Streamside Setbacks

Protecting People, Property, and Montana's Streams and Rivers with Specific Information on Ravalli County, Montana

Montana's future depends on clean water. One of the significant threats to our water quality is the increasing number of developments—including homes, parking lots, lawns, roads, and other development—located next to our streams and rivers. Stream setbacks offer an intelligent solution that protects clean water, a homeowner's privacy, and the natural landscapes that harbor the fish and wildlife that everyone in the state of Montana enjoys. Setbacks also reduce the risk of losing investments to flooding and erosion—and they increase property values. Much of the information contained in this handout is based on *A Planning Guide for Protecting Montana's Wetlands and Riparian Areas* (Ellis and Richard, 2003).

SETBACKS AND PUBLIC HEALTH

The main way that stream setbacks address public health, is by filtering out pollutants from our water. Polluted runoff—which occurs when rainfall or snowmelt washes pollutants such as sediment, nutrients, heavy metals, pesticides, and salt into streams, lakes, and ground water—is the number one source of pollution to the waters of our state (DEQ, 2007a).

> "*Development along rivers and streams that destroys protective riparian areas is possibly the single most urgent ecosystem threat facing Montana today*." Governor Brian Schweitzer. Letter to Directors to state agencies (DEQ, DNRC, DFWP), March 8, 2006.

What Setbacks Do for Clean Water: All Montanans depend upon clean water that comes from ground water or surface water. Wetlands and riparian areas act like a filter to reduce the amount of pollutants that enter streams, ground water, and—ultimately—drinking water, in runoff originating from sources such as city streets, lawns, construction sites, and around buildings. As suspended particles move through wetlands and streamside vegetation, they are held by the vegetation and soil. Toxic substances, including heavy metals, toxic chemicals, and pathogens, can be filtered out or broken down by plants, keeping these pollutants from entering nearby streams. Captured nutrients, including phosphorous and nitrates, are used by plants or are slowly returned to the water, thus stabilizing nutrient loads. This water flows directly into our streams—but it also percolates into our ground water.

The two main ways surface water enters the ground are 1) precipitation falling on the land and penetrating the soil, and 2) water in streams, rivers, lakes, and wetlands seeping into the adjoining ground (Cohen, 1997). In addition to filtering out pollutants that may enter ground water, naturally vegetated riparian areas and wetlands enhance the recharging of wells and aquifers by holding water long enough to allow it to percolate into the underlying soil. In areas dependent upon wells and springs for drinking water, the protection of wetlands is particularly important.

Ravalli County Drinking Water: In Ravalli County, most of the communities depend upon clean ground water as their drinking water. However, Stevensville and Pinesdale also depend upon clean surface water for their drinking water (DEQ, 2007b).

Recommended Setback Distance: A recent review of the scientific literature on riparian vegetative buffer strips concluded that for water quality protection, vegetative buffer strips

should be a *minimum* of 100 feet wide under most circumstances, although buffers should be extended for steeper slopes (Wenger, 1999). Setbacks include a vegetative buffer *plus* an additional distance to the location of a new building (which essentially protects the vegetative buffer). The State of Montana's updated *Nonpoint Source Management Plan*, which was approved by the U.S. Environmental Protection Agency (EPA) in July 2007, states, "A buffer of at least 100 feet is recommended for water quality protection…Minimum widths for buffers should be 50 feet for low order headwaters streams, with expansion to as much as 200 feet or more for larger streams." The *Nonpoint Source Management Plan* identifies locally-adopted water body setbacks as important "Best Management Practices" to protect and improve water quality from nonpoint source pollution. Nonpoint sources of pollution in urban areas includes parking lots, streets, and roads where stormwater picks up oils, grease, metals, dirt, salts, and other toxic materials. In areas where crops are grown or in areas with landscaping (including grassy areas of residential lawns and city parks), irrigation, and rainfall can carry soil, pesticides, fertilizers, herbicides, and insecticides to surface water and ground water (DEQ, 2007a).

Other Montana Examples: Several local governments have adopted stream setbacks to protect water quality, including:

- **Bozeman** has adopted setbacks for all buildings based on providing "bank stabilization, sediment, nutrient and pollution removal and flood control." Their setbacks are 100 feet from the East Gallatin River, 75 feet from Sourdough and Bozeman Creeks, and 50 feet from all other watercourses.
- **Lewis & Clark County (Helena area)** adopted setbacks with vegetative buffers for streams, rivers, and wetlands in subdivision regulations in January 2005. The setbacks were adopted for the "protection of sensitive fish and wildlife habitat, protection of valuable water recharge areas, improved surface and ground water quality, flood prevention, scenic beauty and recreational opportunities." The setbacks classify water courses into four categories, with different setbacks and buffer areas for each water course type (e.g. the setback for rivers is 250 feet, with a 100-foot vegetative buffer; the setback for Type II streams (major streams that are listed in the regulation) is 200 feet, with a 75-foot buffers; etc.). In addition to commercial, residential, and industrial buildings, setbacks also apply to barns, feed lots, corrals, and communication towers.

Vegetative Buffers are Critical

The longer runoff is detained in the buffer before entering a stream or wetland, the better. Wetland and riparian vegetation increases the effectiveness of a buffer in several ways. Physically, roots trap sediments and their contaminants, hold banks in place, and prevent erosion. By providing a canopy, vegetation reduces the velocity of raindrops and lessens runoff and erosion. Trees, shrubs, and to a lesser extent grasses, provide habitat including cover for wildlife and fish, nesting sites, and food.

Lawns do not filter out pollutants. With native vegetation, water flows through the vegetation. With lawns, water flows over the surface. Montana Dept. of Natural Resource and Conservation (DNRC) photo library.

Overhanging branches provide shade that reduces stream temperature. Litter (leaves and organic debris) from trees and shrubs provide food for aquatic organisms. Chemically and biologically, vegetation absorbs nutrients and pollutants such as chemical pesticides, salts, sediments, and organic wastes from entering our surface and ground water. Vegetation is factored into buffer strips through regulations that determine the types of activities allowed. Examples of common restrictions include:

- Minimizing removal of vegetation;
- Using native vegetation
- Prohibiting non-native plants (including lawns); and
- Prohibiting the use of pesticides and fertilizers.

Recommended Vegetative Buffer Distance: As stated above, recent reviews of the scientific literature on riparian buffer strips conclude that for water quality protection, vegetative buffer strips should be a minimum of 100 feet wide under most circumstances, although buffers should be extended for steeper slopes (Wenger, 1999). Vegetative buffer strips are composed of native vegetation and do not include lawns. This conclusion was based on several studies of different pollutants.

SETBACKS AND PUBLIC SAFETY

The main public safety issue that stream setbacks address is protection from flooding. As more people choose to build their homes next to streams and rivers, these people and homes are unwittingly being placed too close to the stream's edge, in harm's way. It is important to remember that all rivers and streams eventually flood. Therefore, larger streams and rivers are recommended to have a buffer that covers the 100-year floodplain. In areas where streams are known to meander, such as the Bitterroot River, setbacks should incorporate floodplains, as well as non-floodplain areas overlooking the stream or river. Using vegetated buffers to set back human developments and land uses from stream banks is cost effective protection against the hazards caused by flooding and moving streams (CRJC, 2000). Because the reasons for extending setbacks to include the 100-year floodplain and extending setbacks to include non-floodplain areas overlooking streams are different, these two issues are discussed separately below:

House impacted by flooding on the East Gallitin River in 1996. DNRC photo library.

Floodplains

What Setbacks do for Flooding and Floodplains: An undeveloped, vegetated floodplain can reduce the force, height, and volume of floodwaters by allowing them to spread out horizontally and relatively harmlessly across the floodplain. Water that floods vegetated floodplains is soaked up by floodplain wetlands and streamside vegetation (riparian areas), and then reenters the main channel slowly (Cohen, 1997). This action can lower flood peaks, slow water velocities, recharge local groundwater aquifers, and provide temporary water storage. These flood control functions also help to avert the

damages caused by flooding to downstream urban and suburban areas, agricultural lands, and irrigation structures. Additionally, scientific studies show that protection of the entire floodplain of a stream or river provides significant contaminant removal. For these reasons, it makes sense to extend the buffers to the edge of the floodplain whenever possible (Wenger, 1999).

Recommended Setback Distance for Floodplains: Studies recommend that stream setbacks extend at least to the edge of the 100-year floodplain (Wenger, 1999). Smaller streams may require only a narrow buffer of trees or shrubs, while larger streams and rivers may require a vegetative buffer that covers its floodplain.

Ravalli County, Floods, and Floodplains:
Ravalli County's Floodplain Regulations, adopted on March 17, 1999, state that, "The Bitterroot River between Hamilton and Stevensville is a meandering river with multiple channels over very deep alluvial deposits. The shifting and changing of the river channel is an ever constant feature of the river in this reach. At one location for example, the channel has shifted as much as 1,800 feet. Throughout this reach, meander loops have been destroyed, the channel has switched to an alternate course, and additional braiding has occurred. Based on these observations, the river reach is inherently unstable" (Ravalli County, 1999). For this reason, it seems important to ensure that setbacks always extend to the edge of the 100-year floodplain, on the main stem of the Bitterroot, as well as any other streams that may meander in the valley.

In 1996-97, floods in Ravalli County caused over $466,450 in damage to public agencies, including school districts, cities, the county government, and irrigation districts. The Federal Emergency Management Agency (FEMA) picked up 75% of the cost of this flood damage—but local government entities had to foot 25% of the bill (J. Anderson, Montana Disaster and Emergency Services, Montana Department of Military Affairs, written communication, 2002). These estimates do not include damage to private property, which the Montana Disaster and Emergency Services does not track.

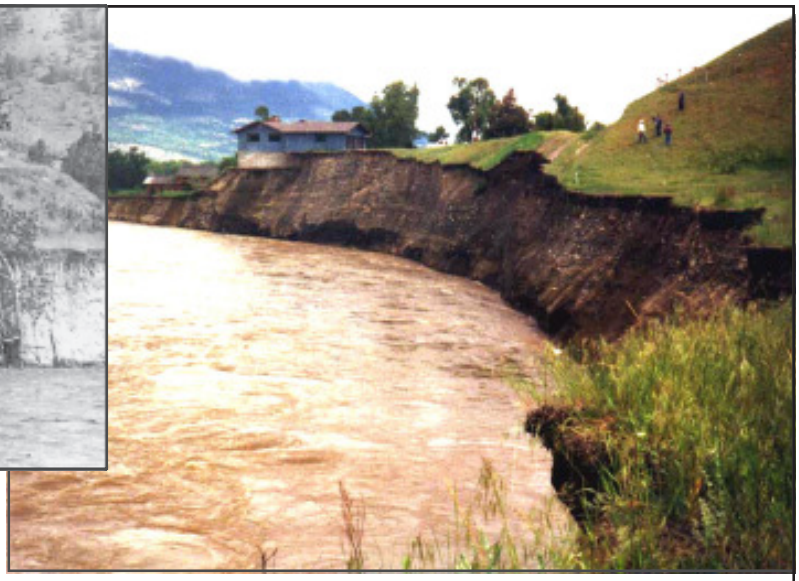
Other Montana Examples: Building in a floodplain and removing riparian vegetation decreases or eliminates the flood control capabilities of riparian areas and consequently can cause a threat to life and property. Because floods affect both public property (the 1997 floods in Montana caused over $7.6 million in damage to public agencies, including school districts, cities, counties, and irrigation districts in 23 counties (J. Anderson, Montana Disaster and Emergency Services, Montana Department of Military Affairs, written communication, 2002)) and private land, several local governments have adopted setbacks that include the 100-year floodplain, including: Lewis and Clark County, Cascade County (Great Falls area) and Flathead County, which all prohibit subdividing land within the floodplain.

Permitting housing in the floodplain can cost local governments money. In 1992, Missoula County approved a 92-lot subdivision west of Missoula along lower Grant Creek. The subdivision was located *outside* the 100-year floodplain boundary on FEMA Flood Insurance Rate Maps. In 1997, during runoff calculated to be less than a 10-year flood, water submerged some of the lots, yards, basements, and the community sewage treatment system of this subdivision. As a result of this flood, homeowners filed a lawsuit against the property developer, the developer's engineer, local real estate agents, *and* Missoula County. A negotiated settlement paid $2.3 million to the homeowners.

Non-floodplain Areas Overlooking Streams and Rivers:
Montana's low elevation streams and rivers need room to move. In addition to protecting riparian areas, uplands located next to streams and rivers also need protection. The long-term health of riparian areas requires maintaining natural stream processes. More riverside development leads to more river channelization projects (e.g. riprap and levees), which increase the frequency and severity of floods and send problems to downstream landowners and communities. In areas where streams

are known to meander, setbacks should incorporate floodplains, as well as non-floodplain areas overlooking the stream or river: a common problem arises when homes are built overlooking a river, as stream channels naturally move these homes can become vulnerable to falling into the water.

Neither of these Montana homes had to get a floodplain permit because they were built above the floodplain. The house above is located on the Shields River. The house to the right is located on the Missouri River. Both photos are from Gillilan Associates, Inc. of Bozeman.



This home on the Yellowstone River in Park County did not need a floodplain permit. On the left, the house is shown in 1996. On the right, the same house is shown after the 1996-97 100-year floods, just before it was destroyed. Many of Montana's streams and rivers located in valley bottoms meander. A flood can shift the main stem of the stream or river hundreds of feet. Both photos are from the DNRC photo library.

What Setbacks do for Flooding and Areas Overlooking Streams and Rivers: In areas where streams are known to meander, such as the Bitterroot River, setbacks should incorporate floodplains, as well as non-floodplain areas overlooking the stream or river: a common problem arises when homes are built overlooking a river, as stream channels naturally move these homes can become vulnerable to falling into the water.

In Montana, many rivers and streams need room to meander. If given space, this meandering creates a pattern where outside bends of a river are dominated by cut banks (caused by natural erosion), and inside bends are dominated by sand or gravel bars (where sediment is deposited). Additionally, the bends in meandering streams naturally and slowly migrate. This process, in combination with the moist, often wet soils and high water table found next to streams, creates a river's floodplain, which is often defined by riparian vegetation. Plants associated with riparian areas are adapted to growing in this dynamic system.

This house on the West Gallatin is seen during a flood. With the river shifting towards the house, emergency riprap was installed to protect the home. Bank stabilization is virtually always authorized after a home is built. Photo by Gillilan Associates, Inc. of Bozeman.

As more bank stabilization structures are built— weirs, riprap, barbs, and other structures—both short term and long term consequences can develop. In the short term, these structures tend to physically stabilize one local stretch of riverbank or divert flows away from one bank to another. This can trigger increases in river flow velocities, exacerbate downstream bank erosion and lead to further instabilities downstream. Over the long term, bank stabilization can cause the channelization of rivers and streams as floodplains narrow or disappear, natural stream migration is prevented, and, ultimately, riparian vegetation does not regenerate (e.g. Ellis, 2002).

Local governments are beginning to grapple with the issue of what to do when people want to build their homes near a meandering stream. Built too close to the stream, landowners will eventually request that bank stabilization structures be built to protect their home. It is important to note that allowing homes to be built on a high point overlooking a stream or river will often require landowners to stabilize the stream bank below to prevent their homes from eventually falling into the water. The best way to deal with this issue is to not allow homes to be built in the floodway or active area of the floodplain; *and* to establish setbacks on areas located above the floodplain, but within the zone where streams will likely meander.

Ravalli County and Bank Stabilization: Between January 1, 1990 and December 31, 2002, the Army Corps of Engineers approved permits for 21,440 feet (1.1 miles) of bank stabilization in Ravalli County.

The Bitterroot River has been particularly impacted by bank stabilization projects. The river is 84.3 miles long from the junction of the East and West Forks to its confluence with the Clark Fork River. Of the 82 projects permitted on the Bitterroot River between 1990 and 2002, 62 authorized bank stabilization structures on 18,298 feet of the river. Fifteen (24%) of these projects were greater than 500 feet in length. Total authorization included:

- riprap: approximately 8,759 feet authorized in 29 permits; 0.07 acres authorized in 1 permit; 25 cubic yards in 1 permit; no information in the length of the riprap in 4 permits;
- barbs: 4 permits; 15 barbs authorized;
- vanes: 8 permits; 12 vanes authorized in 4 permits; no information on the number of vanes in 4 permits;
- weirs: 2 permits; 2 weirs authorized in 1 permit: no information on the number of weirs in 1 permit
- dike: 1 permit; 1,300 feet authorized;
- rootwads: 17 permits; 178 rootwads authorized in 8 permits; no information on the number of rootwads in 9 permits;
- other structures: 1,500 feet authorized for revetment; 12 linear feet authorized for boat ramp; and
- unknown structures (but bank stabilization specifically authorized): 3 permits.

During the same period, 4 restoration projects were authorized on the Bitterroot: one for 476 feet, one for 6.0 acres, one for 100 cubic yards, and the last with no information about size. No mitigation was authorized for bank stabilization projects on the Bitterroot River (Ellis, 2005).

To date, no comprehensive study looking at bank stabilization structures lining the Bitterroot has been completed; one study, however, did examine the 20.6 miles of the river in Missoula County. That study found 28 bank stabilization projects totaling 4.8 miles in length (Brandt and Ringelberg, 1999). Because of the meanders and multiple channels, it was estimated that 12% of this section of the Bitterroot River was covered in bank stabilization.

A Final Word

In addition to protecting public health, clean water goes hand-in-hand with a strong economy (National Association of Counties, 2001). Farmers, ranchers, and commercial activities need water to produce crops, livestock, and manufactured goods. Healthy ecosystems attract tourists and recreation dollars. And maintaining clean water is almost always less expensive than cleaning polluted water.

> "*If you lose property value due to river setbacks, blame your broker. It is all in the packaging. Crowded riverfront and river properties in the Bitterroot, Flathead, and Paradise Valley are losing the intrinsic value of open space, recreation opportunities, and water amenities due to unplanned, widespread development…there are so few river properties – they command high prices ($1 – 2 M for a building site) and will retain their value even if building is restricted adjacent to the river and active floodplain*."
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> From: Clark Wheeler, Real Estate Appraiser, Real Estate Valuation Expert, Norman C. Wheeler and Associates, Bozeman, MT

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