2%	10%	25%	75%	90%	98%
Intercept	49.26	27.73	34.80	43.68	55.16	63.02	69.20
Tx	-3.41	-9.89	-8.08	-5.27	-1.55	1.15	3.47
Chill 6 Wks	0.39	-6.74	-4.36	-1.55	2.29	5.20	7.81
Chill 8 Wks	2.58	-4.64	-2.31	0.55	4.56	7.58	9.92
Tx:Chill 6 Wks	-0.59	-9.92	-7.10	-3.37	2.06	6.10	9.03
Tx:Chill 8 Wks	3.77	-5.75	-2.83	1.13	6.42	10.47	13.14
Intercept	49.06	28.12	34.71	43.77	54.77	62.43	68.15
<i>Acer saccharinum</i> ,Intercept	3.91	-16.51	-10.19	-2.04	9.57	18.72	26.20
<i>Alnus incana rugosa</i> ,Intercept	43.69	23.67	29.56	37.62	49.34	58.87	66.02
<i>Betula papyrifera</i> ,Intercept	-13.61	-33.58	-27.43	-19.46	-7.89	1.31	8.48
<i>Betula populifolia</i> ,Intercept	6.46	-13.58	-7.58	0.46	12.18	21.50	28.50
<i>Cornus racemosa</i> ,Intercept	-3.40	-23.25	-17.50	-9.36	2.25	11.53	18.08
<i>Salix purpurea</i> ,Intercept	36.46	16.89	22.39	30.53	42.05	51.62	59.11
<i>Sorbus americana</i> ,Intercept	-30.68	-50.72	-44.79	-36.60	-24.97	-15.66	-8.88
<i>Viburnum dendatum</i> ,Intercept	-14.67	-34.35	-28.81	-20.56	-8.91	0.09	6.99
<i>Acer saccharinum</i> ,Tx	-0.29	-6.96	-3.85	-1.04	0.56	2.71	5.05
<i>Alnus incana rugosa</i> ,Tx	0.42	-5.60	-3.06	-0.63	1.31	4.62	7.89
<i>Betula papyrifera</i> ,Tx	0.08	-5.79	-3.25	-0.71	0.88	3.53	6.24
<i>Betula populifolia</i> ,Tx	0.53	-4.48	-2.32	-0.39	1.28	4.26	7.61
<i>Cornus racemosa</i> ,Tx	-0.56	-7.56	-4.32	-1.35	0.38	2.32	4.50
<i>Salix purpurea</i> ,Tx	-0.44	-7.54	-4.49	-1.31	0.56	2.88	5.10
<i>Sorbus americana</i> ,Tx	-0.14	-6.77	-3.80	-0.96	0.73	3.20	5.86
<i>Viburnum dendatum</i> ,Tx	0.43	-4.76	-2.59	-0.50	1.17	4.45	7.28
<i>Acer saccharinum</i> ,Chill 6 Wks	1.49	-4.32	-2.04	-0.18	2.63	7.53	12.00
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-1.69	-12.66	-8.10	-3.19	0.21	2.61	5.31
<i>Betula papyrifera</i> ,Chill 6 Wks	-0.92	-10.34	-6.41	-2.09	0.51	3.07	5.56
<i>Betula populifolia</i> ,Chill 6 Wks	-0.28	-8.41	-4.88	-1.39	0.88	3.90	7.16
<i>Cornus racemosa</i> ,Chill 6 Wks	-0.49	-9.07	-5.41	-1.55	0.75	3.71	6.46
<i>Salix purpurea</i> ,Chill 6 Wks	-0.30	-8.90	-5.43	-1.53	0.94	4.43	8.05
<i>Sorbus americana</i> ,Chill 6 Wks	1.26	-5.46	-2.72	-0.29	2.50	7.02	11.38
<i>Viburnum dendatum</i> ,Chill 6 Wks	0.53	-6.88	-3.62	-0.69	1.65	5.56	8.91
<i>Acer saccharinum</i> ,Chill 8 Wks	0.20	-8.38	-4.85	-1.16	1.54	5.38	8.77
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-0.77	-10.60	-6.71	-2.42	0.93	4.44	7.95
<i>Betula papyrifera</i> ,Chill 8 Wks	1.38	-5.93	-2.93	-0.30	2.96	7.05	10.73
<i>Betula populifolia</i> ,Chill 8 Wks	-1.31	-10.81	-7.20	-2.78	0.35	2.79	5.61
<i>Cornus racemosa</i> ,Chill 8 Wks	1.61	-5.17	-2.47	-0.15	2.95	7.54	11.45
<i>Salix purpurea</i> ,Chill 8 Wks	-2.99	-14.97	-10.63	-4.98	-0.19	1.50	3.55
<i>Sorbus americana</i> ,Chill 8 Wks	0.01	-8.73	-5.36	-1.41	1.56	4.97	7.88
<i>Viburnum dendatum</i> ,Chill 8 Wks	1.28	-5.84	-2.93	-0.33	2.72	6.88	10.76
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-0.87	-12.34	-7.31	-2.28	0.77	4.21	7.46
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-1.82	-14.80	-9.63	-3.66	0.42	3.50	6.71
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-1.98	-14.88	-9.48	-3.64	0.23	2.68	5.21
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	0.98	-7.16	-4.01	-0.64	2.40	7.27	11.84
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.56	-8.13	-4.51	-0.98	2.00	6.60	11.47
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.63	-8.71	-4.93	-1.04	2.18	7.06	11.90
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.64	-8.68	-4.76	-0.95	2.14	6.73	11.31
<i>Viburnum dendatum</i> ,Tx:Chill 6 Wks	1.51	-6.58	-3.41	-0.42	3.08	8.77	13.43
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	1.71	-4.94	-2.42	-0.21	3.14	8.66	13.63

Table S7: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on total biomass.

	mean	2%	10%	25%	75%	90%	98%
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	0.49	-8.70	-5.08	-1.10	2.01	6.60	11.66
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	0.70	-7.60	-3.95	-0.74	1.99	6.43	10.94
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.68	-11.41	-6.55	-1.86	0.74	4.00	6.87
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	-0.68	-10.98	-6.69	-1.75	0.74	3.81	7.04
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-0.53	-11.31	-6.52	-1.95	0.99	4.76	8.65
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	-0.61	-10.77	-6.46	-1.95	0.85	4.34	7.95

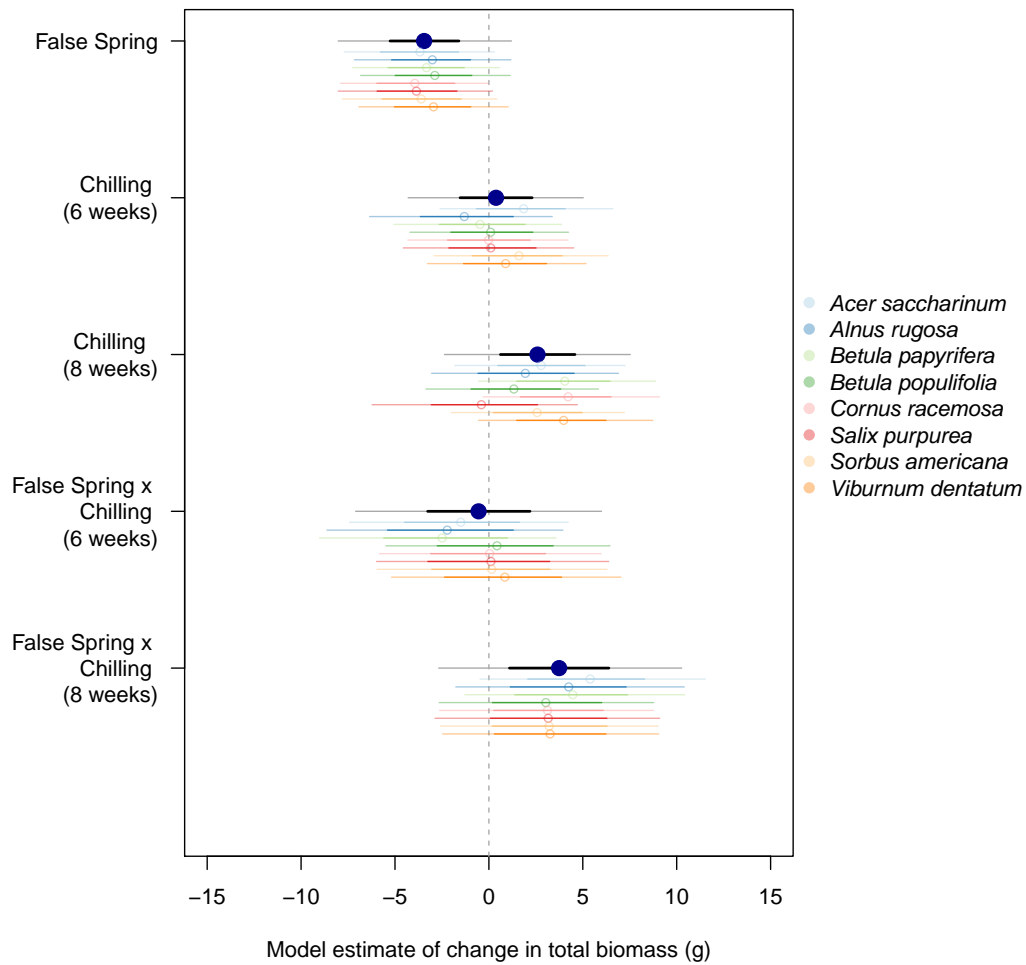


Figure S1: Effects of false spring treatment (Tx), six weeks of chilling and eight weeks of chilling on total aboveground and belowground biomass (g). Larger, blue dots represent overall estimates across all species, while smaller dots are estimates for each species. Dots and thin lines show means and 90% uncertainty intervals and thicker lines show 50% uncertainty intervals.

Table S8: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf toughness.

	mean	2%	10%	25%	75%	90%	98%
Intercept	0.43	0.27	0.33	0.39	0.47	0.53	0.59
Tx	-0.05	-0.10	-0.08	-0.06	-0.04	-0.02	-0.00
Chill 6 Wks	-0.06	-0.11	-0.09	-0.07	-0.05	-0.03	-0.02
Chill 8 Wks	-0.05	-0.11	-0.09	-0.07	-0.04	-0.02	-0.00
Tx:Chill 6 Wks	0.02	-0.04	-0.02	0.01	0.04	0.06	0.08
Tx:Chill 8 Wks	0.02	-0.04	-0.02	0.01	0.04	0.06	0.08
Intercept	0.37	0.22	0.27	0.34	0.41	0.47	0.53
<i>Acer saccharinum</i> ,Intercept	-0.06	-0.22	-0.16	-0.10	-0.02	0.04	0.10
<i>Alnus incana rugosa</i> ,Intercept	-0.05	-0.21	-0.15	-0.09	-0.01	0.05	0.11
<i>Betula papyrifera</i> ,Intercept	-0.11	-0.28	-0.22	-0.15	-0.07	-0.01	0.05
<i>Betula populifolia</i> ,Intercept	-0.10	-0.27	-0.20	-0.14	-0.06	0.01	0.06
<i>Cornus racemosa</i> ,Intercept	-0.05	-0.21	-0.15	-0.09	-0.01	0.05	0.11
<i>Salix purpurea</i> ,Intercept	0.15	-0.01	0.05	0.11	0.19	0.26	0.32
<i>Sorbus americana</i> ,Intercept	-0.01	-0.17	-0.12	-0.05	0.03	0.10	0.16
<i>Viburnum dentatum</i> ,Intercept	0.25	0.08	0.14	0.21	0.29	0.35	0.41
<i>Acer saccharinum</i> ,Tx	-0.00	-0.06	-0.04	-0.01	0.01	0.03	0.05
<i>Alnus incana rugosa</i> ,Tx	0.01	-0.03	-0.02	-0.00	0.02	0.05	0.08
<i>Betula papyrifera</i> ,Tx	0.01	-0.05	-0.03	-0.00	0.02	0.04	0.06
<i>Betula populifolia</i> ,Tx	0.01	-0.05	-0.03	-0.01	0.02	0.04	0.06
<i>Cornus racemosa</i> ,Tx	0.02	-0.02	-0.01	0.00	0.04	0.07	0.09
<i>Salix purpurea</i> ,Tx	-0.01	-0.08	-0.06	-0.03	-0.00	0.02	0.03
<i>Sorbus americana</i> ,Tx	-0.01	-0.08	-0.05	-0.02	0.00	0.02	0.04
<i>Viburnum dentatum</i> ,Tx	-0.02	-0.09	-0.07	-0.03	-0.00	0.01	0.03
<i>Acer saccharinum</i> ,Chill 6 Wks	0.01	-0.03	-0.01	-0.00	0.02	0.05	0.08
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-0.01	-0.06	-0.04	-0.01	0.00	0.02	0.04
<i>Betula papyrifera</i> ,Chill 6 Wks	-0.00	-0.05	-0.03	-0.01	0.01	0.03	0.05
<i>Betula populifolia</i> ,Chill 6 Wks	-0.00	-0.05	-0.03	-0.01	0.01	0.03	0.05
<i>Cornus racemosa</i> ,Chill 6 Wks	-0.01	-0.07	-0.04	-0.02	0.00	0.02	0.04
<i>Salix purpurea</i> ,Chill 6 Wks	0.01	-0.04	-0.02	-0.00	0.01	0.04	0.07
<i>Sorbus americana</i> ,Chill 6 Wks	-0.01	-0.07	-0.05	-0.02	0.00	0.02	0.03
<i>Viburnum dentatum</i> ,Chill 6 Wks	0.01	-0.04	-0.02	-0.00	0.02	0.05	0.07
<i>Acer saccharinum</i> ,Chill 8 Wks	0.02	-0.03	-0.01	0.00	0.04	0.07	0.10
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-0.02	-0.09	-0.06	-0.03	0.00	0.02	0.04
<i>Betula papyrifera</i> ,Chill 8 Wks	-0.02	-0.09	-0.06	-0.03	-0.00	0.02	0.04
<i>Betula populifolia</i> ,Chill 8 Wks	-0.01	-0.08	-0.06	-0.03	0.00	0.02	0.05
<i>Cornus racemosa</i> ,Chill 8 Wks	-0.00	-0.07	-0.04	-0.02	0.01	0.04	0.06
<i>Salix purpurea</i> ,Chill 8 Wks	0.02	-0.04	-0.02	0.00	0.04	0.07	0.10
<i>Sorbus americana</i> ,Chill 8 Wks	-0.02	-0.10	-0.08	-0.04	-0.00	0.01	0.03
<i>Viburnum dentatum</i> ,Chill 8 Wks	0.03	-0.03	-0.01	0.01	0.05	0.08	0.11
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	0.01	-0.05	-0.03	-0.00	0.01	0.05	0.08
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-0.01	-0.08	-0.04	-0.01	0.00	0.02	0.05
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-0.00	-0.08	-0.04	-0.01	0.01	0.03	0.05
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	0.01	-0.04	-0.02	-0.00	0.02	0.05	0.08
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.00	-0.05	-0.03	-0.01	0.01	0.04	0.08
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.00	-0.06	-0.03	-0.01	0.01	0.04	0.07
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.01	-0.10	-0.06	-0.02	0.00	0.02	0.03
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	0.00	-0.06	-0.04	-0.01	0.01	0.04	0.07
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	0.01	-0.04	-0.02	-0.00	0.02	0.05	0.09

Table S8: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf toughness.

	mean	2%	10%	25%	75%	90%	98%
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	-0.00	-0.06	-0.04	-0.01	0.01	0.03	0.06
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	-0.00	-0.07	-0.04	-0.01	0.00	0.03	0.05
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.00	-0.07	-0.04	-0.01	0.01	0.03	0.05
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	0.00	-0.06	-0.03	-0.01	0.01	0.04	0.06
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-0.00	-0.07	-0.04	-0.01	0.01	0.03	0.06
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	-0.00	-0.06	-0.04	-0.01	0.01	0.03	0.06

Table S9: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf chlorophyll content.

	mean	2%	10%	25%	75%	90%	98%
Intercept	30.96	24.38	26.36	29.21	32.74	35.50	37.89
Tx	-0.35	-2.16	-1.61	-0.88	0.15	0.92	1.48
Chill 6 Wks	-0.06	-2.07	-1.42	-0.62	0.49	1.30	1.92
Chill 8 Wks	0.43	-1.97	-1.03	-0.12	1.04	1.86	2.58
Tx:Chill 6 Wks	-1.04	-3.76	-2.90	-1.81	-0.26	0.84	1.68
Tx:Chill 8 Wks	-2.11	-4.74	-3.88	-2.81	-1.40	-0.36	0.31
<i>Acer saccharinum</i> ,Intercept	-5.84	-12.65	-10.48	-7.66	-4.06	-1.25	1.08
<i>Alnus incana rugosa</i> ,Intercept	5.66	-1.33	0.96	3.81	7.48	10.35	12.40
<i>Betula papyrifera</i> ,Intercept	-2.33	-9.20	-6.98	-4.13	-0.48	2.29	4.50
<i>Betula populifolia</i> ,Intercept	0.68	-6.50	-3.99	-1.12	2.48	5.33	7.54
<i>Cornus racemosa</i> ,Intercept	0.96	-5.84	-3.68	-0.88	2.81	5.61	7.89
<i>Salix purpurea</i> ,Intercept	12.24	5.25	7.55	10.37	14.05	16.89	19.14
<i>Sorbus americana</i> ,Intercept	-7.21	-14.06	-11.90	-9.05	-5.38	-2.60	-0.50
<i>Viburnum dendatum</i> ,Intercept	-4.83	-11.98	-9.46	-6.66	-2.98	-0.20	2.01
<i>Acer saccharinum</i> ,Tx	0.04	-1.77	-0.90	-0.22	0.30	1.03	1.81
<i>Alnus incana rugosa</i> ,Tx	-0.02	-1.91	-1.10	-0.30	0.26	1.13	1.91
<i>Betula papyrifera</i> ,Tx	-0.19	-2.44	-1.40	-0.44	0.13	0.69	1.34
<i>Betula populifolia</i> ,Tx	-0.10	-1.99	-1.22	-0.36	0.18	0.88	1.54
<i>Cornus racemosa</i> ,Tx	0.07	-1.68	-0.91	-0.21	0.34	1.18	2.03
<i>Salix purpurea</i> ,Tx	-0.45	-3.06	-2.09	-0.85	0.03	0.58	1.28
<i>Sorbus americana</i> ,Tx	0.31	-1.33	-0.65	-0.07	0.63	1.70	2.48
<i>Viburnum dendatum</i> ,Tx	0.30	-1.22	-0.58	-0.06	0.59	1.62	2.55
<i>Acer saccharinum</i> ,Chill 6 Wks	0.35	-1.81	-0.97	-0.11	0.80	1.98	3.05
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-0.60	-3.81	-2.54	-1.09	0.02	0.68	1.35
<i>Betula papyrifera</i> ,Chill 6 Wks	0.61	-1.21	-0.56	-0.01	1.09	2.48	3.62
<i>Betula populifolia</i> ,Chill 6 Wks	0.31	-1.76	-0.97	-0.17	0.70	2.02	3.23
<i>Cornus racemosa</i> ,Chill 6 Wks	-0.38	-3.37	-2.16	-0.81	0.12	0.95	1.75
<i>Salix purpurea</i> ,Chill 6 Wks	-0.73	-3.84	-2.76	-1.33	-0.01	0.67	1.52
<i>Sorbus americana</i> ,Chill 6 Wks	0.11	-2.52	-1.41	-0.33	0.58	1.65	2.77
<i>Viburnum dendatum</i> ,Chill 6 Wks	0.33	-1.91	-0.98	-0.14	0.79	1.94	2.95
<i>Acer saccharinum</i> ,Chill 8 Wks	0.04	-2.46	-1.51	-0.43	0.47	1.61	2.85
<i>Alnus incana rugosa</i> ,Chill 8 Wks	0.33	-2.20	-1.18	-0.21	0.85	2.15	3.31
<i>Betula papyrifera</i> ,Chill 8 Wks	0.18	-2.29	-1.36	-0.31	0.65	1.86	3.04
<i>Betula populifolia</i> ,Chill 8 Wks	0.10	-2.41	-1.42	-0.38	0.56	1.74	2.94
<i>Cornus racemosa</i> ,Chill 8 Wks	1.12	-0.75	-0.27	0.15	1.82	3.46	4.88
<i>Salix purpurea</i> ,Chill 8 Wks	-0.31	-3.49	-2.24	-0.88	0.29	1.35	2.23
<i>Sorbus americana</i> ,Chill 8 Wks	-0.67	-3.89	-2.68	-1.24	0.01	0.73	1.60
<i>Viburnum dendatum</i> ,Chill 8 Wks	-0.71	-3.86	-2.78	-1.29	0.00	0.60	1.34
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	0.15	-2.87	-1.64	-0.38	0.70	2.05	3.36
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.20	-2.75	-1.60	-0.42	0.72	2.38	3.96
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.08	-3.05	-1.80	-0.44	0.61	1.97	3.09
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	-0.78	-4.76	-3.31	-1.38	0.02	0.77	1.55
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.27	-2.46	-1.46	-0.29	0.78	2.32	3.82
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	-1.15	-5.53	-3.86	-2.00	-0.07	0.73	1.76
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.96	-1.46	-0.68	0.02	1.65	3.49	5.08
<i>Viburnum dendatum</i> ,Tx:Chill 6 Wks	0.37	-2.58	-1.32	-0.20	0.93	2.40	3.58
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	0.06	-2.13	-1.13	-0.25	0.35	1.38	2.47
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	0.06	-2.25	-1.22	-0.29	0.36	1.48	2.59

Table S9: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf chlorophyll content.

	mean	2%	10%	25%	75%	90%	98%
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	0.04	-2.22	-1.20	-0.26	0.32	1.31	2.41
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.06	-2.28	-1.37	-0.35	0.23	1.11	1.82
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	-0.01	-2.46	-1.27	-0.32	0.29	1.30	2.40
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-0.24	-3.31	-2.01	-0.62	0.20	1.13	2.13
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	0.05	-2.33	-1.30	-0.27	0.39	1.44	2.54
<i>Viburnum dentatum</i> ,Tx:Chill 8 Wks	0.11	-2.08	-1.12	-0.22	0.42	1.51	2.74

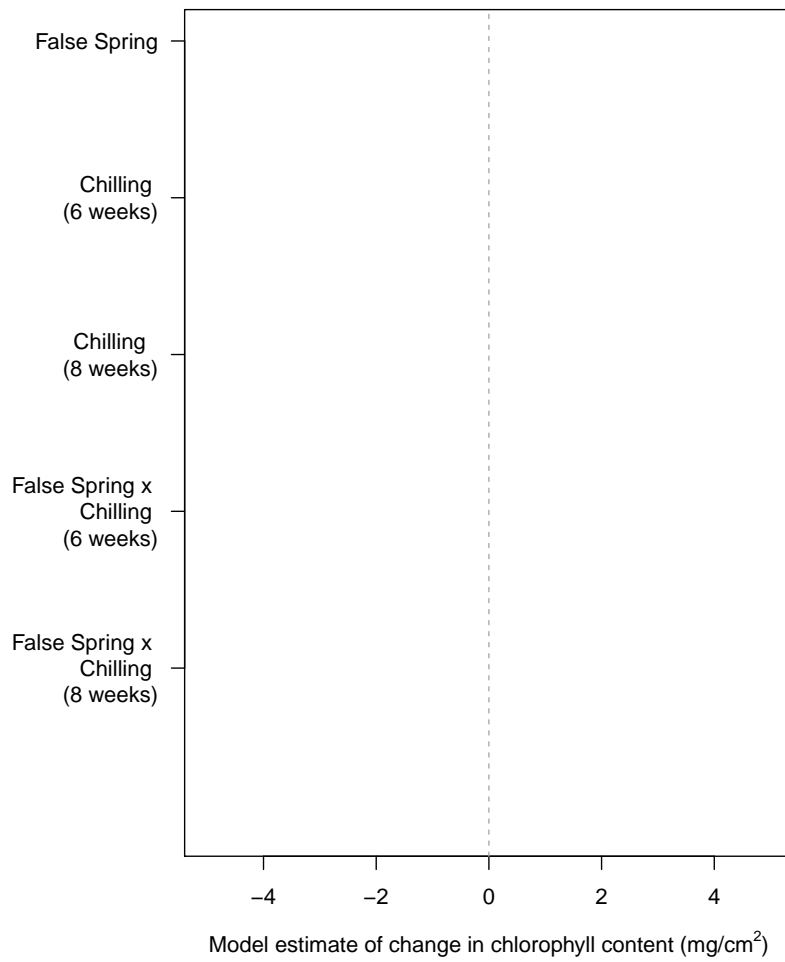


Figure S2: Effects of false spring treatment, six weeks of chilling and eight weeks of chilling on chlorophyll content. Larger, blue dots represent overall estimates across all species, while smaller dots are estimates for each species. Dots and thin lines show means and 90% uncertainty intervals and thicker lines show 50% uncertainty intervals.

Table S10: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf thickness.

	mean	2%	10%	25%	75%	90%	98%
Intercept	141.76	119.08	125.87	135.57	147.79	158.06	166.29
Tx	-8.90	-17.68	-15.08	-11.29	-6.46	-2.75	0.29
Chill 6 Wks	7.21	-9.50	-3.49	3.16	11.24	17.94	23.06
Chill 8 Wks	-8.38	-27.21	-20.39	-12.84	-3.67	3.68	9.06
Tx:Chill 6 Wks	-1.81	-14.56	-10.56	-5.25	1.68	6.78	10.78
Tx:Chill 8 Wks	1.50	-10.93	-7.19	-2.04	5.03	9.99	13.30
Intercept	136.92	115.60	122.45	131.52	142.58	151.41	159.60
<i>Acer saccharinum</i> ,Intercept	-31.97	-57.43	-49.47	-38.60	-25.14	-15.13	-7.93
<i>Alnus incana rugosa</i> ,Intercept	17.84	-7.75	0.82	11.24	24.62	34.74	42.97
<i>Betula papyrifera</i> ,Intercept	32.87	6.91	15.56	26.19	39.61	49.87	58.26
<i>Betula populifolia</i> ,Intercept	10.53	-15.48	-6.66	3.71	17.31	27.75	35.83
<i>Cornus racemosa</i> ,Intercept	-8.65	-33.93	-25.99	-15.17	-1.72	8.17	15.86
<i>Salix purpurea</i> ,Intercept	16.74	-9.31	-0.19	10.08	23.41	34.04	41.29
<i>Sorbus americana</i> ,Intercept	-29.77	-56.70	-47.34	-36.39	-23.02	-12.81	-5.32
<i>Viburnum dentatum</i> ,Intercept	-5.16	-30.61	-22.12	-11.83	1.62	11.95	19.40
<i>Acer saccharinum</i> ,Tx	0.88	-7.11	-4.07	-0.74	2.30	7.03	11.52
<i>Alnus incana rugosa</i> ,Tx	-2.29	-15.60	-10.07	-3.77	0.06	1.94	3.94
<i>Betula papyrifera</i> ,Tx	0.77	-7.33	-3.99	-0.85	2.11	6.87	11.80
<i>Betula populifolia</i> ,Tx	-0.08	-9.56	-5.28	-1.47	1.27	5.04	9.39
<i>Cornus racemosa</i> ,Tx	-0.24	-9.94	-5.76	-1.52	1.19	4.76	8.35
<i>Salix purpurea</i> ,Tx	-0.59	-10.53	-6.32	-1.88	0.86	4.35	7.42
<i>Sorbus americana</i> ,Tx	1.02	-7.19	-4.10	-0.69	2.53	7.48	11.78
<i>Viburnum dentatum</i> ,Tx	0.12	-8.94	-4.91	-1.21	1.40	5.24	8.93
<i>Acer saccharinum</i> ,Chill 6 Wks	-8.97	-31.35	-23.41	-14.20	-3.20	3.73	9.01
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-3.16	-23.21	-16.74	-8.17	1.84	9.89	16.49
<i>Betula papyrifera</i> ,Chill 6 Wks	1.27	-18.39	-11.65	-3.65	6.26	14.48	21.76
<i>Betula populifolia</i> ,Chill 6 Wks	-1.18	-21.11	-14.59	-6.33	3.91	11.89	18.35
<i>Cornus racemosa</i> ,Chill 6 Wks	16.15	-2.21	2.08	9.80	21.75	31.67	39.11
<i>Salix purpurea</i> ,Chill 6 Wks	-12.29	-34.05	-26.76	-17.63	-6.61	0.61	6.97
<i>Sorbus americana</i> ,Chill 6 Wks	10.65	-8.06	-2.47	4.73	16.11	25.45	32.65
<i>Viburnum dentatum</i> ,Chill 6 Wks	-1.53	-21.85	-15.15	-6.64	3.57	11.59	17.73
<i>Acer saccharinum</i> ,Chill 8 Wks	4.24	-16.95	-10.58	-1.50	10.03	19.20	26.80
<i>Alnus incana rugosa</i> ,Chill 8 Wks	-10.03	-31.69	-25.10	-16.00	-4.07	4.54	11.62
<i>Betula papyrifera</i> ,Chill 8 Wks	-5.74	-27.24	-19.93	-11.22	-0.32	8.41	15.98
<i>Betula populifolia</i> ,Chill 8 Wks	-19.37	-42.43	-35.14	-25.05	-13.25	-5.02	1.43
<i>Cornus racemosa</i> ,Chill 8 Wks	-3.79	-26.10	-18.62	-9.55	1.87	10.72	18.91
<i>Salix purpurea</i> ,Chill 8 Wks	0.31	-21.05	-14.02	-5.52	5.79	15.18	23.32
<i>Sorbus americana</i> ,Chill 8 Wks	19.74	-1.14	4.96	13.32	25.66	35.62	44.76
<i>Viburnum dentatum</i> ,Chill 8 Wks	14.47	-5.66	0.51	8.22	20.01	30.14	38.72
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	0.81	-12.64	-6.83	-1.36	2.79	9.69	16.74
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-0.97	-15.84	-9.20	-2.87	1.03	5.61	11.59
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.45	-12.44	-6.54	-1.66	2.29	8.77	15.03
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	-0.94	-15.56	-9.50	-2.85	1.18	6.01	11.86
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	-2.00	-19.11	-11.82	-3.90	0.53	4.34	8.85
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	-0.26	-14.53	-8.21	-2.09	1.70	7.27	12.87
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.77	-12.93	-7.16	-1.30	2.80	9.33	16.07
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	1.89	-8.77	-4.22	-0.56	3.74	11.17	18.71
<i>Acer saccharinum</i> ,Tx:Chill 8 Wks	0.96	-11.32	-5.80	-1.16	2.76	9.34	15.71

Table S10: Summary of model with the effects of false spring treatment (Tx) and chilling duration across species on leaf thickness.

	mean	2%	10%	25%	75%	90%	98%
<i>Alnus incana rugosa</i> ,Tx:Chill 8 Wks	-0.12	-12.38	-7.28	-1.83	1.51	6.96	13.25
<i>Betula papyrifera</i> ,Tx:Chill 8 Wks	-0.47	-14.03	-8.09	-2.20	1.32	6.43	12.10
<i>Betula populifolia</i> ,Tx:Chill 8 Wks	-0.49	-14.26	-8.03	-2.23	1.35	6.36	11.45
<i>Cornus racemosa</i> ,Tx:Chill 8 Wks	0.86	-9.85	-5.64	-1.08	2.41	8.93	14.88
<i>Salix purpurea</i> ,Tx:Chill 8 Wks	-1.35	-15.85	-10.16	-3.04	0.69	4.85	9.36
<i>Sorbus americana</i> ,Tx:Chill 8 Wks	1.31	-10.34	-5.38	-0.88	3.13	10.00	16.75

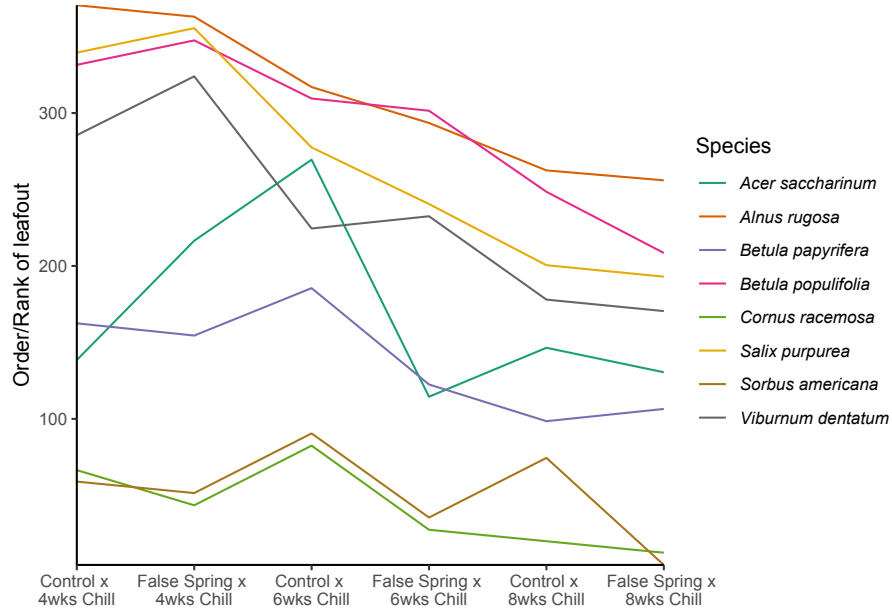


Figure S3: Rank order of leafout across all species using mean trends.