

# Buffers improve water quality



Recently, the MPCA had a request asking if we could see a difference in water quality in streams from sites where there are buffers compared to sites without buffers.

We looked at biological data collected from 3,500 stream sites across the state and saw a strong relationship between buffers and healthy aquatic life. We focused on biology because that reflects conditions of water quality over time.

The analysis of data and information clearly show that:

- Buffers are important for clean water and healthy aquatic life.
- The greater the percentage of stream channel that is buffered upstream of a monitoring site, the better the health of the aquatic life (fish and bugs).
- On average, streams with:
  - » More than 85% intact buffers have excellent aquatic life
  - » About 50% – 85% intact buffers have good aquatic life
  - » Between 25% – 50% intact buffers have fair aquatic life
  - » Less than 25% intact buffers have poor or very poor aquatic life
- Buffers can make a difference to water quality and aquatic life.
- The buffer zone is critical to protecting and restoring water quality and healthy aquatic life, natural stream functions and aquatic habitat due to its immediate proximity to the water.

On the following pages are four examples, two from relatively channelized streams and two from streams that have not been significantly altered, along with supporting information.



# Buffers and stream health

## Findings

Watersheds with missing or disturbed buffers have less healthy fish and bug (invertebrate) communities.

On average, streams with:

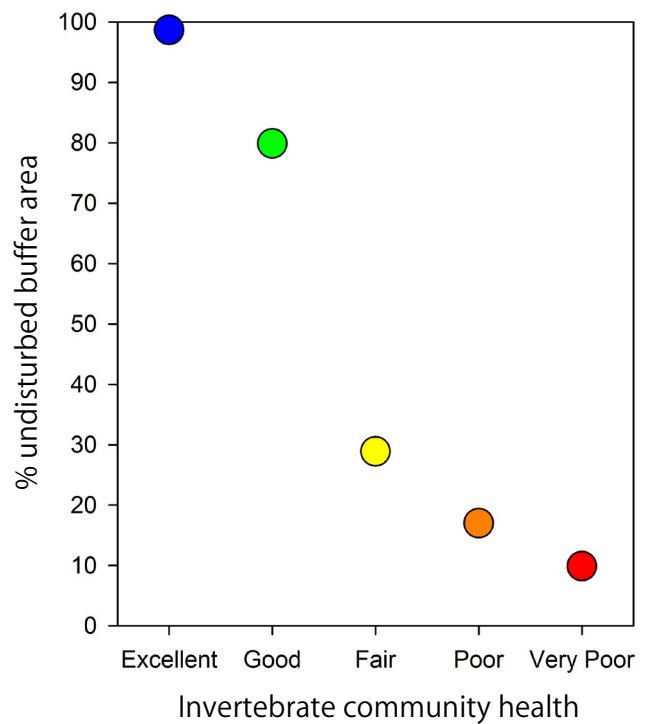
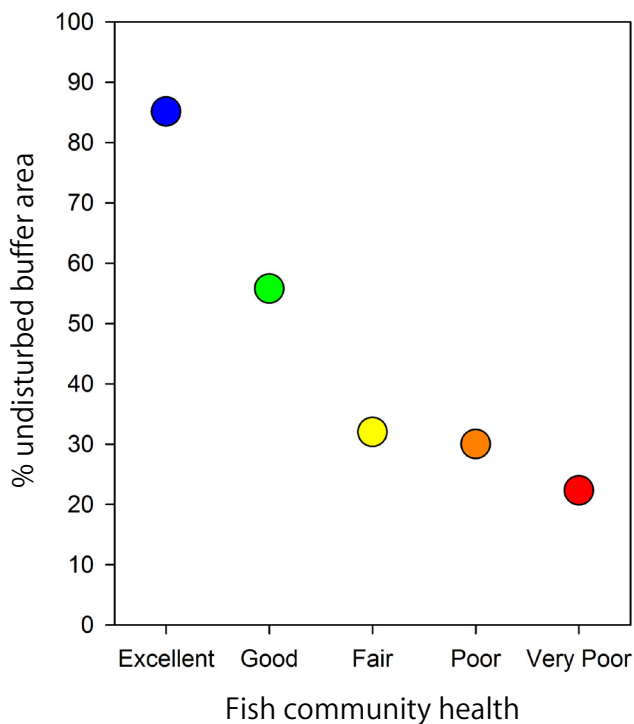
- More than 85% intact buffers have excellent aquatic life
- About 50% – 85% intact buffers have good aquatic life
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## How we came to this finding

We looked at the quality of the buffers next to and upstream of more than 3,500 fish monitoring sites and 3,000 invertebrate monitoring sites across Minnesota.

Buffer quality was measured by calculating the percentage of the buffer area that was undisturbed by human activities.

Then we compared the buffer quality to the health of the fish and invertebrate communities at each site. The sites were grouped into “excellent,” “good,” “fair,” “poor,” and “very poor” categories based on the health of the biological community (see graphs).

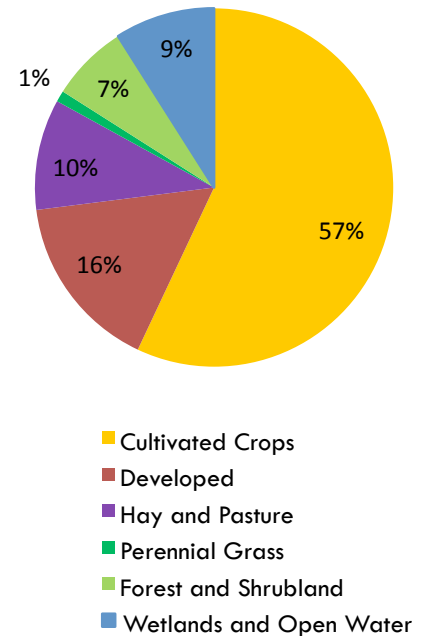


# Lower Minnesota River Watershed, County Ditch 13A (channelized stream)

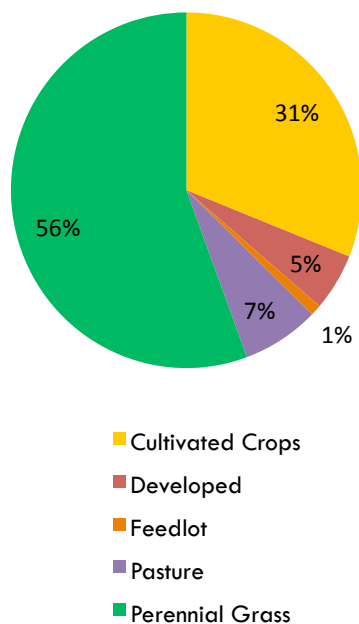


County Ditch 13A is a headwater, channelized tributary to the South Branch of the Rush River in Sibley County. The buffer zone of this stream is in poor condition and dominated by row-crop agriculture. The fish and invertebrate community as well as the in-stream habitat are all severely degraded.

Land use in the watershed



Land use in the buffer zone



Stream monitoring results

Stream condition	Rating	Score (max = 100)
Fish community	Poor/ Very poor	14
Macroinvertebrate community	Poor	5
Habitat	Very poor	26

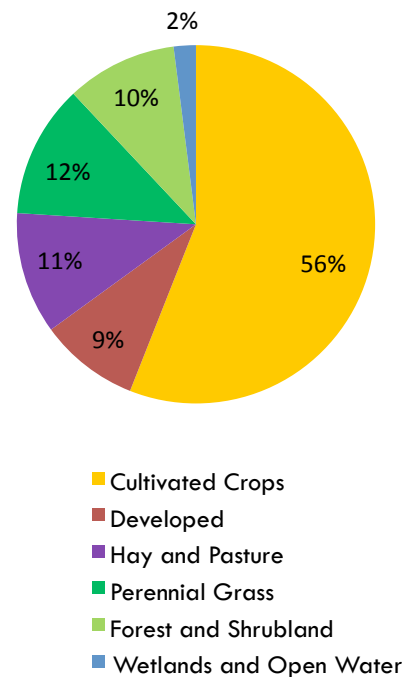


# Zumbro River Watershed, North Fork of Zumbro River (channelized stream)

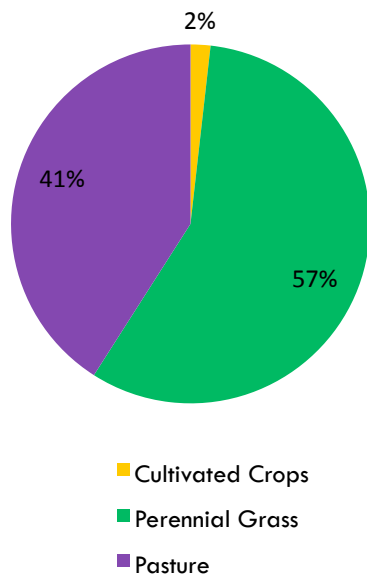


The North Fork of the Zumbro River is a channelized tributary to the Zumbro River in Rice County. The buffer zones of streams in this watershed are generally in poor condition, but the buffer zone around and immediately upstream of the monitoring site is more intact. The fish and invertebrate community reflect the somewhat better habitat conditions at the site.

Land use in the watershed



Land use in the buffer zone



Stream monitoring results

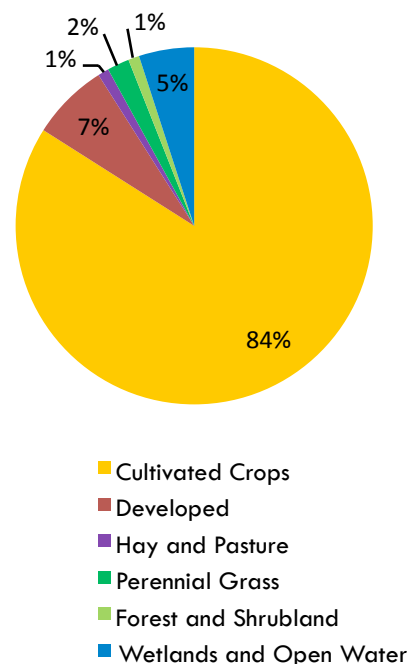
Stream condition	Rating	Score (max = 100)
Fish community	Fair/Good	60
Macroinvertebrate community	Fair/Good	35
Habitat	Poor	37

## Blue Earth River Watershed, Blue Earth River (natural stream)

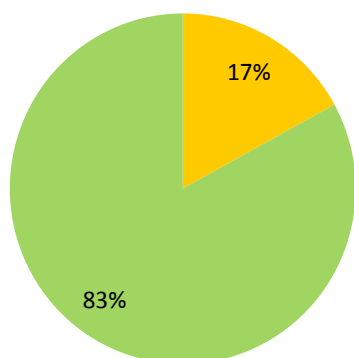


The Blue Earth River is a large, direct tributary to the Minnesota River. The buffer zone of this stream's watershed is often encroached upon by row-crop agriculture. At this monitoring location, the buffer zone around and immediately upstream of the site is somewhat intact, but cropland encroaches on the stream banks in several places and may be contributing to bank erosion along some outside bends. Note the erosion evident in the lower right corner of the air photo and site picture above.

Land use in the watershed



Land use in the buffer zone



- Cultivated Crops
- Forest and Shrubland

Stream monitoring results

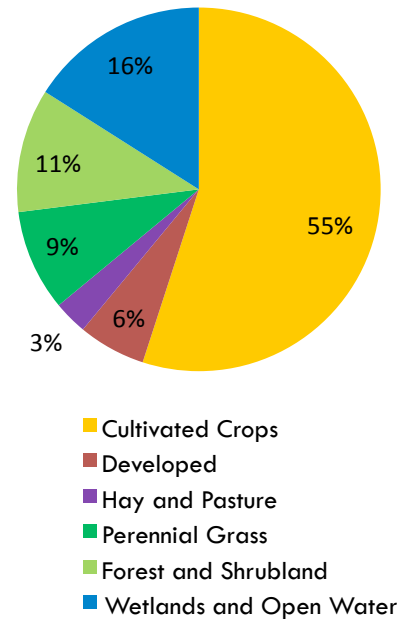
Stream condition	Rating	Score (max = 100)
Fish community	Poor	28
Macroinvertebrate community	Poor	16
Habitat	Fair	59

## Sauk River Watershed, Silver Creek (natural stream)

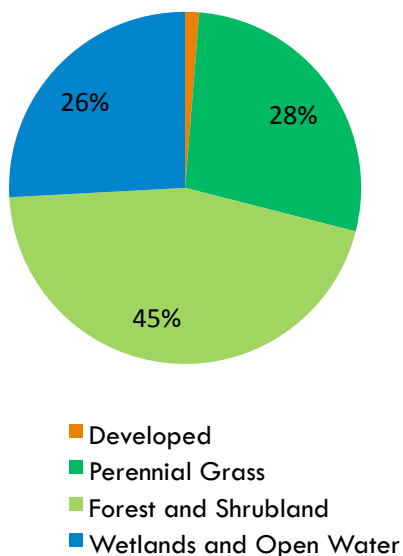


Silver Creek is a tributary to the Sauk River in Todd County. The buffer zone at the monitoring site is composed of perennial grasses that may be grazed at times. The stream has good channel development and a stream bottom composed of coarse substrates that are not covered by fine sediments. The intact buffer at this site may somewhat mitigate the impact on the biology of land use practices in the upstream watershed.

Land use in the watershed



Land use in the buffer zone



Stream monitoring results

Stream condition	Rating	Score (max = 100)
Fish community	Good	58
Macroinvertebrate community	*	*
Habitat	Good	70

\* Macroinvertebrates not collected due to high flows