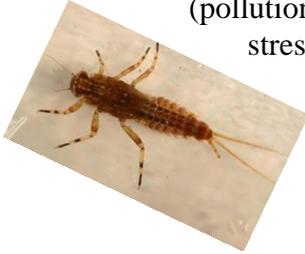


## Urban Impacts on River Water Quality

Protecting water quality to support a healthy balance in the river means more than protecting a good fishing spot. The stream health is impacted by both chemical (pollution, for example) and physical (flow or channelization, for example) stressors. Some organisms, whether insects or fish, are more tolerant of stressors and can indicate whether there may be water quality or habitat impacts in a stream. Human activities and impacts increase as streams flow through urban areas.



Nonpoint source pollution comes from many diffuse sources, unlike point source pollution from industrial activities and sewage treatment plants, Nonpoint source pollution is caused by rainfall, snowmelt or flow from irrigation moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, and even underground sources of drinking water. These pollutants may be:

- Excess fertilizers and pesticides from agricultural lands;
- Excess fertilizer from lawns; pet wastes, litter; and debris;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Oil and grease from automobiles; sand, salt and chemicals applied to roadways for winter conditions;
- Sediment from unprotected construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.

Stormwater runoff increases as the land area is covered with buildings and impervious surfaces, carrying pollution from streets to the river. At this time stormwater is not treated beyond limited settling but efforts are focused on control and minimization of the pollution sources. Point sources are regulated in Colorado by the Colorado Department of Public Health and Environment.



Wastewater plants are built to treat the domestic waste but as growth occurs the potential to increase stream concentration of ammonia (which can be toxic to fish), nutrients (nitrogen and phosphorus), and pathogens (disease causing bacteria and viruses) increases. Each wastewater treatment plant has limits in their permit that are based on the existing water quality of the river, the river flow, the dischargers flow and the water quality standard. Also we

recently have been learning about the potential of low concentrations of pharmaceuticals in treated wastewater from hormones and medications.

Agricultural practices are a common source of water quality concerns; fertilizers used to enhance plant growth, pesticides to control insects, herbicides to control undesirable weeds, and fungicides to control plant diseases. Each of these can potentially contaminate the river if carried to the river by stormwater, irrigation runoff, or groundwater.



In some areas of Colorado the soils naturally contain materials that can exceed water quality standards. The critical question is whether natural sources constitute a problem. The Pierre Shale located in the Pueblo area has high levels of selenium and sulfate that can be carried by the groundwater to the river and cause the river to exceed the water quality standards. Sandy stream bottoms

readily pick up sediment that can be carried in the stream, especially in storm events as seen in Fountain Creek.

Understanding how these factors influence biological communities is essential in developing effective management strategies aimed at protecting stream health.

The State of Colorado establishes water quality standards to protect the beneficial uses, including aquatic life, recreation, agriculture and drinking water.



Aquatic standards vary based on whether the stream is classified as warm or cold water and the aquatic life that is present. For instance, cold water fisheries (game fish including trout) in the upper elevations of Colorado support different fish and insects than the warm plains streams found in the lower elevations of Colorado (minnows).

Drinking water quality standards are required if there are drinking water uses in the segment.

Recreation water quality standards are based on the potential of recreation uses in the stream segment. Various types of recreation have different standards to protect for the level of contact.

Agricultural water quality standards are based on requirements for crop production and soil protection.

