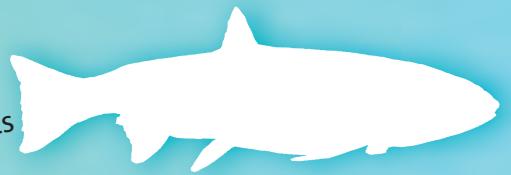


Learn what stream bugs tell us about water quality and how pollutants biomagnify in food chains

CLEAN RIVERS EDUCATION PROGRAMS

Offers free classroom and field trips for all portland students



Clean Rivers Education Programs

Environmental Services offers free, classroom and field study science education programs for K – college students within the City of Portland. Students learn about watershed health, urban ecology, the causes and effects of water pollution and what they can do to protect rivers and streams.

Clean Rivers Education programs address local water quality, environmental design and habitat issues. The program offers hands-on classroom lessons designed to complement teachers' curricula. Classroom programs often serve as a prelude or follow-up to a field trip.

During field experiences, students spend time outdoors observing, interpreting, exploring and connecting to local natural areas. Students apply the skills they learn through watershed investigations and stewardship/community action projects. Clean Rivers Educators work with teachers to develop a unit of study to best meet learning objectives.

**To schedule a program or learn more
about education programs and resources,
please contact:**

Megan Hanson, Clean Rivers Educator

megan.hanson@portlandoregon.gov

503-823-7185

www.portlandoregon.gov/bes/education



classroom Lessons	2
field trips	8
resources	11

classroom Lessons

60-90 minutes depending on lesson and age group

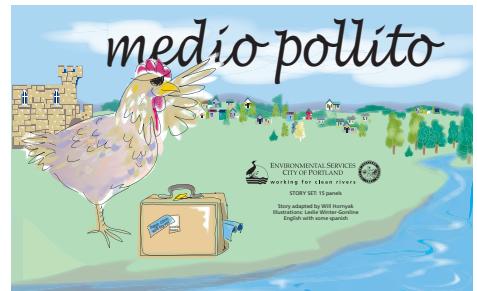
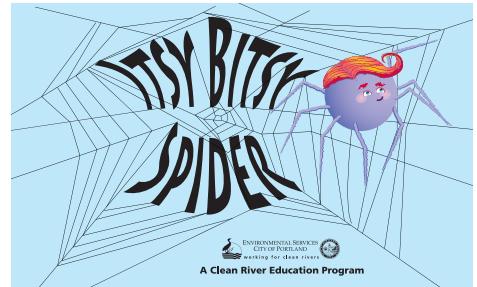
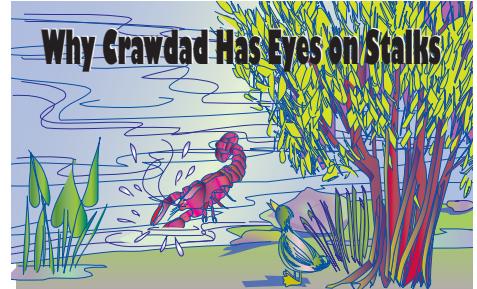
Environmental Storytelling

Grades K - 3

Educators use a Japanese storytelling box to tell students an illustrated story about water. After the story, students draw pictures about what they learned and present their artwork to the class.

Choose from four stories:

- *Why Crawdad Has Eyes on Stalks* (trees/plant identification, floods),
- *Itsy Bitsy Spider and the Macroinvertebrate Café* (watersheds, stormwater pollution, water quality indicators),
- *Medio Pollito* (water quality, stewardship)
- *Land of Bog* (function/value of wetlands).



Riparian Habitats

Grades 1 - 3

Learn about the five elements of a habitat that all animals need to survive: food, water, shelter, space, and oxygen. Play a Habitat Bingo game to learn about Pacific Northwest animals that live in and near rivers and streams. Explore pelts and skulls of local animals. A great introduction before a watershed investigation field trip.

Water Cycle

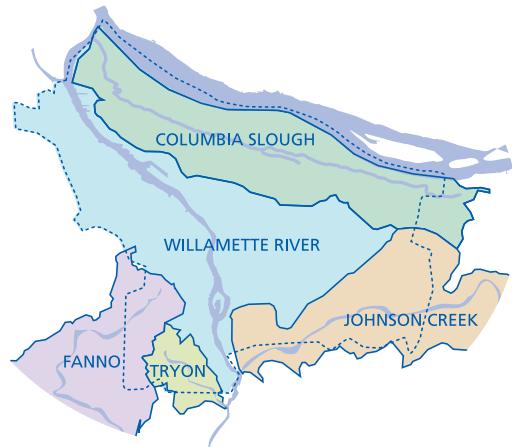
Grades 2 - 5

Follow the path of a water molecule in Project Wet's Incredible Journey lesson. Students track their journey and create a visual map with pipe cleaners and beads. An optional writing extension is available.

Watershed Awareness

Grades 2 - 5

A watershed is an area of land that drains into a specific body of water, like a stream, river or slough. Analyze current and historical maps to identify changes in local watersheds. Using an EnviroScape® watershed model, demonstrate stormwater pollution impacts and brainstorm better pollution solution practices.



Riparian Plants

Grades 3 - 9

A riparian zone is the land next to a water body. Learn the value of native plants in enhancing water quality and wildlife habitat, and the negative effects of invasive plants in a riparian zone. Learn basic botany terminology and gain beginning plant identification skills. Recommended for groups doing restoration or school naturescape projects.

Water Chemistry Lab

Grades 4 - 12

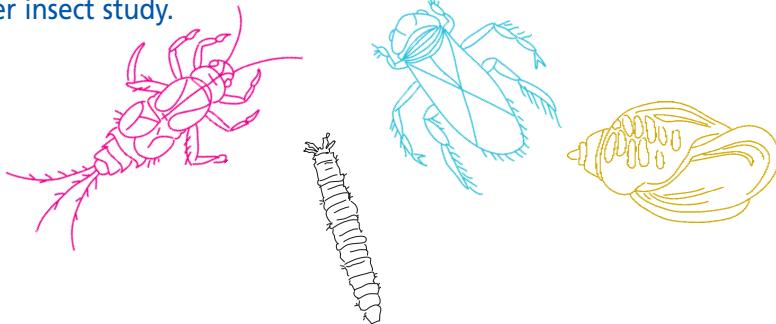
Practice using the scientific method while measuring the health of a water body. Students observe, create hypotheses and interpret data as they measure water quality parameters such as temperature, dissolved oxygen, pH, and turbidity. Recommended as a precursor to a watershed investigation field trip.

Aquatic Macroinvertebrates (Water Bugs)

*Grades 4 - 12**

Macroinvertebrates are excellent indicators of water quality. Explore life cycles, adaptations, and pollution tolerances of water bugs. Using images, field guides and preserved specimens, learn identification skills and create scientific drawings.

* Talk to a Clean Rivers Educator about adapting this lesson for 1st/2nd grade water insect study.



Salmon Survival

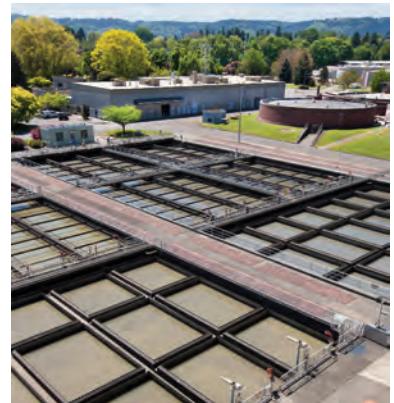
Grades 2 - 8

Learn about Portland's threatened coho, steelhead and Chinook salmon. Explore salmon life cycles with preserved specimens and learn salmon-specific vocabulary. An interactive board game packed with science content helps students explore the journey of salmon and threats to their survival.

After the Flush: The Wastewater Story

Grades 4 - 8

After the flush, it doesn't just go away. Create simulated wastewater and then clean it up following steps taken at Portland's Columbia Boulevard Wastewater Treatment Plant. Gain an appreciation for the city's sewer infrastructure that helps protect public health, water quality, and the environment. Students learn how they can help at home, like preventing fats, oils and grease from clogging sewer pipes. A follow-up field trip to the Columbia Boulevard Wastewater Treatment Plant is recommended for grades 5 and up.



It's an Overflow!

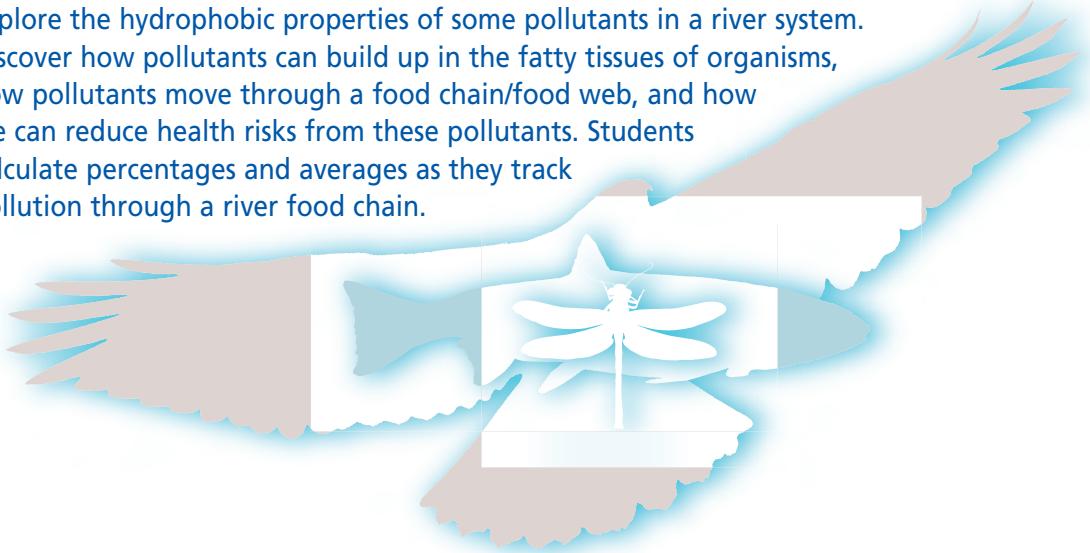
Grades 5 - 12 Time: 1 hour

Are combined sewers still overflowing into the Willamette River? Discover the sewer history of Portland and experience a combined sewer overflow (CSO) in the classroom. Learn about the City of Portland's 20-year program to control combined sewer overflows and the CSO project that was the largest capital project in Portland's history. Learn what the city will do in the future to protect rivers and streams. Interactive sewage and Portland history game activity woven into discussion.

Movin' On Up: Biomagnification and Bioaccumulation

Grades 5 - 12

Explore the hydrophobic properties of some pollutants in a river system. Discover how pollutants can build up in the fatty tissues of organisms, how pollutants move through a food chain/food web, and how we can reduce health risks from these pollutants. Students calculate percentages and averages as they track pollution through a river food chain.



Oil and Water Don't Mix: An Inquiry Lab

Grades 7-10

Learn how naturally-occurring microorganisms break down oil. Students create hypotheses then test the ability of microorganisms to break down oil in various oil spill scenarios. Learn how this information relates locally and nationally. (Note: plan for one week for the biodegradation process and enough space for Petri dishes to sit undisturbed. A Clean Rivers Educator helps introduce the lab and provides resources for teachers to conduct the final discussion.)

field trips

1.5 - 2.5 hours

Investigating Your Urban Stream, Pond or Wetland

Grades 1 - college

Apply concepts and new skills gained in the classroom to a field study. Join us at a local stream, pond or wetland to investigate water and the nearby habitat. Field study activities may include: testing water quality, sampling for aquatic macroinvertebrates (water bugs) as biological indicators, exploring wildlife, and identifying native and non-native plants. Activities depend on the season, site features, and curriculum emphasis. Monitoring activities, research, and scientific inquiry goals may be included. A 6:1 student/adult ratio, not including the Clean Rivers Educator, is recommended. Transportation fund assistance may be available upon request.

Our goal is to engage students in natural areas as close to their communities as possible. Talk to an educator about the best location for your field studies.

Examples:

Columbia Slough Watershed - Whitaker Ponds, Big Four Corners Natural Area, Columbia Boulevard Wastewater Treatment Plant Natural Area, Kelley Point Park

Fanno Creek Watershed - Gabriel Park, Woods Creek Park, April Hill Park

Johnson Creek Watershed - Tideman-Johnson Park, Johnson Creek Park, Brookside Wetlands, Schweitzer Greenspace, Zenger Wetlands, Crystal Springs Creek

Tryon Creek Watershed - Tryon Creek State Natural Area, Foley-Balmer Greenspace

Willamette River Watershed - Forest Park, Water Pollution Control Laboratory, Willamette Park, Oaks Bottom, Sellwood Riverfront Park.

Natural Area Restoration Projects

Grades 4 - 12 (Usually scheduled in late summer or early fall)

Consider a commitment to help restore a local natural area while also learning about field investigation techniques such as water quality testing, plant identification, wetlands, and wildlife study. Participate in stewardship activities such as invasive plant removal, planting, and maintenance. This is a special option involving partnerships with local agencies and organizations. Opportunities are limited. Plan for multiple field trips.

School Yard Science

Grades 3 - 12

Use your school's naturescape or stormwater facility as a science laboratory. Learn native plant identification, perform math calculations such as area and percent cover, investigate soils, and more. Activities depend on grade level and site characteristics.

Sustainable Stormwater Tours

Grades 5 - college

Visit bioswales, ecoroofs (pictured right), stormwater planters, green streets, rain gardens and creative downspout disconnections. Learn how these solutions allow stormwater to soak into the ground to reduce volume, while plants and soil filter pollutants and improve water quality. An educator will work with you to develop an itinerary based on your method of transportation and location.





Storm Drain Curb Marking: A Community Action Project

Grades 3 - adult (dry weather only)

Much of the stormwater in Portland goes directly into streams and rivers carrying oil, dirt, fertilizers, pesticides and other pollutants from our yards and streets. Installing permanent curb markers with the message "Dump No Waste" reminds people that storm drains are for rainwater only. A 4:1 student to adult ratio is required for traffic safety. Curb marker projects may be done independently by checking out equipment or with a Clean Rivers Educator. Dry weather is required before and after installation so the adhesive dries properly. Planning a rain date is helpful. Call 503-823-7185 for more information.

Wastewater Treatment Plant

Grades 6 - college

What happens "after the flush?" Visit the City of Portland's Columbia Boulevard Wastewater Treatment plant to find out where our wastewater goes. The thundering roar of wastewater and knowledgeable guides await you. Call 503-823-2400 or 503-823-2653 to schedule your tour.

resources for checkout

Watershed Model

The popular Enviroscape® Watershed Model is available for classrooms and special events. The model comes with an instructor's manual. The container is about 3 feet square with wheels. Call 503-823-5281 to check out.

Stormwater Obstacle Course

Grades 1 - 6

Students race against the clock to stop pollution before rain carries it down the drain in this highly active game. A gym or open space is needed. Great for special events or large groups. Extra volunteers are needed. Call 503-823-5281 to check out.

Science Inquiry Project Support

Talk to an educator about check-out equipment for science inquiry projects. Examples include water chemistry testing kits, soil porosity/permeability kit, and oil breakdown/bacteria lab. If needed, an educator can conduct the labs with you.



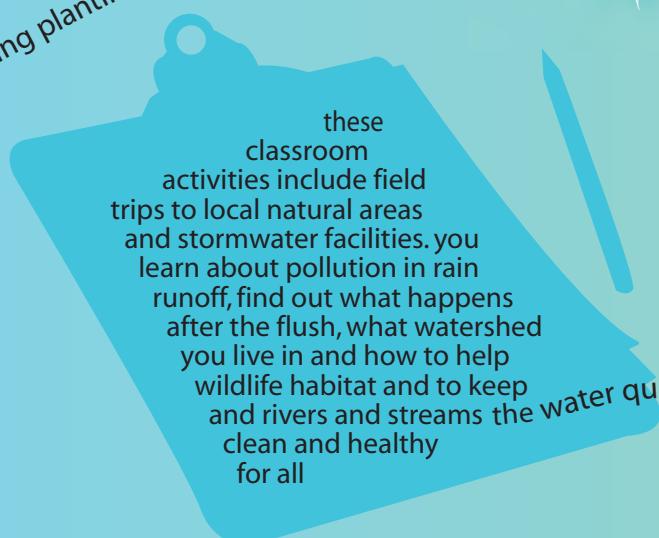
For more information, email Clean Rivers Education
megan.hanson@portlandoregon.gov
1120 SW Fifth Avenue, Room 1000, Portland, Oregon 97204

TDD 503-823-6868 FAX 503-823-6995
www.portlandoregon.gov/bes

gotta love those bugs



landscaping planting trees riparian restoration along river and streambanks
invasive plants removal
wetlands



these classroom activities include field trips to local natural areas and stormwater facilities. you learn about pollution in rain runoff, find out what happens after the flush, what watershed you live in and how to help wildlife habitat and to keep and rivers and streams the water quality for fish and the clean rivers education c
clean and healthy for all

water quality for fish and the clean rivers education c