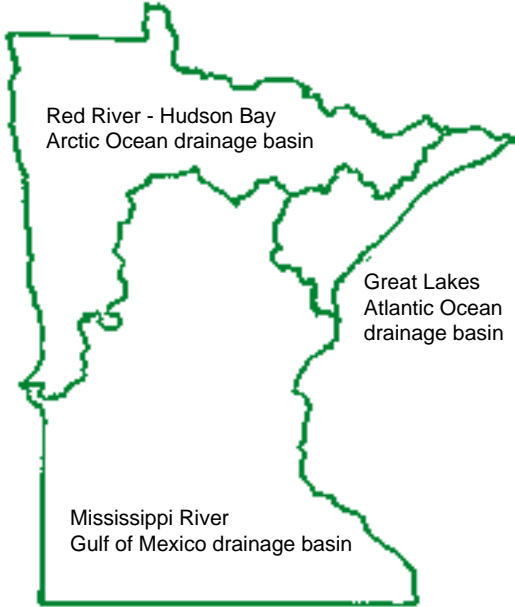


1. How to Protect Water Quality

What Is Your Watershed?

Continental Divides



Minnesotans love water. Indeed, "Minnesota" itself means "land of sky-blue waters" in the Dakota language. For thousands of years, people fished, swam, and boated on its lakes and rivers. We depend on water for drinking, agriculture, and industry. Minnesotans must protect

this resource to ensure that they and their children continue to enjoy its benefits.

Because water does not follow political boundaries, it makes sense to manage natural resources on a watershed basis. (A watershed is the entire land area that drains to a specific waterbody.) Pollutants on the ground *anywhere* in a watershed can wash into lakes and stream with the next rain. In cities and towns, storm sewer pipes carry polluted water *untreated* directly to the nearest lake or river.

Every Minnesotan lives in one of three major watersheds. (See map above.) Everyone lives also in a smaller, local watershed, perhaps as big as hundreds of square miles or as small as a few acres.

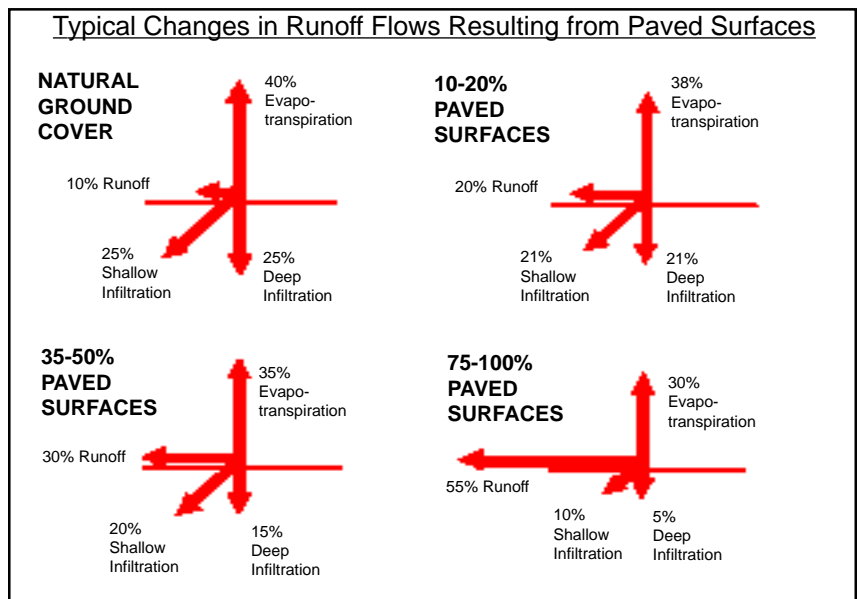
How to identify *your* local watershed?:

- 1) Look at the map on the back of this guide to see if you are in a listed watershed district.
- 2) Ask the agencies listed inside back cover.
- 3) Ask your city public works department, listed in the phone book blue pages.
- 4) Study U.S. Geological Survey topographical maps. (See Minnesota Geological Survey, inside back cover.) "Give Water a Hand," tells step-by-step how to map your watershed using topographical maps. (See inside front cover.)

Note: The Department of Natural Resources has aerial photos of most Minnesota counties: (218) 327-4449 or www.gis.umnedu/fornet/

How Development Affects Water Quality

When an undeveloped area changes to support urban land uses, drastic changes in local hydrology (water flow patterns) result. Roads, buildings, and parking lots prevent rainfall from infiltrating or soaking into the soil. Runoff increases. (See diagrams this page and next.) As runoff rates peak higher and more quickly than



Typical Percentage of Impervious Cover

Land Use	Impervious Cover
Business District or Shopping Center	95-100%
Residential, High Density	45-60%
Residential, Medium Density	35-45%
Residential, Low Density	20-40%
Open Areas	0-10%

"Impervious Cover" means streets, parking lots, roofs, etc.

before, flooding reshapes stream channels and runoff carries more pollution. Between rains, less water percolates through the soil, causing lower stream flows, and drying up aquatic habitats.

Types of Nonpoint Source Pollution

Hear the word, "pollution," and many people imagine smelly gunk pouring from pipes at factories. Yet the Clean Water Act and other measures have cut such sources of pollution dramatically over the last 30 years. Today the greatest threats to water quality are pollutants from lawns, farms, hazardous wastes, animals, driveways and parking lots, as well as trash. The good news is that the solution to this type of pollution is in our hands!

- Sediment** - Sources: erosion, construction sites, bare earth.
 Tiny soil particles fill in streams and lakes, smother habitat, reduce light penetration in water, and raise costs for treating drinking water. Sediments also transport other pollutants.
- Nutrients** - Sources: Lawn clippings, leaves, improper or excessive use of fertilizers, and animal wastes.
 Phosphorus and nitrogen can feed algal blooms and excessive aquatic plant growth in lakes. As microorganisms eat excess organic matter, they use up dissolved oxygen also, which can kill aquatic life.
- Bacteria** - Sources: Animal wastes, improper sewage disposal, and faulty septic systems.
 High coliform bacteria counts often indicate the presence of other pathogens (germs) harmful to human health as well as to aquatic life.

Toxins:

- Toxic Chemicals** - Sources: Improper use or disposal of toxic products, including spills and illegal dumping.
 Solvents, pesticides, paints and stains, and other toxic products in the water can kill aquatic life.
- Trace Metals** - Sources: Galvanizing, chrome plating, fallout from auto emissions, wear of automobile parts, and other metals sources.
 Lead, mercury, zinc, and copper, as well as chromium, cadmium, and nickel are toxic to aquatic life, especially when they accumulate over time in sediments.
- Hydrocarbons** - Sources: Oil or gasoline spills, leaky crankcases, and improper disposal.
 Oily rainbow-colored slicks are toxic to aquatic life even in small amounts. Soil quickly absorbs oil and gas.
- Chloride** - Sources: Improper storage of de-icing salts.
 Chloride is extremely soluble in water. Still, normal application of road salts for de-icing should not cause chloride levels toxic to freshwater organisms.

Water management agencies can say which pollution sources are most important in your watershed.

How Development Affects The Peak of Runoff Flow

