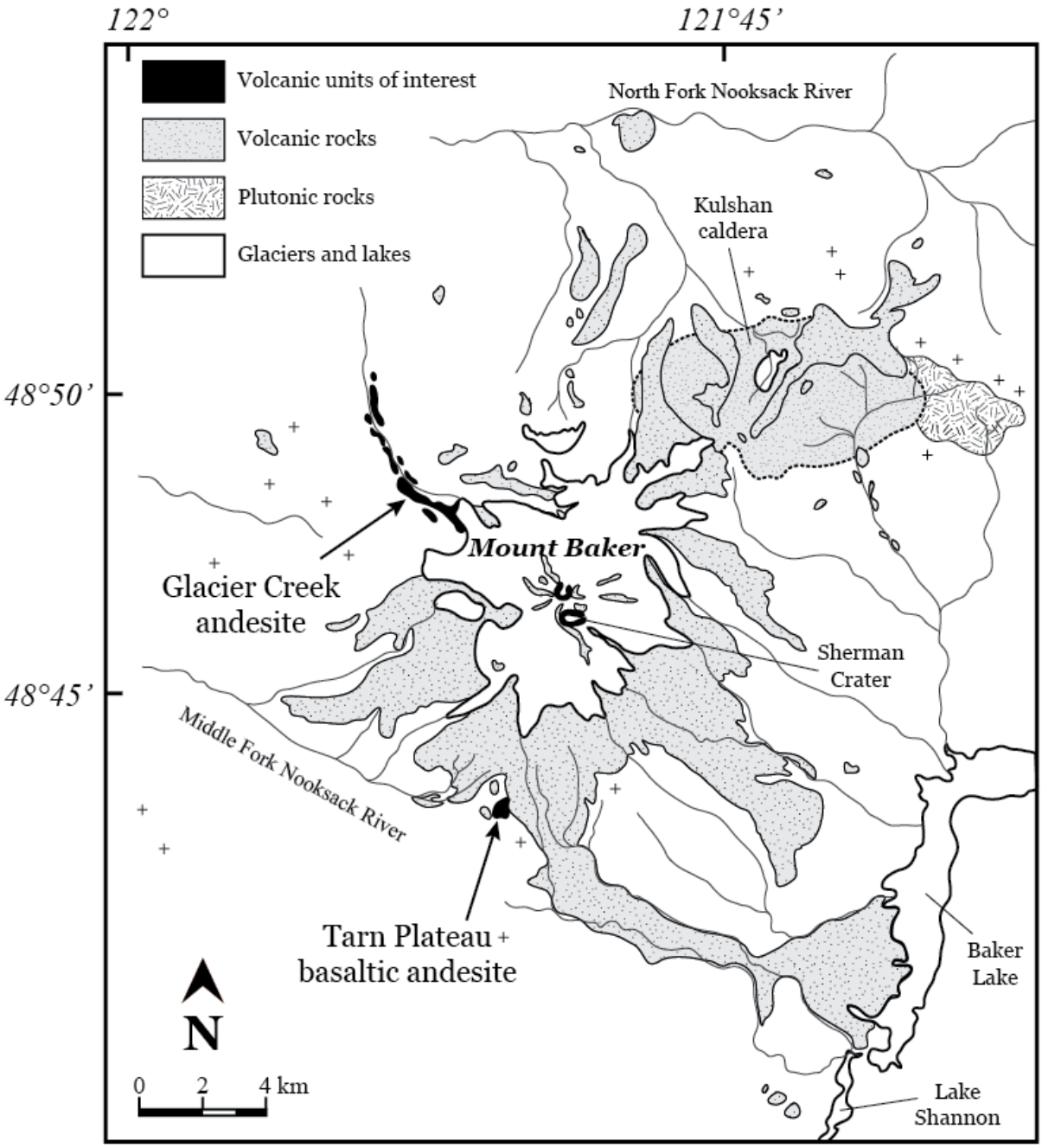
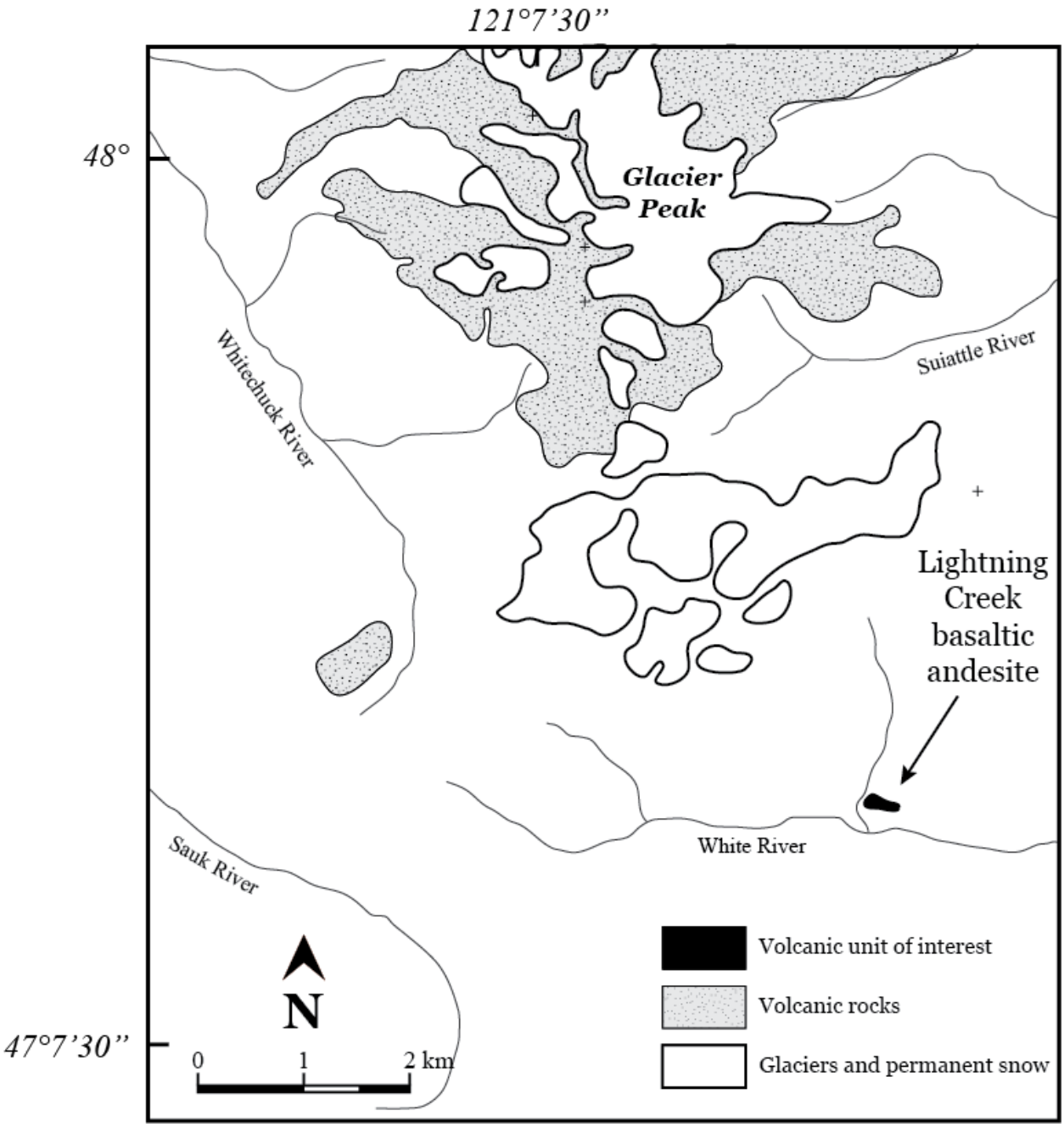
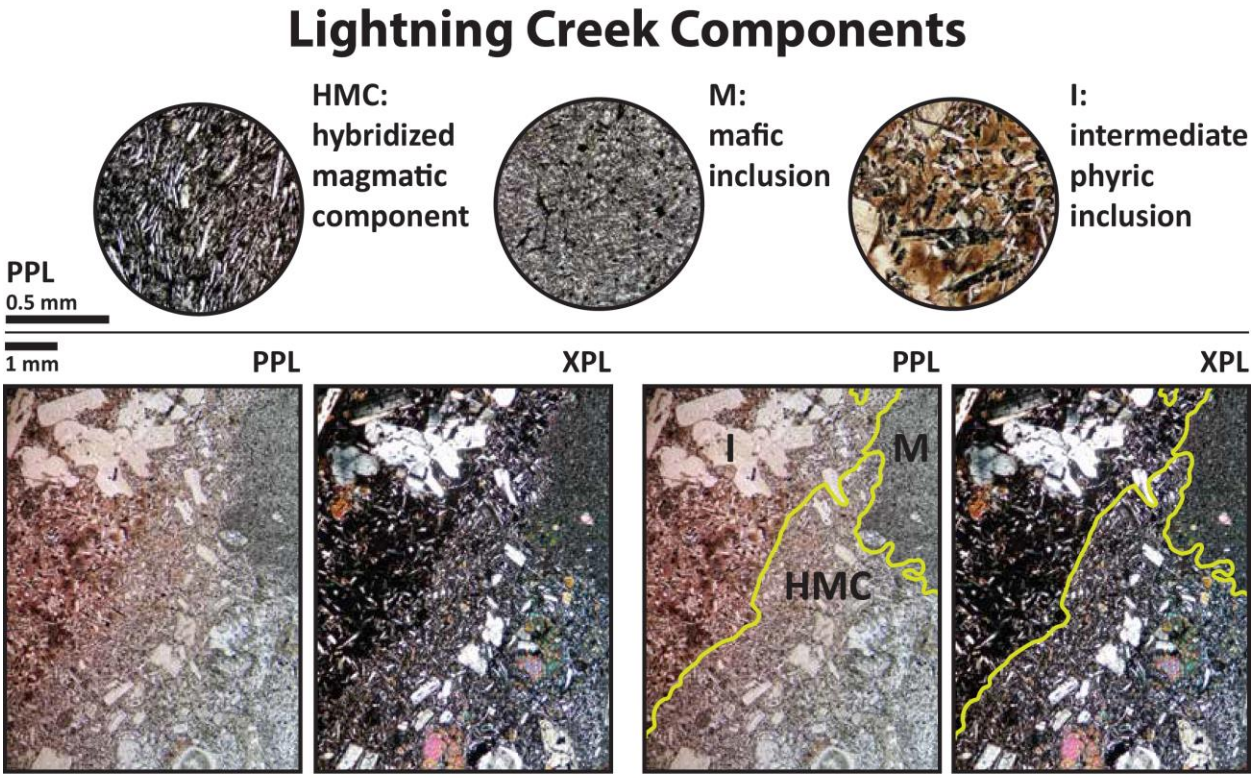


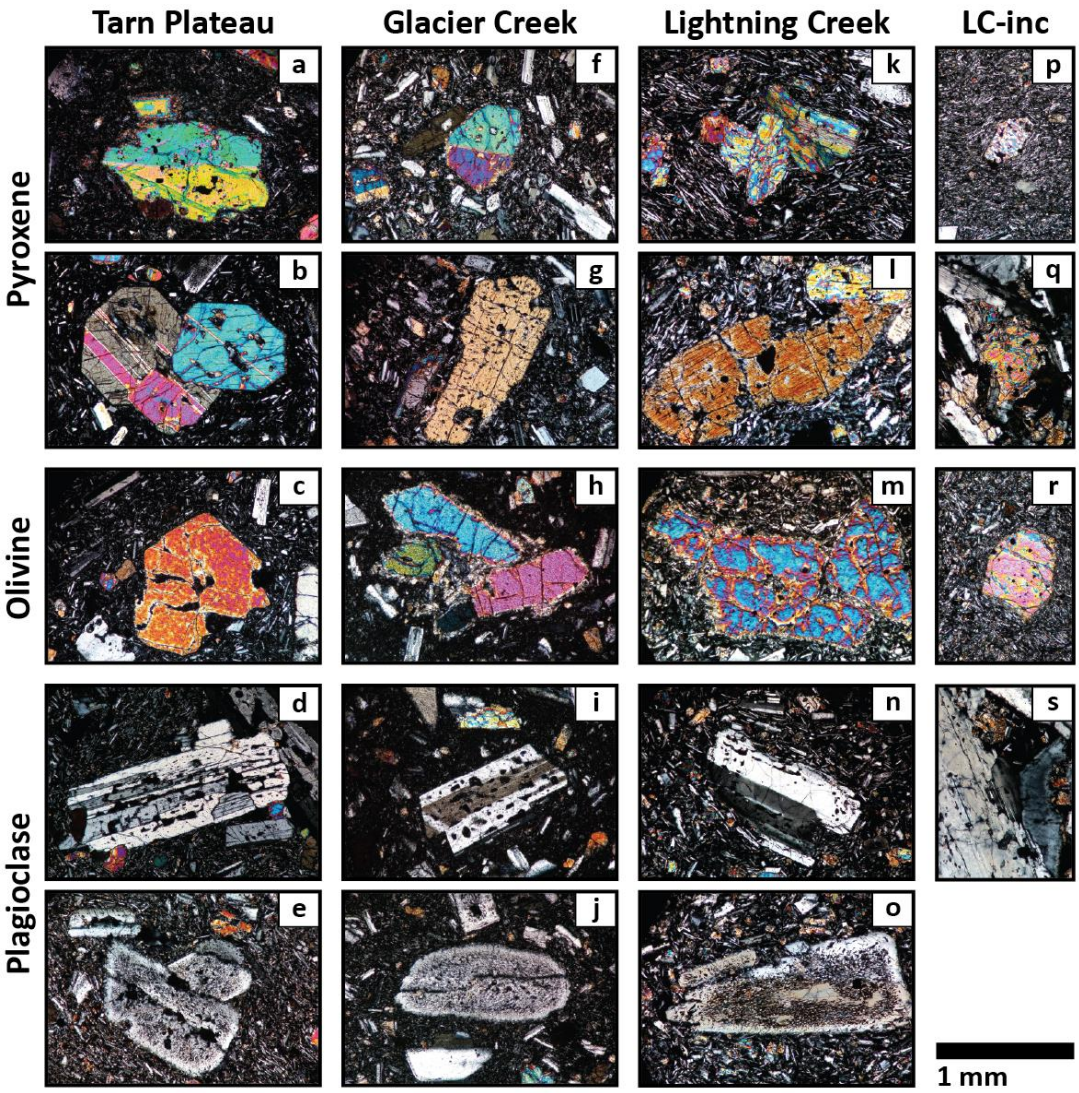
Supplementary Materials Figure 1. Geologic map of Mount Baker Volcanic Field (MBVF) showing location of studied flow units, modified from Hildreth et al. (2003).



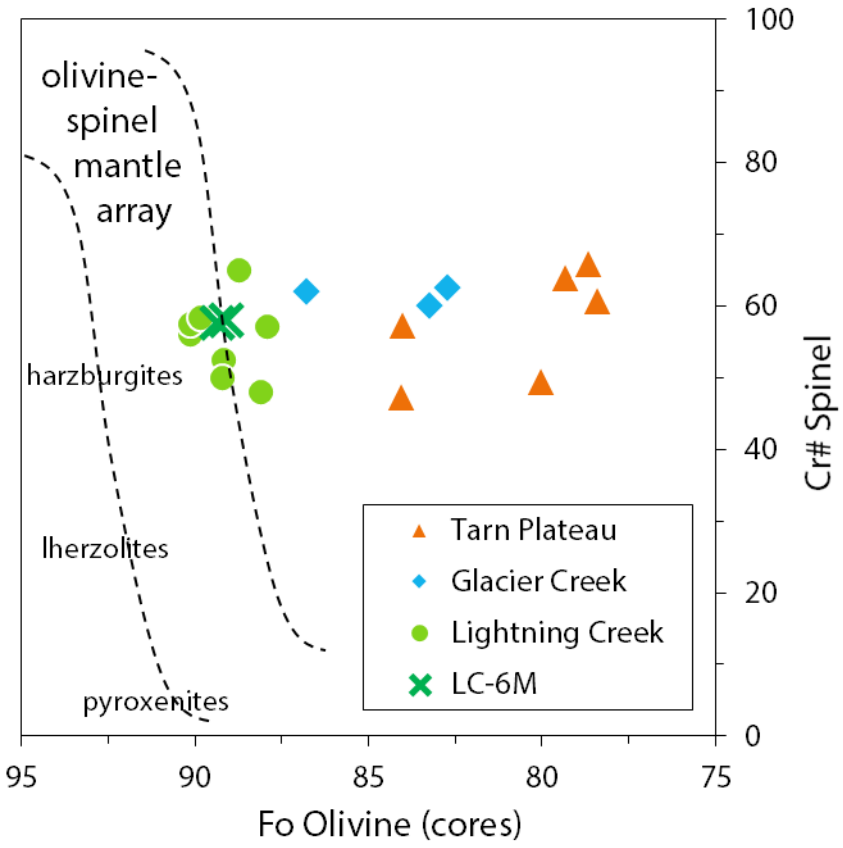
Supplementary Materials Figure 2. Geologic map of Glacier Peak highlighting location of the Lightning Creek flow unit, modified from Taylor (2001).



Supplementary Materials Figure 3. Thin section micrographs of Lightning Creek sample LC-6, which exhibits magma mingling. Three identifiable magmas have been outlined and identified as a hybridized magmatic component (HMC), a mafic inclusion (M), and an intermediate inclusion (I). The degree of mixing varies throughout the Lightning Creek samples. PPL: Plane polarized light, XPL: cross polarized light.



Supplementary Materials Figure 4. Thin section micrographs of clinopyroxene, orthopyroxene, olivine, and plagioclase exhibiting a variety of textures. All images are set to the same scale. Populations listed below refer to the population breakdown presented in Table 1. *Tarn Plateau minerals:* **a** Clinopyroxene with embayed rims, patchy core, and polysynthetic twinning (population 2). **b** Composite clinopyroxene crystals with patchy cores and polysynthetic twinning (population 1). **c** Embayed olivine. **d** Coarse sieved plagioclase (population 2). **e** Fine sieved plagioclase (population 1). *Glacier Creek minerals:* **f** Clinopyroxene with blebby core and simple twinning. **g** Embayed orthopyroxene with blebby texture. **h** Cluster of olivine with clinopyroxene reaction rims. **i** Coarse sieved plagioclase (population 1). **j** Fine sieved plagioclase (population 2*). Lightning Creek minerals:* **k** Cluster of clinopyroxene with polysynthetic twinning (population 2). **l** Orthopyroxene with resorbed rims and glass inclusions. **m** Embayed olivine. **n** Twinned plagioclase with coarse sieving textures towards rim (population 3). **o** Fine sieved plagioclase (population 1). *Lightning Creek Inclusions (LC-inc):* **p** Ratty clinopyroxene (mafic inclusion). **q** Embayed clinopyroxene in a clot with plagioclase and orthopyroxene (intermediate inclusion). **r** Olivine with abundant Cr-oxides (mafic inclusion). **s** Clot of patchy, twinned plagioclase with smaller orthopyroxene crystals (intermediate inclusion).



Supplementary Materials Figure 5. Cr# (molar Cr/(Cr+Al)) of Cr-spinel grains versus their host olivine Fo contents. Olivine-spinel mantle array (OSMA) from Arai (1987). To establish source fertility of these oxides, the Cr# of each Cr-spinel crystal needs to be correlated with Fo contents of its respective host olivine. Also, the host olivine must be in equilibrium with the mantle (≥87 Mg#), otherwise Cr# may not be representative of equilibrium crystallization conditions. Only Lightning Creek olivine exhibits equilibrium with the mantle.