

## Priest River Experimental Forest (PRI)

**Introduction:** Established in 1911, the Priest River Experimental Forest (PREF) has a long history of research in a variety of natural resource disciplines. Located in northern Idaho, PREF contains approximately 2,758 ha (6,368 ac.) of mountainous forestland, with small areas of talus and alpine grassland. There are two Research Natural Areas, Canyon Creek, 395 ha (977ac.), established in 1937, and Wellner Cliffs, 125 ha (310ac.), established in 2006. At the headquarters area, there is housing, laboratory space, and a conference building. Long-term data sets of daily weather (1911), snow pack (1937), tree growth (1914) and streamflow (1938) have been collected and archived. PREF became a monitoring site (site # ID02) of the National Atmospheric Deposition Program (NAP) in 2003.



Office/lab building, weather station on right.

**Characteristics:** The Forest lies on the westward slope of a spur of the Selkirk Mountains. Elevation varies from 671m at the Priest River on the west boundary, to 1798m at Experimental Point, 9km to the east. Mountainous land occupies approximately 90% of the area. The site contains a variety of managed and reserve areas, a multitude of ecological site choices from wild to extremely disturbed situations, and all of the significant forest types and habitat associations of the region.

In general terms, the Priest River-northern Rocky Mountain climate is transitional between a northern Pacific coastal type and a continental type. The average annual (water year) precipitation at the Forest headquarters is 817mm (32.17in). At higher elevations, precipitation slightly increases as noted by the Benton Spring rain gage (elev. 1455m), which has an annual average of 925mm (36.42in). The monthly mean temperatures at the headquarters range from -4°C (25°F) in January to 18°C (64°F) in July; these are midpoint values between the average daily max and min temperatures based on a 1700 hours observation time. The annual mean temperature is 7°C (45°F). Extreme temperatures have ranged from a high of 40° C (103° F) to a low of -38° C (-36° F).

About 2/3 of PREF is covered in mixed conifer forest over 100 years old. Most of this is timber in the 120 to 140-year age class (resulting from a fire ca. 1860). The remainder is in timber over 200 years old. The other third of PREF is in non-stocked areas or in young timber on harvest units and burns that have occurred since PREF was established. Reconnaissance surveys and mapping have helped determine cover types and habitat types. Habitat types within PREF are best described as “complex” because of the extremely rapid changes in aspects and from wet to dry habitats. Plant species diversity is high due to the number of different habitat types that are intimately intermixed.

**Research:** Forest Service researchers and their partners from other research institutions have a history of cooperation and commitment to long-term ecological research. Since 1911, Forest Service scientists and their cooperators have investigated the factors influencing forest fire,

hydrology, silviculture, forest ecology, insects, and diseases of Rocky Mountain conifers. Recent and ongoing projects have evaluated adaptability of native conifers to climate change, compared strategies for restoration of western white pine (*Pinus monticola*), compared mechanical site preparation as an alternative to prescribed fire, and will evaluate the impact of wildfire and management activities on soil productivity and sediment transport.

The University of Idaho has been an active participant at PREF, conducting research and mentoring students since 1928. For the past decade, University personnel have used PREF to conduct stable carbon isotope analysis; here the work focused first on elevation and species differences, then on CO<sub>2</sub> effects, and more recently on tree height and foliar nitrogen effects. There have also been extensive studies of allometric functions, vertical trends in leaf mass per area, leaf turnover, and leaf area index. Recent work has included extensive analyses of sap flow, nocturnal transpiration, and isotopic mass balance of soil water, LIDAR and hyperspectral remote sensing.

The experience provided by 95 years of operation clearly illustrates the critical role for facilities such as PREF. The Forest is not just a place for Forest Service research, but is used by others for cooperative and independent studies. PREF has become a valuable public asset. This goes beyond a facility of buildings and a tract of land established for research. More important is the knowledge accumulated about this particular site. The records of climate, stream flow, snow pack, tree growth, insects, plants, and fungi are the foundation for new research efforts. This is apparent by the current and ongoing studies by scientists from a variety of disciplines and institutions.



**University of Idaho personnel, processing foliage samples.**