Conservation Buffers & Water Quality

Conservation Quiz

1. Where should conservation buffers be placed?

2. How wide should a conservation buffer strip be for sediment control and nutrient removal?

3. How does conservation buffer strip help improve water quality?

(Answers located on page 3.)

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Conservation buffers are areas or strips of permanent vegetation established in and around row crops. They include filter strips, riparian buffers, field borders, shallow water areas for wildlife, grassed waterways, field windbreaks, shelterbelts, designated wellhead protection areas, living snow fences, and contour grass strips. Buffers are designed to intercept sediment and nutrients and reduce soil erosion; however, they also help enhance air and water quality and fish and wildlife habitats, which encourages biodiversity and beautifies agricultural landscapes.

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Understanding Conservation Buffers

Each type of conservation buffer uses different vegetative species, ranging from grasses to shrubs to trees. These living filters, which work together to improve water quality, replace the natural system that once protected most surface water bodies. As runoff flows over the land, grasses slow it down, allowing soil particles to settle into the buffer zone rather than being transported to surface water. The root systems of some grasses may grow more than six feet deep, providing deep pores and increasing water infiltration. Increased water infiltration also reduces the severity of flooding and increases the rate of groundwater recharge. The woody stems of shrubs and trees obstruct surface runoff that flows into streams and help slow floodwaters. Trees near streams' edges offer similar soil and stream-bank protection.

Effects of Conservation Buffers on Water Quality

Conservation buffers are among the best management practices that producers can use to protect water quality. They are flexible in size, can be strategically located in and around fields to reduce surface runoff and soil erosion, and can be used in conjunction with other best management practices to protect and improve water quality.

Buffers serve a critical role in reducing sediment, nutrients, and agricultural chemicals that are transported to surface water bodies (Table 1). The permanent vegetation in buffers acts as a settling basin for sediment in water runoff and uses the nutrients in the sediments. Buffers can reduce sediment, nutrients, and agricultural chemicals in water runoff by 50 percent to 100 percent. In addition to intercepting pollutants, they also prevent banks from falling into water bodies, reduce wind damage to young plants, increase farm profitability by taking marginal land out of production, and increase or improve wildlife and fish habitats.

Managing Conservation Buffers

Buffers are more easily maintained when additional upland conservation practices are used to limit the rate of sediment reaching the buffers. They must be maintained regularly to work efficiently and remain healthy and competitive. Regular maintenance includes carefully controlling grazing and field traffic, harvesting buffers, and removing deposited sediment. Healthy, actively growing vegetation is capable of taking up and degrading trapped nutrients and agricultural chemicals.

Placing conservation buffers

Conservation buffers are useful in and around agricultural row-crop fields, along streams, and around lakes and wetlands. They are most effective when combined with other best management practices to prevent the buffer system from being overloaded with sediment.

Maintaining conservation buffers

- ***Removing deposited sediment***
  Sediment trapped by buffers changes the land shape and may cause runoff to flow parallel to buffers rather than across them. Sediment must be removed from these areas and vegetation reestablished when necessary. It is critical to minimize the load of sediment in the runoff flowing across buffers by using conservation tillage systems in fields above conservation buffers.
- ***Mowing conservation buffers***
  Buffers may require mowing for weed control or other reasons. Mowing also encourages some grass species to tiller and produce denser vegetation at the soil surface; however, short cutting stiff-stemmed grass species may reduce the flow retardence of vegetation. Mowing buffers stimulates vegetation growth, which actively absorbs nutrients and degrades pesticides as well as supplies carbon for microbial degradation.
- ***Harvesting conservation buffers***
  Periodically harvesting buffer vegetation removes trapped nutrients from the system, which prevents their eventual release to the soil and potential movement to water.
- ***Reduced traffic patterns and use***
  Driving heavy equipment on buffers leads to soil compaction and reduced water infiltration. It also can cause ruts when the soil is wet, which may encourage concentrated flow to bypasses the filtering ability of the buffer. In addition, grazing livestock on buffers may reduce grass height and contribute to soil compaction. Planning a grazing system that allows quick, intensive foraging under good soil conditions is essential. Removing livestock when the soil is wet reduces potential damage to buffers.

Table 1. Infiltration and captured sediment, atrazine, metolachlor, and cyanazine in buffer strips from six natural rainfall events.

Rain Event (E)	Infiltration (%)	Sediment (% Retained)	Atrazine (% Retained)	Metolachlor (% Retained)	Cyanazine (% Retained)
E1	9	44	13	22	15
E2	34	57	44	33	37
E3	97	100	100	100	100
E4	44	65	54	51	49
E5	98	98	98	99	98
E6	69	86	58	73	69

Source: Arora, K., S.K. Mickelson, J.L. Baker, D.P. Tierney, and C.J. Peters. 1996. Herbicide retention by vegetative bufferstrips from runoff under natural rainfall. ASAE Transactions 39(6):2155-2162

The riparian buffer along the stream is part of a nationally designated demonstration area for riparian buffers in Story County.

Programs/agencies that can help with cost sharing and planning for conservation buffers

1. Conservation Reserve Program (CRP)

2. Environmental Quality Incentives Program (EQIP)

3. Wildlife Habitat Incentive Program (WHIP)

4. Wetlands Reserve Program

5. Stewardship Incentive Program

6. Natural Resources Conservation Service (NRCS)

7. Farm Service Agency (FSA)

8. Department of Natural Resources (DNR)

9. Iowa State University (ISU)

Quiz Answers: 1. Conservation buffer strips should be placed between surface water and agricultural fields. 2. Conservation buffers used for sediment control and nutrient removal range in width from 40 feet to 150 feet. 3. Buffer strips improve water quality by intercepting sediment, nutrients, and agricultural chemicals before they pollute surface water.

All photographs are from the NRCS website photo gallery (http://www.nrcs.usda.gov).

*Chart adapted and modified from http://www.ctic.purdue.edu/ctic/BuffersProject/IA/County/BUF_AC_IA.gif

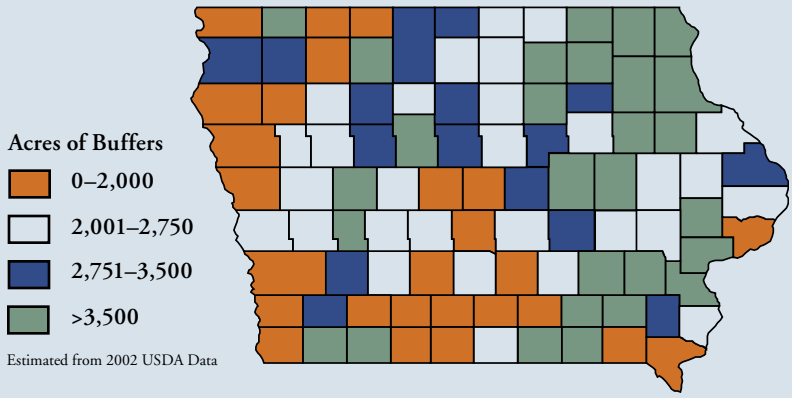

Figure 1. Number of acres in conservation buffers for each county in Iowa*

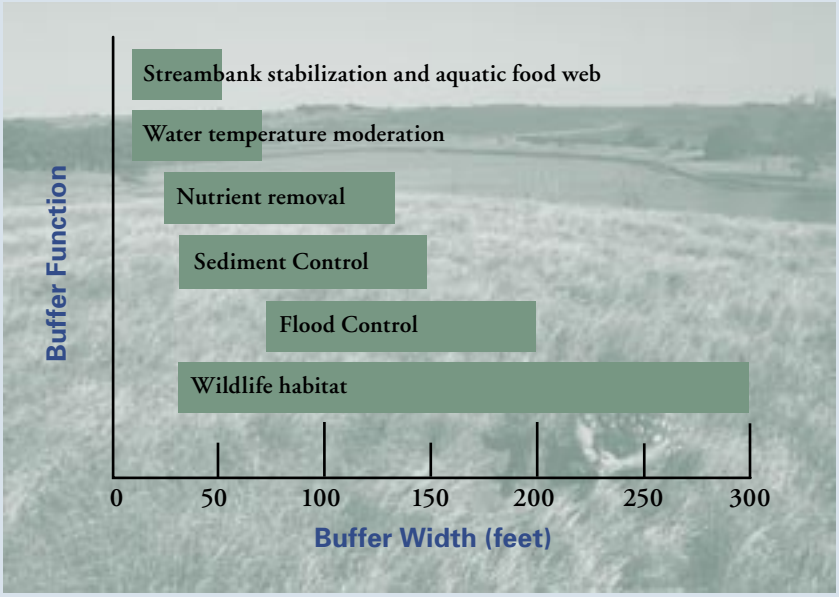

Figure 2. Recommended conservation buffer strip width for different functions or uses.

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Resources Conservation Practices:
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