Table S1. Geographic descriptions and the associated climate data for 7 regions where coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) seeds were collected.

Population	Latitude (N)	Longitude (W)	Elevation (m)	Photo-period (min)	MAT (°C)	MCMT (°C)	eFFP (DOY)	PAS (mm)	MWMT (°C)	TD (°C)	CMD (mm)	MAP (mm)
Calif. (high)	39.87	120.73	1475	671	8.9	0.4	267	131	18.8	18.4	671	1080
Oreg. (high)	42.54	122.87	1063	666	9.1	0.3	272	69	19.6	19.3	693	618
Oreg. (low)	42.90	123.08	483	665	11.8	4.7	314	26	20	15.4	487	1256
Oreg. (coast)	42.70	124.18	299	666	12.9	6.8	341	27	19.8	13	322	2933
Wash. (high)	47.06	121.72	1071	656	5.5	-1.6	262	493	13.5	15.2	122	2074
Wash. (low)	46.92	121.92	445	656	7.8	0.6	285	191	15.7	15	159	1971
Wash (coast)	46.95	123.67	179	656	9.8	4.0	310	59	16.3	12.3	197	2014

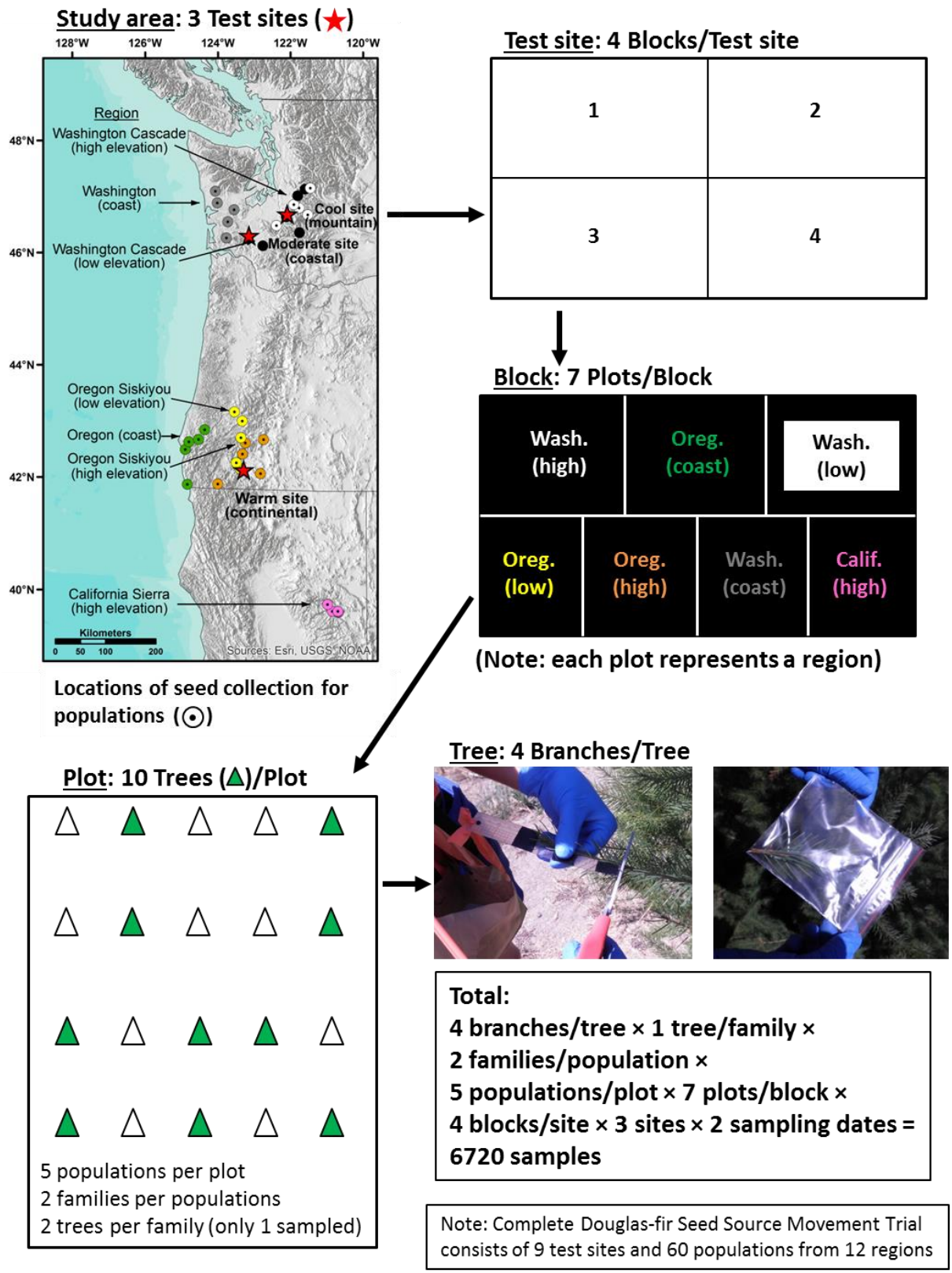
Climate data derived from ClimateWNA; abbreviations: MAT=mean annual temperature; MCMT=mean cold month temperature; eFFP (DOY)=ending day of year of the frost free period; PAS=precipitation as snow; MWMT =mean warm month temperature; TD=continentality (MWMT-MCMT); CMD=aridity (Hargreaves climatic moisture index); MAP=mean annual precipitation.

Table S2. Geographic descriptions and the associated climate data for 35 populations of coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*).

Population	Latitude (N)	Longitude (W)	Elevation (m)	Photo-period (min)	MAT (°C)	MCMT (°C)	eFFP (DOY)	PAS (mm)	MWMT (°C)	TD (°C)	CMD (mm)	MAP (mm)
1	39.83	120.65	1602	671	9.4	1.2	272	95	19.1	17.9	670	1004
2	39.84	120.67	1415	671	9.7	1.4	275	80	19.5	18.1	701	941
3	39.85	120.79	1509	671	9.9	1.2	274	110	19.6	18.4	649	1349
4	39.85	120.66	1744	671	8.5	0.3	268	126	18.5	18.3	662	927
5	39.97	120.90	1080	671	10.4	1.6	266	76	19.9	18.3	762	1130
6	42.05	124.28	17	625	12.1	8.7	348	10	15.9	7.3	245	1912
7	42.08	123.55	961	667	10.7	3.6	297	52	19.6	16.1	594	1351
8	42.29	122.53	1378	667	7.4	-0.4	277	165	16.7	17.2	419	1080
9	42.36	123.02	667	666	11.3	3.4	297	22	20.3	16.9	668	663
10	42.47	123.12	491	666	12.3	4.1	309	17	21.5	17.3	692	712
11	42.63	122.98	1002	666	10.7	2.5	308	50	20.5	18.0	533	1012
12	42.67	124.37	732	666	11.5	6.3	329	53	18.1	11.7	182	3895
13	42.81	124.29	122	665	12.4	7.3	337	21	18.4	11.0	282	2550
14	42.83	122.92	835	665	10.1	3.1	309	53	19.1	15.9	466	1162
15	42.86	124.06	154	665	12.3	6.7	320	16	18.8	12.1	468	1582
16	42.90	122.48	1103	665	6.6	0.1	290	236	16.8	16.7	365	1214
17	42.92	123.03	442	665	11.5	4.3	307	25	19.9	15.6	542	1039
18	43.04	123.92	407	665	11.8	6.4	318	22	18.2	11.8	369	1809
19	43.22	123.01	566	665	11.8	4.6	312	29	19.7	15.1	476	1401
20	43.38	123.21	288	664	11.8	4.8	310	20	19.6	14.8	497	1129
21	46.37	122.62	242	658	9.9	2.9	297	55	17.3	14.4	273	1588
22	46.49	123.57	469	657	8.7	2.3	292	175	15.7	13.4	121	3119
23	46.62	121.68	326	657	9.0	1.3	286	124	17.4	16.2	303	1592
24	46.74	122.28	833	657	8.0	0.9	284	229	16.0	15.1	187	2354
25	46.78	123.55	158	657	10.1	4.0	309	60	17.0	12.9	257	2078
26	46.90	122.03	547	656	8.1	1.0	283	144	15.9	14.9	190	1747
27	46.94	121.47	1405	656	4.2	-2.7	264	753	12.7	15.4	153	1958
28	47.00	123.40	61	656	10.7	4.3	308	42	18.0	13.7	310	1701
29	47.06	121.70	1105	656	5.3	-1.9	259	525	13.4	15.3	129	2057
30	47.11	123.85	66	656	10.4	4.7	321	48	16.6	11.8	157	2249
31	47.12	121.84	1000	656	6.4	-0.5	273	370	14.3	14.8	93	2330
32	47.28	121.74	603	655	8.5	1.5	296	146	16.2	14.7	115	2137
33	47.32	123.91	139	655	10.0	4.0	312	83	16.6	12.6	135	2854
34	47.40	121.55	495	655	7.9	0.4	287	299	16.2	15.8	119	2747
35	47.42	121.41	924	655	4.8	-3.2	266	964	14.3	17.5	114	2640

Climate data derived from ClimateWNA; abbreviations are same as Table S1.

Supplementary Methods 1: Experimental design



Supplementary Methods 2: Freeze-test protocol and LT_{50} calculations.

Four test temperatures were used to produce a range of damage scores, which required using test temperatures below actual field temperatures. Test temperatures were determined during a pre-test at each test site seven days prior to each of the sampling dates for actual tests. Branch samples that were collected after each sampling event were grouped by block from each test site, wrapped into packets of moist cheesecloth and covered with aluminum foil. Sample packets were placed in a programmable freezer (Forma Scientific Model 8270/859M) with a built-in temperature controller (model WestM3750) overnight at -2°C to equilibrate them. The following day, freezer temperatures were lowered by 1-3°C per hour until the warmest test temperature was reached (-14 and -18°C on the first and second sampling date, respectively). The temperature was maintained for one hour and then three packets (one from each test site) were removed from the freezer. The process of reducing temperature by 1-3°C, maintaining for one hour and then removing packets continued for the second, third and fourth test temperatures (-20 and -23°C on the first and second sampling date, respectively). Immediately upon removal from the freezer, the packets were placed in a 4°C refrigerator overnight to allow samples to slowly thaw. The packets were then kept at room temperature for 6-7 days to allow symptoms of cold damage to develop. The whole process was repeated identically for the second, third and fourth blocks on subsequent days.

The freeze-treated samples were visually scored for cold damage as the percentage of each type of tissue (bud, needle and stem) showing injury (yellowing or browning). Stems and buds were tangentially cut to assess percent damage. Scoring was between 0 (no damage) and 10 (100% damage). By taking the mean damage score of the four test-temperatures, we increased

the precision of our cold hardiness assessment for each population (Aitken & Adams, 1996, Aitken & Adams, 1997, Anekonda *et al.*, 2000). In addition, by taking cold damage measurements across a range of temperatures, we could also calculate the temperature at which 50% of tissues were visually damaged (LT_{50}) from a linear regression of damage as a function of freezer temperature. Calculated LT_{50} temperatures corresponded well with mean damage scores (Supplementary Fig. S1). However, many samples had low variation in damage scores among the four temperatures due to high damage scores at the warmer test temperatures, leading to missing LT_{50} values for each of the three tissue types. Bud LT_{50} had the least missing values and the strongest correlation to damage scores compared to stem LT_{50} or needle LT_{50} (Supplementary Fig. S1); thus, we present results only for bud LT_{50}.

Aitken S, Adams W (1996) Genetics of fall and winter cold hardiness of coastal Douglas-fir in Oregon. Canadian Journal of Forest Research, 26, 1828-1837.

Aitken S, Adams W (1997) Spring cold hardiness under strong genetic control in Oregon populations of Pseudotsuga menziesii var. menziesii. Canadian Journal of Forest Research, 27, 1773-1780.

Anekonda T, Adams W, Aitken S (2000) Cold hardiness testing for Douglas-fir tree improvement programs: Guidelines for a simple, robust, and inexpensive screening method. Western Journal of Applied Forestry, 15, 129-136.

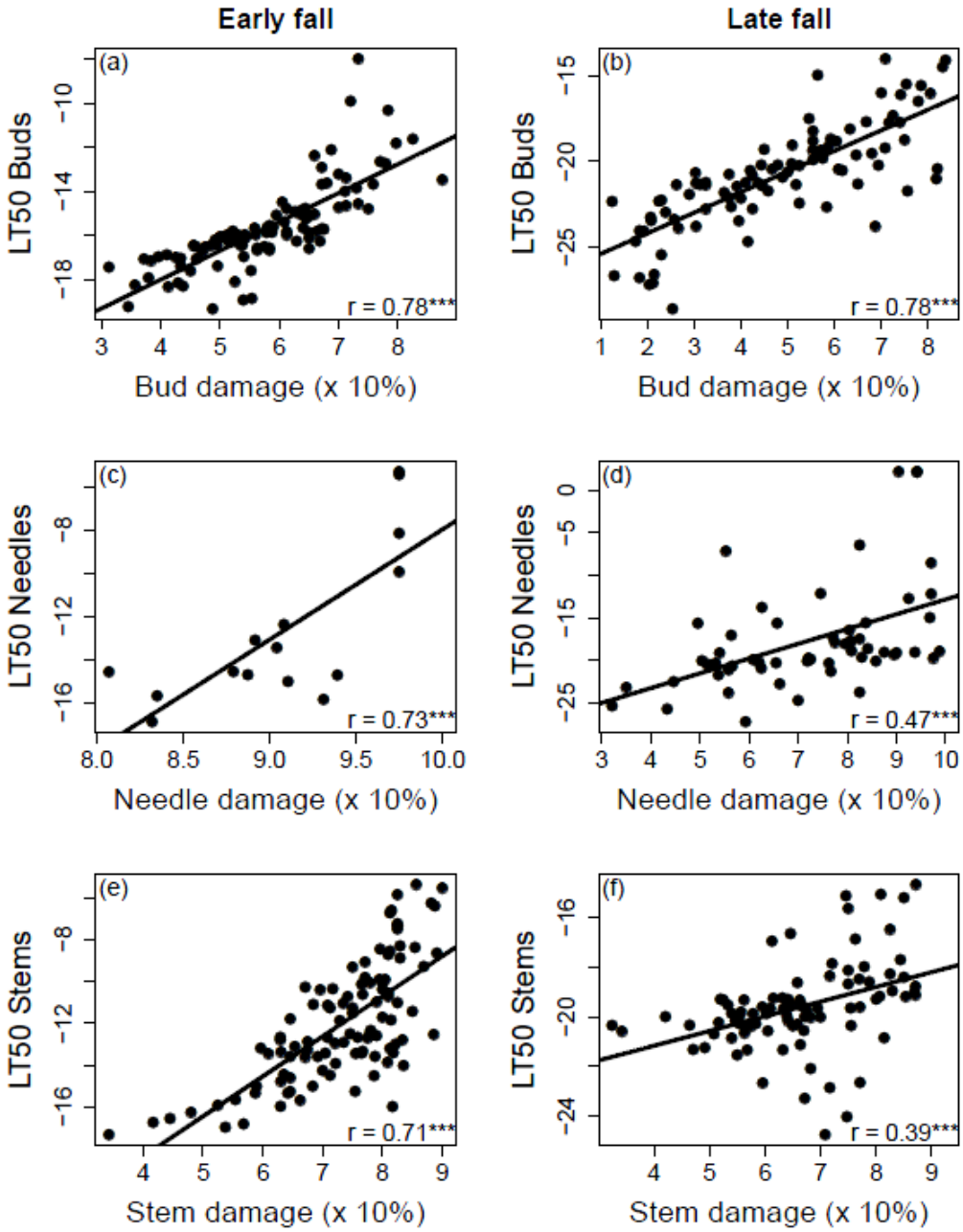



Figure S1. Relationships between the temperature that 50% of tissue damage (LT_{50}) and mean damage of bud (a,b), needle (c,d) and stem (e,f) tissue for 35 coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) populations growing across all three common garden test sites in early (4 Oct. 2012, a,c,e) and late (30 Oct. 2012, b,d,f) fall. All relationships are significant at $P < 0.001$