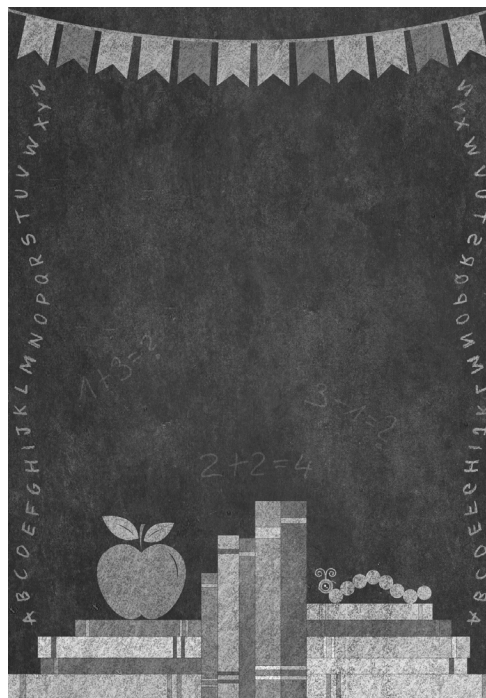




Stormwater Educational Resources



2023

E and S Consulting, LLC
Elizabeth Sagmiller
sagmillere@gmail.com

Contents

Purpose

Mercury

Pollutant Overview and BMPs

Temperature

Pollutant Overview and BMPs

Bacteria

Pollutant Overview and BMPs

Facebook/Social Media Posts

Internet Resources

Mercury education materials

Bacteria education materials

Temperature education materials

General Environmental education materials

Purpose

The purpose and intent of the material in this guide is to provide educational resources to the City in regard to water quality and stormwater. The parameters are limited to those associated with the 2006 Willamette Basin TMDL as it is the driver for current TMDL implementation for direct dischargers, but also for indirect dischargers in other basins. While material is directed toward Mercury, temperature, and bacteria this information provides sound practices that address a much larger pool of pollutants.

The materials in this guide will need to be edited to include specific names and contact information. You should also add the name of your city

A pollutant overview page is included for each of the 3 parameters. This is basic information that you will need to know to communicate in a useful manner with the public. There is significantly more scientific data available, but much of that information will not be suitable for majority of your audiences.

Each message includes the target audience as well as the pollutant of concern so you can track who you are educating. This is important as you move forward in your program and look at what efforts are worth keeping and what might need to be changed. Remember that you must assess your efforts annually. Build on what activities and products get the most positive feedback.

Tone

Maintaining a suitable tone throughout your message can be difficult. In general, you are asking citizens to change the way they do business, and you want them to make those changes willingly. Make an effort to teach your audience in an interesting way. No one is going to change behavior if they don't understand the issue, or if what you're sharing isn't interesting enough to read. For example, if your message is to pick up after your pet, you need to make this practice something that the resident feels they should do. Temper pick-up messages by promoting keeping your dog healthy, or reminding people that picking up pet waste is displaying good manners. No one wants to bring attention to themselves by behaving in a socially unacceptable manner. Consider promotional doggie bags for special events.

Education Level

When developing educational messages, make certain that you don't talk above the understanding level of your audience. This material is scientific in nature and doesn't come easily to everyone. A good rule of thumb is to gear your message to a 8th grade level. Creativity is often needed to make difficult topics user-friendly without losing quality in your message.

When speaking directly to residents, you may have to adjust on the fly if your message isn't being absorbed.

Material Review

Always get a second (or third) set of eyes on your material. Be open to feedback.

MERCURY

Mercury is a naturally occurring toxic heavy metal that was traditionally used in manufacturing and processing. Mercury is a dangerous substance and when ingested can be retained in fat tissue. When mercury gets into water, naturally-occurring bacteria turn it into a toxin called methylmercury. This toxin is especially hazardous because when an animal ingests it, the mercury is absorbed into the body tissue. If that animal gets eaten, the predator will then absorb that same mercury into its tissues. In this way, mercury will accumulate up the food chain so that large, predatory fish contain much more mercury than their smaller prey.

When people eat too much fish with high levels of mercury, it can damage our brains, hearts, and kidneys. This is especially true for children whose bodies are still growing. Symptoms of mercury poisoning include lack of coordination, vision changes and difficulty speaking.

Mercury binds to soil particles and is carried to waterways through erosion. Keeping disturbed soil on the project site keeps mercury moving into local streams.

For the most current information about fish consumption, contact the Oregon Dept of Health, Fish Consumption Advisory

BMPs and programs that are important to mercury reduction include the following list. These items can be used in your outreach efforts.

Erosion and sediment control program – A strong erosion control program which includes a solid inspection component is crucial to erosion control.

Required planting plans – Your organization should require planting plans for soil disturbance with established criteria. For example, if a customer is going to remove streamside blackberries you need to check for project timing (the time of year), what plants and sizes are to be used for replanting (native plants suitable for the site), and maintenance (staking, irrigation, etc)

Retention of native vegetation – Development sites should always retain and protect native vegetation. Code should be developed for protection of native species.

Good housekeeping practices – Lead by example! Make certain that catchbasins are covered when doing work in the street for example. Also, adopt measures that require contractors to operate by water quality minded rules.

BACTERIA

The sources of bacteria in stormwater and waterways come primarily from water fowl and rodents based on the particular community however, dogs are the easy target. While it's important that people know the sources of bacteria, developing cheerful messages about rats may not get the best response from your audience. Bacteria is a human health issue and does not meet the recreational water use standard in the Willamette Basin. It is important to educate your public regarding your wastewater treatment system so they are aware that treated wastewater does not lead to elevated bacteria levels in waterways in most cases.

Consider the following when addressing sources of bacteria.

Water fowl and rodents –

If your City has locations where people feed water fowl, encourage them not to do so. Water quality may improve where there are fewer large congregations of ducks and geese, and feeding wildlife is never a good idea. Frowning on feeding ducks is not a popular message, but making wildlife healthier balances the message

Pet waste –

Installing, stocking, and maintaining pet waste stations is a BMP basic and should be a part of your program. Look to expand the message by looking beyond removing waste in public areas and focus on backyards. Emphasize that pet waste is not fertilizer.

Leaking septic systems –

The use of septic systems varies from community to community and although this is likely not a significant source of bacteria, providing educational material to septic system owners will be viewed on a positive note by DEQ.

Inflow and Infiltration (I & I) or cross-connections –

Depending on your system and how it has been inspected and maintained I & I can be a significant source of bacteria. Addressing this potential source is something that can be added to your program when it's a bit more mature.

TEMPERATURE

Elevated water temperature in local waterways is due primarily to lack of adequate streamside shading. Depending on the waterway, elevated temperatures can be hazardous or fatal for cold water fish such as salmon and trout. Water above established parameters can hamper the survival of juvenile salmon, prevent natural fish migration and much more.

Tree lined riparian corridors are a thing of the past in most communities. Development has not been prevented along waterways and many cities do not have tree protection ordinances in place. Trees shade water which blocks incoming solar radiation. The larger the surface area of the waterbody, the more heat can be absorbed by the water. It's important to note that shade does not cool the water, but foliage block the incoming radiation.

In large bodies of water such as the Willamette River, streamside shading does little to help cool the water. In these cases we refer to the smaller streams in the watershed. The health of clean, cool streams that discharge to the main stem of the stream play a crucial role in keeping the larger waterbody healthy.

Temperature is not a stormwater pollutant as it isn't washed directly or indirectly into receiving waters. However, urbanization has resulted in cities that have acres of impervious surface that does absorb solar heat. It is reasonable to assume that direct runoff is warmer as is the stormwater from point sources. Large areas of impervious surface are sometimes referred to as urban heat islands.

BMPs and program elements for temperature include the following:

Develop a tree protection ordinance –

Develop adequate setbacks to waterways and wetlands –

Start a free tree program –

Keep invasive and native plant lists available for the community –

Develop and enforce a robust erosion and sediment control program –

ONLINE RESOURCES

EPA

[Learning Adventures at Home or at School \(epa.gov\)](#) This site has basic education information as well as some materials to purchase.

[May is American Wetlands Month | US EPA](#) Educational material about wetlands and ways to celebrate wetlands month. Wetlands filter pollutants this would apply to mercury.

[Stormwater Smart Outreach Tools | US EPA](#)

[Stormwater Best Management Practice, Educating the Community about Green Infrastructure \(epa.gov\)](#) Educating the public on Green Infrastructure

[Water Topics | US EPA](#)

USGS

[Interactive Water Cycle Diagram for Kids \(Advanced\) \(usgs.gov\)](#) Water Cycle poster for kids. This is actually suitable for a variety of audiences. Understanding of the water cycle is essential for understanding post-construction

<https://www.usgs.gov/mission-areas/water-resources/science/education> There are a lot of really good educational resources in the USGS Science School material.

[Rainfall calculator \(English units\)
How much water falls during a storm? USGS Water Science School](#) This is an excellent resources for all audiences to help demonstrate why stormwater needs to be managed properly

BACTERIA

[How to Care for Your Septic System | US EPA](#)

[Be Septic Smart \(oregon.gov\)](#) Brochures

[Stormwater Best Management Practice, Pet Waste Management \(epa.gov\)](#)

TEMPERATURE

[Native Plants - Marion SWCD](#) Marion County native plant resources

[Native Plants - POLK SOIL AND WATER CONSERVATION DISTRICT \(polkswcd.com\)](#) Polk County native plant resources

MERCURY

[Department of Environmental Quality : 1200 Series Construction Stormwater Permits - General Use : Water Quality Permits : State of Oregon](#) 1200-C forms and information resources

FACEBOOK POST EXAMPLES

(target audiences: general public, business owners – addresses mercury, and other pollutants)

Do you have hazardous waste in or around your home or business?

The answer is probably yes. Many of us store household/cleaning chemicals, landscaping products, leftover paint, and many other materials in our homes or the places we work. When these products are disposed of or stored improperly they can contaminate our local waterways. Remember that stormwater is not treated and flows directly to waterways untreated! Follow these simple rules:

Store safely

Apply according to label directions

Dispose of properly

For more information contact [insert garbage hauler website link] for product disposal information



(Target audiences: general public, business owners, landscapers, developers/builders, students – addresses mercury and bacteria)

What happens to rain and other water on the street?

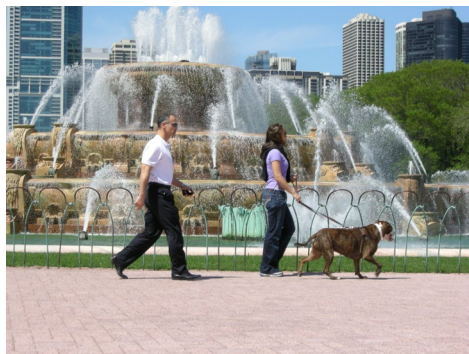


Water that falls on the street in the form of rain or water from your sprinkler or hose, enters catch basins on the street and is transported through pipes where it is discharged to a local stream.. Never dump chemicals, soil, litter, oil, or any contaminant on a hard surface where it can be washed to the street. Water or contaminants that enter the stormwater system are not treated. Help keep your local streams clean and wildlife healthy.

NOTHING IN THE DRAIN BUT RAIN !!

(Target Audiences: general public, school children – bacteria)

April is National Pet Fitness Month!



Grab the leash and get outside with your best buddy. The fresh air will do you both some good. Before you leave the house make sure you have the essentials: walking shoes, water, a hat, and most importantly **PET WASTE BAGS**. Be a good neighbor and always pick up after your pet; even in the backyard. Without proper disposal, pet waste can make its way to local waterways which means unhealthy streams to swim and wade in. Do your part, and have a good walk!

Use National 'days or months' to create quick, pollutant specific messages

This is a quick way to generate material for facebook or other social media. Here's a few to get you started:

World Bicycle Day – June 3

World Environment Day – June 5

National Mutt Day – July 31 and December 2

National Parks Service Founders Day – August 25

A quick Google Search will help you generate lots of ideas!

June 1st is NATIONAL GO BAREFOOT DAY

Do you have a yard that's safe to bare your toesies in? Here are some tips to keep your outdoor space safe and healthy for those bare feet and our waterways too:



- Use environmentally friendly chemicals on your lawn and never over-apply. Follow label directions. Chemicals aren't good for you OR the critters that live in your yard.
- Plant beds and border areas with native plants
- Limit hardscape – turn the walkway into a path of pea gravel or stepping stones so rainwater can soak into the ground.
- Never ever stockpile landscaping material or soil in the street. These products can be washed into storm drains!

[\[For more information\]](#)

OUTREACH MATERIALS

(Target audience, builders, developers)

For the website:

Managing Soil Runoff

Contractors working in the City of [insert City] are responsible for controlling erosion and sediment onsite to prevent sediment pollution in local streams and waterways. Construction, building, and landscaping activities can lead to erosion. Erosion should be mitigated and where impractical eroded sediment and soil must be managed and contained. Construction or development activities that disturb soil can be harmful to water quality. Sediment pollution can lead to water conditions that are unsafe for swimming and fishing, localized flooding, harm to wildlife, and other issues that negatively affect our community's health and quality of life.

It is the responsibility of residents and those working within [City] to properly install and maintain erosion and sediment control devices that will prevent pollutants from leaving the site. In addition to a fine, sites with failing or missing erosion and sediment control mechanisms can negatively impact our community. For more information contact: [Insert Name and Phone]

If your project disturbs 1 acre or more of land, you are required to obtain a 1200-C permit from the Oregon Department of Environmental Quality. [Department of Environmental Quality : 1200 Series Construction Stormwater Permits - General Use : Water Quality Permits : State of Oregon](#)



(Target audience, builders, developers, homeowners)

Mercury in Local Waterways



What is mercury?

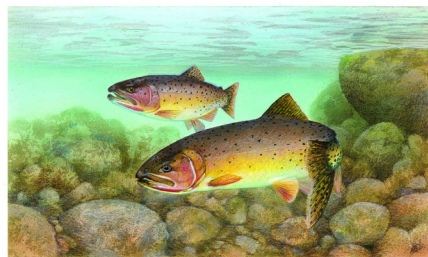
Mercury is a heavy metal commonly found in items such as thermostats, thermometers, fluorescent lights, some cosmetics, certain car parts, batteries and more. Mercury has been used for industrial processing, mining, treatment of hides, and even for medical purposes. For a more complete list see [Mercury in Consumer Products | US EPA](#) Mercury doesn't break down; it lasts for centuries in the environment.

Why is mercury toxic?

A process called Methylation, changes inorganic mercury to organic mercury (methylmercury). Most mercury is atmospherically deposited through the air as inorganic mercury. This inorganic mercury can interact with other compounds by movement through the atmosphere and become methylmercury through a complicated chemical process. Methylmercury can bind with soil which is carried to streams through erosion. Organisms such as algae ingest mercury and in turn are consumed by fish. The heavy metal is then consumed by species higher on the food chain, including humans. Methylmercury is the most common organic mercury compound found in the environment, and is highly toxic. This substance is retained in fat and muscle tissue of fish, shellfish, humans, and other organisms.

The Oregon Health Authority maintains fish consumption advisories. In general, healthy adults should eat no more than 4 meals of native fish per month.

[Oregon Health Authority : Advisories and Guidelines : Fish and Shellfish Consumption : State of Oregon](#)



What can you do?

Check your local recycling providers for information on recycling products that contain mercury.

Home improvement projects such as gardening, landscaping, and construction may all disturb soil. Make certain no loose soil or mud reaches sidewalks or streets where it can be washed into the stormwater system.

For more information call: [insert name and phone]

(Target audience, all audiences)

For the website or flyer

The Mercury Story

Many people know not much more about mercury than it's what we see in a thermometer. However, historically, mercury has been used to purify gold, make paint, and treat felt. The phrase 'mad as a hatter' came about because hat makers used to show signs of dementia from the pelts used to make hats.

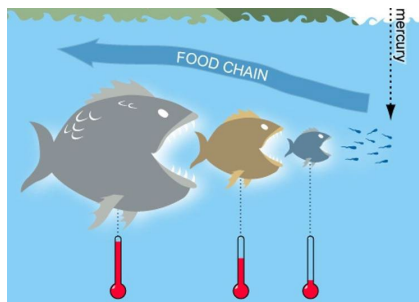
Today people are more aware that mercury is toxic, which has led to regulations about its use. In the United States, mercury is still used in some thermostats, thermometers, laptop screen shutoff switches, pressure switches, old doorbells, and fluorescent lightbulbs. The amount of mercury in these items is small, but it is important to know how to properly dispose of them and cleanup spills if they should occur.

When it comes time to dispose of mercury-containing items, [Yamhill or Polk County residents can take these items to.....] Fluorescent tubes can also be taken to Lowes or Home Depot. If you accidentally break something that contains less than 3 tablespoons of mercury, follow the [DEQ's guidelines](#) for cleanup. If you spill more than that, do not try to clean it up by yourself. Call the Oregon Response System at 1-800-452-0311 or 503-378-6377.

If mercury-containing items are not properly disposed of, the mercury can find its way into our waterways. When mercury gets into water, naturally-occurring bacteria turn it into a toxin called methylmercury. This toxin is especially hazardous because when an animal ingests it, the mercury is absorbed into the body tissue. If that animal gets eaten, the predator will then absorb that same mercury into its tissues. In this way, mercury will accumulate up the food chain so that large, predatory fish contain much more mercury than their smaller prey.

When people eat too much fish with high levels of mercury, it can damage our brains, hearts, and kidneys. This is especially true for children whose bodies are still growing. Symptoms of mercury poisoning include lack of coordination, vision changes and difficulty speaking.

If you accidentally break something that contains less than 3 tablespoons of mercury, follow the [DEQ's guidelines](#) for cleanup. If you spill more than that, do not try to clean it up by yourself. Call the Oregon Response System at 1-800-452-0311 or 503-378-6377.



(target audience; residents, homeowners, businesses)

Flyer or website

How Can I Reduce Stormwater Runoff?

1. Decrease your hard surface footprint.

Impervious surface such as sidewalks, concrete patios, streets, and driveways all prevent water from infiltrating into the soil. These surfaces mean more runoff to the stormwater system and local waterways. Consider making changes like using pervious concrete, pavers, or pea gravel for walkways. Plant a raingarden to capture the water from your roof or other impervious surface. Facilities like raingardens can also treat stormwater through the use of plants and specific soil medium.



2. Support the use of Green Infrastructure.

Most communities in Oregon are using elements of green infrastructure as part of their stormwater systems. Green infrastructure can include facilities like rain gardens, bioswales, vegetated stormwater facilities or even permeable pavement. Green infrastructure can also refer to natural systems such as wetlands, forests, meadows, and other undeveloped area. Whether natural or human-made, these features help address flooding issues, cleans stormwater, have a longer 'life' than traditional storm systems, and can cost less to maintain if designed properly.



Resources

[The Oregon Rain Garden Guide | Oregon Sea Grant | Oregon State University](#)
[Residential Rain Gardens | Portland.gov](#)
[Rain-Gardens-Fact-Sheet \(eugene-or.gov\)](#)

For More Information [insert City and contact information]

(Bacteria – residents)

SEPTIC SYSTEM MAINTENANCE

Septic system maintenance is not complicated, and it doesn't need to be expensive. Upkeep comes down to four key elements:

- [Inspect and Pump Frequently](#)
- [Use Water Efficiently](#)
- [Properly Dispose of Waste](#)
- [Maintain Your Drainfield](#)



Protect Drinking Water

Septic systems that are not working properly can contaminate groundwater sources. More than 70% of all Oregonians are at least partially dependent on groundwater for their drinking water supplies!

Protect Environment

Septic systems that are not working properly can contaminate surface waters, which disrupts natural systems and impairs aquatic and riparian life.

For More Information:

[Be Septic Smart \(oregon.gov\)](http://oregon.gov)

[How to Care for Your Septic System | US EPA](#)

Water Quality Minded Solutions to Common Problems

The City of **[insert City]** is working hard to protect and improve water quality in our local waterways, but residents, businesses, students, and other groups need to do their part too.

You'll find some simple solutions to common problems listed below.



Do your Part to Keep Streams Clean

Common Sources of Water Contamination	Easy Solutions	More Information And Resources
Pet Waste creates nutrient and bacteria pollution.	Pick up and properly dispose of pet waste. Bags go in the trash.	Pet waste bags are widely available online, WalMart, Target, your local pet supply store.
Car Products , such as fuel, oils, and lubricants, harm water quality and ecosystems.	Recycle car oil through the [insert local info] You should keep your car well maintained to quickly identify leaks.	Republic Service has an excellent website to help you with your recycling needs Resource Center Republic Services [insert your local hauler and recycling information]
Car Washing can contribute soap, dirt, oil and grease directly to streams via the storm system when you wash your car in your driveway or street.	Wash cars at a commercial car wash; oil, gas, and grease are all separated and washwater goes to the wastewater treatment plant.	Wash your car on the lawn or on a gravel area. If you must wash your car in the driveway, divert rinse water to vegetated areas.

Common Sources of Water Contamination	Easy Solutions	More Information And Resources
<p>Soil Particles, disturbed through construction or removal of plants, gets washed into storm drains and waterways and harm aquatic habitats and fish.</p>	<p>Cover any exposed soils. Replant with native species</p> <p>Keep soil and landscaping material out of the street</p>	<p>[insert link to erosion control brochure]</p>
<p>Household Products, such as batteries, cleaners, and paints, contain heavy metals that are toxic to aquatic life and the entire food web.</p>	<p>Properly dispose of hazardous household products by calling [insert hauler and recycling info]</p>	<p>For a printable pdf. on Salmon Safe Household recipes, click here</p>
<p>Excess Fertilizers put excess nutrients into waterways, causing algal blooms and low-oxygen conditions in the water, which can kill plants and fish.</p>	<p>Test soils before applying fertilizer and apply only as needed using slow release fertilizers.</p> <p>Always follow label directions. More is not better.</p>	<p>For some great native plants and garden care resources, click below:</p> <ul style="list-style-type: none"> • DEQ Healthy Lawns.pdf • Native Plant Gardening OSU Extension Service (oregonstate.edu)
<p>Pesticides and Herbicides accumulate in waterways and are toxic to human and aquatic life. Natural alternatives can be very effective and safer for children, pets, and water.</p>	<p>Learn about natural alternatives to chemical pesticides and herbicides.</p> <p>Plant native vegetation, which requires less water and fewer chemicals.</p>	<p>Click below for additional resources:</p> <ul style="list-style-type: none"> • A Guide to Eco-Friendly Lawn Helpers - Consumer Reports • 17 Eco-Friendly Landscaping Ideas For Your Garden - Conserve Energy Future (conserve-energy-future.com)
<p>Pharmaceuticals washed down home or street drains end up in our drinking water.</p>	<p>Dispose of unused or expired prescriptions in the trash, <u>NOT</u> the sink, toilet, or storm drain.</p>	

(Target audience residents, homeowners, all)

WHAT CAN I DO TO HELP REDUCE TEMPERATURE IN LOCAL STREAMS



Did you ever notice that the vegetation along waterways often includes tall trees, smaller shrubs, and sometimes grasses or vines? These plants all play an important role in providing a healthy habitat for wildlife and everything that lives there – even us.

Tall trees are especially important to stream health for a number of reasons such as bank stabilization, large woody debris for fish, and more. But trees also play a major role in blocking incoming solar radiation from warming the water in our waterways. Trout and Salmon are more sensitive to warm water than some other fish. While some adult fish may be more able to withstand increasing water temperature, for spawning and hatching of eggs, much lower temperatures are required. Many species spawn only above or below certain temperatures.

What can you do to help?

- Contact your local watershed council and volunteer for a restoration project;
- Plant a tree and care for it properly. Whether near a stream or far away, trees do a remarkable job of removing pollutants from the air and soil. They also cool the environment in general;
- Explore the use of native plants in your yard or in a neighbors yard;
- Support green infrastructure projects in your community such as rain gardens or vegetated swales.
- Build your own rain garden;
- Educate yourself and spread the word. Green is good!