



U.S. Fish & Wildlife Service

# Dam Removal

## *An Opportunity for Our Rivers*

Dams have been used extensively throughout the United States for a variety of purposes, including navigation, flood control, and power generation. While well-designed and properly managed dams can provide many benefits, they drastically alter natural river communities. The natural flow of water and sediment is impeded, and populations of native fish, mussels, and other aquatic animals are damaged. In some cases where the costs of maintaining a dam outweigh its benefits, a decision is made to remove, or decommission, it. Dam removal is a planning process that can often take several years and be expensive. However, the safety and environmental benefits are priceless. In most instances, rivers heal quickly, and it's hard to realize that a dam once blocked the river. Decommissioning provides an opportunity to restore a river's health and return it to its natural, free-flowing state.

### Hydrology

When a dam is built, the flow of water, both above and below the dam, is drastically altered. Above the dam, a deep, still reservoir is created, where once there was a free-flowing river. Most fish, mussels, and other aquatic animals that once thrived in the river often are not able to survive in the lake-like habitat of the reservoir.

Below a dam, the seasonal variation in a river's flow is diminished or eliminated. Indeed, when a dam serves to control flooding, this is the exact effect engineers are seeking the ability to control high flows downstream of the dam to prevent flooding. However, the natural communities in and along the rivers are accustomed to the seasonal fluctuation of the water. Animal and plant reproduction, growth, and movement may have adapted to the river's seasonal high and low flows. Often, plant communities in the floodplain depend on the regular deposition of nutrients that come when a river floods, then recedes, depositing fresh sediment along its banks.

When a dam is removed, the river's natural hydrology (movement of water) is restored. Above the dam, habitat for

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*Dillsboro Dam on North Carolina's Tuckasegee River*

native river species is reestablished as the reservoir disappears. And below the dam, the natural flow patterns that native plants and animals are accustomed to are returned to their original configuration.

### Water Quality

In addition to altering the flow of water, dams can alter the physical and chemical characteristics of the water itself. Some dams have bottom-release facilities, meaning that when water passes through them, it comes from the bottom of the reservoir, not the top. In these cases, the water passing through the dam typically has a low dissolved oxygen level and is abnormally cold. Often, native fish species and other animals aren't able to survive the cold temperatures or the lack of oxygen. However, in the reservoir above, the water may become warmer and full of nutrients.

While too much sediment, like silt, sand, and rocks, in a river is harmful, rivers naturally carry a certain amount of it. The amount of sediment a stream carries

depends on geology, the velocity of the water and the steepness of the streambed. Faster water has more energy and can carry more sediment. Slower water can't carry as much; therefore, the sediment drops to the streambed. This means that when water comes to a standstill behind a dam, most of the larger sediment drops to the bottom. The result is that sediment free water comes out of the dam. While this may seem like a good thing, it can lead to problems downstream. This clean water then picks up sediment from the streambed and stream banks below the dam, but no sediment is deposited to replace it, so there is increased erosion within the stream itself. This increased erosion can alter the character of a streambed, possibly eliminating mussel habitat or important spawning grounds for fish. Removal of the dam would restore the natural downstream movement of sediment.



Duane Raver

*American eel and American shad are both migratory fish that find their migration routes blocked by dams. Dam removal restores migration routes for these and other migratory fishes.*



Duane Raver



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*Populations of the endangered Appalachian elktoe mussel, like numerous species of freshwater mussels, have suffered as a result of impoundments. The removal of dams can be a major step in restoring the river communities these mussels depend on.*

## Migration

There are numerous fish species, including salmon, sturgeon, paddlefish, shad, and eels that migrate up and down rivers as a part of their life cycle. A dam without some mechanism to move fish around it, like a fish ladder, can impede migration and block movement to spawning grounds, resulting in a decline in reproductive success.

For many fish species, the ability to move along a free-flowing river means (1) greater genetic diversity, as populations are able to mix freely, and (2) greater species distribution, as fish are able to move into important areas to feed, breed, grow, or rest that might otherwise be unreachable. Both of these factors increase a species' chances for long-term survival.

## Safety

Older, poorly-maintained dams can be a safety hazard for river users and people living downstream. They require much maintenance to remain safe and stable, and an old decrepit dam may fail without warning, causing sudden downstream flooding. Dams can also pose safety problems for paddlers and swimmers who may get caught in the undercurrent below the dam, or swept over dams where the river has been allowed to flow over the top of the dam. Removing these dams provides a clear safety benefit to the community.

## Why Care?

Rivers have been flowing across North America since before humans first set foot here. They are complex systems, moving water and sediment from the mountains to the sea. Fish, mussels, crayfish, snails, other animals, and plants have adapted to life on their banks, in their water, and on their beds. These same rivers provide drinking water for us, places to go fishing, and opportunities for canoe trips. They help define our communities. They provide connections between upstream and downstream communities. We must remember that the long-term health of our rivers is in everyone's best interest. To take our rivers for granted is to risk the quality and quantity of our water and to endanger some of our most beautiful natural places. When a dam no longer serves its intended purpose, removing it provides an opportunity for us to return a river to its original state, where natural systems are allowed to work without barriers.

This fact sheet was created by the Asheville Field Office, 160 Zillicoa St., Asheville, NC 28801. 828/258-3939.