



## Rocky Mountain National Park

# Effects of the Grand Ditch

### **The Question:** *What are the ecological effects of the Grand Ditch water diversion on riparian areas in the Kawuneeche Valley?*

The Grand Ditch is a century-old water diversion project in the northwestern corner of Rocky Mountain National Park. The ditch is 15 miles long with a drainage area of approximately 20 miles or 5% of the park. Eleven headwater tributaries of the Colorado River are intercepted by the ditch between May and September every year. Park managers have been concerned with the ecological effects of the water diversion on the riparian and wetland communities in the Kawuneeche Valley downstream from the ditch.

### **The Project:** *A variety of techniques were used to measure the effects of the diversion on stream flow and plant communities below the ditch between 1996 and 1997.*

The project began in 1996 when Dr. David Cooper, Dr. Lee MacDonald, Dr. Rod Chimner and Dr. Scott Woods compared plant communities in the impacted area with similar communities in unimpacted areas. Surface water flow rates and ground water levels were measured throughout the valley. Gasses released from soils in peatlands were monitored and estimates were made for sediment accumulation in the Colorado River. (Peatlands are ecosystems with organic (peat) soils, produced because the perennially saturated soils have little oxygen, which slows the rate of decomposition of dead plants. Some plants grow only in this type of community.)

### **The Results:** *The Grand Ditch diverts an average of 29% of the runoff from the Never Summer Mountains, having a significant impact in the valley below.*

Depending on the snowpack, the Grand Ditch can divert between 20 and 40% of the runoff from the Never Summer Mountains. Although the ditch reduces the amount of water reaching the valley floor, it does not completely dewater the tributaries that are so vital to the wetlands and riparian areas below. However, water table elevations, found to be the most important variable in healthy water-associated plant communities, were significantly affected by reduced flow of the Colorado River over a large part of the valley floor.



Peatlands are home to unique plants such as this vibrant Queen's Crown.



Built over 100 years ago, the Grand Ditch moves water to the arid east side of the continental divide.

Three types of ecological impacts of the Grand Ditch were identified by this study.

- 1) The occurrence of flooding has been reduced by as much as 50%, reducing the creation of bare, moist soil for the establishment of new riparian trees and shrubs such as willow.
- 2) Reduced water flow may have enabled more xeric exotic species to establish a foothold in otherwise wet areas.
- 3) Water levels in peatlands drop by as much as 20 inches (50 cm) when the snowmelt is diverted. This increases the level of aerobic organisms and results in the rapid loss of the peatland soil. Under the current hydrologic regime, many of these peatlands are likely to disappear.

The ecological impacts of the Grand Ditch are significant. Impacts to peatland communities could likely be mitigated by releasing small quantities of water from the Grand Ditch into specific west slope areas during the late summer. How much water and when to release it are questions requiring more study before a release could be conducted effectively.