ABSTRACT

THESIS: Zircon Geochemistry and Geochronology of the Seven Devils Mountains, Western Idaho: Testing Proposed Ties to the Wrangellia Terrane

STUDENT: Heather Casares

DEGREE: Master of Science

COLLEGE: Sciences and Humanities

DATE: May 2019

PAGES: 77

The North American Cordillera provides an excellent location to study terrane translations in an accretionary orogeny. Some previous studies have proposed the Baja-British Columbia hypothesis of northward terrane transport in the Cordillera. This has been supported by fault displacements and paleomagnetic data showing displacements from 1100 to 3000 km in Washington and British Columbia. The Seven Devils Mountains are located in the Wallowa-Whitman National Forest in western Idaho. This geologically complex and variably metamorphosed terrane preserves a Permo-Triassic volcanic arc accreted against the Cordilleran margin. Whole-rock geochemical analyses from the 1970s and 1980s led authors to propose that the Seven Devils terrane was part of the Wrangellia terrane, a volcanic arc terrane located further north in the Cordillera. Despite their physical similarities, the distance between the terranes and significant geochemical differences make correlation uncertain. Zircon U-Pb and Lu-Hf was used to test proposed ties to Wrangellia terrane and the neighboring Blue Mountains Province terranes. LA-ICPMS zircon U-Pb dating on 6 intermediate intrusive samples yield ages ranging from 120.1 ± 1.0 Ma to 137± 2.0 Ma with the average age of 127 ± 7.8 Ma. All the samples have similar Lu-Hf isotopic compositions, with a range in εHf(t) of 8.6 to 13.8 with the average εHf(t)

value of 10.8 ± 1.2. Isotopic data and ages show that the intrusive rocks were forming close to the time of accretion. Whole rock geochemistry has confirmed the juvenile crustal signature provided by the Hf isotope data. These new data, combined with previous age and isotope data from the surrounding terranes suggest that the Seven Devils terrane is the most similar to the terranes in the Blue Mountains Province. This not only disproves the proposed ties to the Wrangellia terrane and its extreme long-range transport, but also provides new data and a more robust tectonic history.