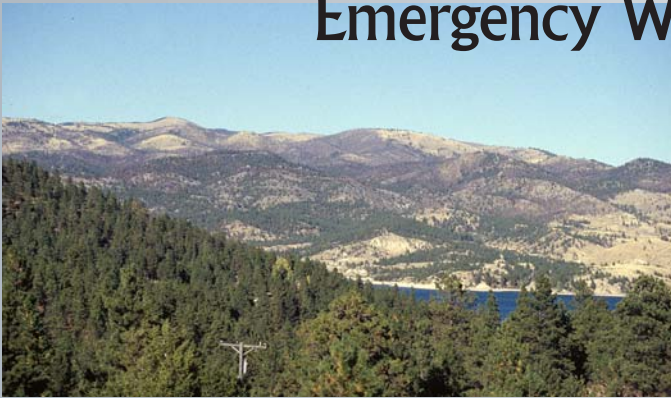


Emergency Watershed Protection Program:

Cave Gulch Erosion Mitigation Project



The Cave Gulch Fire in July 2000 burned 45,000 acres on Hedges Mountain near Canyon Ferry Lake in Montana. The fire was mainly of moderate intensity, but denuded enough land to allow debris and sediment to move during precipitation events. Following the fire, five flash floods occurred in Cave Gulch between May 2001 and August 2002. The severity and force of the flash floods caused major damage to businesses and homes in the area. Citizens and government agencies worked together to determine the best methods to convey and reduce flood-water across private, federal, and state properties in the Cave Gulch drainage area into Canyon Ferry Lake.



Two businesses and five homes near Canyon Ferry Lake were impacted by debris flows caused by flash floods. The floods also caused such erosion that the drainage, which usually only ran water during periods of snow melt or high rainfall events, was eroded down to the water table creating a perennial stream in certain areas. Conservation measures were applied to protect buildings and roads from future floods and to provide for a permanent streambed.

Typical flood damage to a home after the debris/flood flows.



Installed practices include a diversion dike, a grassed and armored channel, large culverts, and short-term barriers used for immediate flood protection. In addition, sewage drain fields, storage sheds, and other buildings in the path of floodwaters were removed or protected by a dike. The shallow channel and diversion dike is designed to keep floodwaters in the channel where grass or rock armoring will protect the streambed from further erosion.

The Natural Resources Conservation Service (NRCS) contributed more than \$180,000 to construction costs for work on private lands through the Emergency Watershed Protection (EWP) program. Lewis and Clark County acted as the project sponsor for the private landowners, and through this partnership the landowners and others provided about \$60,000 toward the cost of construction. This amount includes about \$30,000 of in-kind contributions. The Bureau of Reclamation also spent \$50,000 to provide immediate flood protection for businesses in the area before any other work started.



Planning and implementing conservation practices in the Cave Gulch drainage has been a cooperative effort on the part of many agencies and private landowners in the area. Partnering agencies include NRCS, Lewis and Clark Conservation District, Lewis and Clark County, Montana Department of Emergency Services, Montana Department of Transportation, U.S. Forest Service, Bureau of Reclamation, and the Bureau of Land Management.

This flash flood affected businesses and homes in the Cave Gulch drainage with water and sediment washed down slopes left bare by the Cave Gulch fire.

PHOTO STORY



Above: Temporary barriers, like the sandbags, silt fence, and straw check dams above were used to protect homes from flooding prior to completion of the EWP project.



Left: Because of the steep grade of the channel, a lining of rock-filled geo-grid material was required to control erosion. After excavation was completed, the geo-grid material was laid down and filled with rocks, then covered with soil and seeded with grass..



Before the dike and channel were constructed the flood waters ran into Kim's Marina.



Now, the dikes on either side of the stream protect businesses and homes. The dikes have been lined with netting and seeded with grass to protect them from erosion.



Left: Highway 284 sustained damage when water and debris were forced to flow over the road because the small culvert was too small to handle the flows.

Right: Through the EWP project, three large culverts have replaced the one small culvert on the north side of Highway 284 and the area has been armored with rocks.





Above: The dikes, grass, and covered geo-grid material filled with rock armoring a little further upstream of Highway 284.



Some areas of rock armoring were needed in the channel to allow homeowners a safe, erosion resistant way to cross the stream channel to reach their homes. These boats are parked directly in the stream channel.



This home sustained damages from flood water. Water marks on this home (the gray area on the walls) show how high water rose during some of the flood events.



Now, a dike in front of the home helps keep flood waters and debris away from the home. Homeowners are using water from the stream, which has been redirected, to help grass establish in the channel.



Concrete barriers were used to protect property where there was limited room to build a dike and/or channel.



This access road to Forest Service, Bureau of Land Management, and private properties was built using the excess fill excavated from the channel. Construction was done and paid for by the Forest Service, BLM, and landowners.

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