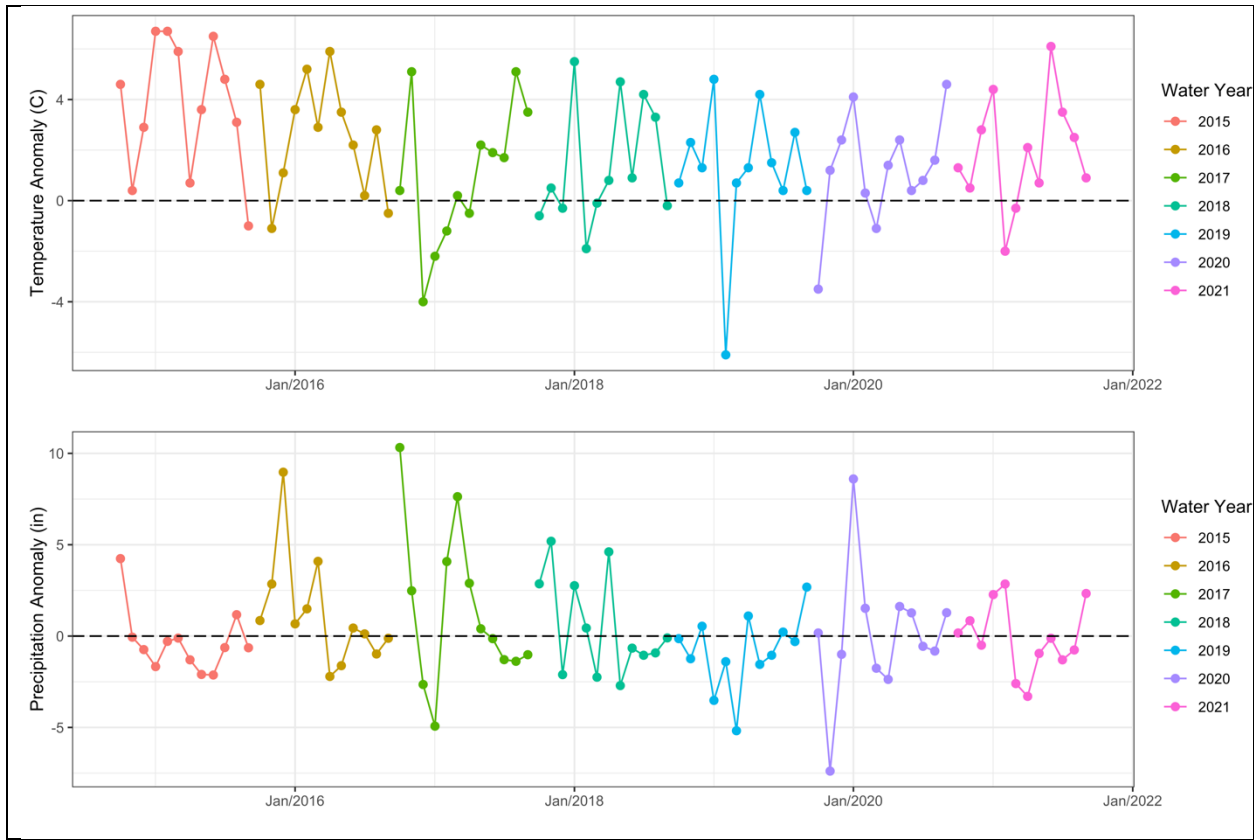**Figure S1.** Detailed precipitation and temperature anomalies for all years of data in the study.
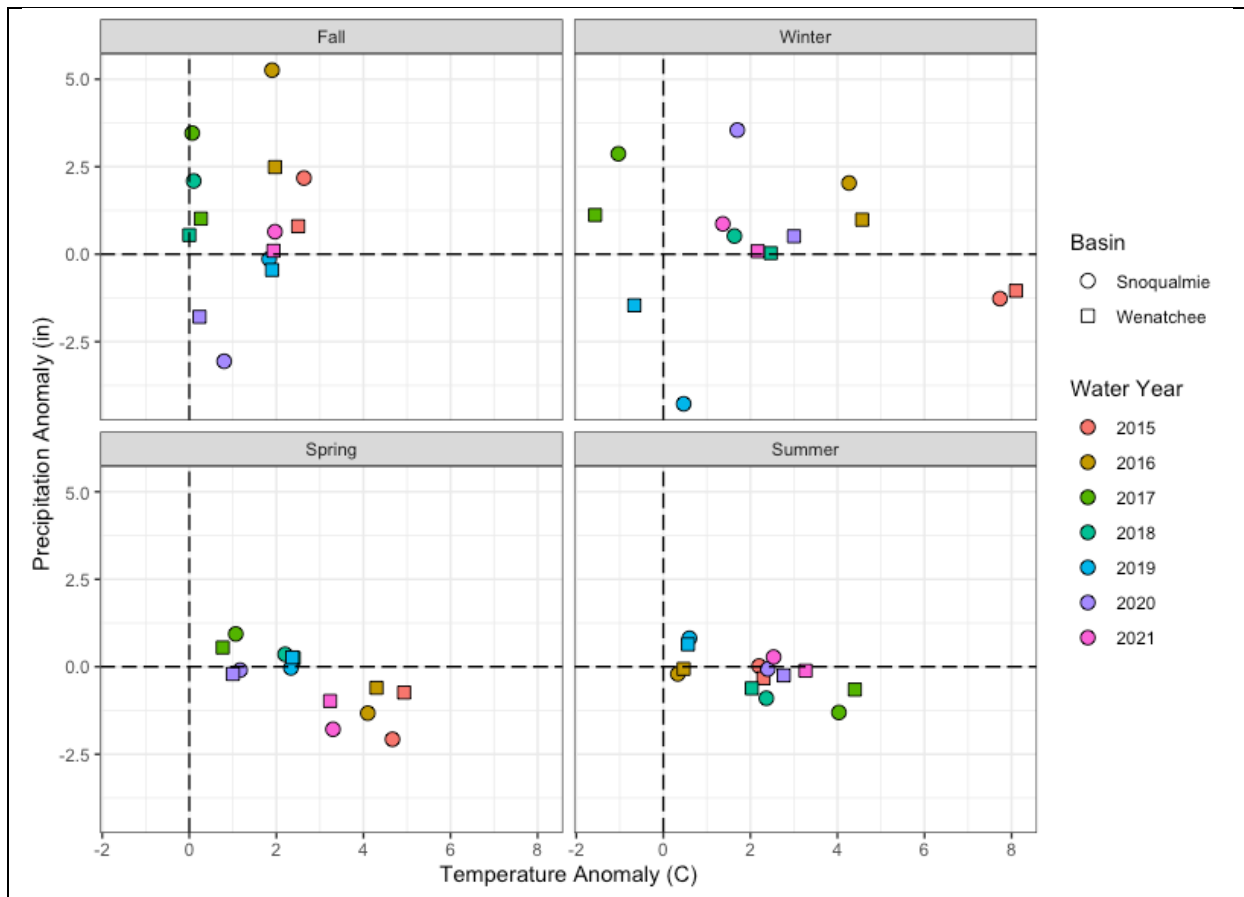
**Figure S2**. Seasonal temperature anomalies for Washington Climate Division 5 (Western Cascades) and Division 6 (Eastern Cascades) vs seasonal precipitation anomalies. Anomalies are calculated as the departure from the 1901-2000 mean temperature or precipitation by month and subsequently averaged within a season. Positive (negative) anomalies indicate a wetter (drier) season for precipitation and a hotter (cooler) season for temperature.
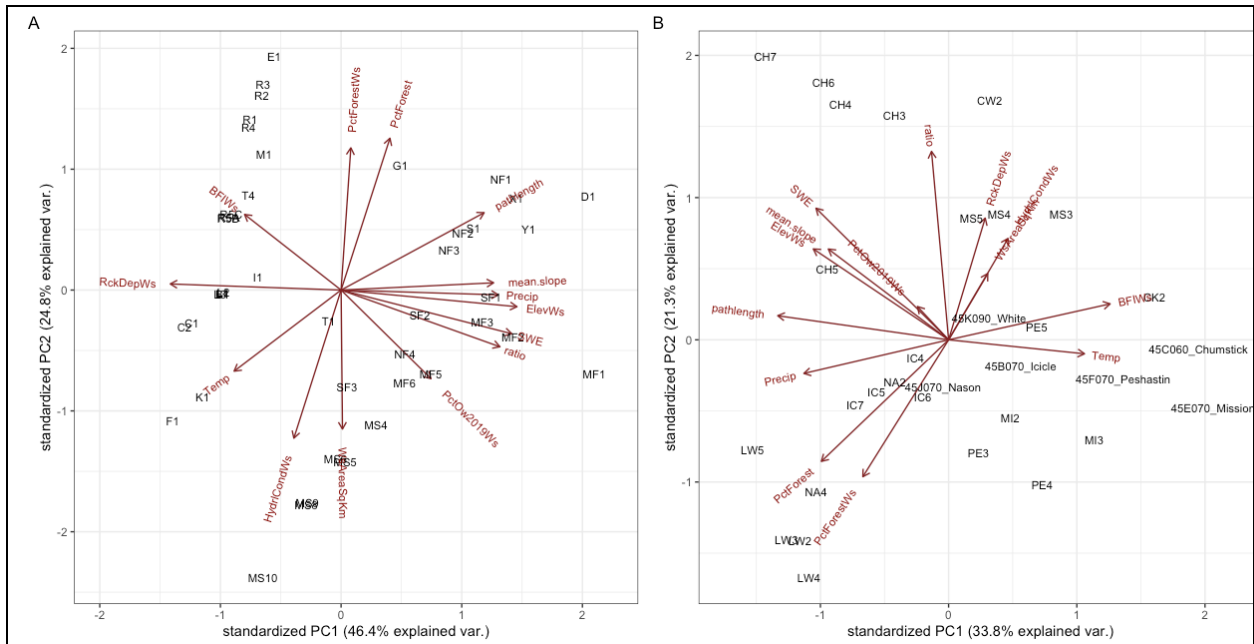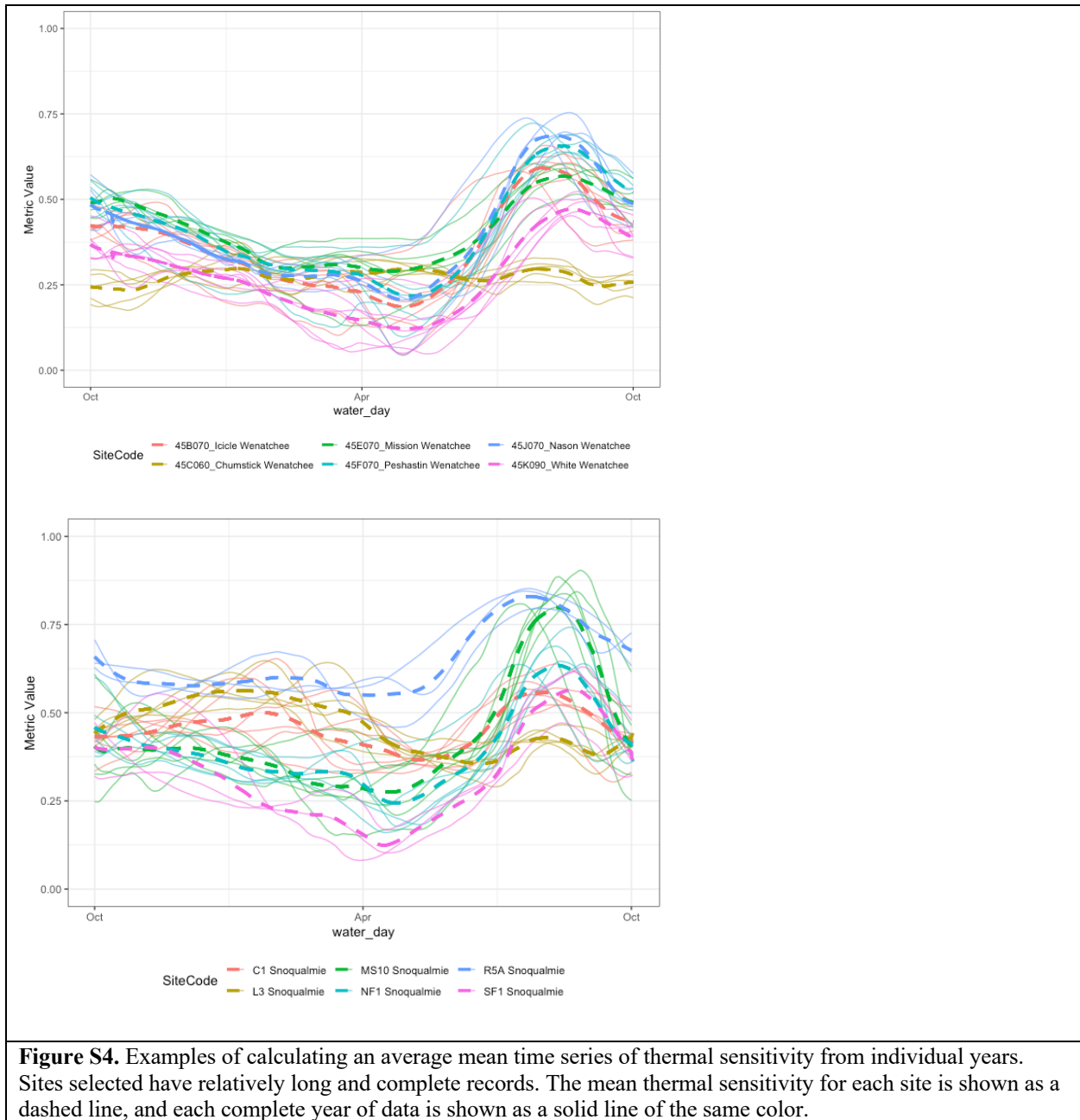
**Figure S3.** PCA results for the Snoqualmie (A) and Wenatchee (B) covariates. In the Snoqualmie, MWE and slope had high, positive loadings (0.45, 0.41) on PC1 and mean soil depth to bedrock had a high, negative loading (-0.43). In the Wenatchee patterns differed slightly, with MWE, slope, and distance upstream having negative loadings on PC1 (-0.38, -0.40, -0.45) and baseflow index loading positively (0.43). For PC2, both watersheds show percent forest in the watershed and riparian area as the highest loadings (-0.55, -0.52 and -0.43, -0.48), with the Wenatchee also showing percent ice cover loading positively (0.45).

**Figure S4.** Examples of calculating an average mean time series of thermal sensitivity from individual years. Sites selected have relatively long and complete records. The mean thermal sensitivity for each site is shown as a dashed line, and each complete year of data is shown as a solid line of the same color.
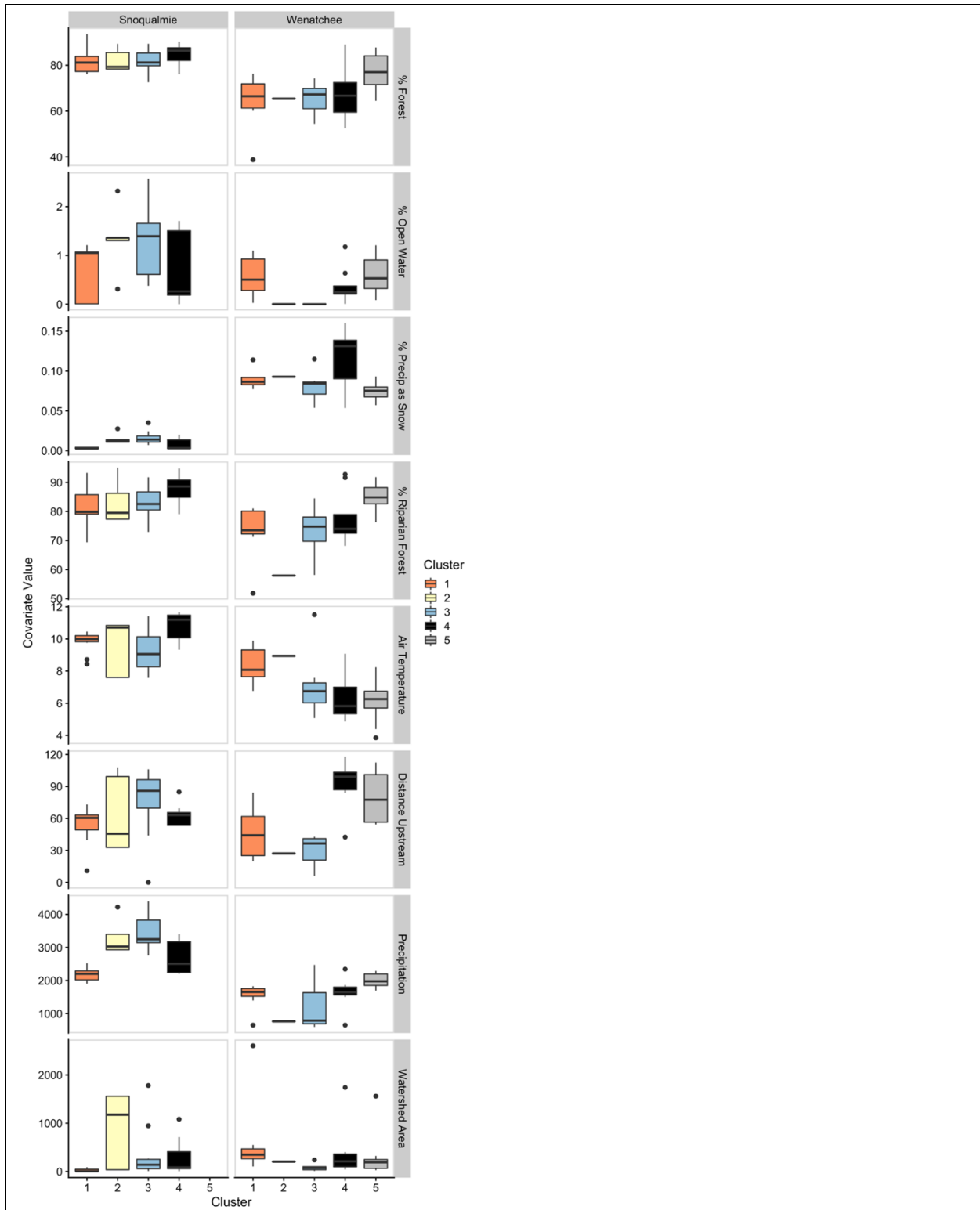
**Figure S5.** Relative variable importance for all covariates in the Snoqualmie (A) Wenatchee (B) basins, and the distributions of variables for the remaining variables in the Snoqualmie basin and in the Wenatchee basin. Boxes are grouped and colored by cluster membership. See Figure 7 for the four top relative variable importance plots.

**Table S1.** A generalized description of the climate for each water year. Adapted from Supplementary Figures 1 and 2.

| Water Year | Climate Description |
|---|---|
| 2015 | A hot winter and dry winter and spring led to historically low snowpack, low summer streamflow, and hot summer stream temperatures. |
| 2016 | This year experienced an anomalously wet fall with periods of very heavy rain. Spring was slightly drier and warmer than average and in the western Cascades, snowpack slightly lower than average due to the warm winter. |
| 2017 | This year experienced an anomalously wet fall with periods of very heavy rain. Summer was relatively dry, winter relatively cool and wet, and fall relatively wet. |
| 2018 | A slightly larger than average snowpack. |
| 2019 | A dry winter led to a smaller than average snowpack that melted off earlier than normal, particularly for the western Cascades. |
| 2020 | Winter was slightly wetter than average. |
| 2021 | Higher than average snowpack. A period of extreme heat occurred in early spring. The spring was also relatively dry. |

**Table S2.** The optimal number of clusters selected for each metric and cluster validity index (CVI).

| Cluster Validity Index | Wenatchee | | | Snoqualmie | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Air Temperature | Water Temperature | Thermal Sensitivity | Air Temperature | Water Temperature | Thermal Sensitivity |
| Silhouette | **2** | **2** | 2 | **2** | **2** | 2 |
| Gap | **2** | **2** | 2 | **2** | **2** | 2 |
| Davies–Bouldin | **2** | **2** | **5** | **2** | **2** | **4** |
| Calinski–Harabasz | **2** | **2** | **5** | **2** | **2** | **4** |
| Generalized Dunn | 3 | 5 | **5** | 5 | 4 | **4** |