Use of Building Setbacks in the Water Body Standards of the Fish and Wildlife Recommendations for Subdivision Development in Montana: Justification and Rationale

A Professional Paper
January 9, 2012

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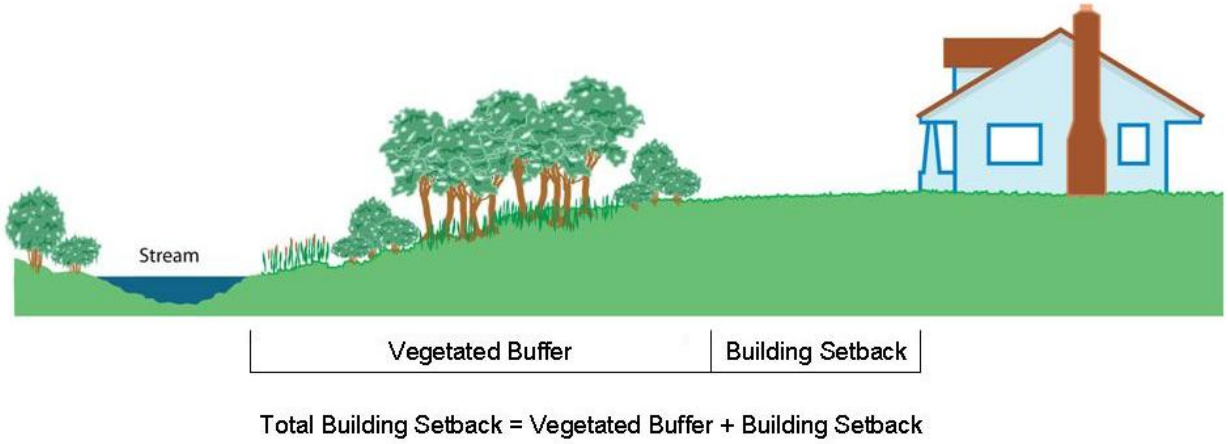
This professional paper outlines the justification and rationale behind the building setback portion of the Water Body Standards for rivers, perennial streams, and other water bodies, which is contained within the Fish and Wildlife Recommendations for Subdivision Development in Montana. This standard consists of three distances: a total building setback, a vegetated buffer, and the smaller building setback.

Type of Water Body	Total Building Setback	Vegetated Buffer	Building Setback
Rivers	≥ 300 feet	≥ 250 feet	≥ 50 feet
Perennial Streams	≥ 200 feet	≥ 150 feet	≥ 50 feet
Other Water Bodies	≥ 130 feet	≥ 100 feet	≥ 30 feet



The following definitions apply:

> **Total Building Setback:** Vegetated Buffer + Building Setback = Total Building Setback (see illustration above).
>
> **Vegetated Buffer** from a water body: A natural, undisturbed strip or "greenbelt" along each side of a natural water body. Lawns and nonnative landscaping do not count toward the vegetated buffer.
>
> **Building Setback:** An area beyond the outer boundary of the vegetated buffer where native vegetation can be removed or otherwise disturbed and lawns can be planted, but where permanent structures are prohibited.

Justification and Rationale

There is much scientific literature on the "vegetated buffer" standards for wildlife and wildlife habitat along rivers, perennials streams, and other bodies of water that are contained within the Fish and Wildlife Recommendations for Subdivision Development in Montana (e.g., Knutson 1997; Wenger 1999). This document lays out the justification and rationale for establishing a 50-foot or 30-foot "building setback" as part of the "total building setback."

The building setback is located between the outer edge of the vegetated buffer and any permanent structures. These areas can be used for lawns or any other domestic use that is not a permanent structure. If buildings are constructed on the edge of the vegetated buffer, the buffer will degrade over time. The building setback is designed to protect the vegetated buffer from human disturbance that could diminish the effectiveness of the buffer. Examples of human disturbance include dumping refuse or yard waste; cutting, mowing, or burning vegetation; filling areas; trampling vegetation; and recreational vehicle use. Direct human disturbance affects both the habitat provided by the vegetated buffer and the wildlife species that are dependent on the buffer. "Plant loss can result from either direct crushing or the compaction of soil. Plants in wet soils are especially vulnerable to trampling. Compaction of the soil damages roots, decreases soil water retention, lessens seed germination and seedling survival, and promotes the survival of more aggressive weedy species. As cover is reduced, by trampling, for example, wildlife species that depend on the cover or food provided by the vegetation decrease." (Castelle et al. 1992)

For building setback standards, there are three main sources of information: scientific literature on human impacts to buffer strips, information on typical distances needed for activities conducted in a residential backyard in Montana, and information on wildfires and "defensible space."

The most pertinent scientific studies we found on the human impact to buffer strips are summarized in *Wetland Buffers: Use and Effectiveness* (Castelle et al. 1992). In this paper, the authors describe two particularly relevant studies:

- A 1987 study analyzed the relationship between buffer width and human disturbance on 100 sites in New Jersey (Shisler et al. 1987). The study concluded that as buffer width increased,

direct human disturbance decreased. Specifically, buffers less than 50 feet had double the human disturbance than was documented in buffers 100 feet and wider.

- A 1992 study analyzed the relationship between buffer width and human disturbance on 21 sites in the state of Washington. The study concluded that the size of vegetated buffers is usually reduced over time due to human disturbance (Cooke 1992, p. 6):
    - "More than 90 percent of the buffers examined for this study did not remain in a pristine state after the surrounding land use change was initiated. Of those buffers altered, 76 percent were altered in a negative manner."
    - "Buffers less than 50 feet in width showed a 95 percent increase in alteration of the buffer," but "where the buffer was greater than 50 feet, only 35 percent showed alteration."
    - "Of the 21 sites examined, 18 were shown to have reduced buffer zones between one and eight years later."

While these studies examined only the vegetated buffers, they do support the premise that buffers require some reasonable distance from human activity. As stated above, if buildings are constructed on the buffer's edge, a functional vegetated buffer will degrade. In fact, the 1992 Washington study noted that nearly all the vegetated buffers that were less than 50 feet wide at the time they were established demonstrated a significant decrease in effective size within a few years; in some instances, degradation was so great that the buffers were effectively eliminated. Fewer than half the buffers that were originally at least 50 feet wide showed demonstrable degradation.

A 50-foot backyard is a reasonable distance to conduct most activities associated with a residential or commercial subdivision. As an example, most families use the area between their home and the vegetated buffer for lawns, play areas, swing sets, picnic tables, vegetable gardens, landscaping, etc.

In addition to the above studies regarding riparian vegetated buffers, there is further justification for a building setback in research conducted around "defensible space" and wildfires. Creating a defensible space involves protecting a home from wildfires by clearing the area around the home of flammable items (such as dead vegetation), maintaining watered lawns and gardens, and maintaining landscaping to certain spacing and pruning specifications. Specifically, three studies on defensible space indicate that at least a 30-foot building setback is needed, with a 60-foot building setback recommended for additional protection:

- Research by Stanford Research Institute on the 1961 Belair/Brentwood Fire in California revealed that "95 percent of the structures that maintained 30 to 60 feet of clearance survived" the fire;
- Research by the University of California–Berkeley on the 1990 Painted Cave Fire in California showed that 86 percent of structures survived the wildfire if they maintained at least 30 feet of clearance; and
- 1998 research conducted in the International Crown Fire Modeling Experiment in the Northwest Territories of Canada showed that "a crown fire must be less than 100 feet from a structure to ignite a wood wall. At 33 feet, heavy char and a few ignitions occurred. At 66 feet, there was no char or scorch." (National Fire Protection Association 2009)

In the Fish and Wildlife Recommendations for Subdivision Development in Montana, at least a 50-foot building setback from the vegetated buffer is recommended on rivers and perennial streams, and at least a 30-foot setback is recommended on other bodies of water. The 50-foot standard was established because (1) scientific studies support that it will protect the vegetated buffer; (2) it is a reasonable distance for a backyard; and (3) it provides a defensible space to protect structures from wildfire. A smaller 30-foot building setback on "Other Water Bodies" reflects the fact that the vegetated buffer around lakes, wetlands, reservoirs, and other water bodies is generally fixed in place (i.e., it is unlikely to change location over time from flooding and other events, in contrast to most stream channels). This smaller distance also is similar to building setbacks for residential and commercial buildings established for wetlands in several other states (McElfish et al. 2008). A building setback smaller than 30 feet is not recommended because it will most likely result in degradation of the vegetated buffer over time.

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Citation: Clancy, C.G., M.A. Deleray, and S.T. Opitz. 2012. *Use of Building Setbacks in the Water Body Standards of the Fish and Wildlife Recommendations for Subdivision Development in Montana: Justification and Rationale*. Montana Fish, Wildlife & Parks Professional Paper, January 9, 2012.