Supplemental Fig. S1. Phenotypic frequency distributions for low temperature tolerance (LTT) evaluated in Oregon Barley coordinated agricultural project (CAP) I and CAP II germplasm. Three checks were used: Orca is low temperature susceptible and has a spring growth habit, Strider is low temperature tolerant and has a winter growth habit, and Dicktoo is low temperature tolerant and has a facultative growth habit. The locations are abbreviated as follows: SPMN, St. Paul, MN; FCCO, Fort Collins, CO; POR, Pendleton, OR; MRI, Agricultural Research Institute of the Hungarian Academy of Sciences, Martonvásár, Hungary.

Supplemental Fig. S2. Phenotypic frequency distributions for heading date (HD) and final leaf number (FLN) evaluated in the Oregon Barley coordinated agricultural project (CAP) germplasm. (A) CAP I and CAP II were evaluated for HD spring planted (S) under field conditions at Corvallis, OR (COR), and HD and FLN without vernalization (V–) under greenhouse (GH) conditions. (B) HD fall planted (F) under field conditions at COR, and HD and FLN were measured with vernalization (V+). Maja (facultative growth habit) and Strider (winter growth habit) were used as checks.

Supplemental Fig. S3. Model fitting for each vector of phenotypes in the Oregon Barley coordinated agricultural project (CAP) germplasm sets by including or excluding the Q matrix. Cumulative distributions of the observed p values are plotted against the expected, where the diagonal line represents the ideal distribution of p values. (A) CAP I, (B) CAP II, and (C) CAP I and II. Traits: LTT, low temperature tolerance; HD, heading date; FLN, final leaf number. Environments: POR, Pendleton, OR; FCCO, Fort Collins, CO; SPMN, St. Paul, MN; COR, Corvallis, OR; MRI, Agricultural Research Institute of the Hungarian Academy of Sciences, Martonvásár, Hungary. GH, greenhouse; (V+), vernalized; (V–), not vernalized; (F), fall planted; (S), spring planted.

Supplemental Fig. S4. Low temperature tolerance (LTT) association scans for Oregon Barley coordinated agricultural project (CAP) I and CAP II germplasm evaluated at Pendleton, OR (POR); Fort Collins, CO (FCCO); Agricultural Research Institute of the Hungarian Academy of Sciences, Martonvásár, Hungary (MRI); St. Paul, MN (SPMN). Significance thresholds were determined with a false discovery rate (FDR) level of 0.05 (dashed line).

Supplemental Fig. S5. Heading date (HD) and final leaf number (FLN) association scans for Oregon Barley coordinated agricultural project (CAP) I (A) and CAP II (B). Significance thresholds were determined with a false discovery rate (FDR) level of 0.05 (dashed line). Left panels show the vernalization sensitivity scans and right panels show the flowering time scans. Environments and treatments are coded as follows: COR, Corvallis, OR; GH, greenhouse; S, spring planted; (V–), not vernalized; F, fall planted; (V+), vernalized.