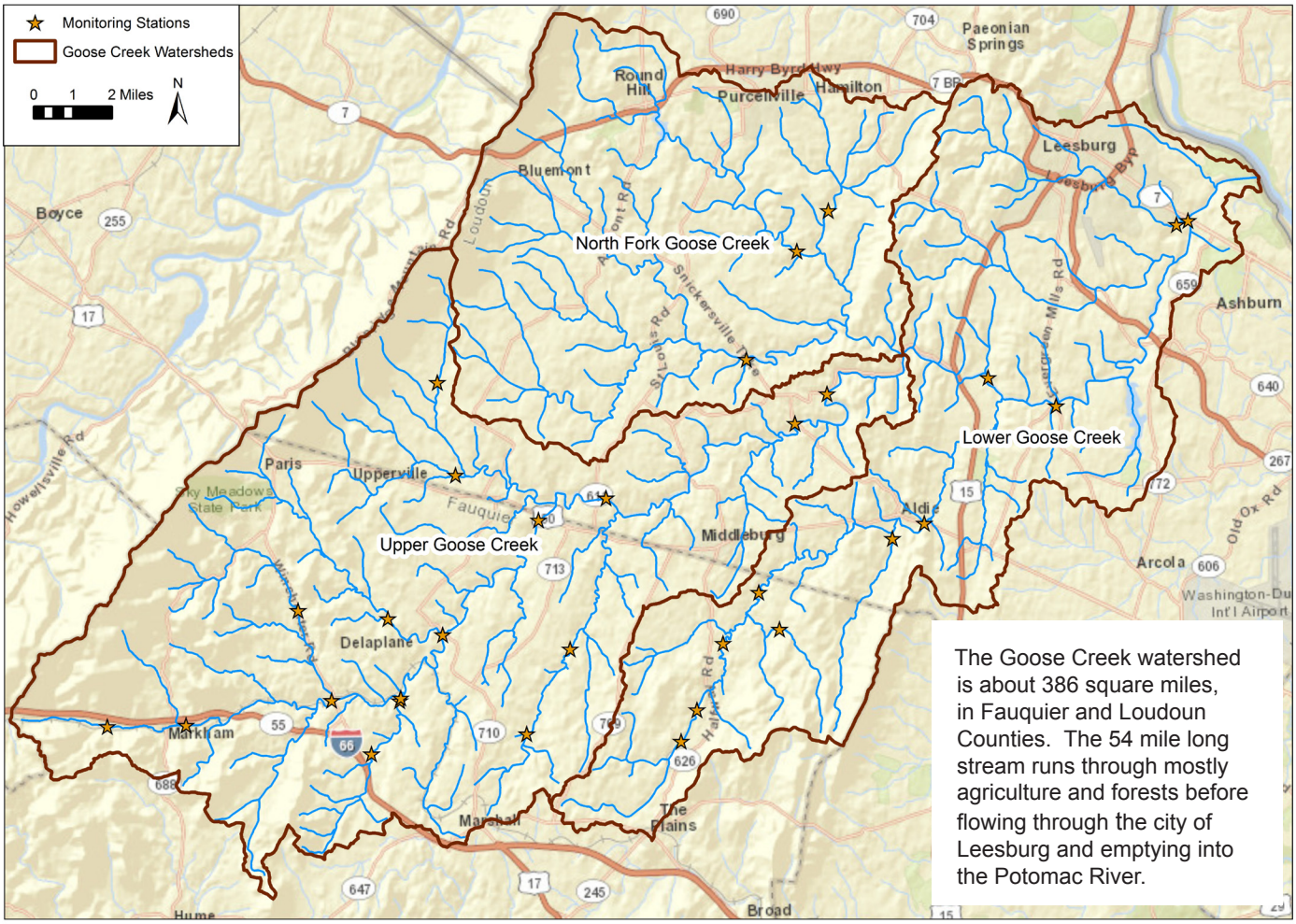
# Goose Creek Report Card 2013




The Goose Creek watershed is about 386 square miles, in Fauquier and Loudoun Counties. The 54 mile long stream runs through mostly agriculture and forests before flowing through the city of Leesburg and emptying into the Potomac River.

## Ecological Health

| Indicators | | Grades |
|---|---|---|
| DO | Dissolved Oxygen | A+ |
| | pH | A |
| | Water Temperature | A+ |
| TP | Total Phosphorus | A- |
| TN | Total Nitrogen | B- |
| | Benthic Macroinvertebrates | D |

This report card summarizes water quality results based on data collected by the Goose Creek Association and the VA Department of Environmental Quality from January 2013 to December 2013 at the stations on the map, except for benthic data. Monitoring data was assessed against threshold values for each indicator at each site by determining the percentage of samples passing the thresholds over the period of interest. The grades for each site were then averaged together to determine an overall watershed score for each indicator. Benthic scores are based on data collected from 2000 to 2010 and synthesized into an Index of Biological Integrity for the watershed.

The data suggests that the Goose Creek watershed is significantly clean! In the rest of the report card, we will take a closer look at the grades and the importance of protecting the land in order to protect water quality.

Grade Scale

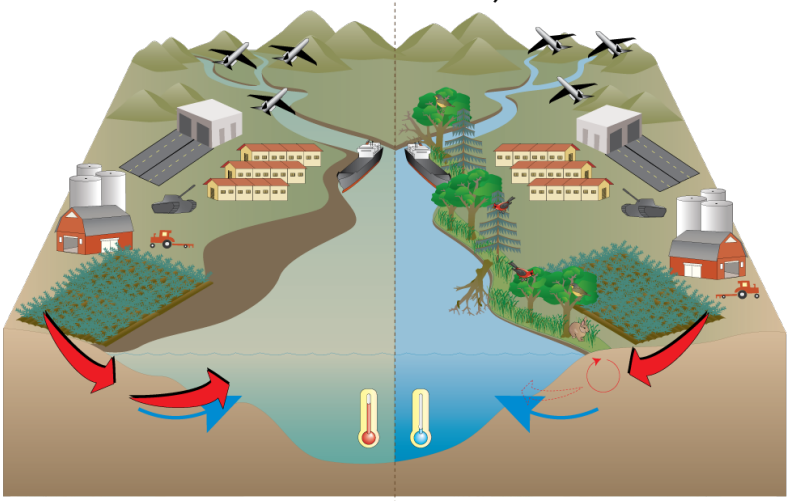
| | |
|---|---|
| A | 100 |
| B | 80 |
| C | 60 |
| D | 40 |
| F | 20 |
| | 0 |

*Volunteers collect benthic macroinvertebrates.*

# Forest Buffers Help Improve Water Quality

Stormwater runoff can carry pollutants such as excess nutrients (Total Nitrogen and Total Phosphorus), sediments, and bacteria, to streams. These pollutants degrade the water quality in the stream, sometimes to a point where fish and other aquatic life (i.e., benthic macroinvertebrates) cannot survive. Stormwater runoff increases in areas where there are no trees planted along streams or where there is an increase in impervious surfaces, such as cities with buildings and parking lots. Forest buffers play a critical role in filtering runoff before it enters a stream. Trees and shrubs also help minimize erosion by stabilizing the stream banks. This helps keep sediment out of the stream and creates a better habitat for aquatic life.

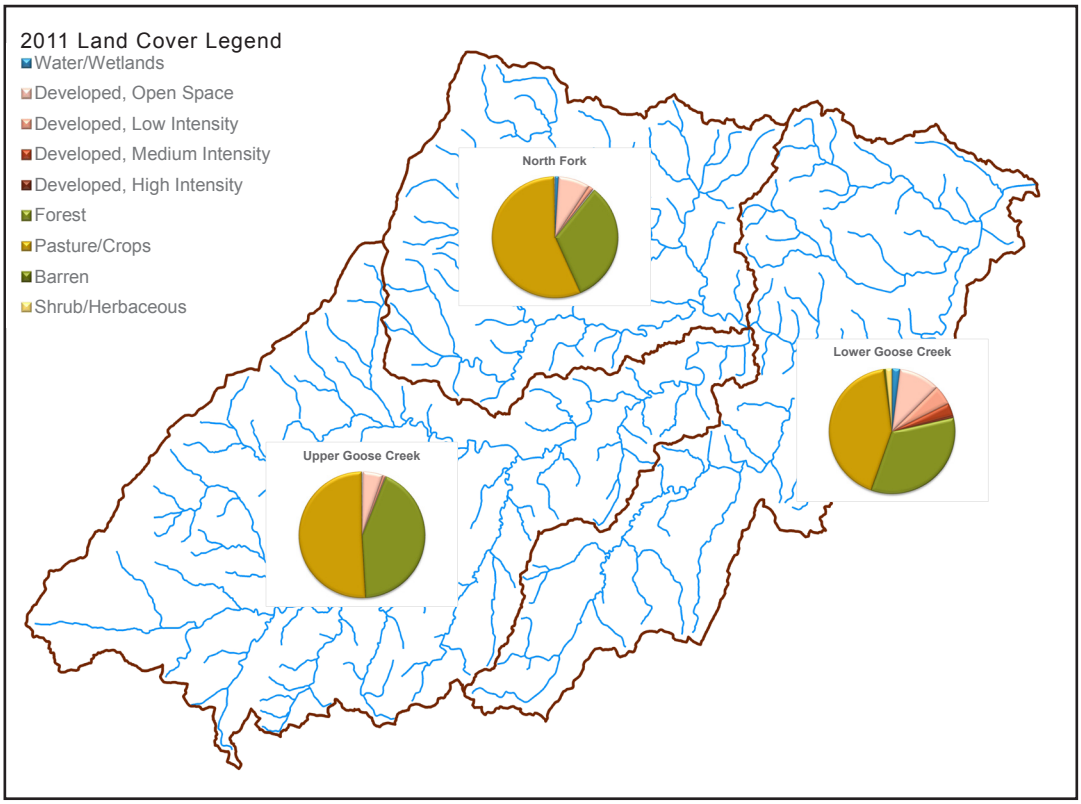
*Stream bank erosion on Bolling's Branch.*




Streamside areas that lack riparian forest buffers are prone to erosion. When riparian forest buffers are not present, stream water temperature rises, which can be detrimental to aquatic organisms. In the absence of riparian forest buffers, sub-surface nutrients are not taken up or reduced prior to entering the stream with groundwater.

Riparian forest buffers stabilize stream banks by reducing erosion, keeping stream water temperature cool as a result of shading, and provide important habitat for organisms, both on the land and in the stream itself. Riparian forest buffers also help reduce nutrient inputs into streams. Some sub-surface nutrients are taken up by the roots of the riparian vegetation, reducing the nutrients that enter the stream with groundwater to a small amount.

Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Lane, H., J.L. Woerner, W.C. Dennison, C. Neill, C. Wilson, M. Elliott, M. Shively, J. Graine, and R. Jeavons. 2007. Defending our National Treasure: Department of Defense Chesapeake Bay Restoration Partnership 1998-2004. Integration and Application Network, University of Maryland Center for Environmental Science, Cambridge: MD.

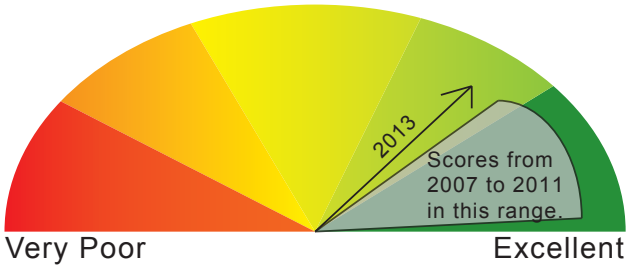



*This figure uses data from the 2011 National Land Cover Database (NLCD), which classifies land cover based on 2011 satellite data. 2011 is the most recent dataset available.*

The chart to the left shows the different types of land use in the three subwatersheds of Goose Creek. Agriculture (pasture/crops) and forests are the main type of land use. The Upper Goose Creek subwatershed has the greatest percentage of these lands, while the Lower Goose Creek subwatershed, where Leesburg is located, is more developed. Please note that the chart is based on 2011 data, and there has been development since then particularly in Lower Goose and North Fork subwatersheds.

Whether living in the rural area or in the city or suburbs of Leesburg, property owners can install practices that help capture stormwater runoff, thus decreasing the amount of pollutants that reach the stream. For example, a rain garden, which is a planted depression with permeable soils, allows stormwater runoff to soak into the garden, where it is filtered by the plants and soil. Forested buffers along streams also provide infiltration and filtering of stormwater runoff.

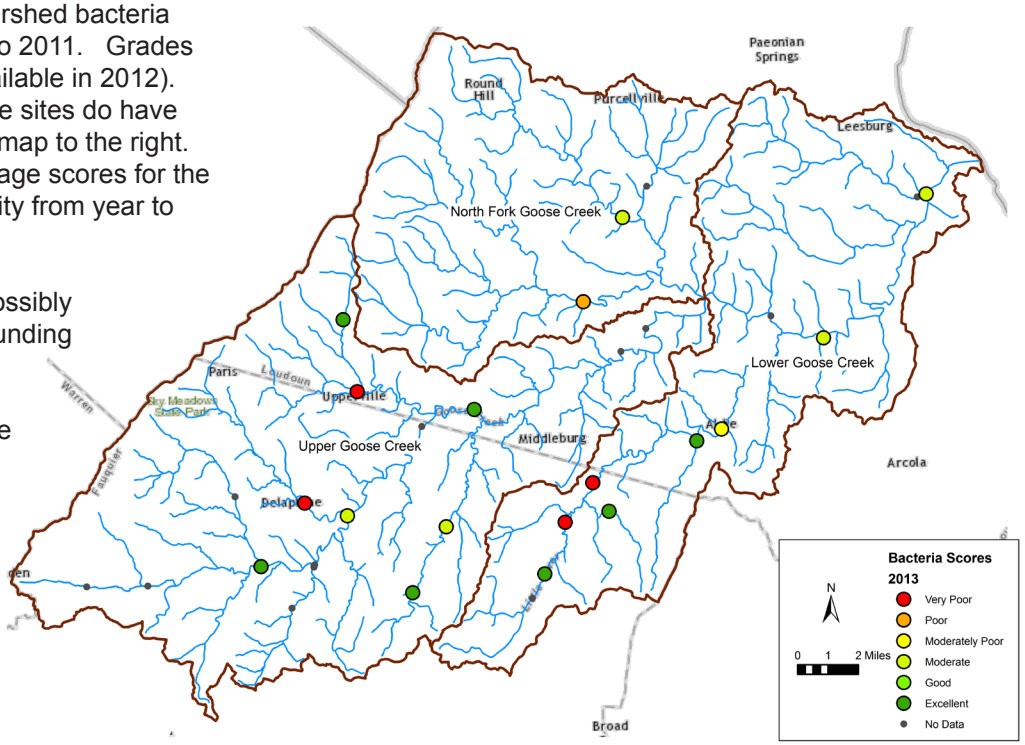
# Overall Bacteria Levels Are Good But Individual Sites Have Very Poor Scores




Escherichia coli (E. coli) is a type of bacteria that occurs in the intestines and feces of warm blooded mammals. It is used as an indicator species to determine the level of fecal waste contamination, which can also carry other bacteria, viruses and protozoans that can cause illnesses in humans. Causes of fecal contamination include: livestock (feeding or slaughter operations), on-site treatment systems (septic), solid waste storage facilities, leaky municipal sanitary sewer lines, urban runoff/storm sewers, and waste from pets, waterfowl and other wildlife.

As shown in the figure above, overall watershed bacteria scores were good to excellent from 2007 to 2011. Grades did drop a bit in 2013 (insufficient data available in 2012). While overall scores tend to be good, some sites do have poor to very poor scores, as shown in the map to the right. This shows the large variability in the average scores for the year 2013 per site. There is some variability from year to year at some sites as well.

The variability among sites and years is possibly due to weather variations as well as surrounding land use. Bacteria loads usually increase during rain events, as the rain carries the bacteria from the land to the stream. In the rural upper portion of the watershed, cattle are the major cause of bacteria entering the waters. When farmers fence cattle out of streams, we have cleaner water.




# Stream Habitat Affects Aquatic Life

| Subwatershed | IBI Score | IBI Rank |
|---|---|---|
| Upper | 32.23 | Fair |
| Lower | 11.1 | Very Poor |
| North Fork | 18.5 | Poor |

*Eroded stream banks create sediment bars and reduce aquatic habitat.*

Benthic macroinvertebrates are freshwater organisms that live in the stream and on the river bottom. Insects such as dragonfly larvae need a stream habitat with many rocks and little sediment and erosion in order to survive. The abundance and diversity of these organisms is a great indicator of stream health. The Chesapeake Bay watershed Index of Biotic Integrity compares benthic data to reference conditions and rolls the information into individual scores for subwatersheds. The table to the left shows the IBI score for each Goose Creek subwatershed based on data collected from 2000 to 2010 (the most recent data available). The scores are very poor for Lower Goose Creek subwatershed, which could be due to the higher amount of development in that area. Usually erosion increases and buffers decrease in more developed areas, which contributes to poorer stream habitat.

It is important to note that most of this data was from 2009, so the scores are heavily influenced by conditions in 2009 which could explain the lower scores.

# We Have More Work To Do

The recently signed Chesapeake Bay Watershed Agreement calls for a total of 181,440 stream bank miles to be restored with forest buffers by 2025 - that's 900 miles per year! The Goose Creek Association is doing our part to reach that goal by planting trees and shrubs along local farm stream banks and wetlands with help from students and volunteers. So far, GCA has planted 14,800 stream bank linear feet with over 3,579 trees, live stakes, and shrubs on local farms in Fauquier County.

Join the Goose Creek Challenge! If you are a landowner who wants to stabilize your creek banks or a volunteer who wants to help plant trees, please send an email to info@goosecreek.org or call 540-687-3073. For more information, visit the Goose Creek Challenge website: http://www.goosecreek.org/programs/goose-creek-challenge.

*Students and volunteers pause for a photo after a day of tree planting.*

# How The Grades Are Calculated

*Volunteers check out the quality of Goose Creek.*

Report card grades are based on data collected by the Goose Creek Association and Virginia Department of Environmental Quality. Goose Creek Association volunteers are trained according to procedures outlined in a DEQ approved Quality Assurance Project Plan (QAPP), which was designed with the direction of DEQ and VA Save our Streams and sets standards for data collection that assure the data are comparable to data collected by universities and government agencies.

Grades were calculated using the Mid-Atlantic Tributary Assessment Coalition's "Sampling and data analysis protocols for Mid-Atlantic non-tidal tributary indicators."

If you are interested in helping collect valuable water quality data, contact Andrea Rosse at the Goose Creek Association at 540-687-3073 or andrea@goosecreek.org for details.

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VIRGINIA BAY-2K FRIEND OF THE CHESAPEAKE

Alliance for the Chesapeake Bay

GOOSE CREEK ASSOCIATION

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