



**Rocky Mountain National Park
Continental Divide Research Learning Center**

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 five percent 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.



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

The Project: Use a variety of techniques 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 (Colorado State) compared plant communities in the impacted area with similar communities in unimpacted areas. They measured surface water-flow rates and ground-water levels throughout the valley. They monitored gasses released from soils in peatlands and estimated 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.)



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

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 percent 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.

Scientists identified three types of ecological impacts of the ditch.

- 1) The occurrence of flooding has been reduced by as much as 50 percent, 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.

This summary is based on published, peer-reviewed and/or unpublished reports available at the time of writing. It is not intended as a statement of park policy or as a definitive account of research results.

For more information on the park's research program, see www.nps.gov/romo

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