

Stream Team News

FREE

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FALL EDITION
Sept–Oct–Nov 2018

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Nature *Enthusiasts* Wanted: Be a McLane Creek Steward!

..... New volunteer opportunity

Are you interested in the ecology and natural history of McLane Creek Nature Trail? Washington State Department of Natural Resources (DNR) and Native Plant Salvage (a WSU Extension program) is teaming up with Stream Team to offer a new training with volunteer opportunities!

McLane Creek Nature Trail is home to a wide variety of native plants and animals and is a popular location for spotting resident and migrating birds. Every fall wild chum salmon return for all to see as they swim upstream to spawn.

Since 2010, Stream Team and Native Plant Salvage have helped DNR with trail maintenance at the McLane Creek Nature Trail to ensure the preservation of native habitat and to maintain access for this popular walking trail.

We need your help! Volunteer crew leaders are needed to share local, ecological knowledge while assisting newcomers in trail maintenance (such as proper non-invasive pruning and weeding techniques). Throughout the year, Stream Team staff will provide multiple hands-on trainings for volunteer leads. You will learn the common amphibians, reptiles, macroinvertebrates, salmon, and birds who call McLane Creek home, as well as multi-season plant identification.

On-site training will be provided at our scheduled McLane Creek Nature Trail maintenance dates. See calendar for the dates. Or if you'd like to learn more about the program, contact Erica Guttman at Erica@nativeplantsalvage.org or visit www.nativeplantsalvage.org.



ON THE COVER: Deschutes River Falls, Chinook salmon. Photo by Michele Burton Photographer.

STREAM TEAM MISSION

To protect and enhance the water resources and associated habitats and wildlife in Thurston County through citizen action and education.

Stream Team is funded and jointly managed by the stormwater utilities of the Cities of Lacey, Olympia and Tumwater and Thurston County. Stream Team programs meet the requirements for the National Pollutant Discharge Elimination System (NPDES) permit for stormwater.

SPECIAL NEEDS?

Citizens requiring special accommodations can call one of the coordinators listed at least one week prior to an event to make special arrangements.

FIND US ON FACEBOOK:

 [ThurstonStreamTeam](https://www.facebook.com/ThurstonStreamTeam)

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Attn: Emily Watts

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TDD: 1-800-833-6388
ewatts@ci.lacey.wa.us

IN OLYMPIA:

City of Olympia Water Resources Program
P.O. Box 1967, Olympia, WA 98507-1967

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Thurston County Water Resources Program
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Get 'Chummy' with Chum Salmon Spawning in McLane Creek!

Imagine getting a birds' eye view of chum salmon while they are digging their nests and getting ready to spawn! That's exactly what you can do at the McLane Creek Nature Trail this fall.

The McLane Creek Nature Trail located off of Delphi Road, offers excellent viewing of wild chum in all their spawning splendor. With their dark, purplish-black tiger-like stripe, they are truly a sight to see as the females dig their nests and males vie for optimal spawning.

Thousands of people trek to the nature trail every year to see this annual spawning display. And every fall, Stream Team trains Salmon Steward volunteers to greet people at salmon viewing locations along the nature trail and answer questions they may have while watching the chum.

If you are interested in being a Salmon Steward at the McLane Creek Nature Trail, Stream Team will host a three-part training in late October and early November. (No prior experience is necessary!)

All volunteers will receive a Salmon Stewards binder and hat to keep, plus useful materials, handouts and a Salmon Stewards vest to use during the stewarding season.



..... The Chum Salmon Stewards training dates are:

Thursday	Nov. 1	6 – 8 p.m.	Part 1: Basic Salmon Classroom Session*
Saturday	Nov. 3	9 a.m. – Noon	Part 2: Field Training at McLane Creek Nature Trail
Monday	Nov. 5	6 – 8 p.m.	Part 3: South Sound Chum with WA Dept. of Fish & Wildlife & Squaxin Island Tribe

To register for the training go to www.streamteam.info and click on "Register". For more information, contact Ann Marie at pearcea@co.thurston.wa.us or 360-754-3355 ext. 6857.

Chum Salmon & Cider Celebration at McLane Creek

Help celebrate the return of the chum salmon to McLane Creek and enjoy free hot spiced cider and snacks. Salmon Stewards will be on hand to answer your questions about the wild chum salmon run at McLane Creek.

See the Salmon at McLane Creek this November!**

Can't make it on November 11th? No worries! Salmon Stewards will be at the McLane Creek Nature Trail on the weekends in November and Thursday and Friday of the Thanksgiving Day holiday. Look for Salmon Stewards between 10 a.m. and 2 p.m. on Saturdays, Sundays, Thanksgiving Day and the day after.

For more information about McLane Creek Nature Trail, including directions go to WA State Department of Natural Resources (DNR) website at <http://www.dnr.wa.gov/Capitol#mclane>.

CHUM SALMON & CIDER CELEBRATION AT MCLANE CREEK

- **Sunday, Nov. 11**
- **11:30 a.m. – 2 p.m.**
- **McLane Creek Nature Trail****

* The Basic Classroom Session is for Salmon Stewards who did not complete the Salmon Stewards Basic trainings held in late July through mid-August, or for anyone who would like a refresher on the salmon life cycle, the 4 H's and Salmon Docent skills.

** Note: The McLane Creek Nature Trail is part of the Capitol State Forest and is a WA State DNR Recreation Site. A Discover Pass parking pass is required when visiting state recreation lands managed by the WA State DNR and WA Department of Fish & Wildlife. For information about how to purchase a \$10 day pass or \$30 annual pass, visit www.discoverpass.wa.gov (Salmon Stewards are granted temporary parking passes.)

Salmon in a Changing Climate

by Aaron Dufault, Salmon Policy Analyst, Washington State Department of Fish and Wildlife

The anadromous life cycle of salmonids subject them to the impacts of climate change in spawning rivers, estuaries, and the ocean. For the five species of Pacific Northwest salmon, the time spent in any one of these habitats can vary greatly. For example, immediately upon emerging from the gravel, chum fry migrate down-river before transitioning into marine waters. The time spent in freshwater habitat by chum fry is in stark contrast to coho fry, who spend a year or more in freshwater before becoming smolts and out-migrating to the marine environment. Understanding the effects of climate change on salmonids requires consideration of life history differences and knowledge about the amount of time spent in the various habitats.



The primary climate drivers that will likely impact salmon include: temperature in the air, streams, and ocean; precipitation in high elevation areas, which will impact the snow pack and stream flow in spawning rivers; and oceanographic factors such as increased acidification and changes to the frequency and intensity of ocean upwelling. Perhaps the best way to describe how climate drivers will impact salmon is to follow a salmon on its life history journey from a fertilized egg buried within the gravel of a stream to the final return from the open ocean as an adult to spawn in its natal stream.

When salmon eggs are fertilized and buried underneath stream gravel, changes in climate can influence the survival of developing eggs. Increased temperatures can lead to more precipitation falling as rain as opposed to snow during fall and winter months. This can increase the frequency of flooding in streams and rivers. If floods are strong enough, scouring can occur in-river where gravel deposited. As a result, eggs can be pushed downriver where the eggs may not survive. This

ANADROMOUS:
migrating to fresh water from the sea
to spawn

appears to have occurred to pink salmon in 2015, when adults deposited eggs in drought conditions. Several significant flood events followed in the fall which scoured redds (egg nests) and contributed to very poor production throughout Puget Sound rivers. Further climate impacts at this early life stage may include increased in-stream water temperatures that can result in altered development periods and increased thermal stress.

For species that spend a longer amount of time in freshwater streams as juveniles, like Chinook and coho salmon, it is anticipated that they will be more susceptible to in-river low flows and increased temperatures relative to chum or pink salmon, who migrate downriver shortly after emergence from the gravel. Increased air temperatures will result in decreased mountain snowpack, a more rapid spring melt, lower summer flows, and increased in-river temperature. This can limit habitat availability, increase disease and alter fish behavior.

Upon migrating into the estuary, salmon fry and smolts make the transition to marine conditions. The current pace of sea level rise is outpacing the rate that estuarine plants can grow and colonize new habitat. This may result in a reduction of available estuary habitat over time. Sea level rise projections vary considerably, but based on observation, sea level rise has been under-predicted. While there is still a lot of uncertainty about how much sea level rise will occur throughout the 21st century, as sea level rise modeling advances, the outlook for estuaries which juvenile salmon rely on seems to be grim.

After rearing in estuaries, salmon fry and smolts make their way into Puget Sound and further into the open ocean. In the ocean, they need to feed and grow rapidly before they return to their natal streams 1 to 5 years later. In the open ocean, rapid large-scale changes might seem unlikely. During the 'Warm Blob' in 2014-2016, average sea surface temperature (SST) rose 4°C above average. This illustrates just how quickly entire ecosystems can respond to changes in SST. The "Warm Blob" event was unprecedented and resulted in drastic changes to the food web that salmon depend on. We know from historical salmon returns that when SST in the Pacific Ocean is warm, the survival of most salmonids to the Pacific Northwest is lower compared to cooler years. The decreased survival in warm years is attributed to a shift in the food web with less abundance of lipid-rich zooplankton upon which salmon and their prey depend. This food web shift was observed in 2015-16 and correlates when Puget Sound had extremely poor returns of pink and coho salmon.

Ocean acidification (OA—reduced ocean pH from CO₂ dissolution) also has the potential to alter the food web salmon depend on. OA can reduce the ability for many organisms such as urchins, clams, and corals to create calcium carbonate shells. A key organism in many North Pacific food webs that many salmon depend on is a zooplankton known as pteropods. Pteropods also create shells of calcium carbonate and are negatively impacted by ocean acidification when tested in the



laboratory. The impact this will have on the food web that salmon depend on remains unknown but is of keen interest to researchers and fisheries managers.

Finally, after spending their time in the open ocean, salmon return as adults to complete their life cycle and spawn in-river. Similar to the impacts of temperature and flow experienced by juvenile salmon, returning adult salmon will incur added thermal stress. Increasing their susceptibility to disease. Reduced summer flows may also limit spawning habitat availability.

Following salmon through their life cycle demonstrates the unique challenges they will have to overcome in the coming century with climate change. Puget Sound salmon will need our continued efforts to recover current habitat so that they may be best equipped to deal with trials ahead.

Sources:

Bond, N. A., M. F. Cronin, H. Freeland, and N. Mantua (2015), *Causes and impacts of the 2014 warm anomaly in the NE Pacific*, *Geophys. Res. Lett.*, 42, 3414–3420, doi:10.1002/2015GL063306.

IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.

Mote, P.W. and E.P. Salathe Jr. (2010) *Future climate in the Pacific Northwest*. *Climate Change* doi: 10.1007/s10584-010-9848-z

Ou, M., Hamilton, T. J., Eom, J., Lyall, E. M., Gallup, J., Jiang, A., Lee, J., Close, D. A., Yun, S.-S. and Brauner, C. J. (2015). *Responses of pink salmon to CO₂-induced aquatic acidification*. *Nat. Clim. Change* 5, 950–955.

Wainwright, T.C., and L. A. Weitkamp (2013) *Effects of climate change on Oregon coast salmon: habitat and life-cycle interactions*. *Northwest Science* 87(3):219–242. doi: 10.3955/046.087.0305

Featured Creature

Banana Slug (*Ariolimax columbianus*)

GASTROPODS:

a Greek word meaning stomach foot. Mollusks including snails and slugs typically having a flattened muscular foot for locomotion and a head with stalked eyes

Banana Slug (*Ariolimax columbianus*)

Natures Giant, Slimy Recycler

Banana Slugs are the largest slug in North America and can grow up to ten inches long. They only live in the wet Pacific Northwest, coastal lowlands of southeast Alaska, and British Columbia to central California.

The life span of a Banana Slug is up to seven years. This native slug lives on the forest floor in our cooler maritime forests where it can retain its body moisture. Their name comes from the common yellow color and brown spots that are reminiscent of bananas, but they are also found in multiple hues of greens and tans.

Banana slugs are herbivores, eating plants while also eating detritus (dead organic material), decomposing it and turning it to soil. Like other gastropods they have a radula, which is a rasp-like tongue, covered in rows of tiny teeth that they use for scraping food off the surface and drawing into the mouth to feed.

Like all slugs, banana slugs have two pairs of eyestalks or tentacles. The upper pair senses light and movement and the other pair is used to detect chemicals. The slug is able to retract its tentacles and if severed they can grow a new one.

Slug slime is used for breathing, protection and even for mating. Banana slugs have a single lung for breathing. As they dry out easily, they excrete a thick coating of slime or mucus that assists them in breathing. Breathing occurs through the tiny external lung or through the wet skin. During times of drought, the slug secretes a thick coat of mucus over its body then covers itself with a layer of soil and leaves to protect against dehydration. They will remain inactive like this until the environment becomes moist again.



DETRITUS:

organic matter produced by the decomposition of organisms

While moving, thick mucus is secreted for the slug to travel upon, rather than on the ground surface, which protects its soft body from damage. In mating, the slime contains pheromones, or chemicals, used to attract other slugs for mates. Slugs mate and lay eggs throughout the year producing up to 75 eggs that are laid on leaves or wood on the forest floor. Adults provide no care for eggs, abandoning them after they are laid.

Since banana slugs are prone to dehydration, they are usually found in forest-covered areas, generally causing little harm to flower beds and gardens. If you see one in your landscape or garden you can always “leave it be”, or move it with a moistened leaf back into the shady woods!

Amphibian Road Survey Results

Traffic and animal migrations: A perilous combination

Across the developed world, vehicle traffic impacts many wildlife species including migrating frogs and salamanders. In areas where traffic is heavy, amphibian populations can be decimated as they cross busy roadways that have been built within their migration pathways.

Many amphibians migrate seasonally to and from their aquatic breeding habitat back to the forest or other terrestrial habitat. In the late winter to spring, they migrate to breed and lay their eggs in lakes, wetlands, and streams, followed by travel to their summer habitat. Then in the fall, they migrate to winter habitats. Many migrating amphibians prefer rainy nights while the weather stays relatively warm (above 40 degrees F).

Over the past three winters, dedicated volunteers and volunteer biologists have met almost every Wednesday evening and some Saturdays, from October to March to count migrating frogs and salamanders. Fifty-six individuals donated 550 hours of their time and expertise, in some of the worse weather conditions, to help with the surveys.

Three Thurston County roads, Young Road, Champion Drive and Kaiser Road, all known to have migrating amphibians, were selected for surveying.

TERRESTRIAL:
living or growing
on land or in the
ground rather
than water



Amphibian Species Observed

Five pond-breeding and one terrestrial-breeding (*Ensatina*) species of amphibians were found in each of the survey areas. Rough-skinned newts were observed in the largest numbers, especially at the Young Road sites.

Northwestern salamanders made up the second largest number of observations. These were the most common species observed for both Champion Drive and Kaiser Road. Both Pacific tree (chorus) frogs and red-legged frogs were observed in moderate numbers, especially on Champion Drive and Young Road. Of the 266 newts found on the Young Road sites (Units #1–#5), 29 were alive. Overall during daylight road surveys most animals were mortalities on Young and Kaiser roads. Surveys on Champion Road were held weekly, in the evening and 40% of the observations were of live animals. (Champion Road surveys were led by Bonnie Blessing-Earle and Jim Terry; Young Road surveys were led by Bill Peer; and Joanne Schuett-Hames led Kaiser Road surveys.)

The table at left shows the species that were found at each site.

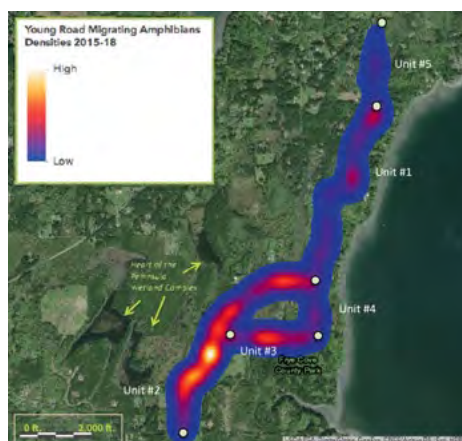
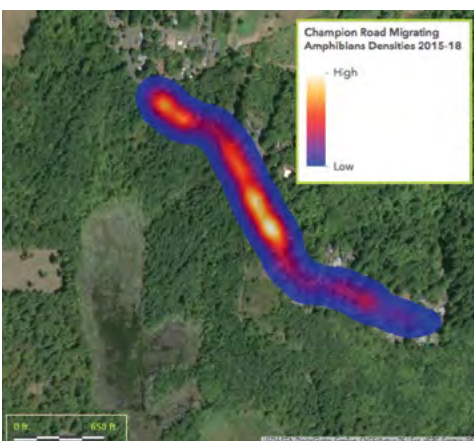
Migration hot spot areas were also identified based on where the most numerous counts and observations of amphibians were found along each survey route. Examples of this for Champion Drive and Young Road are shown in the graphics at the lower left.

Recommendations

Encourage jurisdictional managers to install amphibian-crossing signs to educate and make motorists aware of seasonally migrating amphibians. Encourage non-essential traffic to take alternative routes. Volunteers will continue monitoring and locating additional survey locations.

Interested in helping collect this valuable information? Do you have a frog crossing location you are interested in surveying? Let us know! Training dates TBD and training provided as part of the survey. Contact Michelle at mstevie@ci.olympia.wa.us for more information or register at www.streamteam.info.

SURVEY AREA	Champion Road			Kaiser Road Unit #1			Young Road Units #1–5		
Migration Year	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
Pacific Treefrog (<i>Hyla regilla</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Red-legged Frog (<i>Rana aurora</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northwestern Salamander (<i>Ambystoma gracile</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Long-toed Salamander (<i>Ambystoma macrodactylum</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rough-skinned Newt (<i>Taricha granulosa</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ensatina (<i>Ensatina escholtzii</i>)	✓	✓	✓	✓	✓	✓	✓	✓	✓



FALL FUNGAL FORAGING FORAY

- Saturday, Oct. 20
- 9 a.m. – 3 p.m.
(stay as long as you like)
- Location TBD

Recommended field guides:

- ☐ *Mushrooms of the Pacific Northwest* (Trudell & Ammirati, 2009)
- ☐ *Mushrooms Demystified* (Arora, 1986)
- ☐ *All the Rain Promises and More* (Arora, 1991)

What to bring:

- ☐ Weather appropriate clothing, footwear, etc.
- ☐ Small backpack with water, lunch, and personal items needed for a day in the woods.
- ☐ Basket or a non-plastic bag to carry foraged mushrooms.
- ☐ Discover Pass for parking.
- ☐ Foraging friend!



Fall Fungal Foraging Foray

Are you wild about mushrooms? Join Stream Team and special guest mycologist, Marcus Goodman, for a forest foray to find edible mushrooms.

Edible mushrooms represent a broad group of fungi that come in many forms and colors. Fungi in general occurs throughout the forest, living on dead organic material and symbiotically living with plants, animals and other fungi. They play a major role in the forest ecosystem, as they provide nutrients to trees and plants, while also recycling nutrients, by breaking down woody material and plant material. Fungi use mycorrhiza (mīkə' rīzə) for their symbiotic partnership with trees and plants, connecting the entire forest.

People of many cultures have long histories of gathering mushrooms for food and medicine and for other uses such as dyes. Over the past few decades, mushroom foraging has become increasingly popular. Being familiar with the types of edible fungus and how to identify them through the use of guides makes the experience much more safe and enjoyable!

If you are looking to gain a better understanding of local, delicious, edible fungi in our area, join us for a day of foraging.

To register for this workshop, visit www.streamteam.info and click on "register". For more information, contact Michelle at mstevie@ci.olympia.wa.us

SYMBIOSIS:
a mutually
beneficial
relationship
between two
organisms



Fall Planting Ideas

to Enhance Urban Wildlife Winter Foraging

Native wildlife rely on plants for food and cover and in the urban environment, this can be a challenge. There is much controversy about whether non-native plants provide the same habitat as native plants. In general, native trees, shrubs and other plants are preferred to non-native plants, as non-native plants affect the entire food web.

How is the food web affected by non-native plants? Insects that feed upon our native plants are greatly reduced, which reduces the amount of food available for wildlife. These insects provide essential food resources for our native birds, reptiles and mammal species. Our native birds' diets are made up mostly of insects and during nesting season young birds feed exclusively upon nutrient rich insects.

Studies have shown that native insects, which have evolved with our native plants, lack the ability to overcome the chemical defenses of an ornamental non-native plant. What does this mean? Butterflies may visit and feed upon the nectar of the flowers on your ornamental shrub, but its larvae or caterpillar is unable to feed on the leaves, as they may not have the ability to overcome the chemical defenses of the ornamental plant. You may think it is good that your plants are not being eaten, but it may have an impact on native wildlife species. If all things are in balance, a healthy plant will seldom have life threatening damage from the insects that rely on it for food.



SNOWBERRY

Snowberry (*Symphoricarpos albus*) provides white berry until the first hard frost. **Nootka rose** (*Rosa nutkana*), grows well in western Washington gardens and has beautiful red rosehips well into winter. The hips are edible even after they have shriveled from frost. Native roses, as well as ornamental roses, will produce hips, both providing a winter food source and color to your garden.



PACIFIC NINEBARK

Pacific ninebark (*Physocarpus capitatus*) is a drought tolerant deciduous shrub with white flower clusters in spring that offers browse for wildlife and seeds for birds in winter.



RED-OSIER DOGWOOD

Red-osier dogwood (*Cornus sericea*) is attractive year round with its red bark, clusters of white flowers and golden fall foliage. It can form thickets, which birds, bees, butterflies and small mammals will use while also creating a summer screen.



EVERGREEN HUCKLEBERRY

Evergreen huckleberry (*Vaccinium ovatum*), is another shrub that provides habitat, with beautiful evergreen foliage and dark blue-black berries.



CORNELIAN CHERRY

Cornelian Cherry (*Cornus mas*) is a large deciduous shrub in the dogwood family. It has bright red berries that can be eaten by birds and humans alike. More than one plant is necessary for cross-pollination if fruit is desired.



BLUEBERRIES

Blueberries, grapes and other fruiting cultivars such as apple, crab apple and pear trees can provide cover and fruit late into the fall for wildlife to use.

To help support wildlife, some scientific resources suggest planting your landscape with at least 75% or more native plants. Remember that during the summer food sources are more available than winter, making winter a more difficult time for urban wildlife to find food to forage upon. If you have a bare winter garden, you can liven it up for yourself and for the neighboring wildlife. By planting native or non-spreading shrubs that produce berries or seeds, you can provide cover and much needed winter forage for wildlife.

Shown on this page are a few native plants and non-spreading ornamentals that can provide habitat for wildlife and color for your winter garden.

As always, please avoid planting varieties that are invasive, such as English hawthorn, Norway maple, and Asian honeysuckles to name a few.

For more information on native plants visit Washington Native Plant Society <https://www.wnps.org/landscaping/herbarium/index.html>



HIGHBUSH CRANBERRY

Pacific Northwest Viburnums such as **highbush cranberry**, **mooseberry** (*Viburnum edule*) and **American cranberry bush** (*Viburnum trilobum* or *V. opulus americanum*) has bright red fruits (not actual cranberries) that last well into winter. This family also has non-invasive ornamentals that can also provide valuable wildlife habitat throughout the year. These shrubs do well in full sun and can tolerate partial shade, such as hydrangeas.

Seasonal First Flush:

A Story About Stormwater Contamination

Western Washington's climate is often compared to a Mediterranean climate. We usually have a wet winter and spring followed by a rainless summer season. During our summer drought pollutants build-up on impervious surfaces. When we get our first heavy rains in the fall it mobilizes built-up contaminants that end up in stormwater runoff. This phenomena is called seasonal first flush.

So what is the problem? Stormwater runoff is generated from rain and snowmelt that flow over land or impervious surfaces. The runoff picks up pollutants like trash, chemicals, oils, and sediment that can end up in our rivers, streams, lakes, and Puget Sound. In fact, 75% of the toxic chemicals reaching Puget Sound are carried by stormwater runoff! This is partly because many older stormwater system components were designed to reduce the flow of stormwater to prevent flooding, but not to remove pollutants.

IMPERVIOUS:
not allowing fluids
to pass through,
impermeable,
watertight

How Seasonal First Flush Impacts Urban Stormwater Quality

The initial surface water runoff after the first major rainstorm of the season is generally referred to as the first flush. The amount of impervious surface in a watershed can have a significant impact on the seasonal first flush. When there is large percentage of impervious surface area and it rains hard, it can often result in faster moving stormwater runoff. This runoff can easily transport debris and scour (scrub) pollutants from surfaces. In developed urban landscapes, runoff occurs almost immediately at the onset of rainfall. The quickly occurring runoff and short time of travel produced in urban areas, provides greater potential for high concentrations of contaminants delivered by first flushes. During seasonal first flush the amount of pollutants carried into our local water bodies is significantly higher than other times of the year. A report done in 2005 by the California Department of Transportation (Caltrans) Division of Environmental Analysis notes that various ways have been proposed to define first flush. Most suggest the existence of a first flush if 80% of the pollutant mass is emitted in the first 30% of the runoff volume.

The first flush image below shows how the concentration of contaminants decreases with the amount of rainfall over time.

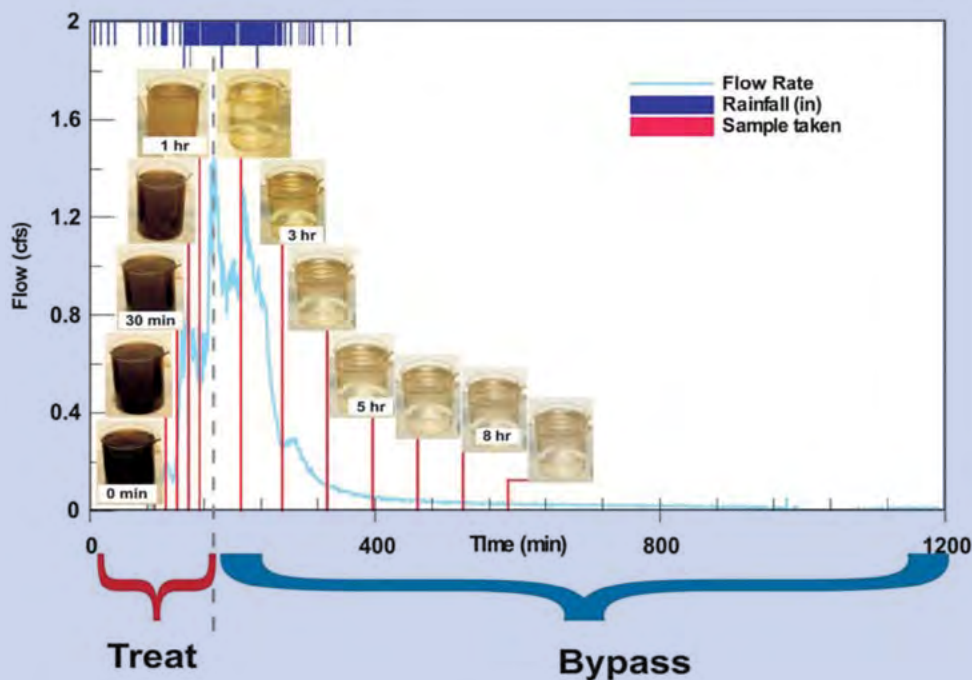
Image provided by Caltrans (2005) "First flush Phenomenon Characterization", Stenstrom Michael K., Kayhnhian M, Report No. CTSW-RT-05-73-02.6, California Department of Transportation, August 2005

A study by Lee, Lau, Kayhanian and Stenstrom, (2004) found pollutant concentrations in the first part of the wet season ranged from 1.2 to 20 times higher than concentrations near the end of the season.

Another analysis performed by Caltrans in 2003 showed that several environmental and site-specific factors have a significant influence on runoff pollutant concentrations:

- Pollutant concentrations in stormwater runoff increase with higher traffic levels.
- Pollutant concentrations in runoff are highest early in the wet season.
- Longer dry periods prior to rain events result in higher pollutant concentrations in runoff.
- As total event rainfall increases, pollutant concentrations tend to decrease; i.e., runoff from larger storms tends to dilute pollutant concentrations.

Concentration of Contaminants



How Can We Prevent Stormwater Pollution?

Before our first rain events begin this fall and throughout the year, there are practices we can all follow to help keep contaminants out of stormwater runoff. When it comes to stormwater pollution prevention small actions add up to make a big difference! Here are some ways to help reduce stormwater pollution:

- Clean-up litter, pet waste, leaves, and debris out of street gutters and storm drains.
- Avoid or apply lawn and garden chemicals sparingly and according to directions. Avoid weed-and-feed type lawn fertilizers; they contain pesticides.
- Sweep driveways and sidewalks.
- Use public transit, walk, or ride a bike.
- Properly store oil, antifreeze, paints, and other household chemicals.
- Clean up and properly dispose of spilled brake fluid, oil, grease, antifreeze and garden chemicals. Do not hose them into the street.
- Control soil erosion on your property by planting native or non-invasive ground cover and stabilizing erosion-prone areas.
- Encourage local government officials to enforce construction erosion and sediment control ordinances in your community.
- If you have an on-site septic system, have it inspected and pumped, at a minimum, every 3–5 years so that it operates properly.



Keep Storm Drains Clear

As we move into the rainy season storm drains can get clogged with leaves, sediment and debris. Help reduce the risk of local flooding by picking up leaves and other yard waste from your property. Never blow or sweep yard debris into the roadway. If you see a storm drain in your neighborhood that needs to be cleared, use a rake or shovel to remove the debris. Remember safety always comes first! To properly dispose of leaves, put them in your organics cart or compost pile. Alternatively, use leaves to mulch planting beds to provide winter protection for plants.

In addition to looking after your neighborhood storm drain, residents and businesses can take two other important steps to get ready for the storm season:

- Maintain gutters, downspouts, rain barrels, and private culverts by keeping them clean, flowing and directed away from properties and hillsides.
- If you see major flooding or you are unable to clear a drain contact your local jurisdictions: Olympia: 360-753-8333; Thurston County: 360-754-4681; Tumwater: 360-754-4150; and Lacey: 360-491-5644

CLIMATE CONVERSATIONS

- Wednesday, Oct. 17
- 6:30 – 8 p.m.
- Olympia City Hall,
601 4th Ave E, Olympia



Beyond Flooding: Climate Conversations presents Warming Waters and Marine Water Quality

Environmental conditions can trigger changes to water quality in Puget Sound. When water parameters such as temperature change, becoming warmer, it can prompt a response in the production of phytoplankton. When we have unusually high concentrations of phytoplankton, it is referred to as “blooms”.

During his lecture, Dr. Christopher Krembs of Washington State Department of Ecology will discuss recent climate impacts and his latest water quality findings for Puget Sound. He will explore how climate change effects the lower food web of Puget Sound. He will discuss how climate affects water quality more strongly in the dry summer months and how human caused impacts can magnify these conditions. In summer, streams have lower water levels and pollutants become more concentrated and residing longer in the water. This can lead to severe impacts to water quality and the species that live in or use our waterways.

To register for this workshop, visit www.streamteam.info and click on “register”. For more information, contact Michelle at mstevie@ci.olympia.wa.us

Farewell & Welcome!

This quarter, Stream Team is saying farewell to two amazing coordinators and welcoming a new coordinator! Please join us in wishing Debbie Smith and Kim Jones well as they leave Stream Team and welcoming Emily Watts!

Farewell, Kim Jones

Kim joined Stream Team in 2014 as the Lacey coordinator, and has accepted an exciting new job in the City of Newcastle! She looks forward to serving Newcastle's residents in an expanded role, taking her years of experience from Stream Team and the City of Lacey with her. In addition, Kim is excited to move closer to her beloved Huskies, taking full advantage of her football season tickets without the commute. She also looks forward to being closer to her family and friends in Seattle. We will miss Kim's upbeat attitude and hard work with Stream Team, but are proud of her exciting new career move. Congratulations, Kim!

Goodbye
Kim & Debbie!



Farewell to Tumwater Stream Team Coordinator, Debbie Smith

After almost 17 years, Debbie Smith has retired from her position as Water Resources Educator for City of Tumwater. In her position, Debbie provided public education in all areas of water: storm/surface water, ground/drinking water and wastewater. By far, her favorite area was surface water and working as the Tumwater Stream Team Coordinator to improve the Deschutes Watershed.

What made working as a Stream Team Coordinator so great was the interaction with the volunteers. Debbie was in awe of the hard work of our Stream Team volunteers. She was inspired by their dedication to the betterment of the Earth and all of its resources, including plants, animals and people. Many Stream Team volunteers and partners became Debbie's life-long friends.

Highlights of Tumwater Stream Team projects include all of the habitat restoration along the banks of Percival Creek and the Deschutes River. Tons of invasive weeds were removed and replaced with thousands of native trees and shrubs. It was one of the highlights of her career to witness acres of Scotch broom and Himalayan blackberry be turned into mature closed-canopy forests of native plants along Tumwater streams.

Biologic monitoring allowed volunteers to be citizen scientists as they collected stream bug samples. Chemical water quality monitoring was performed through a partnership with the South Sound GREEN (Global Rivers Environmental Education Network). Debbie assisted Tumwater schools in the field monitoring and led annual *State of the Rivers* sessions and field trips at the GREEN Congress. Debbie has

been involved with SS GREEN since 1993, both as a volunteer and through her work with conservation districts. She plans to continue to be involved in the future.

Debbie loved working with the public. Workshops and public outreach events invigorated her, especially her interactions with children. Her two favorite events were both at Tumwater Falls: the *Return of the Chinook* in October and Juvenile the *Chinook "Bon Voyage" Party* in May. The fall event enabled the public to see and learn about adult salmon, while the spring event allowed the public to be able to actually release juvenile Chinook into the Deschutes River to launch them on their journey to the Pacific Ocean.

Debbie is not fully retiring. After taking a few months off to rest and rejuvenate, she plans to create her own business and continue to do part-time work from home. Allowing her a flexible schedule, she plans to travel a bit (including visiting her "second home" in New Mexico), work on home and yard projects, and play with her grandchildren. She may even show up to volunteer for Stream Team!

Debbie likes to say, "Jobs are temporary, but the work that was done is permanent". Thanks to all the Stream Team volunteers who worked under Debbie's supervision. All of the trees planted and all of the people educated will go forth into the future to make our world a better place!



Welcome, Emily Watts

Emily is joining Stream Team as the Lacey coordinator! After serving Lacey residents as the waste water and drinking water outreach coordinator for the past year, Emily has decided to expand her horizons in stormwater and stream restoration. As an alum of The Evergreen State College, earning a Business & Economic Degree and minoring in Resource Management, Emily is interested in studying the cross-section of economics and natural resource management. Emily is also an AmeriCorps alum, serving with the City of Tacoma as a Sustainability Coordinator. In Emily's spare time, she's raising her Belgian draft horse, Leopold, and has spent time backpacking in the Olympic Mountains with her family's llamas. Emily looks forward to learning about Stream Team's programs and working with our dedicated volunteers on restoration projects!

Say hi to Emily at any of Lacey's Stream Team watering events at Woodland Creek Community Park this summer! She looks forward to meeting you!

WELCOME
Emily!



Stream Team Site Stewards Enhance City of Tumwater Lands

Stream Team has a program for dedicated volunteers who wish to focus their efforts on enhancing the riparian (near-stream) habitat selected site. Tumwater is lucky to have the services of three Site Steward volunteers: Steve Parks, Charlie Schneider and Bob Barnes.

Steve Parks began his service by helping at a Stream Team volunteer event along Percival Creek at Sapp Road in 2007. He was so inspired by the revegetation work being done on this twelve-acre parcel, that he dedicated himself to its restoration. Over the past ten years, Steve has volunteered an average of three days per week planting, weeding and watering!

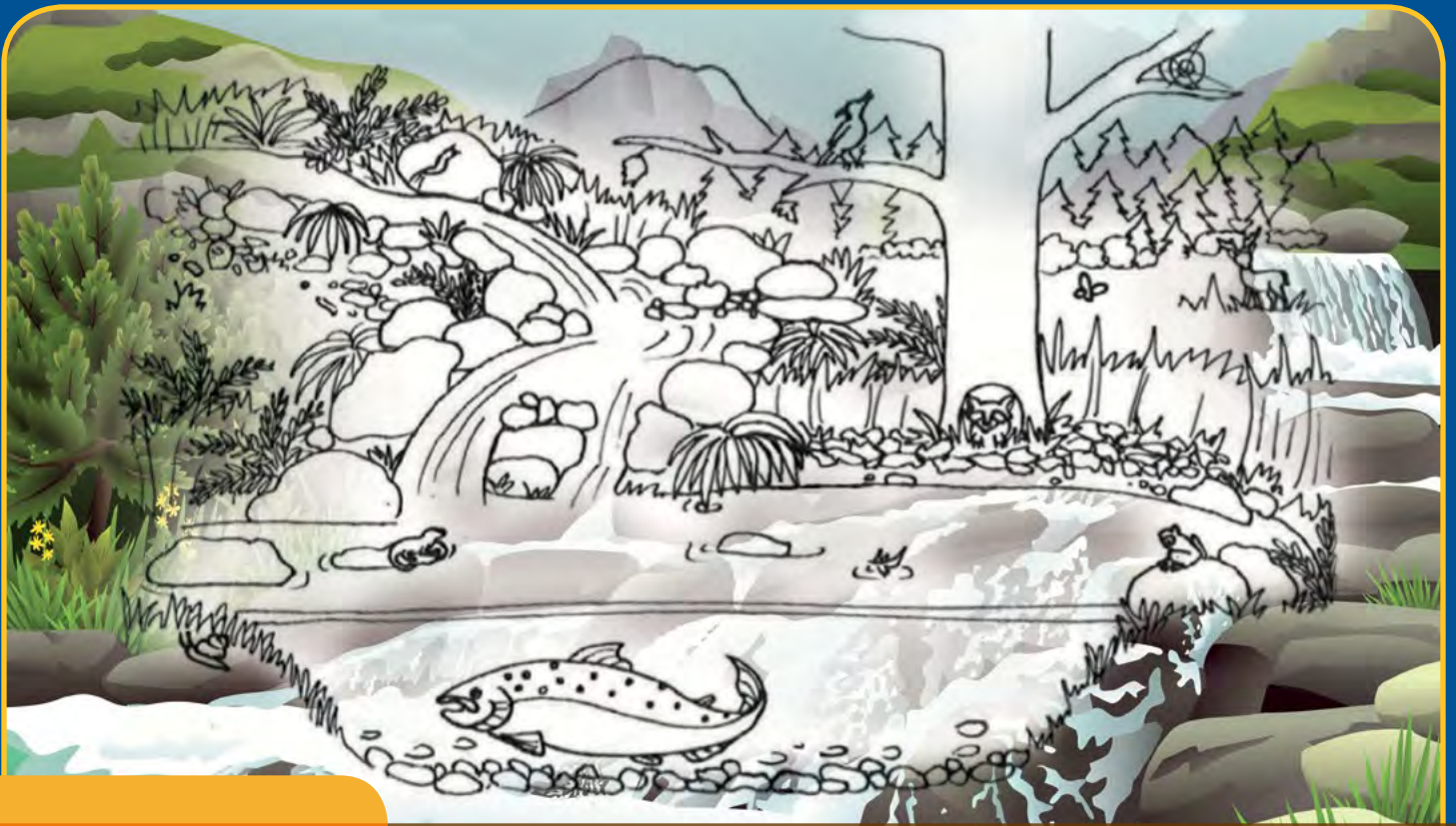
Steve removes Scotch broom and keeps the Himalayan blackberry at bay. He also keeps a sharp eye out for tansy ragwort and vigilantly removes this toxic weed. He has supervised two Eagle Scout projects at the site to remove invasive weeds and replant with native species. Steve helps plan and assist with the annual Tumwater Middle School Field Day at Percival Creek, as well as Stream Team revegetation projects. He plants native shrubs and trees, hand-waters plants in the summer, repairs weed barrier fabric, picks up litter and restocks dog waste bags in the dispenser.

Charlie Schneider and his wife, Nancy, retired from their jobs in Las Vegas and moved to Tumwater recently to be closer to their grandchildren. Charlie has dedicated his retirement to volunteer work. Charlie volunteers for numerous projects, including Stream Team storm drain marking, Salmon Stewards, public outreach, education events and revegetation work. When Charlie works a Stream Team event, he doesn't just put in a couple of hours. He shows up early to set up, works the whole event and stays after to clean up!

In 2017, Charlie became a Site Steward for the Stream Team project along the Deschutes River at E Street, in Tumwater. He pulls Scotch broom, removes Himalayan blackberry and plants native shrubs.

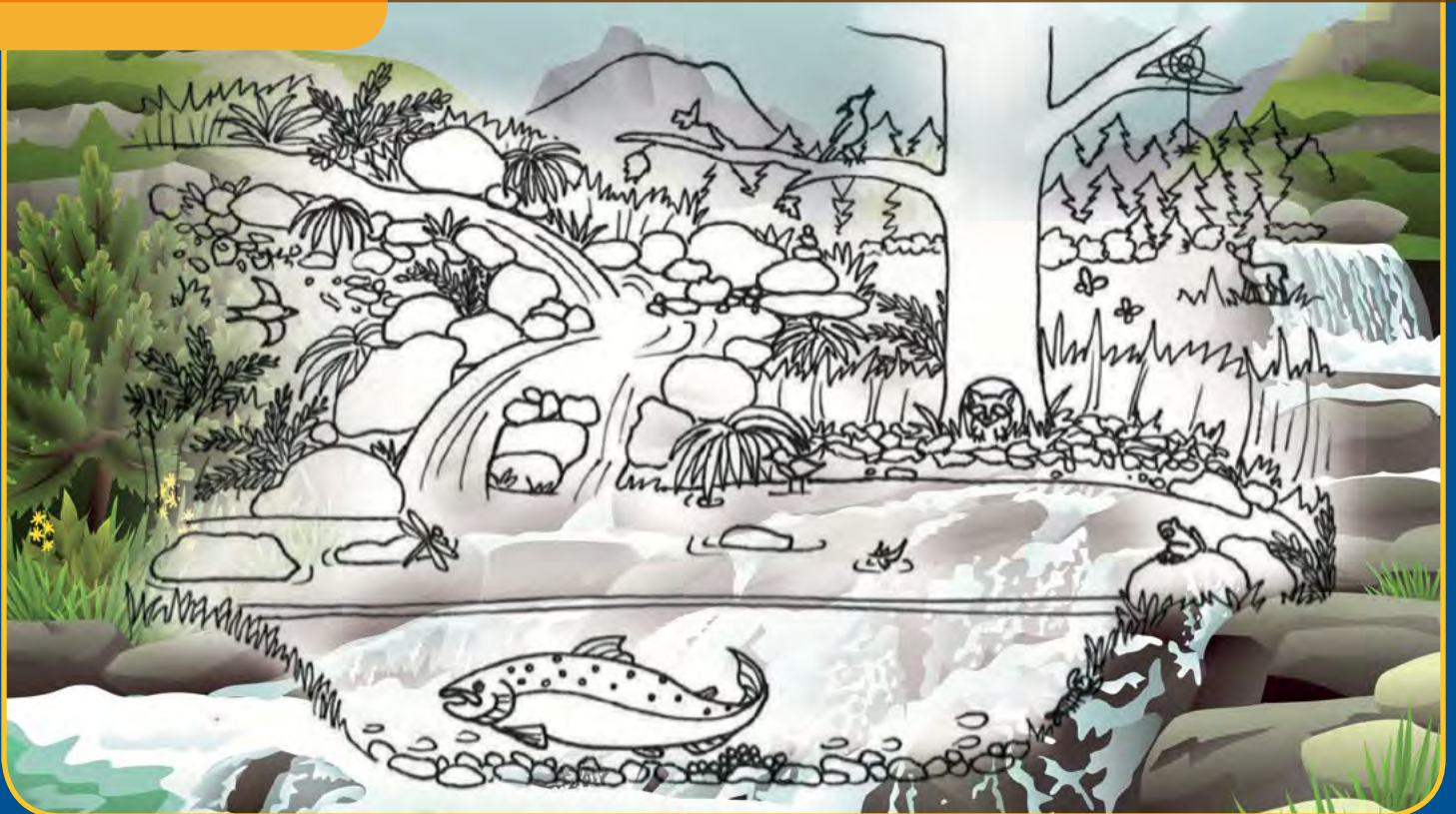
Bob Barnes became an active Stream Team volunteer since retiring as a landscape architect for Washington Department of Transportation. Bob is active in the local Deschutes Watershed Technical Advisory Group. He has a particular interest in the revegetation project along the Deschutes River at E Street and serves as a crew leader at this site. Bob recently planted over 50 red-osier dogwood stakes along the river with fellow volunteer Charlie Schneider.

Bob has a native plant nursery and donated over 100 plants to the first E Street revegetation event. He also uses his truck to pick up and deliver compost for Deschutes Stream Team projects and he helps to recruit Stream Team volunteers.



Kids' CORNER

Search These TWO pictures TO
Find 12 differences
in who is using The Stream side habitat!





Stream Team *Events*

For additional events, event details or to register, please visit our website and click on "Calendar" or "Register": streamteam.info

For maps and directions to any of these events, go to: streamteam.info/getinvolved/directions/

SEPTEMBER / OCTOBER / NOVEMBER

Fall Salmon Stewards Needed at 5th Ave Bridge & Harbor Days

HARBOR DAYS: Sun., Sept., 2 • 10 a.m. – 6 p.m.

5th AVE BRIDGE: Sept., 1 – 14 (multiple time slots available)

Registration limited to trained Salmon Stewards only

Fin the Migrating Salmon will be visiting! Fin is a 25-foot fiberglass sculpture of a summer chum salmon built by the educational non-profit group Wild Olympic Salmon and used all over the state for salmon education. Come visit Fin!

Register Online. For more info., contact Michelle mstevie@ci.olympia.wa.us

Citizen Science Plankton Monitoring

WHAT'S LIVING IN LONG LAKE:

Sat., Sept. 8 • 1 – 2 p.m. • Long Lake Park, 2790 Carpenter Rd, Lacey

WHAT'S BLOOMING IN BUDD:

Sat., Sept. 15 • 1 – 2 p.m. • Port Plaza Dock near Anthony's Homeport, Olympia

No registration required! Plankton samples will be collected then viewed and identified under a field microscope. Appropriate for all ages.

Forage Fish Surveys

Thurs., Sept. 6 • 9 a.m. – 3 p.m.

The Evergreen State College Beach

Tues., Oct. 9 • 9 a.m. – 3 p.m.

Priest Point Park

Tues., Nov. 6 • 9 a.m. – 3 p.m. • **The Evergreen State College Beach**

Survey various beaches for sand lance and surf smelt eggs, a main prey for Pacific salmon. Surveys are tide dependent so survey dates will be variable. Trained and untrained volunteers welcome! Register Online. For more info., contact Michelle mstevie@ci.olympia.wa.us

McLane Creek Nature Trail Maintenance

Wed., Sept. 26 • 3 – 6 p.m.

Wed., Oct. 24 • 2 – 4 p.m.

Thurs., Nov. 8 • 10 a.m. – Noon

Thurs., Nov. 29 • 10 a.m. – Noon

Thurs., Dec. 13 • 10 a.m. – Noon

McLane Creek Nature Trail, 5044 Delphi Rd. SW, Olympia

Register online. For more info., contact nativeplantsalvage@gmail.com

29th Annual Nisqually Watershed Festival

Sat., Sept. 29 • 10 a.m. – 4 p.m.

Billy Frank Jr. Nisqually Wildlife Refuge, 100 Brown Farm Rd., Olympia

For more info., contact Ann Marie at pearcea@co.thurston.wa.us See page 16 for details. Register online.

Cider & Salmon Sunday

Sun., Oct. 7 • 10 a.m. – 4 p.m.

Tumwater Falls Park

Stream Team will be celebrating the return of the Chinook with a family-friendly event featuring salmon-themed arts and crafts activities. Join in the fun!

Beyond Flooding: Climate Conversations presents Warming Waters and Marine Water Quality

Wed., Oct. 17 • 6:30 – 8 p.m.

Olympia City Hall, 601 4th Ave E, Olympia
Dr. Christopher Krembs of Washington State Department of Ecology will be our guest speaker; he will discuss recent climate impacts and his latest water quality findings for Puget Sound.

Register online. For more info., contact Michelle at mstevie@ci.olympia.wa.us See page 11 for details.

Fall Fungal Foraging Foray

Sat., Oct. 20 • 9 a.m. – 3 p.m.
(stay as long as you like)

Capitol Forest TBA, Van pool available
Are you wild about mushrooms? Join Stream Team and special guest mycologist, Marcus Goodman, for a forest foray, to find edible mushrooms.

For more info., contact Michelle mstevie@ci.olympia.wa.us Register Online. See page 8 for details.

Salmon Stewards Training

PART 1: BASIC CHUM SALMON

Thurs., Nov. 1 • 6 – 8 p.m.

PART 2: FIELD TRAINING

Sat., Nov. 3 • 9 a.m. – noon

PART 3: SOUTH SOUND CHUM

Mon., Nov. 5 • 6 – 8 p.m.

Olympia

For more info., contact Ann Marie at pearcea@co.thurston.wa.us

See page 3 for training locations and details. Register online.

Chum Salmon & Cider Celebration

Sun., Nov. 11 • 11:30 a.m. – 2 p.m.

McLane Creek Nature Trail, Olympia

For more info., contact Ann Marie at pearcea@co.thurston.wa.us

See page 3 for details. Pre-registration is NOT required.

OTHER COMMUNITY EVENTS

Darlin Creek Nature Preserve Planting

Sat., Sept. 22 | Sun., Oct. 7 | Sun., Oct. 21 | Sat., Nov. 17
10 a.m. – 3:30 p.m.

8999 Lake Lucinda Dr. SW, Olympia

Replant native species with WSU/Native Plant Salvage Foundation to restore forests and wetland buffers on Capitol Land Trust's Darlin Creek Preserve. The Preserve protects over 300 acres of diverse habitats and fish-bearing waterways. For more info., visit www.nativeplantsalvage.org.



Stream Team

EDUCATE • PROTECT • RESTORE
Olympia • Lacey • Tumwater • Thurston County

2000 Lakeridge Dr SW
Bldg 4 #100
Olympia, WA 98502
streamteam.info



NISQUALLY WATERSHED FESTIVAL •••••

- Saturday, Sept. 29
- 10 a.m. – 4 p.m.
- Billy Frank Jr. Nisqually National Wildlife Refuge

Celebrate with Stream Team the 29th Annual Nisqually Watershed Festival on the 29th of September!

There's something for everyone at the annual Nisqually Watershed Festival! Sip some coffee while you check out the interactive displays, see great raptors of the Northwest, listen to live music, sample some barbecued salmon, take part in walking tours, make a salmon print, view marine creatures and much, much more!

This year's festival will be held on Saturday, September 29th from 10 a.m to 4 p.m. at the Billy Frank Jr. Nisqually National Wildlife Refuge. Festival activities include a large variety of educational exhibits and hands-on activities for adults and kids of all. The festival main stage will feature live, majestic Raptors of the Watershed including peregrine falcons and hawks, a salmon dissection, music and dancing. Don't forget to stop by and listen to stories in the Red Salmon Tent and dress up to take part in a critter parade! You can also board a shuttle to the Nisqually Reach Nature Center and take a tour of the Nisqually nearshore.

For those who like to paint, bring a t-shirt to create your own fish print t-shirt, or you can purchase a t-shirt to paint at the festival. You can make a paper print, too!

Don't forget to bring your appetite; there will be a variety of delicious treats and coffee available. This event is FREE, except for the food, so come out and celebrate the history and culture of the Nisqually Watershed! For more information including parking information go to <http://nisquallyriver.org/nisquallywatershedfestival/> or contact Ashley at 360-456-5221 ext. 2145.

Note: Free parking and free shuttle to the festival will be available at River Ridge High School, 350 River Ridge Drive, Lacey.



Do you like to talk to people?

Do you want to help people learn about Stream Team and what they can do to protect local streams and salmon?

Then volunteer for a two-hour shift at the Stream Team table at the Nisqually Watershed Festival. All volunteers will receive a Stream Team t-shirt. For more information, contact Ann Marie at pearcea@co.thurston.wa.us or call 360-754-3355 ext. 6857. Register for volunteer shifts online.