

¹ **Supplemental materials: False springs coupled with warming winters alter temperate tree growth**

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¹³ **Supplemental Materials and Methods: Data analysis and model equations**

¹⁵ Using Bayesian hierarchical models, we estimated the effects of chilling duration, false spring treatment and
¹⁶ all two-way interactions as predictors with species modeled hierarchically as grouping factors. False spring
¹⁷ treatment is written as ‘tx’ in the equation below and chilling was split into two binary predictors: ‘chill1’,
¹⁸ which is denoted as ‘0’ for 8 weeks of chilling or ‘1’ for 6 weeks of chilling and ‘chill2’ which is ‘1’ for 4 weeks
¹⁹ of chilling:

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

,

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

²⁰ The α and each of the five β coefficients are modeled at the species level, as follows:

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

²¹ where i represents each unique observation, $species$ is the species, α represents the intercept, β terms represent
²² slope estimates, and y is the phenology or growth measurement.

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

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

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

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

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 Supplemental Materials and Methods: Measuring shoot apical meristem damage

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³⁰ We monitored shoot apical meristem damage and quantified damage as 0, no damage, or 1, damage. Damage
³¹ was determined if the shoot apical mersitem terminated growth, if the individual died or if the individual
³² relied on lateral shoots for growth (see Figure S4 for examples of damage).

³³ References

³⁴ Gelman A , Hill J. 2006. *Data analysis using regression and multilevel/hierarchical models*. Cambridge
³⁵ university press.

³⁶ Supplemental tables and figures

Table S1: Chill units under growth chamber conditions.

Duration	Chilling Hours	Utah Model	Chill Portions
8 weeks	1344.00	1344.00	40.47
6 weeks	1008.00	1008.00	30.35
4 weeks	672.00	672.00	19.73

Table S2: Summary of simple linear regression model of day of budburst across chilling treatments.

term	mean	std.err
Intercept	20.95	1.27
Chilling 6 Wks	4.84	1.78
Chilling 4 Wks	7.63	1.76

Table S3: Summary of simple linear regression model of duration of vegetative across chilling treatments.

term	mean	std.err
Intercept	15.63	0.56
Chilling 6 Wks	0.65	0.79
Chilling 4 Wks	2.72	0.78

Table S4: 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	13.37	10.74	11.67	12.69	14.02	15.09	16.13
Tx	3.62	1.60	2.31	3.09	4.16	4.92	5.55
Chill 6 Wks	2.14	0.06	0.77	1.59	2.68	3.54	4.36
Chill 4 Wks	2.72	-1.04	0.21	1.78	3.63	5.23	6.76
Tx:Chill 6 Wks	-1.52	-4.14	-3.33	-2.25	-0.80	0.32	1.19
Tx:Chill 4 Wks	-0.65	-3.46	-2.48	-1.39	0.11	1.22	2.12
Intercept	16.44	13.59	14.54	15.69	17.17	18.38	19.55
<i>Acer saccharinum</i> ,Intercept	-2.14	-5.53	-4.22	-2.88	-1.31	-0.30	0.47
<i>Alnus incana rugosa</i> ,Intercept	2.80	-0.10	0.83	1.96	3.63	4.97	6.02
<i>Betula papyrifera</i> ,Intercept	1.43	-1.62	-0.47	0.65	2.19	3.46	4.56
<i>Betula populifolia</i> ,Intercept	-0.89	-3.95	-2.90	-1.62	-0.10	0.97	1.83
<i>Cornus racemosa</i> ,Intercept	0.96	-1.82	-0.82	0.22	1.67	2.90	3.89
<i>Salix purpurea</i> ,Intercept	-1.14	-4.46	-3.22	-1.89	-0.33	0.78	1.66
<i>Sorbus americana</i> ,Intercept	-2.02	-5.28	-4.17	-2.75	-1.20	-0.16	0.58
<i>Viburnum dentatum</i> ,Intercept	0.62	-2.28	-1.31	-0.12	1.37	2.57	3.53
<i>Acer saccharinum</i> ,Tx	-0.46	-3.13	-2.01	-0.86	0.03	0.63	1.31
<i>Alnus incana rugosa</i> ,Tx	0.52	-1.40	-0.66	-0.03	0.98	2.15	3.25
<i>Betula papyrifera</i> ,Tx	0.56	-1.01	-0.45	0.00	0.99	2.18	3.20
<i>Betula populifolia</i> ,Tx	-0.53	-3.29	-2.18	-0.90	0.00	0.48	1.07
<i>Cornus racemosa</i> ,Tx	0.22	-1.48	-0.83	-0.14	0.54	1.54	2.56
<i>Salix purpurea</i> ,Tx	-0.03	-2.38	-1.38	-0.41	0.35	1.30	2.16
<i>Sorbus americana</i> ,Tx	-0.48	-3.10	-2.09	-0.89	0.03	0.59	1.23
<i>Viburnum dentatum</i> ,Tx	0.15	-1.77	-1.05	-0.23	0.51	1.53	2.46
<i>Acer saccharinum</i> ,Chill 6 Wks	-0.62	-3.79	-2.54	-1.14	0.02	0.63	1.43
<i>Alnus incana rugosa</i> ,Chill 6 Wks	0.50	-1.84	-0.90	-0.08	1.00	2.44	3.50
<i>Betula papyrifera</i> ,Chill 6 Wks	0.65	-1.20	-0.57	-0.00	1.15	2.55	3.87
<i>Betula populifolia</i> ,Chill 6 Wks	0.15	-2.13	-1.20	-0.29	0.55	1.79	2.95
<i>Cornus racemosa</i> ,Chill 6 Wks	0.02	-2.41	-1.43	-0.38	0.44	1.47	2.43
<i>Salix purpurea</i> ,Chill 6 Wks	0.38	-1.96	-1.11	-0.16	0.90	2.24	3.36
<i>Sorbus americana</i> ,Chill 6 Wks	-0.85	-4.29	-2.99	-1.44	-0.05	0.47	1.07
<i>Viburnum dentatum</i> ,Chill 6 Wks	-0.32	-3.26	-2.03	-0.76	0.19	1.05	1.94
<i>Acer saccharinum</i> ,Chill 4 Wks	-1.07	-5.96	-4.08	-2.15	0.08	1.81	3.19
<i>Alnus incana rugosa</i> ,Chill 4 Wks	1.75	-2.66	-1.14	0.59	2.88	4.88	6.45
<i>Betula papyrifera</i> ,Chill 4 Wks	-0.73	-5.31	-3.75	-1.82	0.38	2.13	3.58
<i>Betula populifolia</i> ,Chill 4 Wks	1.43	-3.13	-1.43	0.26	2.56	4.43	6.14
<i>Cornus racemosa</i> ,Chill 4 Wks	-0.44	-5.17	-3.39	-1.51	0.66	2.41	3.82
<i>Salix purpurea</i> ,Chill 4 Wks	-5.08	-10.17	-8.34	-6.28	-3.78	-2.23	-1.03
<i>Sorbus americana</i> ,Chill 4 Wks	0.89	-3.66	-2.09	-0.27	2.05	3.87	5.43
<i>Viburnum dentatum</i> ,Chill 4 Wks	3.11	-1.18	0.29	1.91	4.26	6.17	7.74
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-0.71	-4.47	-3.06	-1.31	0.03	0.83	1.77
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.52	-2.14	-1.13	-0.12	1.09	2.72	4.14
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.42	-2.37	-1.18	-0.13	0.94	2.38	3.86
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	-0.36	-3.76	-2.35	-0.85	0.18	1.17	2.32
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.08	-2.89	-1.60	-0.35	0.53	1.79	2.88
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.77	-1.65	-0.79	-0.02	1.40	3.14	4.55
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.56	-4.13	-2.75	-1.10	0.09	0.98	2.00
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	-0.41	-3.91	-2.51	-0.92	0.18	1.16	2.20
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	-0.03	-3.32	-1.95	-0.53	0.46	1.88	3.22

Table S4: 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>Alnus incana rugosa</i> ,Tx:Chill 4 Wks	-0.11	-3.80	-2.21	-0.60	0.46	1.75	2.99
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	0.25	-2.56	-1.41	-0.29	0.71	2.37	3.78
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	-0.44	-4.26	-2.68	-0.91	0.16	1.16	2.18
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	-0.57	-4.79	-2.90	-1.06	0.08	0.93	1.87
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-0.10	-3.70	-2.18	-0.66	0.46	1.90	3.30
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.33	-2.44	-1.36	-0.25	0.85	2.58	4.08

Table S5: 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	258.78	223.40	236.81	251.16	267.25	278.06	287.72
Tx	-9.91	-23.20	-19.27	-13.56	-6.11	-0.96	3.09
Chill 6 Wks	13.71	1.71	5.64	10.36	17.01	21.91	25.60
Chill 4 Wks	13.33	1.19	5.29	10.01	16.57	21.78	25.62
Tx:Chill 6 Wks	-1.81	-18.04	-12.82	-6.32	2.64	9.34	14.64
Tx:Chill 4 Wks	10.05	-6.19	-1.16	5.53	14.61	21.14	25.79
Intercept	264.27	227.15	241.91	256.81	272.76	284.09	294.17
<i>Acer saccharinum</i> ,Intercept	19.02	-10.10	-1.12	10.24	26.81	42.18	55.76
<i>Alnus incana rugosa</i> ,Intercept	39.43	9.57	18.63	30.49	47.20	63.31	77.66
<i>Betula papyrifera</i> ,Intercept	0.45	-29.43	-19.52	-8.27	8.28	22.64	35.64
<i>Betula populifolia</i> ,Intercept	15.01	-13.93	-5.30	6.24	22.78	38.20	52.32
<i>Cornus racemosa</i> ,Intercept	-44.11	-74.72	-65.15	-52.70	-35.90	-21.98	-8.50
<i>Salix purpurea</i> ,Intercept	35.31	6.52	15.20	26.58	42.91	58.52	72.16
<i>Sorbus americana</i> ,Intercept	-39.22	-70.47	-59.78	-47.92	-31.08	-16.46	-2.96
<i>Viburnum dentatum</i> ,Intercept	25.82	-3.10	5.53	16.86	33.71	48.87	62.73
<i>Acer saccharinum</i> ,Tx	0.71	-14.16	-8.81	-2.44	3.76	10.52	17.00
<i>Alnus incana rugosa</i> ,Tx	5.52	-8.37	-3.89	0.85	9.46	17.70	23.85
<i>Betula papyrifera</i> ,Tx	2.45	-10.95	-6.06	-0.96	5.54	12.90	19.94
<i>Betula populifolia</i> ,Tx	3.64	-9.19	-4.50	-0.05	6.85	14.35	20.29
<i>Cornus racemosa</i> ,Tx	-6.00	-23.76	-17.54	-9.93	-1.36	3.06	7.65
<i>Salix purpurea</i> ,Tx	3.78	-10.69	-5.34	-0.08	7.34	14.90	21.40
<i>Sorbus americana</i> ,Tx	-9.45	-29.33	-23.05	-14.12	-3.75	0.37	3.02
<i>Viburnum dentatum</i> ,Tx	4.95	-7.70	-3.48	0.52	8.50	16.50	21.96
<i>Acer saccharinum</i> ,Chill 6 Wks	-0.26	-12.13	-6.98	-1.93	1.41	6.48	11.30
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-2.34	-17.98	-11.83	-4.44	0.29	3.56	7.67
<i>Betula papyrifera</i> ,Chill 6 Wks	-0.11	-11.31	-6.88	-1.78	1.55	6.46	11.42
<i>Betula populifolia</i> ,Chill 6 Wks	-0.17	-12.31	-6.78	-1.82	1.44	6.23	11.47
<i>Cornus racemosa</i> ,Chill 6 Wks	2.95	-6.47	-3.03	-0.12	5.26	12.73	19.51
<i>Salix purpurea</i> ,Chill 6 Wks	-1.45	-15.83	-9.76	-3.27	0.68	4.74	8.69
<i>Sorbus americana</i> ,Chill 6 Wks	1.58	-9.31	-4.86	-0.73	3.60	9.97	15.96
<i>Viburnum dentatum</i> ,Chill 6 Wks	-1.35	-15.15	-9.09	-3.04	0.64	4.55	8.89
<i>Acer saccharinum</i> ,Chill 4 Wks	-2.02	-19.28	-11.66	-4.17	0.74	4.75	9.01
<i>Alnus incana rugosa</i> ,Chill 4 Wks	3.12	-8.40	-3.93	-0.23	5.75	14.22	21.16
<i>Betula papyrifera</i> ,Chill 4 Wks	-0.18	-13.49	-7.83	-2.22	1.94	7.24	12.25
<i>Betula populifolia</i> ,Chill 4 Wks	0.77	-11.70	-6.65	-1.37	2.86	8.86	14.31
<i>Cornus racemosa</i> ,Chill 4 Wks	-2.11	-17.92	-11.67	-4.80	0.72	5.53	10.65
<i>Salix purpurea</i> ,Chill 4 Wks	3.38	-7.32	-3.64	-0.09	6.23	13.88	20.56
<i>Sorbus americana</i> ,Chill 4 Wks	-3.20	-20.13	-13.75	-6.09	0.16	3.93	8.31
<i>Viburnum dentatum</i> ,Chill 4 Wks	2.60	-7.65	-4.10	-0.36	4.98	12.55	18.58
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-2.68	-23.50	-14.71	-4.81	0.45	4.33	8.62
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-0.05	-16.51	-9.52	-2.34	2.27	9.22	16.02
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-0.62	-16.50	-9.29	-2.56	1.50	6.93	13.70
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	0.79	-13.04	-6.91	-1.36	2.70	9.99	17.58
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	1.25	-12.89	-7.10	-1.37	3.63	11.58	19.25
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	-0.32	-16.52	-9.64	-2.48	1.90	8.49	14.86
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.92	-14.13	-7.85	-1.61	3.14	11.40	19.34
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	0.15	-14.69	-8.04	-1.93	2.22	8.63	15.25
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	0.81	-13.03	-6.91	-1.59	2.71	10.14	18.33

Table S5: 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>Alnus incana rugosa</i> ,Tx:Chill 4 Wks	-0.42	-18.98	-10.44	-2.57	2.10	8.58	14.53
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	-0.77	-16.83	-10.08	-2.65	1.44	6.85	12.81
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	0.85	-13.04	-7.14	-1.29	2.81	9.81	17.28
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	-1.58	-20.40	-12.32	-3.89	1.08	6.74	13.06
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	0.54	-15.56	-8.53	-1.80	2.75	10.34	18.01
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.03	-16.40	-8.87	-2.47	2.22	9.84	17.63

Table S6: 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 4 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 4 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 dentatum</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 dentatum</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 dentatum</i> ,Chill 6 Wks	5.87	-0.04	0.97	2.95	7.48	14.25	21.82
<i>Acer saccharinum</i> ,Chill 4 Wks	-1.58	-7.47	-4.63	-2.37	-0.42	0.53	1.60
<i>Alnus incana rugosa</i> ,Chill 4 Wks	-1.42	-6.46	-4.32	-2.22	-0.33	0.56	1.59
<i>Betula papyrifera</i> ,Chill 4 Wks	-0.43	-4.14	-2.58	-1.12	0.28	1.57	2.83
<i>Betula populifolia</i> ,Chill 4 Wks	0.56	-3.60	-2.12	-0.43	1.46	3.66	5.55
<i>Cornus racemosa</i> ,Chill 4 Wks	-0.09	-3.92	-2.40	-0.79	0.67	2.07	3.20
<i>Salix purpurea</i> ,Chill 4 Wks	0.06	-3.17	-1.99	-0.63	0.74	2.18	3.48
<i>Sorbus americana</i> ,Chill 4 Wks	-0.37	-6.14	-3.60	-1.34	0.68	2.62	4.40
<i>Viburnum dentatum</i> ,Chill 4 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 dentatum</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 4 Wks	0.35	-3.25	-1.77	-0.32	0.82	3.00	5.96
<i>Alnus incana rugosa</i> ,Tx:Chill 4 Wks	-0.09	-4.24	-2.25	-0.63	0.41	1.96	4.23

Table S6: 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 4 Wks	0.07	-3.48	-1.82	-0.40	0.55	1.97	3.60
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	-1.34	-10.73	-5.87	-1.96	0.02	0.92	2.05
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	0.81	-2.28	-1.16	-0.10	1.32	4.28	7.73
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-0.38	-4.53	-2.76	-0.87	0.21	1.33	2.53
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.73	-3.06	-1.55	-0.19	1.28	4.38	7.63
<i>Viburnum dentatum</i> ,Tx:Chill 4 Wks	-0.06	-6.79	-3.54	-0.95	0.61	3.57	8.46

Table S7: 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	22.29	-1.65	5.53	15.37	29.23	39.00	45.84
Tx	-5.66	-16.87	-13.01	-8.61	-2.74	1.78	5.46
Chill 6 Wks	-8.15	-18.85	-15.17	-10.85	-5.33	-1.36	1.91
Chill 4 Wks	-11.63	-23.62	-19.31	-14.37	-8.70	-4.46	-0.68
Tx:Chill 6 Wks	3.15	-14.58	-8.23	-1.16	7.50	14.61	21.54
Tx:Chill 4 Wks	10.93	-6.78	-0.11	6.69	15.23	21.90	27.49
Intercept	15.22	-7.32	-0.82	8.69	21.64	31.17	37.50
<i>Acer saccharinum</i> ,Intercept	44.26	20.05	26.71	37.24	51.33	61.78	70.07
<i>Alnus incana rugosa,Intercept</i>	56.70	31.83	38.97	49.50	63.79	74.53	81.81
<i>Betula papyrifera</i> ,Intercept	26.16	1.50	8.88	18.94	33.28	43.84	51.34
<i>Betula populifolia</i> ,Intercept	58.32	34.35	41.00	51.30	65.21	75.66	83.06
<i>Cornus racemosa</i> ,Intercept	7.07	-17.95	-10.46	-0.05	14.13	24.41	31.86
<i>Salix purpurea</i> ,Intercept	118.56	93.27	100.70	111.12	125.96	136.36	145.18
<i>Sorbus americana</i> ,Intercept	-15.25	-39.36	-32.62	-22.33	-8.24	2.02	9.74
<i>Viburnum dentatum</i> ,Intercept	41.12	17.44	24.02	33.88	48.21	58.31	66.16
<i>Acer saccharinum</i> ,Tx	-2.91	-18.26	-12.25	-5.33	0.06	3.37	7.27
<i>Alnus incana rugosa</i> ,Tx	2.89	-8.19	-4.07	-0.28	5.49	13.29	19.51
<i>Betula papyrifera</i> ,Tx	-0.07	-12.84	-7.68	-2.18	2.05	7.55	12.33
<i>Betula populifolia</i> ,Tx	-0.54	-13.89	-8.37	-2.62	1.50	6.57	11.70
<i>Cornus racemosa</i> ,Tx	0.50	-11.88	-6.74	-1.62	2.53	8.44	14.30
<i>Salix purpurea</i> ,Tx	-5.24	-24.38	-17.78	-8.86	-0.41	2.34	5.99
<i>Sorbus americana</i> ,Tx	0.85	-10.21	-5.72	-1.10	2.71	8.50	13.63
<i>Viburnum dentatum</i> ,Tx	-0.00	-12.24	-7.65	-2.08	2.04	7.67	12.62
<i>Acer saccharinum</i> ,Chill 6 Wks	0.88	-9.83	-5.05	-1.02	2.56	8.43	13.61
<i>Alnus incana rugosa</i> ,Chill 6 Wks	-2.22	-18.95	-11.68	-4.31	0.41	3.90	8.19
<i>Betula papyrifera</i> ,Chill 6 Wks	-1.51	-15.00	-9.31	-3.12	0.58	3.93	7.70
<i>Betula populifolia</i> ,Chill 6 Wks	0.68	-9.69	-5.35	-1.12	2.31	7.86	13.73
<i>Cornus racemosa</i> ,Chill 6 Wks	2.09	-7.05	-3.38	-0.31	3.86	10.72	17.05
<i>Salix purpurea</i> ,Chill 6 Wks	1.31	-11.06	-5.91	-1.13	3.37	10.83	17.81
<i>Sorbus americana</i> ,Chill 6 Wks	0.40	-9.52	-5.16	-1.23	1.92	6.80	12.16
<i>Viburnum dentatum</i> ,Chill 6 Wks	-0.63	-12.85	-7.73	-2.34	1.22	5.41	10.01
<i>Acer saccharinum</i> ,Chill 4 Wks	0.19	-12.34	-6.83	-1.77	2.05	7.61	14.25
<i>Alnus incana rugosa</i> ,Chill 4 Wks	3.05	-7.76	-3.66	-0.20	5.67	13.58	20.65
<i>Betula papyrifera</i> ,Chill 4 Wks	-0.54	-14.72	-8.35	-2.27	1.41	6.06	11.44
<i>Betula populifolia</i> ,Chill 4 Wks	-0.43	-14.91	-7.89	-2.29	1.62	6.58	11.60
<i>Cornus racemosa</i> ,Chill 4 Wks	-0.52	-13.41	-8.15	-2.49	1.41	6.55	12.35
<i>Salix purpurea</i> ,Chill 4 Wks	4.10	-7.11	-3.28	-0.03	7.02	16.96	26.00
<i>Sorbus americana</i> ,Chill 4 Wks	1.00	-8.73	-5.25	-1.08	2.57	8.98	15.40
<i>Viburnum dentatum</i> ,Chill 4 Wks	-0.37	-13.90	-8.10	-2.18	1.66	6.54	11.06
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-2.71	-24.99	-16.26	-6.42	1.27	8.01	16.18
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-4.87	-28.84	-20.05	-9.40	0.21	6.38	12.66
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-7.65	-34.05	-24.15	-12.48	-1.07	2.77	7.59
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	1.64	-16.81	-9.88	-2.16	5.29	14.48	22.16
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	7.18	-8.58	-3.25	0.93	11.98	23.36	32.60
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.68	-21.78	-13.91	-3.89	5.10	15.63	25.28
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	1.24	-16.64	-9.70	-2.24	4.80	12.97	22.10
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	3.14	-13.72	-7.31	-1.09	6.91	16.53	25.85
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	-2.03	-22.27	-14.34	-5.33	1.48	8.17	14.49

Table S7: 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>Alnus incana rugosa</i> ,Tx:Chill 4 Wks	6.92	-8.41	-3.43	0.49	11.68	23.62	34.41
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	1.47	-15.43	-9.10	-1.82	4.61	13.25	21.76
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	-0.33	-19.27	-11.56	-3.64	2.90	10.70	18.32
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	-4.43	-26.99	-18.10	-8.03	0.05	5.06	10.32
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-3.25	-29.25	-19.37	-7.42	1.35	9.31	16.77
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	-0.72	-20.38	-11.71	-3.56	2.24	9.48	16.61

Table S8: 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	51.72	30.01	37.24	46.32	57.49	65.03	70.28
Tx	0.57	-5.79	-3.81	-1.20	2.39	4.96	6.94
Chill 6 Wks	-2.12	-8.48	-6.76	-3.98	-0.23	2.50	4.57
Chill 4 Wks	-2.73	-10.07	-7.66	-4.69	-0.81	2.07	4.40
Tx:Chill 6 Wks	-3.33	-12.94	-10.00	-5.96	-0.61	3.21	6.26
Tx:Chill 4 Wks	-3.88	-12.80	-9.92	-6.44	-1.44	2.36	5.55
Intercept	49.17	27.50	34.54	43.88	54.87	62.22	67.80
<i>Acer saccharinum</i> ,Intercept	4.87	-14.87	-8.66	-0.97	10.31	19.41	26.70
<i>Alnus incana rugosa</i> ,Intercept	43.46	24.27	30.00	37.37	48.99	58.57	66.13
<i>Betula papyrifera</i> ,Intercept	-12.39	-32.00	-26.21	-18.19	-6.79	2.45	9.95
<i>Betula populifolia</i> ,Intercept	5.05	-14.48	-8.65	-0.88	10.51	19.98	27.47
<i>Cornus racemosa</i> ,Intercept	-2.43	-22.07	-16.08	-8.20	3.04	12.54	18.81
<i>Salix purpurea</i> ,Intercept	33.72	13.89	20.16	27.69	39.29	48.71	56.48
<i>Sorbus americana</i> ,Intercept	-30.13	-49.46	-43.61	-35.83	-24.60	-15.26	-8.26
<i>Viburnum dentatum</i> ,Intercept	-13.51	-33.06	-27.13	-19.21	-8.09	1.16	8.59
<i>Acer saccharinum</i> ,Tx	0.00	-5.99	-3.34	-0.85	0.78	3.37	6.52
<i>Alnus incana rugosa</i> ,Tx	0.92	-4.61	-2.35	-0.36	1.90	5.68	9.34
<i>Betula papyrifera</i> ,Tx	0.23	-5.86	-3.15	-0.69	1.02	4.07	6.86
<i>Betula populifolia</i> ,Tx	0.31	-4.83	-2.71	-0.55	1.06	3.90	6.65
<i>Cornus racemosa</i> ,Tx	-0.65	-8.22	-4.77	-1.41	0.39	2.23	4.38
<i>Salix purpurea</i> ,Tx	-0.51	-7.97	-4.89	-1.48	0.59	2.87	5.53
<i>Sorbus americana</i> ,Tx	-0.37	-7.47	-4.24	-1.27	0.60	3.03	5.70
<i>Viburnum dentatum</i> ,Tx	0.34	-5.35	-2.77	-0.56	1.13	4.02	7.12
<i>Acer saccharinum</i> ,Chill 6 Wks	0.91	-5.56	-2.83	-0.41	1.97	6.02	9.73
<i>Alnus incana rugosa</i> ,Chill 6 Wks	0.07	-8.23	-4.92	-1.21	1.39	5.12	8.27
<i>Betula papyrifera</i> ,Chill 6 Wks	-1.46	-11.46	-7.34	-2.73	0.18	2.26	4.55
<i>Betula populifolia</i> ,Chill 6 Wks	0.14	-7.11	-3.92	-0.94	1.17	4.35	7.73
<i>Cornus racemosa</i> ,Chill 6 Wks	-0.97	-10.03	-6.13	-2.05	0.39	2.62	5.20
<i>Salix purpurea</i> ,Chill 6 Wks	0.90	-5.66	-3.12	-0.55	2.13	6.45	10.09
<i>Sorbus americana</i> ,Chill 6 Wks	0.67	-5.70	-3.32	-0.67	1.76	5.77	9.38
<i>Viburnum dentatum</i> ,Chill 6 Wks	-0.27	-8.12	-4.70	-1.34	0.84	3.85	6.93
<i>Acer saccharinum</i> ,Chill 4 Wks	-1.38	-11.68	-7.56	-2.94	0.37	3.06	6.06
<i>Alnus incana rugosa</i> ,Chill 4 Wks	1.86	-6.32	-3.15	-0.25	3.82	8.65	12.00
<i>Betula papyrifera</i> ,Chill 4 Wks	-0.99	-10.25	-6.67	-2.57	0.62	3.87	7.01
<i>Betula populifolia</i> ,Chill 4 Wks	1.48	-5.53	-2.73	-0.28	3.03	7.38	10.78
<i>Cornus racemosa</i> ,Chill 4 Wks	-0.90	-10.01	-6.35	-2.37	0.67	3.71	6.33
<i>Salix purpurea</i> ,Chill 4 Wks	3.70	-2.71	-1.03	0.50	6.00	11.61	16.03
<i>Sorbus americana</i> ,Chill 4 Wks	-1.09	-10.23	-6.80	-2.76	0.57	3.74	7.10
<i>Viburnum dentatum</i> ,Chill 4 Wks	-1.77	-12.03	-8.03	-3.40	0.17	2.48	4.91
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-1.60	-13.99	-8.72	-3.33	0.46	3.41	6.52
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	2.10	-7.45	-3.96	-0.36	4.27	10.47	15.70
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	-3.18	-17.18	-11.95	-5.44	-0.07	1.89	4.62
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	1.43	-6.99	-3.61	-0.47	3.06	8.38	13.74
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.08	-9.82	-5.95	-1.55	1.67	6.36	11.01
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	1.72	-7.73	-4.09	-0.51	3.69	9.51	14.68
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.16	-10.17	-6.35	-1.96	1.50	6.03	10.73
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	1.03	-7.61	-4.45	-0.89	2.72	8.17	13.30
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	-0.94	-11.78	-6.91	-2.11	0.58	3.15	6.10

Table S8: 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 4 Wks	0.47	-9.06	-4.97	-1.08	1.91	6.74	10.94
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	0.56	-7.12	-3.96	-0.79	1.73	5.95	10.76
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	0.63	-6.68	-3.46	-0.62	1.76	5.58	10.39
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	-0.61	-10.42	-5.96	-1.68	0.68	3.72	6.98
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-1.00	-12.66	-7.77	-2.24	0.66	3.70	7.01
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.31	-8.05	-4.44	-1.02	1.53	5.64	9.71

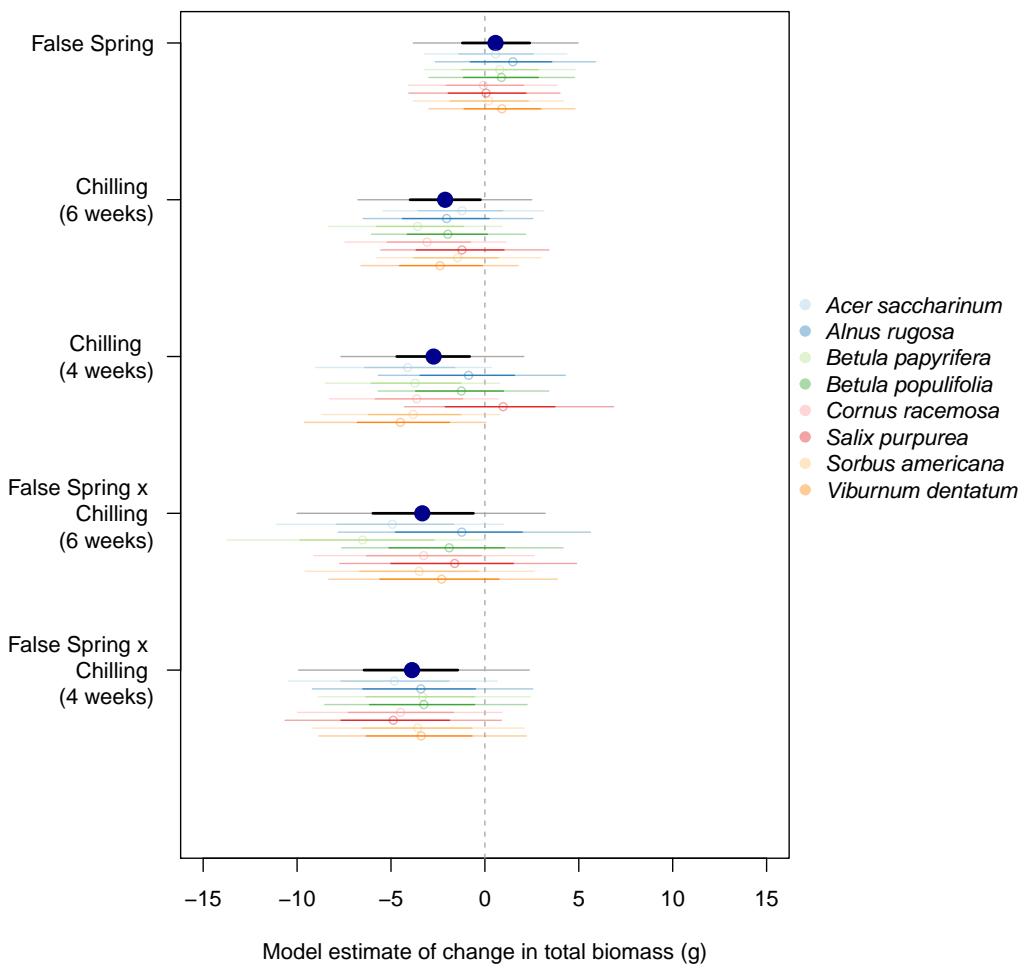


Figure S1: Effects of false spring treatment (Tx), six weeks of chilling and eight weeks of chilling on total aboveground and belowground biomass (g). Larger, blue dots represent overall estimates across all species, while smaller dots are estimates for each species. Dots and thin lines show means and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

Table S9: 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	0.38	0.19	0.27	0.34	0.42	0.48	0.54
Tx	-0.03	-0.07	-0.06	-0.04	-0.01	0.01	0.02
Chill 6 Wks	-0.01	-0.05	-0.04	-0.02	0.00	0.02	0.03
Chill 4 Wks	0.05	-0.00	0.02	0.04	0.07	0.09	0.11
Tx:Chill 6 Wks	-0.00	-0.06	-0.04	-0.02	0.02	0.04	0.06
Tx:Chill 4 Wks	-0.02	-0.09	-0.07	-0.04	-0.01	0.02	0.04
Intercept	0.37	0.20	0.27	0.34	0.41	0.48	0.53
<i>Acer saccharinum</i> ,Intercept	-0.03	-0.20	-0.14	-0.08	0.01	0.08	0.15
<i>Alnus incana rugosa,Intercept</i>	-0.06	-0.23	-0.17	-0.11	-0.02	0.05	0.13
<i>Betula papyrifera,Intercept</i>	-0.12	-0.29	-0.23	-0.17	-0.08	-0.01	0.06
<i>Betula populifolia,Intercept</i>	-0.11	-0.27	-0.22	-0.15	-0.07	0.00	0.07
<i>Cornus racemosa,Intercept</i>	-0.05	-0.22	-0.17	-0.10	-0.01	0.06	0.13
<i>Salix purpurea,Intercept</i>	0.17	0.01	0.06	0.13	0.21	0.28	0.36
<i>Sorbus americana,Intercept</i>	-0.03	-0.19	-0.14	-0.07	0.01	0.08	0.15
<i>Viburnum dentatum</i> ,Intercept	0.27	0.11	0.16	0.22	0.31	0.38	0.46
<i>Acer saccharinum</i> ,Tx	0.00	-0.05	-0.03	-0.01	0.01	0.03	0.05
<i>Alnus incana rugosa</i> ,Tx	0.01	-0.04	-0.02	-0.00	0.02	0.05	0.07
<i>Betula papyrifera</i> ,Tx	0.00	-0.05	-0.03	-0.01	0.01	0.03	0.05
<i>Betula populifolia</i> ,Tx	0.00	-0.05	-0.03	-0.01	0.01	0.03	0.05
<i>Cornus racemosa</i> ,Tx	0.02	-0.02	-0.01	0.00	0.03	0.06	0.08
<i>Salix purpurea</i> ,Tx	-0.01	-0.07	-0.05	-0.02	0.00	0.02	0.03
<i>Sorbus americana</i> ,Tx	-0.01	-0.08	-0.05	-0.02	0.00	0.02	0.03
<i>Viburnum dentatum</i> ,Tx	-0.01	-0.08	-0.05	-0.02	0.00	0.02	0.03
<i>Acer saccharinum</i> ,Chill 6 Wks	0.00	-0.04	-0.02	-0.00	0.01	0.03	0.04
<i>Alnus incana rugosa</i> ,Chill 6 Wks	0.00	-0.04	-0.02	-0.01	0.01	0.02	0.04
<i>Betula papyrifera</i> ,Chill 6 Wks	0.00	-0.03	-0.02	-0.00	0.01	0.03	0.05
<i>Betula populifolia</i> ,Chill 6 Wks	0.00	-0.03	-0.02	-0.00	0.01	0.03	0.05
<i>Cornus racemosa</i> ,Chill 6 Wks	-0.00	-0.05	-0.03	-0.01	0.00	0.02	0.03
<i>Salix purpurea</i> ,Chill 6 Wks	-0.00	-0.05	-0.03	-0.01	0.00	0.02	0.04
<i>Sorbus americana</i> ,Chill 6 Wks	0.00	-0.04	-0.02	-0.01	0.01	0.03	0.04
<i>Viburnum dentatum</i> ,Chill 6 Wks	-0.00	-0.05	-0.03	-0.01	0.00	0.02	0.04
<i>Acer saccharinum</i> ,Chill 4 Wks	-0.03	-0.12	-0.09	-0.05	-0.01	0.01	0.02
<i>Alnus incana rugosa</i> ,Chill 4 Wks	0.02	-0.05	-0.02	-0.00	0.03	0.06	0.09
<i>Betula papyrifera</i> ,Chill 4 Wks	0.01	-0.06	-0.03	-0.01	0.02	0.05	0.08
<i>Betula populifolia</i> ,Chill 4 Wks	0.01	-0.05	-0.03	-0.00	0.02	0.05	0.08
<i>Cornus racemosa</i> ,Chill 4 Wks	0.01	-0.06	-0.03	-0.01	0.02	0.05	0.08
<i>Salix purpurea</i> ,Chill 4 Wks	-0.02	-0.09	-0.07	-0.03	0.00	0.02	0.05
<i>Sorbus americana</i> ,Chill 4 Wks	0.03	-0.02	-0.01	0.01	0.05	0.09	0.13
<i>Viburnum dentatum</i> ,Chill 4 Wks	-0.02	-0.10	-0.07	-0.04	-0.00	0.02	0.05
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	-0.00	-0.06	-0.03	-0.01	0.01	0.03	0.05
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	0.00	-0.06	-0.03	-0.01	0.01	0.03	0.06
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.00	-0.06	-0.03	-0.01	0.01	0.03	0.05
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	0.01	-0.03	-0.02	-0.00	0.02	0.05	0.08
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	0.01	-0.04	-0.02	-0.00	0.01	0.04	0.08
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	-0.00	-0.06	-0.04	-0.01	0.01	0.03	0.06
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	-0.01	-0.08	-0.05	-0.02	0.00	0.02	0.04
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	-0.01	-0.08	-0.05	-0.02	0.00	0.03	0.05
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	-0.01	-0.10	-0.07	-0.02	0.00	0.03	0.05

Table S9: 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 4 Wks	0.02	-0.04	-0.02	-0.00	0.03	0.07	0.11
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	0.01	-0.05	-0.02	-0.00	0.03	0.07	0.10
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	-0.00	-0.08	-0.04	-0.01	0.01	0.04	0.07
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	0.01	-0.05	-0.02	-0.00	0.03	0.07	0.10
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-0.01	-0.10	-0.07	-0.03	0.00	0.03	0.06
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.00	-0.08	-0.05	-0.01	0.01	0.05	0.08

Table S10: 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 4 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 4 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,Intercept</i>	5.66	-1.33	0.96	3.81	7.48	10.35	12.40
<i>Betula papyrifera,Intercept</i>	-2.33	-9.20	-6.98	-4.13	-0.48	2.29	4.50
<i>Betula populifolia,Intercept</i>	0.68	-6.50	-3.99	-1.12	2.48	5.33	7.54
<i>Cornus racemosa,Intercept</i>	0.96	-5.84	-3.68	-0.88	2.81	5.61	7.89
<i>Salix purpurea,Intercept</i>	12.24	5.25	7.55	10.37	14.05	16.89	19.14
<i>Sorbus americana,Intercept</i>	-7.21	-14.06	-11.90	-9.05	-5.38	-2.60	-0.50
<i>Viburnum dentatum</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 dentatum</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 dentatum</i> ,Chill 6 Wks	0.33	-1.91	-0.98	-0.14	0.79	1.94	2.95
<i>Acer saccharinum</i> ,Chill 4 Wks	0.04	-2.46	-1.51	-0.43	0.47	1.61	2.85
<i>Alnus incana rugosa</i> ,Chill 4 Wks	0.33	-2.20	-1.18	-0.21	0.85	2.15	3.31
<i>Betula papyrifera</i> ,Chill 4 Wks	0.18	-2.29	-1.36	-0.31	0.65	1.86	3.04
<i>Betula populifolia</i> ,Chill 4 Wks	0.10	-2.41	-1.42	-0.38	0.56	1.74	2.94
<i>Cornus racemosa</i> ,Chill 4 Wks	1.12	-0.75	-0.27	0.15	1.82	3.46	4.88
<i>Salix purpurea</i> ,Chill 4 Wks	-0.31	-3.49	-2.24	-0.88	0.29	1.35	2.23
<i>Sorbus americana</i> ,Chill 4 Wks	-0.67	-3.89	-2.68	-1.24	0.01	0.73	1.60
<i>Viburnum dentatum</i> ,Chill 4 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 dentatum</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 4 Wks	0.06	-2.13	-1.13	-0.25	0.35	1.38	2.47
<i>Alnus incana rugosa</i> ,Tx:Chill 4 Wks	0.06	-2.25	-1.22	-0.29	0.36	1.48	2.59

Table S10: 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 4 Wks	0.04	-2.22	-1.20	-0.26	0.32	1.31	2.41
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	-0.06	-2.28	-1.37	-0.35	0.23	1.11	1.82
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	-0.01	-2.46	-1.27	-0.32	0.29	1.30	2.40
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	-0.24	-3.31	-2.01	-0.62	0.20	1.13	2.13
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.05	-2.33	-1.30	-0.27	0.39	1.44	2.54
<i>Viburnum dentatum</i> ,Tx:Chill 4 Wks	0.11	-2.08	-1.12	-0.22	0.42	1.51	2.74

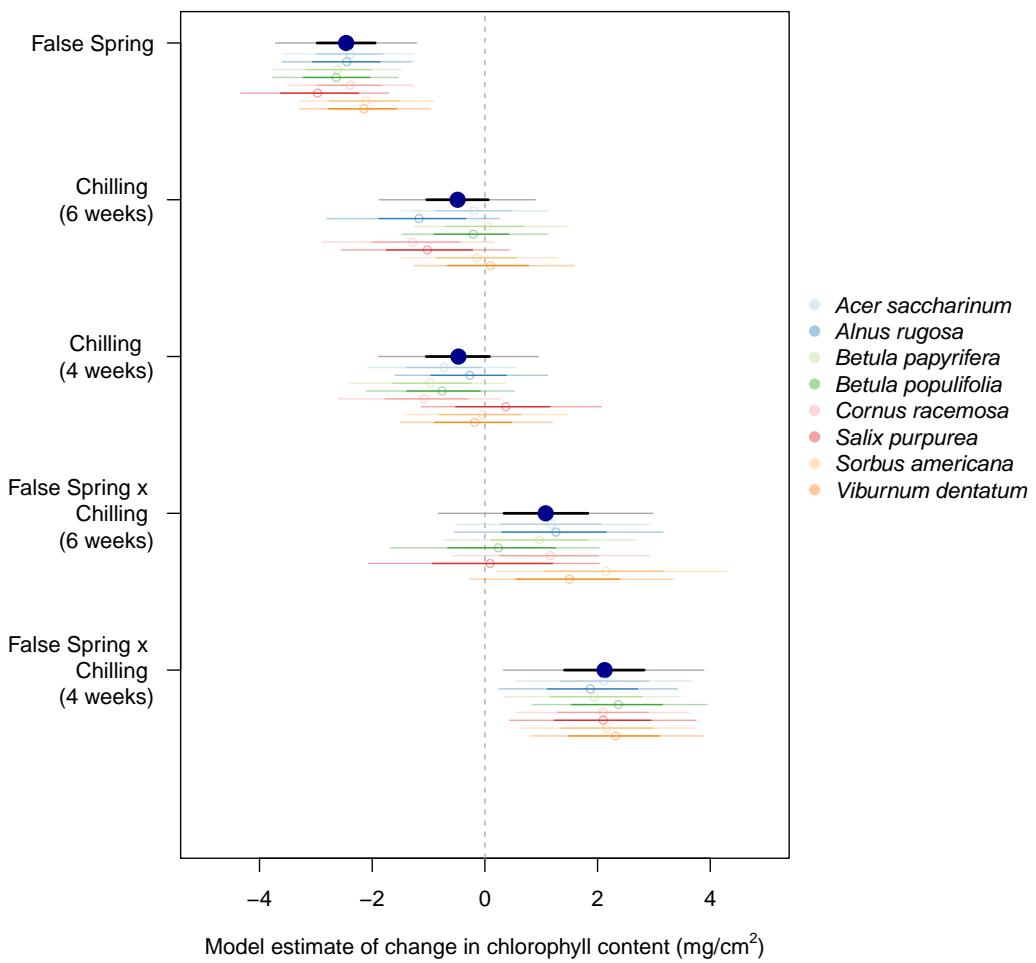


Figure S2: Effects of false spring treatment, six weeks of chilling and eight weeks of chilling on chlorophyll content. Larger, blue dots represent overall estimates across all species, while smaller dots are estimates for each species. Dots and thin lines show means and 90% uncertainty intervals and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

Table S11: 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	133.73	114.66	120.60	128.70	138.61	147.21	154.83
Tx	-7.35	-16.61	-13.81	-9.88	-4.80	-1.11	1.73
Chill 6 Wks	15.44	-4.06	2.94	10.72	20.19	27.80	34.07
Chill 4 Wks	8.18	-10.41	-3.98	3.60	12.84	20.08	26.23
Tx:Chill 6 Wks	-3.17	-16.01	-12.07	-6.69	0.41	5.77	9.58
Tx:Chill 4 Wks	-1.56	-14.76	-10.46	-5.20	2.07	7.48	11.76
Intercept	137.18	117.08	123.10	131.90	142.43	151.18	159.19
<i>Acer saccharinum</i> ,Intercept	-27.41	-51.57	-42.46	-33.01	-21.66	-13.20	-7.01
<i>Alnus incana rugosa</i> ,Intercept	7.37	-15.14	-7.24	1.62	13.11	22.03	29.34
<i>Betula papyrifera</i> ,Intercept	26.61	4.54	12.22	20.83	32.35	41.23	48.17
<i>Betula populifolia</i> ,Intercept	-7.96	-31.68	-22.68	-13.62	-2.21	6.82	13.54
<i>Cornus racemosa</i> ,Intercept	-10.85	-34.61	-25.96	-16.31	-5.17	3.35	10.01
<i>Salix purpurea</i> ,Intercept	14.72	-7.67	0.50	9.13	20.36	29.46	36.92
<i>Sorbus americana</i> ,Intercept	-10.10	-32.83	-24.84	-15.70	-4.36	4.27	11.27
<i>Viburnum dentatum</i> ,Intercept	7.35	-14.93	-7.17	1.88	13.11	21.80	28.99
<i>Acer saccharinum</i> ,Tx	1.00	-7.00	-3.99	-0.70	2.38	7.75	12.23
<i>Alnus incana rugosa</i> ,Tx	-1.81	-14.31	-9.18	-3.24	0.23	2.54	5.08
<i>Betula papyrifera</i> ,Tx	0.78	-6.86	-3.94	-0.82	2.10	7.02	11.40
<i>Betula populifolia</i> ,Tx	-0.41	-9.98	-6.02	-1.83	1.01	4.62	8.96
<i>Cornus racemosa</i> ,Tx	-0.32	-9.67	-5.84	-1.59	1.04	4.69	8.93
<i>Salix purpurea</i> ,Tx	-0.64	-10.52	-6.23	-1.87	0.75	3.99	7.19
<i>Sorbus americana</i> ,Tx	1.23	-6.92	-3.44	-0.52	2.72	7.84	12.05
<i>Viburnum dentatum</i> ,Tx	0.32	-8.90	-4.63	-0.94	1.58	5.71	9.45
<i>Acer saccharinum</i> ,Chill 6 Wks	-14.35	-37.93	-29.93	-20.20	-8.15	0.73	6.78
<i>Alnus incana rugosa</i> ,Chill 6 Wks	5.58	-17.30	-9.92	-0.51	11.58	21.15	29.88
<i>Betula papyrifera</i> ,Chill 6 Wks	7.05	-14.91	-7.41	1.14	12.80	22.35	30.08
<i>Betula populifolia</i> ,Chill 6 Wks	15.75	-5.19	1.17	9.48	21.69	31.57	40.55
<i>Cornus racemosa</i> ,Chill 6 Wks	19.03	-2.12	4.26	12.67	24.95	35.13	43.97
<i>Salix purpurea</i> ,Chill 6 Wks	-11.32	-35.50	-27.19	-17.15	-5.27	3.26	10.73
<i>Sorbus americana</i> ,Chill 6 Wks	-7.37	-30.13	-22.39	-13.16	-1.33	7.13	14.13
<i>Viburnum dentatum</i> ,Chill 6 Wks	-13.53	-37.93	-29.45	-19.40	-7.36	1.23	8.05
<i>Acer saccharinum</i> ,Chill 4 Wks	-4.04	-26.53	-18.95	-10.16	1.84	11.22	19.05
<i>Alnus incana rugosa</i> ,Chill 4 Wks	12.62	-8.28	-1.90	6.20	18.47	28.47	36.93
<i>Betula papyrifera</i> ,Chill 4 Wks	6.01	-15.86	-8.67	0.05	11.98	20.75	29.28
<i>Betula populifolia</i> ,Chill 4 Wks	18.53	-1.95	3.78	12.20	24.53	34.74	42.88
<i>Cornus racemosa</i> ,Chill 4 Wks	-0.48	-22.22	-15.01	-6.37	5.27	14.36	21.36
<i>Salix purpurea</i> ,Chill 4 Wks	3.38	-17.70	-11.44	-2.22	8.99	17.95	25.15
<i>Sorbus americana</i> ,Chill 4 Wks	-22.39	-46.24	-38.36	-28.54	-15.85	-7.33	-1.34
<i>Viburnum dentatum</i> ,Chill 4 Wks	-12.54	-36.66	-27.72	-18.20	-6.41	1.79	8.51
<i>Acer saccharinum</i> ,Tx:Chill 6 Wks	0.78	-12.53	-7.19	-1.38	2.80	9.88	16.34
<i>Alnus incana rugosa</i> ,Tx:Chill 6 Wks	-0.51	-15.23	-8.63	-2.29	1.32	6.96	12.52
<i>Betula papyrifera</i> ,Tx:Chill 6 Wks	0.62	-12.34	-6.55	-1.49	2.46	8.74	15.36
<i>Betula populifolia</i> ,Tx:Chill 6 Wks	-0.43	-14.08	-8.37	-2.31	1.44	6.77	13.56
<i>Cornus racemosa</i> ,Tx:Chill 6 Wks	-2.25	-19.12	-12.23	-4.28	0.44	3.89	8.53
<i>Salix purpurea</i> ,Tx:Chill 6 Wks	0.13	-13.13	-7.46	-1.62	1.88	7.93	13.30
<i>Sorbus americana</i> ,Tx:Chill 6 Wks	0.03	-14.11	-7.67	-1.82	1.98	7.83	13.74
<i>Viburnum dentatum</i> ,Tx:Chill 6 Wks	1.52	-10.14	-4.81	-0.79	3.36	10.66	16.93
<i>Acer saccharinum</i> ,Tx:Chill 4 Wks	-0.30	-16.31	-9.67	-2.63	2.07	8.92	15.11

Table S11: 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 4 Wks	-3.61	-26.18	-16.49	-6.00	0.16	3.28	7.20
<i>Betula papyrifera</i> ,Tx:Chill 4 Wks	1.33	-11.53	-6.32	-1.29	3.48	11.33	18.71
<i>Betula populifolia</i> ,Tx:Chill 4 Wks	0.89	-12.07	-7.09	-1.53	3.03	10.41	17.41
<i>Cornus racemosa</i> ,Tx:Chill 4 Wks	1.25	-12.53	-6.37	-1.20	3.43	10.90	17.69
<i>Salix purpurea</i> ,Tx:Chill 4 Wks	0.06	-14.61	-7.76	-2.09	2.12	8.19	14.55
<i>Sorbus americana</i> ,Tx:Chill 4 Wks	0.86	-13.57	-7.40	-1.58	3.11	10.36	17.78

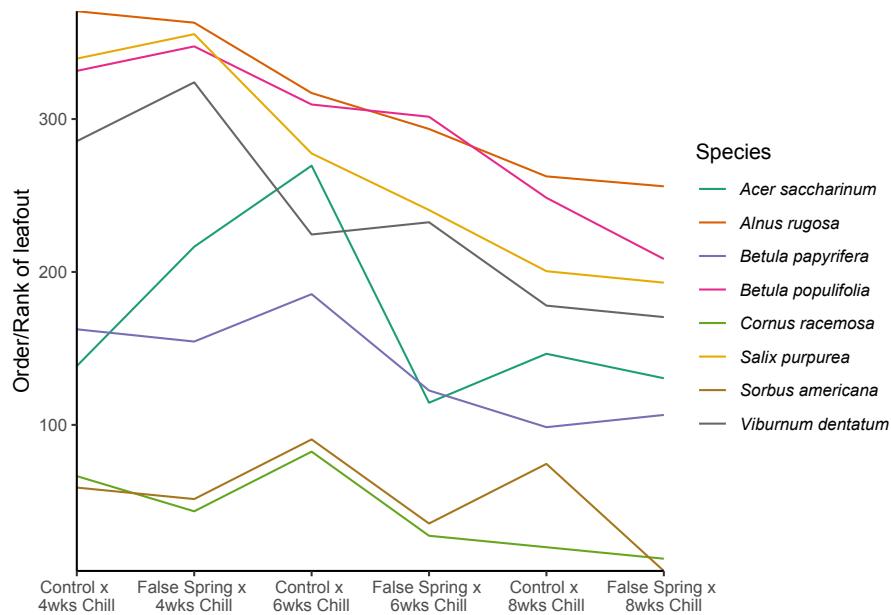


Figure S3: Rank order of leafout across all species using mean trends.



Figure S4: Evidence of shoot apical meristem damage, quantified as 1.