Missouri Streams Fact Sheet

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The relatively flat land along one or both sides of a stream channel is called a *floodplain* (Figure 1). Healthy floodplains are critical for healthy streams. Because a floodplain is only flooded when a stream overflows its banks, it is easy to forget the important work a healthy floodplain does for a stream.

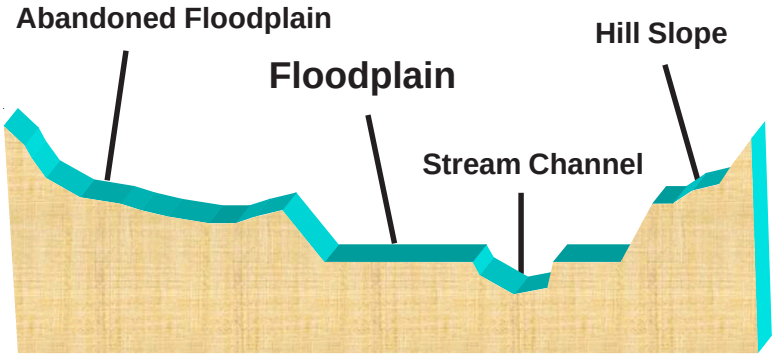

Figure 1

What jobs does a floodplain have?

If a floodplain is allowed to work the way it is supposed to without alteration, the floodplain will store floodwater. This slows velocity and reduces the power of floods, therefore protecting downstream areas from flooding or erosive stream velocities. While storing this floodwater, the *groundwater* is recharged because standing water has time to soak into the water table. Many aquatic and terrestrial habitats are created by healthy floodplains. These habitats are important because of the many plants and invertebrates living on the floodplain that become food for the stream system. Figure 2 shows the spring 2007 flooding of the Missouri River.

Figure 2 Photo courtesy of Missouri Department of Natural Resources

Flooding is a completely natural process that helps to replenish the local ecosystem if floodplains are allowed to be filled by the stream during floods.

Altered Floodplains

Modified floodplains minimize or completely eliminate the natural functions of the floodplain. Some of these alterations include channel restriction, incised channels, urban development

in the floodplain or other changes in land use. Figure 3 shows high-cost development in the floodplain that will eventually be damaged during a flood, a non-vegetated riparian corridor, steep banks and a trench-like streambed. Alterations to a floodplain can cause a lot of damage in a stream ecosystem.

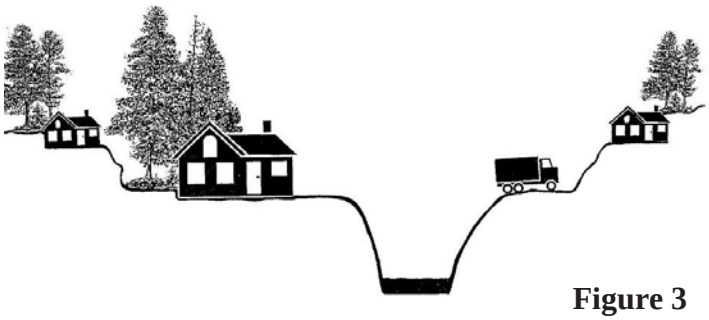

Figure 3

How do floodplains slow the flow?

When confined to the stream channel, floodwaters can reach velocities that cause erosion of the stream's banks and bed. When floodwaters overtop the streambanks of the channel, they slow as they spread out across the floodplain. The stream power that causes erosion decreases as the velocity of floodwater slows.

The amount of floodwater energy dissipated also depends on the roughness of the floodplain. The rougher the floodplain, the slower the floodwaters will become when moving across the land. Rough boundaries, or *hydraulic roughness,* between flowing water and the land surface slow down more floodwater energy than smooth boundaries. Flood height, or water level, topography and vegetation control hydraulic roughness of the floodplain. Uneven surfaces and dense vegetation create more obstacles and will slow the velocity of floodwaters by causing more friction on the flowing water.

Figure 4 Photo courtesy of Missouri Department of Natural Resources

Slower velocities not only result in less erosion but also allow sediments to be carried and deposited on the floodplain. In healthy stream systems, this deposition of sediment and nutrients typically creates the rich, fertile soils found in floodplains. However, excessive deposition is a sign that the amount of sediment that a stream is carrying is too large and therefore the stream is unstable.

Streams confined to a deep, narrow channel by *channelization, levees* or *roads* that are not allowed to spread out usually cause accelerated erosion of the stream's banks and bed. This puts nearby levees and roads in danger of being damaged too (Figure 4).

How do floodplains reduce flooding?

Natural, undisturbed floodplains contain and store the flood, so to speak. Floodplains can reduce the downstream peak of floodwaters by absorbing and storing overbank flows. This function is called *floodwater storage*. Floodplains can store a much larger volume of water than the stream channel. Figure 5 shows the Missouri River overflowing into its forested floodplain at either side; the main river channel curves at the top right corner of the photo. Many different areas including large, relatively flat areas, high flow channels and floodplain wetlands, basins and depressions collect floodwaters that the stream channel can no longer hold when the water rises. While storing these floodwaters, the floodplain can replenish wetlands, evaporate, flow slowly back to the channel or filter into the *water table*. Downstream flooding may worsen if channelization, levees, elevated roads or other features force the floodwaters to stay in the channel. By slowing floodwaters, floodplains protect the stream channel during floods.

Photo courtesy of Missouri Department of Natural Resources **Figure 5**

Floodplains and Groundwater for Fish and Wildlife

Some of the water that covers floodplains can seep into the soil and underlying rock layers to re-charge groundwater supplies. Unless it is pumped for human use, most water that seeps into ground-water flows to a stream through *interflow, base flow or spring flow*. The groundwater that flows into a stream can help protect fish and other aquatic life by keeping a stream cool and flowing during the hot, dry summer months.

Figure 6 Photo by Jim Rathert

How do floodplains provide fish and wildlife habitat?

Floodplains can provide many habitats for both terrestrial and aquatic life ranging from sport fishes to migrating or nesting waterfowl. Forested floodplains provide food, cover, travel lanes between trees and nesting habitat for many terres-trial species (Figure 6). As floodwaters rise, stream fishes move onto floodplains to take advantage of available spawning habitats, rearing sites and nutrient-filled feeding areas.

Deposition of rich sediments during floods also improves conditions for many plants and trees and increases the productivity of floodplain communities. The water table and the depth, frequency and duration of flooding all influence the types and conditions of floodplain vegetation. Occasional flooding is needed to maintain diversity of floodplain habitats and natural communities. Flooding can be decreased by many factors that affect floodplain life. If floodplain wells and upstream water uses lower the water table, or upstream dams reduce flooding, floodplain vegetation, habitats and ecology can be negatively impacted.

Figure 7 Photo courtesy of Missouri Department of Natural Resources

How do floods feed the stream system?

Floodplain forests and prairies supply a large portion of the food energy available to stream food webs. When floodwaters recede and return to the stream, they carry organic material such as branches, leaves, twigs and berries that floodplain plants and trees produce. Stream *microbes* and *macroinvertebrates* feed on this organic matter and in turn become food for other macroinvertebrates, fish, amphibians and other aquatic life, therefore recharging the food web.

What's a floodplain ever done for me?

Floodplains are a vital part of the interconnected stream system. Floodplains benefit people by providing fertile soils and water storage areas to reduce destructive flooding. They also recharge groundwater and make streams clean and healthy for all life forms. When flooplains are allowed to function naturally, the benefits to humans and wildlife are mutual.