Stream Team News

FREE

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EDUCATE • PROTECT • RESTORE

FALL EDITION
Sept–Oct–Nov 2019

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Osmoregulation in Pacific Salmon

Pacific salmon are anadromous, typically migrating twice within their life span. First, from freshwater where they hatch, to ocean saltwater to grow and feed. Then returning to freshwater streams to spawn and die.

Migrating between salt and freshwater means that a salmon must regulate its body functions to accommodate large fluctuations of salt input and output, a physiological (normal body function) process called osmoregulation. The osmoregulation process helps salmon maintain a healthy water balance, compensating for water loss and avoiding excess water gain of vital body fluids. This complex process is a function of cell permeability and osmotic pressure that regulates salt ions and water in their fluids.

To survive in both freshwater and saltwater, salmon either conserve or excrete salts or water to maintain this delicate balance. When in saltwater, salmon maintain a salt concentration that is lower than the seawater and when residing in freshwater they retain more salt than the freshwater stream. Salmon maintain this osmotic balance of regulating the transport of water and salts through their intestine, kidney, and gills.

CREDIT: MICHELE BURTON PHOTOGRAPHER

Osmoregulation is how an organism maintains the balance between water and salt ions through osmotic pressure, which prevents losing or gaining salts.

To prevent dehydration while living in the marine environment, salmon drink large amounts of water, eliminating the excess salt. In turn, when salmon are in freshwater they no longer drink water or eliminate salts to regulate their body's salt balance. Osmoregulation occurs whenever a salmon migrates from the freshwater stream they hatched in, to the ocean where they feed and grow, and then back again to the freshwater environment where they will spawn. An amazing adaptation for survival!

ON THE COVER: 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.

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RETURN OF THE CHINOOK CELEBRATION

- **Saturday, Oct. 5**
- **Noon – 4 p.m.**
- **Tumwater Falls Park, 110 Deschutes Way SW, Tumwater**

Return of the Chinook Celebration

Show your love for the Chinook! Join us to celebrate the return of the largest Pacific salmon species. Featuring family-friendly salmon-themed arts and crafts activities, discussions with our Salmon Stewards and more! To volunteer at the Stream Team booth, please register at **www.streamteam.info**.

For more information on the Chinook salmon run at Tumwater Falls Park or the Return of the Chinook event, contact Meridith Greer at mgreer@ci.tumwater.wa.us or 360-754-4148.

The Salmon are Back!

The Best Places to View Salmon in Thurston County

5th Avenue Bridge Downtown Olympia*

See hatchery Chinook salmon near the fish ladder late August or early September through mid-September.

Tumwater Falls Park*

The hatchery Chinook travel past the 5th Avenue bridge, through Capitol Lake, then head upstream to Tumwater Falls Park. See them mid-Sept. through mid-Oct. The Washington Department of Fish and Wildlife processes fish Mon., Wed., and Fri. mornings. On average, more than 4.5 million eggs are harvested annually during this fish spawning operation.

McLane Creek Nature Trail*

See a wild chum salmon run mid-Nov. through early to mid-Dec. Easily walkable 1.1 mile trail. Visitors must have a Discover Pass. Located in the Capitol State Forest at 5044 Delphi Rd. SW, Olympia 98512.

Kennedy Creek Salmon Trail

See wild chum salmon Nov. 2 – Nov. 29, 2019. This 1.5 mile trail (3/4 ADA accessible) is a collaborative effort hosted by the South Puget Sound Salmon Enhancement Group. Free to visit, but donations are appreciated. The trail is reserved for school groups during the week and open to the public from 10 a.m. to 4 p.m. on weekends, Veteran's Day, and the day after Thanksgiving. Volunteer docents are onsite to answer questions, offer salmon expertise, and direct people to the best viewing spots of the day! For directions visit **www.spsseg.org/education-outreach/kcst**.

IMPORTANT NOTICE!

When visiting McLane Creek or Kennedy Creek, please leave your dog at home. Dogs can disturb spawning, and are also susceptible to poisoning via a parasite on salmon skin.

Stream Team Salmon Stewards will be on hand at these locations on weekends, some weekdays, and during the morning spawning operation at Tumwater Falls Park. Salmon Stewards share information, viewing tips, visual aids, and polarized glasses for better viewing! For more information on hours at each location, visit **www.streamteam.info.*

Help Others Learn About Chum Salmon!

More than just birds flock to the McLane Creek Nature Trail when the chum return to spawn. Thousands of people also flock to the trail for a bird's eye view of wild chum in all their spawning splendor. With their stark spawning colors and sharp teeth, they are truly a sight to see as the females dig their nests and males vie for optimal spawning.

Many people have never seen live salmon while others have salmon questions. That's why every fall, Stream Team trains volunteers to be Salmon Stewards at the McLane Creek Nature Trail.

If you are interested in being a Salmon Steward this fall, Stream Team will be hosting 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.

Salmon Steward shifts occur on the weekends in November and early December and during the Thanksgiving Day holiday. Volunteers can sign up for one or more salmon steward shifts.

Chum Salmon Stewards Training Dates

Tuesday	**Oct. 22**	6 – 8 p.m.	Part 1: Basic Salmon Classroom Session*
Wednesday	**Oct. 30**	6 – 8 p.m.	Part 2: South Sound Chum Specific Classroom Session with WDFW biologist and Squaxin Tribe
Saturday	**Nov. 2**	9 a.m. – 12 p.m.	Part 3: Field Session at McLane Creek Nature Trail**

To register for the training, visit **www.streamteam.info** and click on the Calendar Icon. For more information, contact Ann Marie at ann.marie.pearce@co.thurston.wa.us or 360-754-3355 ext. 6857.

Chum Salmon & Cider Celebration at McLane Creek

Join Stream Team as we celebrate the chum salmon making their way back home to McLane Creek! Enjoy free locally made hot cider and donuts, plus volunteer Salmon Stewards will be on hand to answer your questions about the wild chum!

CHUM SALMON & CIDER CELEBRATION AT MCLANE CREEK • • •

- **Sunday, Nov. 10**
- **11:30 a.m. – 2 p.m.**
- **McLane Creek Nature Trail****

See the Salmon at McLane Creek this November!**

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

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

** 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.discoverpasss.wa.gov** (Salmon Stewards are granted temporary parking passes.) **Parking is limited at the nature trail. We recommend carpooling if possible.***

What's That Word?

Learn more about some of the terminology used in this issue!

Chemical features

Properties that become evident after or during a chemical reaction that can change a substance's chemical identity

Diphenylguanidine

The primary and secondary accelerator used to harden rubber and is found in the rubber industry and used in tires

Dissolved oxygen

Bubbles of gaseous oxygen that are mixed in water and available to aquatic organisms for respiration, or breathing

Leachate

Contents that are leaked or dissolved out of a solid as water is passed through that may enter the environment causing harm

Natal

Birth place or origin of birth

Osmotic or osmosis

The movement of water through a semi-permeable membrane from low solute concentration to high solute concentration creating a balance

Redds

A nest-like depression made by a female salmon to hold her eggs

Riparian

The land adjacent to rivers and streams that is periodically influenced by flooding

Did you know?

Much of the information we reference in our quarterly newsletter can be found on our website!

Articles marked with a dragon damselfly icon, like the one to the right, will be posted on our website for easy access under the Library tab.

Introducing...

A New Stream Team Website!

This summer, Stream Team launched a new website with a fresh look! The new site is not only compatible with desktop computers but also smart phones and tablets. Accessing our online resources and registering for events is easier than ever.

What can you find on the Stream Team website?

- Upcoming events and registration information
- Hands-On Science opportunities
- Past issues of the Stream Team newsletter
- Actions for clean water
- More options for getting involved with Stream Team
- A new Reference Library to easily locate information for natural yard care, pollution prevention tips and much more!

We think you are going to like what you see! Visit streamteam.info today!

The *Mystery* of Pre-Spawn Mortality

The population boom in the Pacific Northwest has caused a large influx of people and development over the last 30 years. Communities are expanding at increasing rates as more and more land is transitioned from forest to subdivisions. With this growth comes unintended consequences, particularly for some of the Pacific Northwest's oldest inhabitants, our iconic Coho salmon.

Coho salmon, *Oncorhynchus kisutch*, have been an important part of Pacific Northwest life for thousands of years. These salmon, also known as silver salmon, used to range across the Pacific Ocean from Japan to southern California. Now these amazing fish face deadly challenges as humans have encroached on their habitat.

Coho salmon are anadromous, meaning they migrate from the ocean to freshwater rivers to spawn. They usually spawn in small lowland streams from October to December. Eggs incubate in gravel nests called redds, until spring when fry emerge. The juvenile salmon spend about a year rearing in freshwater before migrating the following spring. The Coho then spend at least one full year in the ocean, eating and growing, before returning to their natal watersheds to spawn, restarting the incredible journey over again. However, in recent years, more and more Coho salmon have been dying in these streams before they can spawn.

Streams around the Puget Sound have been the focus of many habitat restoration projects since the 1990s. The streams Coho spawn in were becoming increasingly urbanized and degraded as treed riparian areas were replaced with houses and roadways. The goal of these restoration projects was to restore natural spawning and rearing habitat for Coho, which would hopefully help increase falling population numbers. Many of these sites required post-project monitoring to determine how successful the restoration efforts were. But what surveyors found was baffling.

Coho salmon returning to these streams to spawn were exhibiting unusual behaviors. Surveyors found salmon swimming at the surface of the water, gasping for air with their fins splayed as they appeared to be losing orientation and equilibrium. The alarming behaviors didn't stop there, many Coho salmon died within a few hours. Salmon death isn't an unusual occurrence, salmon usually die after spawning in their natal streams, but Coho were dying before spawning, females were found dead still full of eggs. In fact, over the last 30 years, pre-spawn mortality (PSM) was affecting 60–100% of the fall Coho salmon runs in urban streams. While non-urban streams were seeing PSM levels of less than 1%. Something in the urban environment was causing mass causalities to Coho salmon populations.

In 2011, Washington State University began intense research on PSM to try to determine its cause. Pre-spawn mortality in itself wasn't an uncommon occurrence; fish hatchery staff have been reporting it

Urban stormwater runoff, on average, contains more than 2,400 distinct chemical features.

for many years. These reports listed high water temperatures, disease, large fish populations, low dissolved oxygen (DO) levels, and low flows as common causes of PSM. In these situations, fish health often deteriorated over a matter of weeks, not hours. When researchers began testing the water quality in the streams where the Coho were dying, there was little evidence that temperature, DO, or low flows were causing the PSM seen in Coho salmon.

Researchers next sought to determine if disease or injuries were causing the deaths. Yet stricken Coho were generally in good physical condition, showing little to no signs of major disease or wounds. They also found that Coho salmon from hatcheries were just as likely to die prematurely as their wild counterparts. To add even more to the mystery, it appeared that whatever was causing the PSM was only affecting Coho salmon. Chinook and Chum salmon spawning in the same water during field and laboratory tests appeared to show milder symptoms and were not dying at the same rate.

In an attempt to learn more about what was causing PSM in Coho, researchers began working to determine the biological impacts of being exposed to the water. They tested blood pH, blood gases, lactate, plasma electrolytes, hematocrit, and glucose in exposed Coho. The physical symptoms and biological reactions of these Coho were similar to that of hypoxia, a condition where the body is deprived of oxygen. Preliminary results indicate that the water Coho are exposed to disrupts their osmorespiratory function, their ability to breathe and use oxygen.

The vast majority of the large pre-spawn mortality die-offs were seen in urban streams, with less than one percent of nonurban streams seeing similar salmon die-offs. Researchers began assuming that some contaminant or combination of contaminants in stormwater runoff is causing PSM in Coho. The question then became, what are the responsible chemicals?

Urban stormwater runoff, on average, contains more than 2,400 distinct chemical features, making the task of determining the exact chemicals responsible for PSM extremely difficult. A group of researchers from the Center for Urban Waters, University of Washington, Southern California Coastal Water Research Project, Northwest Fisheries Science Center, and National Oceanic and Atmospheric Administration began working on this problem in 2018. They started by taking stormwater runoff samples from areas where PSM was occurring around Seattle. By cross-referencing the chemical signatures from each sample, they were able to create a "Coho mortality signature", a mix of chemicals that were always present in the water where PSM was occurring.

After researchers were able to identify this "signature" they then started testing known stormwater pollutants to find matching chemical signatures. After testing things like brake pads, pesticides, car soap, fertilizers, pet waste, and other pollutants, researchers discovered that tire dust particles had an almost identical chemical make up as the "Coho mortality signature". During normal driving wear and tear, up to 14% of the diphenylguanidine (DPG) used in the manufacturing of vehicle tires can be released. Current research suggests that this tire wear particle leachate might be the major reason for the PSM occurring in Coho salmon around Puget Sound.

Continued research is needed across the board to understand more about pre-spawn mortality in Coho salmon, but preliminary results indicate that our everyday driving could be significantly contributing to declining Coho salmon populations. The good news is that preliminary findings have successfully shown that filtering urban stormwater runoff can significantly increase Coho survival. Laboratory studies have shown that running stormwater runoff through a mixture of 60% sand and 40% compost with a mulch bark top coat has been improving Coho survival from 0% to 100% in both adults and juveniles.

The Coho pre-spawn mortality syndrome represents an expanding threat to Coho populations, especially in areas of increased human development and encroachment. Increasing our understanding of the factors causing PSM will be an important part of restoration efforts in the future. Research continues to determine the reason for this chemical contamination as well as ways stormwater can be treated before it is discharged into local creeks and waterways. Coho salmon remain an important indicator species for watershed health and will help future restoration efforts to improve not only habitat quality but water quality as well.

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Natural Yard Care for Fall

Natural yard care is a practical way to create a lovely yard that's easier to care for and healthier for families, pets and wildlife. Whether it's planting, mulching or aerating your lawn, the effort you put in this fall will reap big benefits next spring and summer. By making some simple changes to your yard care routine, you can save time and money and help protect our local waterways.

Go Ahead and Plant

Planting in fall gives plants a jump-start on next spring's growing season. Natural rains and cooler fall temperatures help keep soils moist so new plants can establish healthy root systems. Plants will keep growing until the first frost when they move into winter dormancy. Here are a few things to keep in mind when choosing plants:

- **Select the right plant** – Conditions within your yard may vary from sunny to shady and moist to dry. Soil conditions may even change. Take note of these changes and choose the right plant for the right spot in your yard. This is the first step toward an easy to care for yard that is pesticide free.
- **Choose native and drought tolerant plants** – Native plants provide shelter and food for wildlife and require less water. Common native plants for landscaping include sword fern, vine maple, salal, oceanspray, bald hip rose and salmonberry. Visit nativeplantsalvage.org for information about planting natives in your yard.
- **Build healthy soil** – Plants need good soil to thrive. Healthy plants are more resilient with fewer pest problems and lower water needs. After you plant, mulch beds with compost or leaves.

Keep Leaves for Free Compost

Composting yard debris has tremendous environmental benefits for both the planet and your yard. Valuable nutrients stay in your yard while adding nutrient-rich compost improves soil quality and reduces the need for chemical fertilizers.

Reasons to compost:

- Compost added to soil, or top-dressed on lawns, releases nutrients to plants slowly over time. This helps prevent nutrient leaching into our wetlands, rivers, lakes and Puget Sound.
- Organic matter present in compost increases water retention, air circulation and root penetration in the soil.
- Adding compost to soil or mulching with compost helps prevent soil erosion. When soil erodes, sediment particles carry pollutants such as oils, metals and chemicals into stormwater runoff.
- Compost increases soil's ability to infiltrate water & decrease stormwater runoff.

For more information on practicing home composting or vermiculture contact the Thurston County Master Gardener Program at: ***http://extension.wsu.edu/thurston/gardening/***

Help Prevent Stormwater Pollution

- Avoid yard chemicals such as weed and feed products that contain pesticides
- Follow integrated pest management best practices (visit **GrowSmartGrowSafe.org** for more info)
- Let rainwater soak in by removing impermeable surfaces
- Properly store or dispose of harmful chemicals
- Sweep your driveway and sidewalk to keep pollutants out of storm drains
- Mulch beds to prevent soil erosion
- Practice natural lawn care – visit **https://streamteam.info/yard-care/** to learn how to have a beautiful lawn that is safe for children, pets and local waterways
- Visit out our online reference library for more natural yard care and planting information at **https://streamteam.info/document-library/**

Harvest Rainwater from Your Roof

Rainwater harvesting can have important environmental and economic pay-offs. It reduces stormwater runoff and saves on water use. Collecting rainwater from impervious surfaces, such as roofs, and storing it for later use, has been done for ages. Limited water resources and stormwater pollution are increasingly serious problems. With the emergence of green building, the role that rainwater harvesting can play has become more apparent.

Rainwater reuse brings a number of benefits:

- Provides inexpensive supply of water
- Reduces stormwater runoff and pollution
- Reduces erosion
- Provides water for irrigation or non-potable indoor uses
- Helps reduce peak summer demands

Early fall is a great time to install a rain barrel or two for your home. Residential rain barrels are an inexpensive and easy retrofit that can help reduce stormwater runoff and your water bill. If you live in the City of Olympia or Tumwater you may be eligible for a rain barrel rebate, to find out more visit:

City of Olympia: www.olympiawa.gov/waterwise

City of Tumwater: https://www.ci.tumwater.wa.us/departments/public-works/utilities/rebates-and-incentives

Reinvigorate Your Tired Lawn

The high temperatures and dry days of summer can take a toll on your lawn. Fall is the perfect time to help your lawn recover and give it a boost for next year.

Tips to create a healthier, more resilient lawn:

- **Aerate for healthier lawn** – When the soil beneath your lawn is compacted, it leads to shallower and weaker grass roots and poor lawn appearance. Aeration pulls plugs from the soil to optimize nutrient, air, and water flow. This improves soil texture, structure, density and porosity and increases nutrient uptake by grass roots. Aeration also decreases stormwater runoff through rainfall absorption.
- **Overseed for a thick lawn** – Thick lawns can outcompete weeds, retain more moisture and look and feel great! Overseed with a Pacific Northwest seed blend following aeration. Keep seeds moist during germination.
- **Topdress with compost** – After aerating add organic matter and nutrients to your soil by topdressing with a ¼" of organic compost. Simply rake it into the lawn and let the rain do the rest.
- **Rake fallen leaves off your lawn to avoid lawn dieback** – Alternatively, you can mulch mow light layers of leaves into your lawn.

*Visit **http://olympiawa.gov/city-utilities/water-resources/pollution-prevention/natural-yard-care.aspx** to check out our natural lawn care video series and get detailed guidance on each of these steps.*

Remove Invasive Plants Now

Problem weeds can quickly overtake a yard and surrounding local habitat. Some are toxic to humans and pets. Problem weeds include knotweed, scotch broom, Himalayan blackberry, English ivy and tansy ragwort. For more information on controlling and disposing of noxious weeds, visit Thurston County's website at **www.co.thurston.wa.us/tcweeds**.

Proper Winter Prep

Pool & Hot Tub/Spa Draining

Did you know? Draining a swimming pool or spa into a nearby stormwater drain is illegal. Chlorinated water, chlorine, and bromine fall under the illicit discharge category for stormwater drains. Remember, storm drains can lead directly to the nearest body of water where water is released back into the environment, untreated.

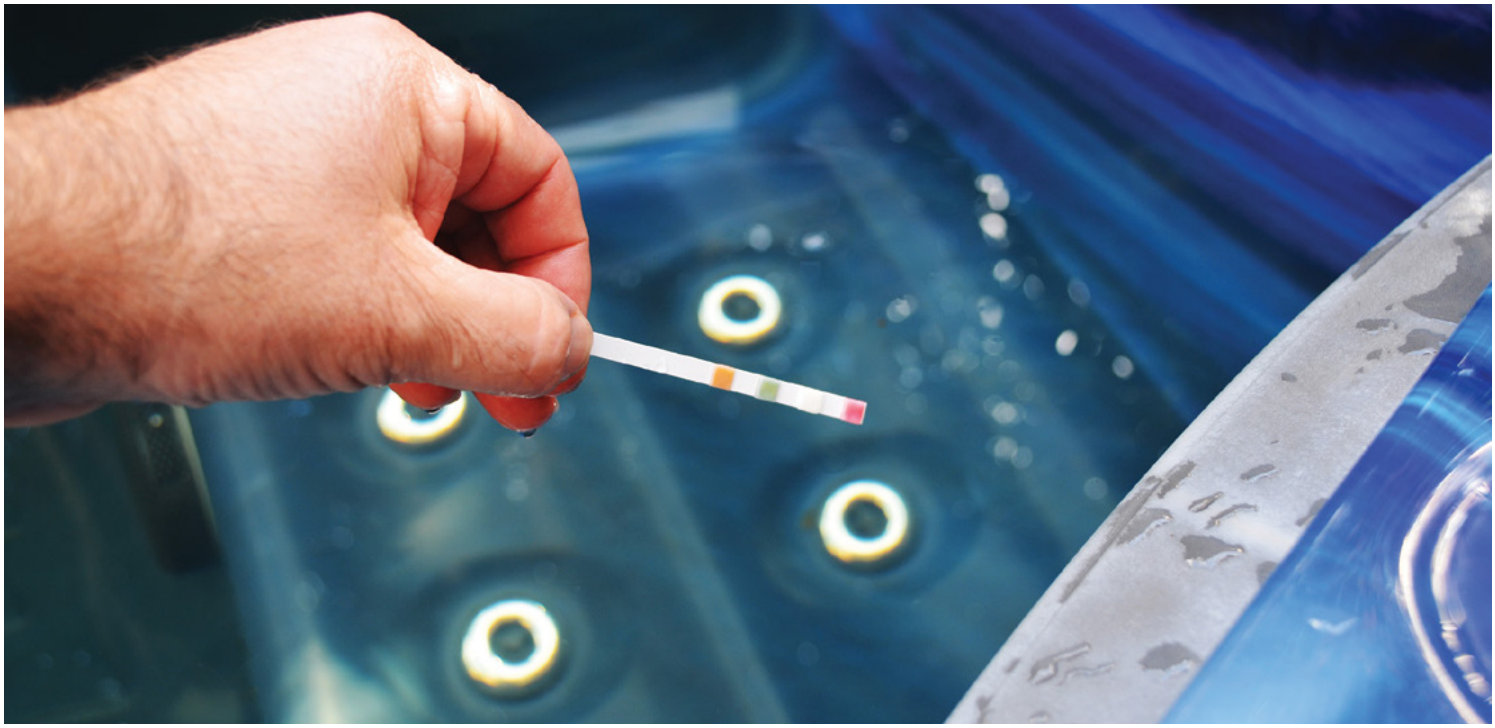
To help minimize your impact on local streams, lakes and Puget Sound follow these steps for draining your spa, above-ground, in-ground or kiddie pool. **These procedures apply only to households that are connected to the city sewer and not for households with on-site septic systems.**

1. If the water is chlorinated, allow the pool or spa to sit at least 2 full days after the last addition of chlorine or bromine. Then test to make sure the chlorine levels are at 0.1 ppm or less and the pH-level is neutral.
2. Drain the water to the following locations:
   - **Lawn area:** The soil will filter out most chemicals and pollutants remaining in the water.
   - **Household sink or bathtub:** Run a garden hose between your pool and your sink or tub and start the flow! This will direct the water to the sanitary sewer where the water can be treated.
   - **Sanitary sewer cleanout:** Locate your sanitary sewer cleanout for your house (cap will be black or green in color) and run your hose from the pool to the cleanout. *Do not attempt to open or remove a sewer manhole cover—this is dangerous and not recommended!*

Fact!

Illicit discharge occurs when anything other than stormwater is washed or dumped into the stormwater drainage system. Examples include:

- A measurable flow during dry weather that contains pollutants (such as car oils) or pathogens (pet waste).
- Disposal of vehicle maintenance fluids (oil, antifreeze, brake fluid etc.) into a storm drain.
- Hosing or washing loading areas or restaurant mats in the vicinity of storm drain inlets.
- Leaking dumpsters flowing onto roadways and into storm drains.
- Old or damaged sanitary sewer lines leaking fluids into a stormwater drainage.
- Disposal of wastewater from recreational vehicles (RV).



If you have an on-site septic system *don't dispose of water from hot tubs or pools into the on-site sewage system. Large volumes of water are harmful to the system, and the chlorine can destroy important bacteria in the system. Drain hot tubs onto the ground, away from the drain field and not into a storm drain. Visit* ***https://www.co.thurston.wa.us/health/ehoss/dos_donts.html*** *for more information on residential septic system care.*

Maintaining Your RV

Before you cover your RV or put it in storage, you will likely be performing annual maintenance or winter preparations. To help prevent surface water pollution, cover concrete and asphalt with a tarp before performing maintenance activities to make spill cleanup easier.

After maintenance is complete, always remember to recycle old oils, antifreeze, solvents, and batteries. Many local auto part stores and gas stations accept used oil and oil filters. In addition, Thurston County's HazoHouse located at the Thurston County Waste and Recovery Center accepts batteries, oil, oil filters, antifreeze, solvents, and more. For a complete list of what is accepted, visit **ThurstonSolidWaste.org** and click on "Hazardous waste disposal."

Proper Disposal Tips:

- Never dump new or used automotive fluids or solvents on the ground, in a stormdrain or street gutter.
- Never mix wastes. The chlorinated solvents in some cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Always keep your wastes in separate containers, properly labeled and stored out of the weather.

Spill Cleanup Tip!

Always keep a bag of kitty litter on hand to absorb spills. If there is a spill, sprinkle a good layer of kitty litter over the top, let it absorb and then sweep it up a few minutes later. Then double bag the contaminated litter in plastic bags, tie it up, and dispose of it in your regular garbage.

Proper Car Care = Clean Water

With the rainy season quickly approaching, it is a good time to check your vehice for leaks. When rainwater washes over hard, impermeable surfaces like driveways or streets, it picks up pollutants before flowing into a nearby stormdrain, untreated, to local creeks, rivers, lakes and Puget Sound.

Oil, grease and other vehicle fluids, called nonpoint source pollution, are a large percentage of the pollution found in rainwater runoff. Automotive chemicals not only affect water quality, they also harm fish and wildlife habitat.

Checking for vehicle leaks and fixing detected leaks not only protects the water we depend on but may also save you money! When your car leaks oil, transmission fluid, antifreeze or other fluids, it can be a sign of a larger problem. Fixing car leaks can prevent unwanted breakdowns, major engine damage, or more expensive repairs.

Nonpoint Source Pollution: *Pollution resulting from many different sources or activities.*

Helpful tips to get leaks fixed:

- Next time you get an oil change, ask your mechanic to check for leaks.
- Check for leaks yourself by placing a large sheet of clean cardboard under your engine when you come home. Check the cardboard every few hours for any sign of a leak.
- If your car is leaking, please get it fixed. In the meantime, keep using cardboard to catch drips and dispose of the cardboard in the trash.
- If you are changing your own oil or other automotive fluids, be extra careful to avoid spills and splatters. If you do have a spill, use kitty litter to soak up the fluid, then sweep up the kitty litter and place it in the garbage.
- Collect your used oil in a reusable waterproof container, then recycle it at the Thurston County HazoHouse (visit ThurstonSolidWaste.org and click on "Hazardous waste disposal") or other local recycling center.

Get a FREE Leak Check!

Don't Drip & Drive is partnering with the Automotive Service Association (ASA), AAA and EnviroStars to offer free leak inspections and discounts on leak repairs! Find certified, participating repair shops offering free visual leak inspections. If a leak is identified, a free estimate for repairs will be provided.

Find the nearest participating location in Lacey, Olympia, Tumwater, & Thurston County by visiting:

FixCarLeaks.org

Featured Creature

Oregon Ash
(Fraxinus latifolia)

Our Native Butterfly Bush! Oregon Ash

(*Fraxinus latifolia*)

Distribution: Oregon Ash is found to the west of the Cascade Mountain Range from southwestern British Columbia, south through western Washington, Oregon and into the Sierra Nevada range in California. In general, it will grow from sea level up to 3,000 feet in elevation.

There are approximately 65 species of ash that grow mostly in temperate regions of the northern hemisphere, worldwide. Sixteen of these species occur in North America. Oregon Ash is the only ash native to the Pacific Northwest.

Oregon Ash is a medium sized (up to 25 meters) deciduous tree that is a member of the olive family (*Oleaceae*), living up to 250 years. This species prefers poor-draining, moist or wet soils found along streams, wetlands or low valleys as these trees are able to withstand frequent flooding.

A more familiar ash tree is the non-native and showier Mountain Ash or Rowan Tree with its bright red berries. The Mountain Ash is a member of the rose family and grows best in moist, acidic, well-drained soils in full sun or part shade. These ornamental trees are a favorite for landscapers for their white blossoms and showy bright berries. Our Pacific Northwest Ash is a bit subdued in comparison but hardy and a favorite of local butterflies.

Oregon Ash thrives in mild, humid climates that have relatively cool, humid summers and wet, mild winter temperatures. These trees will tolerate summer drought but may drop leaves when conditions become too hot and dry.

Oregon Ash propagate by seeds dispersed by wind or flooding waters. Trees begin to produce seeds at 20–30 years of age. The spring blooming flowers appear before leaf-out and are inconspicuous with male and female parts growing on separate flowers. Seeds are single winged, like half a maple seed forming in large drooping clusters. Young trees are fast growing while growth slows as the tree matures. Seedlings are able to propagate in shady areas.

Given the right conditions, and if your space allows, these trees are easy to grow and can provide valuable habitat for wildlife. Birds and small animals eat the seeds and deer browse on young plants. Butterflies, such as the Western Tiger Swallowtail, will use the plant as a host for its larvae to feed upon the leaves.

For more information about native plants, visit Washington Native Plant Society at **https://www.wnps.org**.

Rake-a-Drain

In heavy rain and snow events, storm drains are key in preventing localized flooding and keeping homes and roads safe. In one square mile, one inch of rain is equivalent to 17,378,560 gallons of stormwater, that is enough to fill almost 873 swimming pools!

Because stormwater runoff cannot soak through hard surfaces like streets, sidewalks, and roofs, our communities rely on storm drains to carry that water safely away from neighborhoods. Runoff travels down storm drains and into creeks, lakes, and storm ponds, eventually making its way to Puget Sound. Storm drains must be kept clear for the system to work properly. Although city and county crews regularly clean our storm drains and streets, leaves and other debris can gather quickly between cleanings and clog the drain, flooding neighborhood streets. This can be hazardous for both drivers and pedestrians.

You can help!

When the leaves start to fall and, before the heavy rains start, check to see if there is anything blocking the storm drains around your neighborhood. Organic material like leaves and dirt can be disposed of in the yard waste bin or a compost pile, and anything else should be placed in the garbage.

Street sweepers weren't designed to pick up large piles of leaves in the street, but luckily your garden can use them! Leaves provide nutrients, protect plants from freezing winter temperatures, and help reduce the number of weeds in your yard. What's bad for your storm drain can be good for your yard.

In the winter months, after a heavy snowfall, remove snow and ice around the storm drain to allow snowmelt to flow down the drain. Checking your storm drain routinely throughout the fall and winter will ensure that water can drain properly, protecting your property and neighborhood. Help keep storm drains clear of debris all year by not blowing or pressure washing debris into the street.

Remember!

- Do not attempt to unclog a storm drain if the street is flooded or if you see debris below the grate—call your local stormwater utility instead.
- If you can safely unclog the drain, remember to use extreme caution and be aware of traffic. Wear reflective clothing and buddy up with another person when you clean so they can watch for vehicles while you safely unclog the drain.
- In Thurston County, storm drains almost always lead directly to a body of water like a creek, lake, or Puget Sound. Most stormwater runoff from our neighborhoods does not flow to a water treatment facility. That is why it is so important that only rain goes down the drain!

Kids' CORNER

Help Clean Up Puget Sound!

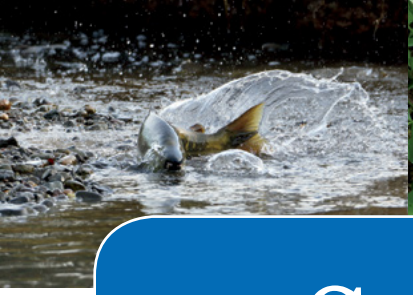
Puget Sound is in danger and we need your help cleaning it up! In the drawing below, place an X over the items that don't belong and cause damage in Puget Sound.

ILLUSTRATION BY RACHEL SAUNDERS

3 easy steps you can take to keep trash out of the Sound:

1. **Use re-usable bags, straws & containers**
2. **Keep litter and debris out of street drains**
3. **Cover and secure garbage bins**

Answers: Styrofoam container, spork, spoon, balloon, fish hook, toothbrush, straw, flip flop, spray bottle, soda can, golf ball, golf tee, plastic bag, six-pack plastic rings, boot, tire, water bottle, license plate



Stream Team *Events*

For additional events, event details or to register, please visit our website at streamteam.info and click on the calendar icon.

SEPTEMBER

Native Plant Nursery Learning & Work Parties

Thu., Sept. 5 • 5 – 7 p.m.
Thu., Sept. 19 • 9:30 a.m. – 11:30 p.m.

WSU's Native Plant Salvage Project Nursery
2214 RW Johnson Boulevard Southwest, Tumwater

Join plant experts at WSU Extension's plant nursery to process new native plants and keep up on nursery operations, all while learning new plant skills! For more info., contact Samantha at info@nativeplantsalvage.org. Register online.

Salmon Stewards Field Training

Sat., Sept. 14 • 10 a.m – 1 p.m.

Tumwater Falls Park
110 Deschutes Way SW, Tumwater

For more info., contact Meridith at mgreer@ci.tumwater.wa.us. Register online.

Forage Fish Surveys

Thurs., Sept. 26 • TESC, Sunset Beach Drive
Thurs., Oct. 10 • Priest Point Park, Flora Vista parking entrance • 9 a.m. – 3 p.m.

Collect sand-gravel samples on local beaches to look for surf smelt and sand lance eggs. Following the sample collection, samples will be processed and taken back to the lab to analyze for eggs. *Surveys are tide dependent so survey dates are variable.*

Trained and untrained volunteers welcome!

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

30th Annual Nisqually Watershed Festival

Sat., Sept. 28 • 10 a.m. – 4 p.m.

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

For more info., contact Ashley at 360-456-5221 ext. 2145.

See page 16 for event and parking details.

HOW TO REGISTER FOR EVENTS

Visit streamteam.info and click on the calendar icon at the very top of the page.

Select the event for which you plan to register.

Click on the register button near the bottom of the Event page. If multiple times are listed, click "sign up" on the date & time you'd like to register for.

Follow the instructions to log in as an existing volunteer or create a new secure profile.

OCTOBER

Return of the Chinook Celebration

Sat., Oct. 5 • 12 p.m. – 4 p.m.

Tumwater Falls Park
110 Deschutes Way SW, Tumwater

For more info., contact Meridith at mgreer@ci.tumwater.wa.us. Register online.

See page 3 for event details.

Native Plant Salvage Foundation Fall Plant Sale!

Sun., Oct. 6 • 11 a.m. – 3 p.m.

(Order plants in advance)

Support Native Plant Salvage Foundation's water resources and habitat work by beautifying your home landscape and becoming more water savvy. For more info., contact Samantha at info@nativeplantsalvage.org. More information will be available soon at www.nativeplantsalvage.org.

Chum Salmon: Part 1—Basic Training

Tues., Oct. 22 • 6 – 8 p.m.

929 Lakeridge Drive SW, Building 4, RM 101, Olympia

For more info., contact Ann Marie at ann.marie.pearce@co.thurston.wa.us.

See page 4 for details. Register online.

Fall Planting at McLane Creek

Sun., Oct. 20 • 10:30 a.m. – 3:30 p.m.

McLane Creek Nature Trail

5044 Delphi Rd SW, Olympia

Join WSU's Native Plant Salvage Project and Thurston County Stream Team to protect the salmon-bearing stream at McLane Creek! For more info., contact Samantha at info@nativeplantsalvage.org. Register online.

Chum Salmon: Part 2—Basic Training

Wed., Oct. 30 • 6 – 8 p.m.

929 Lakeridge Drive SW, Building 4, RM 101, Olympia

For more info., contact Ann Marie at ann.marie.pearce@co.thurston.wa.us.

See page 4 for details. Register online.

NOVEMBER

Chum Salmon: Part 3—Field Training

Sat., Nov. 2 • 9 a.m. – 12 p.m.

McLane Creek Nature Trail, Olympia

For more info., contact Ann Marie at ann.marie.pearce@co.thurston.wa.us.

See page 4 for details. Register online.

Chum Salmon & Cider Celebration

Sun., Nov. 10 • 11:30 a.m. – 2 p.m.

McLane Creek Nature Trail, Olympia

For more info., contact Ann Marie at ann.marie.pearce@co.thurston.wa.us.

See page 4 for details. Registration is NOT required.

Stream Team

EDUCATE • PROTECT • RESTORE

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

30th Annual Nisqually Watershed Festival

Join Stream Team Saturday, Sept. 28 from 10 a.m. to 4 p.m. at the Billy Frank Jr. Nisqually National Wildlife Refuge for the Nisqually Watershed Festival. There will be something for everyone!

Family friendly activities happening all day:

- Paint a wood fish to decorate next year's festival
- Make a salmon lifecycle keychain
- Paint a salmon to make a paper print or a t-shirt (bring your own or buy one at the festival!)
- Watch fish and shellfish dissections with local scientists
- Take a guided nature walk along the Refuge trails
- Listen to stories in the Red Salmon Tent
- See a real eagle's nest
- Tour the Insect Extravaganza hall to learn about the fascinating world of bugs
- Take a tour of the Nisqually nearshore

This event is FREE (except for food). So come out and celebrate the streams, wildlife, history and culture of the Nisqually Watershed! For more information including parking information visit, http://nisquallyriver.org/nisquallywatershedfestival/ or contact Ashley at 360-456-5221 ext. 2145.

Note: *Free parking and shuttle to the festival (runs every 15 minutes) will be located at River Ridge High School, 350 River Ridge Drive, Lacey. Handicapped parking is available at the Billy Frank Jr. Nisqually National Wildlife Refuge, 100 Brown Farm Rd., Olympia.*

NISQUALLY WATERSHED FESTIVAL

- **Saturday, Sept. 28**
- **10 a.m. – 4 p.m.**
- **Billy Frank Jr. Nisqually National Wildlife Refuge**