

# Stream Team News

**FREE**

OLYMPIA • LACEY • TUMWATER • THURSTON COUNTY

EDUCATE • PROTECT • RESTORE



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CREDIT: MICHELE BURTON PHOTOGRAPHER

## The Purple Martins Are Back!

**Interested in monitoring these beautiful aerial acrobats?**

☐ Join the East Bay Purple Martin Monitoring Team.

☐ Training Provided!

**No previous experience necessary!**

### PURPLE MARTIN MONITORING TRAINING DATES ••••

- Monday April 11  
OR April 18
- 5 – 6 p.m.



Stream Team is looking for volunteers to help monitor the purple martin nest boxes from April to September. The boxes are located at East Bay in downtown Olympia. To be qualified to monitor, just attend a short training on monitoring basics and bird identification before you begin monitoring. To sign up, go to the Stream Team website at [www.streamteam.info](http://www.streamteam.info) and click "Register". For more information, please contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us).

For more information on purple martins, go to <http://www.streamteam.info/localstreams/wildlife/landair/martin/>

**ON THE COVER:** Purple martin 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)

### NEWSLETTER CONTRIBUTORS:

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### STREAM TEAM INQUIRIES

360-438-2672 or [streamteam@ci.lacey.wa.us](mailto:streamteam@ci.lacey.wa.us)

#### IN LACEY:

City of Lacey Water Resources Program  
420 College St. SE, Lacey, WA 98503

**Attn: Kim Benedict**

Tel: 360-438-2687  
TDD: 1-800-833-6388  
[kbenedic@ci.lacey.wa.us](mailto:kbenedic@ci.lacey.wa.us)

#### IN OLYMPIA:

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

**Attn: Michelle Stevie**

[mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us)

#### IN TUMWATER:

City of Tumwater Water Resources Program  
555 Israel Road SW, Tumwater, WA 98501

**Attn: Debbie Smith**

Tel: 360-754-4148 TDD: 1-800-833-6388  
[dmsmith@ci.tumwater.wa.us](mailto:dmsmith@ci.tumwater.wa.us)

#### IN THURSTON COUNTY:

Thurston County Water Resources Program  
929 Lakeridge Dr. SW, Olympia, WA 98502

**Attn: Chris Maun or Ann Marie Pearce**

Tel: 360-754-3355 EXT 6377  
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[maunc@co.thurston.wa.us](mailto:maunc@co.thurston.wa.us)  
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**DESIGN & LAYOUT:** Azure Summers Graphic Design, [design@azuresgd.com](mailto:design@azuresgd.com)



## 5 Spring Tips for *Healthy Lawns*

Spring is finally here! Our lawns are waking up and, so too, are weeds. Weeds and moss often outcompete the grass in our lawns because they can survive in soil conditions that are stressful for our lawns. To create conditions that create healthy grass, follow these tips:

### 1 Test Your Soil

A basic soil test will help you determine the amount of lime, nitrogen, potassium and micro-nutrients your lawn needs. It can also help you know how much water is appropriate for your landscape.

**TIP:** Thurston Conservation District provides soil testing for a nominal fee. For more information, call 360-754-3588 or go to [www.thurstoncd.com/soil-testing.html](http://www.thurstoncd.com/soil-testing.html)

### 2 Aerate Your Lawn

Many weeds thrive in compacted soil and will outcompete grass under these conditions. Aerating your lawn removes small “plugs” of soil, which improves root development of grass by allowing air and water to soak into the soil.

**TIP:** You can hire a lawn care service to aerate for you or rent an aerator. To save money, you could share the rental of an aerator with your neighbors!

**NOTE:** Our local soils are naturally high in phosphorus, so it rarely needs to be added.

Due to its adverse effects on aquatic environments, phosphorus is now banned from fertilizers in our area.

There may still be some on store shelves or in your garage. Its use is not recommended unless you are establishing a brand new lawn. Please dispose of any unused fertilizer at HazoHouse. (See pg. 4 for location info.).

### 3 Overseed and Top Dress with Compost

Overseeding your lawn will help grass take root in bare and thinning areas instead of opportunistic weeds! If you are going to aerate, apply seed afterward using a perennial rye/fine fescue grass seed mix that is designed for growing conditions in the Pacific Northwest. Then, lightly rake in ¼ inch to ½ inch of fine compost. The compost will cover the seed and add nutrients and micro-organisms to the soil that will help your lawn thrive!

### 4 Add Lime

Pacific Northwest soils tend to be acidic (low pH). Moss flourishes in acidic soils. Washington State University recommends a soil pH of 5.5 to 6.5 for lawns. If your soil pH is less than 6.5, it will take multiple applications of lime over time to help increase the pH.

**TIP:** Apply up to 50 lbs/1,000 sq. ft. of pelletized dolomite lime up to four times per year to help increase your soil pH over time.

### 5 Use a Slow-Release Fertilizer

When applying fertilizer, use a slow-release fertilizer. Slow-release fertilizers rely on soil organisms and other processes to “release” nutrients at a rate at which plants can use them, making it less likely that the nutrients will wash away and be wasted.

Use a calibrated fertilizer spreader, and follow package instructions carefully. More is not better!

**TIP:** For best results, wait about two weeks after you apply lime before you fertilize.



Sweep up any fertilizer that falls on hard surfaces, such as driveways and sidewalks.

Excess fertilizer can wash off into storm drains, wasting your money and contributing to the pollution of our local water bodies.

#### 3 Reasons to Stay away from Fertilizers that Include Insect, Disease or Weed “Control”

- Spreads harmful chemicals throughout your lawn (even where it is not needed).
- Often contain herbicides or pesticides that target species which are not even present in the Pacific Northwest.
- Kills the beneficial micro-organisms in your soil that help your grass to grow green and healthy!

For more information, go to the Grow Smart Grow Safe website at [www.growsmartgrowsafe.org](http://www.growsmartgrowsafe.org)





### Is This Product Hazardous?

Look for these key words on the label:

**POISON**  **DANGER**  
**WARNING**  **CAUTION**

Safely Dispose of Household  
Hazardous Waste at

**HazoHouse**  
2418 Hogum Bay Rd. NE, Lacey

Open: Fri. – Tues., 8 a.m. to 5 p.m.  
FREE to residential customers.

For more information, contact Thurston  
County HazoHouse at 360-786-5494 or  
go to [http://www.co.thurston.wa.us/  
solidwaste/hazardous/haz-hazohouse.htm](http://www.co.thurston.wa.us/solidwaste/hazardous/haz-hazohouse.htm)

## 5 Spring Cleaning Tips

### Keep Kids, Pets & Local Waterways Safe

1

#### Get Rid of Unused Hazardous Household Products

Are you thinking about cleaning out your house or garage this spring? If so, you may have “hazardous” household products that should NOT be put in the garbage. The average American household has dozens of hazardous products including oil paints and thinners, solvents, used motor oil and some cleaning supplies.

Household hazardous products can harm the environment, people and pets if they are not properly stored and disposed of. Follow these simple guidelines to keep our families, pets and waterways safe:

- Store in original container. Do not remove the label. Never combine products.
- Keep all hazardous products out of the reach of children and pets.
- Store hazardous products in a large plastic tote to contain any spills or leaks.
- Follow the label instructions for cleaning up any spilled or leaked products.
- Take unused hazardous products and any materials used to clean up spills to HazoHouse.

2

#### Clean Your Carpets at Least Once Per Year

Cleaning your carpets at least once per year can eliminate pollutants, prevent mold growth and reduce allergens from dust mites. When cleaning your carpet, make sure to dispose of the dirty wash water properly. Never dump it down a storm drain.

If you are connected to the sanitary sewer system, you can dump the wash water down a sink, toilet, bathtub or shower drain. Make sure to filter larger debris to prevent drain clogs.

**If you have a septic system, do NOT dump dirty wash water down a drain! It can harm your septic system. Instead, dump the waste water on your lawn or flower gardening beds. Make sure you do NOT dump it over your drainfield.**

3

#### Pressure Washing Buildings: Test, Protect and Clean-up

If you have an older home, test your paint first to find out if it contains lead or heavy metals, which may require that paint flakes be disposed of at HazoHouse.

Before pressure washing, cover the ground with tarps to capture paint flakes, and direct wash water into a grassy or graveled area to keep contaminants from washing into storm drains or roadside conveyance ditches.

**TIP: A shop vac can be used to vacuum up paint flakes.**

4

#### Cleaning Driveways and Sidewalks: Sweep or Use Only Water in a Pressure Washer

Whenever possible, sweep driveways and sidewalks to remove debris instead of pressure washing. Dispose of dirt and debris in the garbage. Cover spills with kitty litter or other absorbent material and dispose of in the garbage. Take debris to HazoHouse if the spill is a hazardous material.

If you are going to use a pressure washer, sweep first, then use the lowest setting possible. If possible, pressure wash with plain water without soap added. Direct dirty wash water (with or without soap) to a grassy or graveled area away from storm drains to allow the wash water to infiltrate into the ground.

5

#### Clean Up Pet Waste—Every Dog, Every Doo, Every Time

Pet waste contains harmful bacteria and viruses that can make young children sick, pollute our waterways and contaminate shellfish. Bacteria and viruses in pet waste can persist in the soil for a long time. The best way to dispose of pet waste is to scoop it, bag and trash it—every dog, every doo, every time.

**Stream Team can supply you with a FREE pet waste bag dispenser to attach to your leash and FREE signs and durable bag dispensers for qualifying public places such as neighborhood common areas, multi-family housing complexes and other approved community areas.** Contact your local Stream Team Coordinator to find out more information (page 2).

# Cutting Copper in Car Brakes is *Helping to Protect Washington's Salmon*

A video from the Northwest Fisheries Science Center shows juvenile coho salmon swimming in two tanks. When a researcher drops a bit of predator scent into the water, the fish in one tank immediately freeze and drop to the tank floor to avoid attracting attention. In the other tank, however, the young fish continue to swim about obliviously. What's going on here? Copper.

Scientists have known for years that copper can affect fishes' sense of smell, reducing their ability to avoid predators. This is true even at extremely low concentrations.

In Puget Sound and the streams and rivers that feed it, copper pollution is a real problem. Hundreds of thousands of pounds of copper enter these waters every year from sources such as plumbing pipes, pesticides and vehicle brake pads.

Many people may not even know that car and truck brakes contain copper, but it can be a significant ingredient in some brake pads and shoes, helping the friction material disperse heat. As brakes wear down, that friction material turns to dust and washes off into streams and rivers, with much of it eventually ending up in Puget Sound.

Washington Department of Ecology scientists estimate that 250,000 pounds of copper enters Puget Sound every year from vehicle brakes.

Brake manufacturers were aware of the concerns, but reformulating thousands of products that need to meet extremely high standards for performance is not an easy feat. The Brake Manufacturers Council, an industry group, worked with Washington and California to develop legislation designed to gradually phase copper out of brakes. Manufacturers wanted state regulations on the books to create a level playing field where everyone would be held to the same standards.

In 2010, the Washington Legislature passed the Better Brakes Law, and California passed a similar law the same year. Better Brakes required manufacturers to begin reporting the



copper content in their products in 2015, and to eliminate other toxic chemicals like asbestos, cadmium, chromium, lead and mercury. The law also created a framework to phase out copper completely by 2025.

The first step on that path came December 1, 2015, when the law called for the Department of Ecology to review data from manufacturers and find out whether low-copper and copper-free brakes were available in the state. In fact, the data showed that more than 3,000 brakes from more than 100 manufacturers are now available that meet either the "low-copper" standard for containing less than 5 percent copper by weight or the "copper-free" standard for less than 0.5 percent copper.

Furthermore, the data showed that the average copper content in brakes had fallen by 25 percent since the Better Brakes Law took effect. Manufacturers report that they are replacing copper with new formulations including ceramics, synthetic aramid fibers (like Kevlar), carbon and other less-hazardous materials.

The next step in reducing copper will be for the Department of Ecology to bring together a panel of industry experts, safety regulators and environmental stakeholders to advise the state whether a complete phase out of copper by 2025 is achievable. That group will meet several times during 2016.

So, you might ask, if we eliminate copper in brake pads in the next decade, will we save Washington's endangered

salmon runs?

Unfortunately, it's not that simple. Stormwater runoff from highways and roads is a toxic soup of chemicals—copper, zinc, polycyclic aromatic hydrocarbons and many more. These chemicals persist in the aquatic environment and can harm aquatic organisms alone or in combination.

Still, reducing copper from brakes will remove a significant obstacle to the recovery of salmon and improve our state's environment for all fish.

What's more, in early 2015, brake manufacturers, states and the U.S. Environmental Protection Agency signed an agreement modeled on Washington's program that will extend our standards to the entire country.

That's the big picture. Right now, each of us can help to protect salmon by asking our repair shop or auto parts store whether low-copper or copper-free brakes are available when the time comes to replace our brakes.

How can you tell? Brake manufacturers now place a LeafMark on every package of brakes. One leaf colored in means the brakes meet the 2015 standards for lead, mercury and other toxics, two filled in mean the brakes contain less than 5 percent copper by weight, and all three filled in mean the brakes contain less than 0.5 percent copper by weight.



IMAGE: AFTERMARKET NEWS, SAFE BRAKING.COM

You can see the effects of copper on coho yourself at <http://tinyurl.com/cohovideo>

Learn more about the Better Brakes program at [www.ecy.wa.gov/programs/hwtr/betterbrakes.html](http://www.ecy.wa.gov/programs/hwtr/betterbrakes.html).

Article courtesy of Ian Wesley and Andrew Wineke, Washington Department of Ecology. Ian Wesley is Better Brakes Coordinator for the Washington Department of Ecology. Andrew Wineke is Communications Manager for Ecology's Hazardous Waste and Toxics Reduction program.



# What's Blooming in Budd?

With the onset of spring comes blooming crocus, Indian plum and red-flowering currant. Did you know Puget Sound blooms as well? Spring marks a time of plentiful nutrients, sunshine and good mixing conditions in Puget Sound—perfect ingredients for fueling the microscopic plants of the sea, phytoplankton.

Last year marked the fourth year of Stream Team's plankton monitoring events in Budd Inlet near downtown Olympia. Between June and September, volunteers gathered at the Port Plaza dock to collect weekly information about the weather, tides, temperature, salinity and water clarity. Plankton samples were taken to the LOTT WET Science Center where they were projected onto a large screen for viewing, analyzed for species composition, and screened for harmful algal bloom (HAB) species. This ongoing data set allows the tracking of seasonal changes as well as the detection of changes over time.

## Why study plankton?

Besides being fascinating to observe under the microscope, plankton are the life force of the ocean. Phytoplankton and zooplankton, the microscopic plants and animals of the sea, are the basis of the marine food web. The food web, which is a delicate balance between species and the environment, responds to human pollution and pressures in ways we are only beginning to understand. For example, Christopher Krembs, Washington Department of Ecology (WDOE), hypothesizes that *Noctiluca*, the bioluminescent dinoflagellate responsible for painting surface waters bright orange, may be blooming more frequently and intensely than in the past. The voracious appetite of this organism for phytoplankton, protozoans, copepods and fish eggs may be having an impact on important species such as diatoms and copepods. Copepods are not only a critical food source for many fish and invertebrates, but their sinking fecal pellets transfer nutrients to deposit-feeding organisms below. As you can see, a simple shift in plankton composition could have profound and unexpected impacts on the surrounding environment.

Phytoplankton also influence dissolved oxygen levels in seawater. They produce oxygen while photosynthesizing and are believed to be responsible for over half of the oxygen that we breathe today. However, in late summer and early fall, bacterial decomposition of plankton that have settled to the bottom can cause dissolved oxygen levels to plummet to dangerously low levels. This is especially true in lower Budd Inlet, where excess nutrients from a multitude of sources result in plankton-rich waters. Oxygen is critical to the health of all marine organisms and, when concentrations are low, fish and invertebrates become stressed. Moderation is key—too little or too much phytoplankton are both cause for concern.

Finally, phytoplankton is monitored because several species are capable of producing harmful biotoxins that can accumulate in filter feeding organisms such as shellfish. Washington Department of Health regularly tests shellfish for biotoxins to ensure that those harvested commercially and recreationally are safe to eat. Sound Toxins, a phytoplankton monitoring program managed by NOAA and Washington Sea Grant, relies on volunteers to collect weekly water samples throughout Puget Sound, screening them for HAB species that produce biotoxins. The "What's Blooming in Budd?" program participates in this program by entering weekly data onto the Sound Toxins database.

## Did you know?

The weight of all the plankton in the oceans is greater than that of all the dolphins, whales and fish put together. Amazing when you consider that most plankton are microscopic in size!



*Volunteers collect phytoplankton samples and view under microscopes to discover what's blooming in Budd.*



*Noctiluca bloom captured by WDOE's Eyes Over Puget Sound program.*

# Citizen Plankton Monitoring

## What have we discovered?

Over the past four years, volunteers have observed several interesting findings. First, it was hard not to notice the unusually warm surface water temperatures in Budd Inlet during the summer of 2015. Since 2014, researchers have identified a persistent warm water mass, nicknamed “the blob”, in northeast Pacific waters. Extending into Puget Sound, “the blob” has raised water temperatures by 1.5–2.0°C. Since “What’s Blooming in Budd?” was initiated, volunteers recorded peak surface temperatures reaching a high of around 21°C (70°F). Last summer, however, temperatures reached 24.4°C, or 75.2°F, by early July!

Volunteers were also fascinated by the enormous fluctuations in surface salinity occurring after rain events or Capitol Lake dam releases. While salinity remains fairly constant at depth (27–29 ppt), surface values can drop as low as 6 ppt during dam releases. Volunteers have also witnessed interesting changes in water clarity throughout the summer using an instrument called a Secchi disk. Water clarity is influenced by the amount of particulates in the water column such as suspended sediments and plankton. Too many particles can restrict light availability and visibility for submerged vegetation and marine life. Poor water clarity can also represent an overabundance of plankton, which could lead to subsequent drops in dissolved oxygen upon decomposition. According to the data collected, water clarity typically ranges from 2–5 meters in depth in lower Budd during the summer, but at times dropped to less than 1 meter, when *Akashiwo* and *Ceratium* were blooming!

Finally, volunteers have detected HAB species such as the diatom *Pseudo-nitzschia* (responsible for amnesic shellfish poisoning) and dinoflagellate *Dinophysis* (responsible for diarrhetic shellfish poisoning) over the past several years. This is not unusual, and their presence does not necessarily indicate that they are producing toxins. However, one unusually large bloom of *Dinophysis* was detected in July of 2013. Simultaneously, Washington Department of Health posted the first closure to recreational shellfish harvesting in Budd Inlet’s history based on elevated DSP toxins in tested mussel tissue.

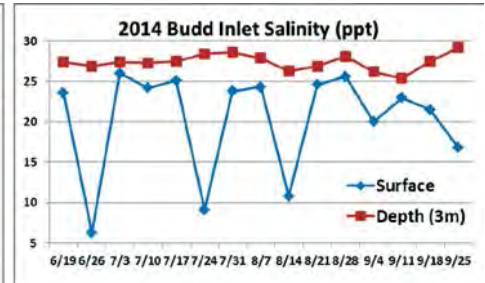
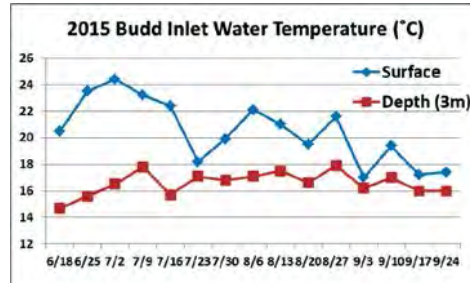


*Akashiwo sanguinea* bloom in lower Budd Inlet, September 2014. Photo by Kelsey Browne, LOTT Clean Water Alliance.

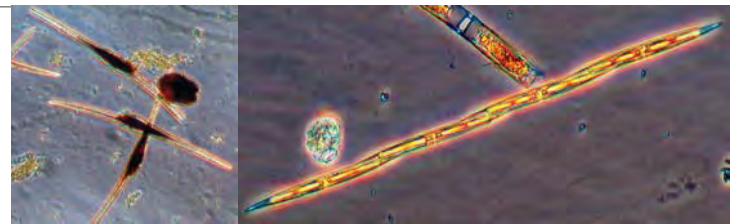
## Don't Feed the Phytoplankton!

Phytoplankton are critical to the marine world, but too many nutrients can fuel large blooms that negatively impact water clarity and dissolved oxygen levels. Keep excess nutrients out of Puget Sound with these easy steps!

1. Minimize your use of synthetic lawn fertilizers. Use slow-release organic options instead.
2. Properly dispose of pet waste. Scoop It, Bag It, Trash It....every poop, every time.
3. Have your septic system inspected every year and pumped every 3–5 years.



Graphs displaying water temperature and salinity collected from the surface and depth.



*Akashiwo sanguinea* and *Ceratium fusus*—two of the most common dinoflagellates found in south Puget Sound Inlets during summer (left) and *Pseudo-nitzschia*, the diatom responsible for amnesic shellfish poisoning (right).

## How can I get involved?

Join Stream Team and biologists from Pacific Shellfish Institute at the dock this summer, starting June 23, to collect water quality data and discover what’s blooming in Budd. Join us and be amazed as a drop of water comes to life right before your eyes! For more information, check the Stream Team website at [www.streamteam.info](http://www.streamteam.info)

## Additional Resources

WDOE’s Eyes Over Puget Sound: [www.ecy.wa.gov/programs/eap/mar\\_wat/surface.html](http://www.ecy.wa.gov/programs/eap/mar_wat/surface.html) Learn more about algal blooms, “the blob,” jellies, and Puget Sound water quality.

SoundToxins: <http://www.soundtoxins.org/> Learn about this Puget Sound-wide HAB monitoring program.

Stream Team: [www.streamteam.info/actions/lawncafe/](http://www.streamteam.info/actions/lawncafe/) Learn ways to keep your lawn healthy while keeping nutrients out of Puget Sound.

Pacific Shellfish Institute: [www.pacshell.org](http://www.pacshell.org) Discover what’s blooming in Budd. Also learn how PSI is removing nutrients in Budd Inlet by growing mussels and turning them into surf-to-turf compost.

Article courtesy of Aimee Christie, Pacific Shellfish Institute



# Glacial Kettles Abound in Thurston County

Have you ever pondered why there are so many small lakes in South Puget Sound, and maybe even why so many are near circular, especially the smaller ones?

If it weren't for the glaciers that last occupied the Sound around 12,000 years ago, we wouldn't have these treasured fresh water swimming and fishing holes.

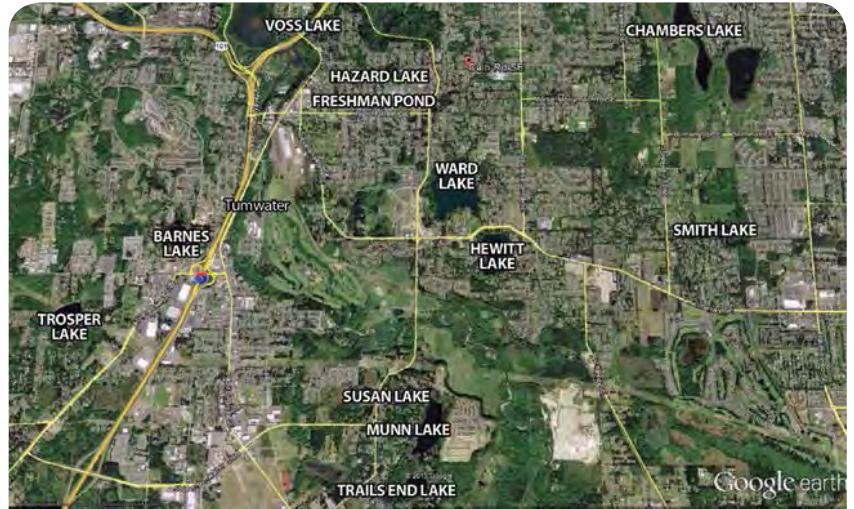
About 15,000 years ago, the Puget glacial lobe of the Vashon glacial period advanced southward as far as Tenino. This ice sheet, about 5,000 feet thick near Seattle, retreated about 12,000 years ago at a rate of 350–530 feet per year. That is very fast for any glacier. As the glacier retreated, large blocks of ice detached from the main ice sheet, becoming “dead ice” and melting in place.

Sediments carried by the glacier and its meltwater streams surrounded and covered these melting ice blocks, eventually collapsing into the depression left by the melted ice. These depressions, called **kettles**, are generally steep-sided hollows in an otherwise relatively flat landscape known as an **outwash plain**. The kettles look somewhat like meteor-impact craters and may be no more than a few tens of feet deep. These shallower kettles are dry most of the year. You can see some of these at Kettle View Park in Olympia and elsewhere along Henderson Blvd., as well as along Cain Rd. between 22<sup>nd</sup> Av. SE and North St. SE.

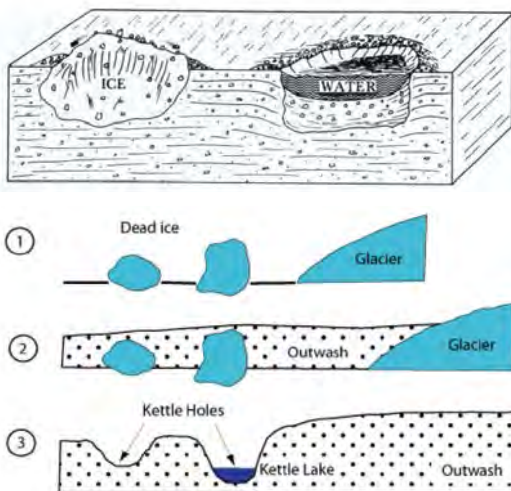
Where the depressions or kettle lakes are larger and extend to depths below the elevation of the local aquifer groundwater surface, they form lakes such as Lake St. Clair and Ward, Hewitt and Chambers Lakes. An **aquifer** is the sediment through which subsurface water, or **groundwater**, travels.

A word about aquifers—In general, there are two kinds of aquifers: confined and unconfined. **Confined** aquifers lie at some depth below the ground surface, separated from the Earth's atmosphere by a confining geologic layer (for example, clay) that creates pressure conditions under which the groundwater flows. To some extent, these confining layers can protect the groundwater from contaminants infiltrating from the surface. Many wells drilled for drinking water penetrate confined aquifers that lie deeper in the sediments.

**Unconfined** aquifers are in direct contact with the Earth's atmosphere, receiving surface water from run-off and infiltration. This direct exposure to surface waters makes an unconfined aquifer more susceptible to contamination from pollutants carried from roads, homes, driveways, etc. The surface elevation of the water in local ponds and lakes often reflects the surface elevation of the local unconfined aquifer. This surface elevation is known as the **water table** of the unconfined aquifer.



*Some of the kettle lakes south of Olympia.*



*These two diagrams illustrate the formation of kettles as a consequence of melting glaciers.*

Because not all lake surfaces in an area are necessarily at the same elevation, there must be other geologic controls acting on lake and pond water levels. The sediments underlying the kettles can range from very permeable to relatively impermeable. Permeable sediments such as sand and gravel drain easily, so, if the bottom of a kettle in permeable sediments is located at a higher elevation than the local groundwater surface (or water table), the kettle may go dry in summer, or remain dry through much of the year. If, however, the kettle is underlain by a localized layer of silt and/or clay, the lake surface may reflect a perched water table. A **perched** water table represents a small localized unconfined aquifer and does not necessarily reflect the broader regional water table, confined or unconfined.

If you study kettles and kettle lakes in the area, you will note that most do not have feeding or draining streams—inlets or outlets, respectively. Instead, they are fed by groundwater or intermittent surface runoff. Those intercepting the regional groundwater surface suggest a hydrologic connectivity between lakes, and, therefore, sensitivity to contaminant input not only of a nearby lake, but potentially of the aquifer being intercepted. Perched kettle lakes may be better at isolating contaminants, but, because they are hydrologically disconnected

...continued on page 9



## *Tumwater E Street* Stormwater Project Protects Deschutes River

People traveling along Capitol Blvd. in Tumwater between E Street and the Capitol Bridge will notice a new roadway, complete with new paving, bike lanes, sidewalks, landscaping, LED lighting, beautiful stone columns and ornamental metal railings lining both sides of the street.

What they probably won't notice is the new stormwater facility on the east side of Capitol Blvd. that is protecting the Deschutes River from stormwater pollution. This stormwater facility is termed a "stormwater outfall retrofit" because it replaces a stormwater outfall pipe with a new treatment facility. Whereas the old stormwater pipe allowed untreated stormwater to flow a short distance overland and into the Deschutes River, the new facility treats stormwater on-site.

The treatment facility was constructed in the summer and fall months of 2015. The facility allows polluted stormwater from the adjacent 6.25 acres of impervious street and commercial land use to slow down and settle out before the water flows to the river. Pollutants picked up by stormwater in the area include petroleum products, metals, sediments and nutrients. Excess sediment from erosion was previously identified as one of the major pollutants entering the Deschutes River from the old stormwater outfall pipe.

In preparation for construction of the stormwater facility, invasive weeds, including Japanese knotweed, Himalayan blackberry and Scotch broom were removed. The new facility features a settling basin and a constructed wetland. Once the stormwater passes through this facility, much cleaner water will now flow into the Deschutes River.

The Deschutes River is home to fish and wildlife, including Chinook, steelhead and coho salmon. This project will help protect Deschutes River habitat for local wildlife. There is also a pathway connection from the project into the local Deschutes Valley Trail.



*Tumwater E Street before (left) and after (right) stormwater project.*

### **Glacial Kettles Abound in Thurston County** ...continued from page 8

from the larger aquifer system, could suffer greater water quality degradation through a concentration of contaminants.

With these many influencing processes and potential impacts on our local kettle lakes and aquifers through surface and groundwater movement, it is important that we consider the connectivity and interconnectedness of our natural water systems. This is best described using the concept of a **watershed**. A watershed is that area of land where all water, including groundwater, which is under it or drains off of it flows to the same discharge point. This point of discharge might be a lake, a river or Puget Sound. So, a watershed can range in size from a few acres like Percival Creek, to thousands of acres like the Deschutes River, to hundreds of square miles, like Puget Sound.

John Wesley Powell—U.S. soldier, geologist, explorer, professor—defined a watershed this way:

*"...that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."*

Because watersheds are controlled by surface topography as well as subsurface geology, managing their use and protection is challenged by the complexities of defining their boundaries and the pathways of their surface and subsurface water flow. Kettles can be considered a window into our local aquifers, giving us an idea of water quality throughout the region. Monitoring their health, and that of drilled water supply systems and other monitoring wells, can provide long-term guidance for managing water quality and mitigating contamination.

*Article courtesy of Wendy Gerstel, QWG Applied Geology*

# Featured Waterbody

## Trosper Lake

Trosper Lake is the headwaters of a very important local stream: Percival Creek.

### Trosper Lake

The City of Tumwater is home to several kettle lakes, one of which is Trosper Lake. Many people pass by this lake on their way to businesses along Littlerock Road in Tumwater, yet they have no idea that this lake exists. Although the lake is within walking distance just to the west of Tumwater Middle School, most students are also unaware of its presence.

Up until at least 1924, the lake was known as Ferguson Lake. It was named after Tumwater pioneer “Uncle” Jesse Ferguson. The Trosper family purchased 60 acres at the north end of the lake from Ferguson, and the lake eventually became known as Trosper Lake. Prior to the sale, Jesse Ferguson planted Northern Spy apple trees around the NE corner of the lake, and the local community would gather there every fall to press the apples into cider. Cider pressing continues to be an annual Tumwater event every fall, but now takes place at Tumwater Falls Park.

No roads lead directly to this 43 acre lake. It is surrounded by protective wetlands which limit lakeside development. The lake is bisected by a Bonneville Power Administration easement from east to west. There is some light residential development set back from the perimeter of the lake, mostly to the southeast and north. The area around the lake has no industrial development. No streams feed the lake. Trosper Lake is fed solely by rainfall and groundwater.

Trosper Lake is, however, the headwaters of a very important local

stream: Percival Creek. Many Stream Team volunteers have conducted monitoring and revegetation projects along Percival Creek, yet few know where this creek originates. Each spring, over 200 seventh-grade Tumwater Middle School students attend the annual Earth Day at Percival Creek event. And each spring, few of the students can identify the source of the creek, even though it begins right behind their school!

The Trosper Lake shoreline is a combination of coniferous and deciduous trees and shrubs. This provides habitat for wood duck and osprey. Like most kettle lakes in the area, salmon are not known to use the lake, but the lake does contain non-native largemouth bass, yellow perch, brown bullhead and crappie. It was once stocked with rainbow trout, but few trout remain today.

On the east side of Trosper Lake, between Tumwater

Middle School and the lake, is an 18.7 acre piece of undeveloped property owned by City of Tumwater Parks and Recreation Department. This future park includes three acres of forested wetland habitat and will provide future public access to the lake. Future development plans include providing interpretive trails, picnic facilities and other neighborhood park amenities.

To read more about the Percival Creek sub-watershed, go to <http://www.streamteam.info/localstreams/streams/percival/>



Thanks to Don Trosper, historian from Olympia-Tumwater Foundation, for some of the information in this article.



## Townsend's Vole (*Microtus [small ear] townsendii*)

Voles live in small colonies of a few to several hundred individuals. As with most rodents, voles are productive breeders and can have many broods each year. Voles can produce 3 to 12 litters per year, though the average is 3 to 5. Litter sizes average 3 to 6 young. Each litter of young is born and raised in a grassy nest found below or above ground. Young are ready to leave the nest within 15–17 days and are able to begin reproduction within 35–80 days.

Voles are a significant part of the food web. Many predators, such as hawks, owls, weasels, foxes, coyotes, minks, badgers, skunks, bobcats and snakes, rely upon voles as an essential food source.

In the human landscape, voles are known for the damage they may cause to our gardens. Backyards and gardens that share borders with forests, fields and grasslands may experience damage from vole population pressures. Damage is usually identified easily by the tiny tooth-scars on woody plants and bulbs. Bulbs and roots are often completely eaten over winter, and trees can be completely girdled, leading to loss of the tree. During the spring, feeding moves to the new growth as herbaceous plants sprout and leaf out.

### How can one small furry being wreak so much havoc?

Voles and their early offspring can have several litters over the summer, so populations can fluctuate from just a few to several hundred per acre. Population densities can be as high as 800 per hectare (1 hectare = 2.47 acres or 10,000 square meters). According to Washington State University Extension, one pregnant female births an average of five female offspring in the first litter (28 day gestation). Those young females in turn can produce an additional 25 females and so on. The population can go from the “original” five offspring to 125, then 625 and up to 3,125 females within 4.6 month if there is no mortality! This results in periodic population explosions, which commonly occur every 3–5 years. When this happens, the population explosion is usually followed by a population crash as the habitat becomes unable to accommodate such large populations.

### Managing for voles around your home:

Voles are a natural part of our ecosystem, and extermination is both impractical and harmful since they provide a large portion of food for many predators. Tall grass is one of the primary food sources and hiding places for voles. Keeping your grass mowed helps to reduce vole occupation and damage. Installing barriers around gardens helps as well. An exclusion fence built 12 inches high and buried 6–10 inches deep is recommended. Applying 1–2 inches of mulch or crushed rock around the perimeters of gardens and trees will also provide barriers that may help reduce the migration of voles. Avoid applying thick layers of organic mulch or weed cloth, which may encourage tunneling.

For more information, visit: <http://gardening.wsu.edu/voles-in-the-garden/>

## Featured Creature

### Townsend's Vole (*Microtus [small ear] townsendii*)



#### Description

One of the largest and most abundant voles in North America. Voles are rodents and are generally identified by their small front feet and ears, blunt noses and relatively short tails. The Townsend's vole has dark-brownish fur and small rounded ears that are large enough to project above the fur. They are neither mice nor moles.

#### Range

British Columbia to California. Can be found at sea level to approximately 1800 feet.

#### Size

Length: 5–8 in. (169–225mm) Weight: 1.6–2.9 oz. (47–83g)

#### Habitat

The Townsend's vole occupies a variety of habitats: salt and freshwater marshes, alpine and subalpine meadows and grasslands. They construct extensive underground burrow systems and runways through grass and other vegetation on the surface of the ground. Tunnels provide protection from predators and from the weather. Townsend's voles are good swimmers and burrow entrances may be found below the water surface.

#### Diet

Various kinds of green vegetation in summer such as grasses, sedges, forbs and bulbs. Grains, seeds, fungi, roots and bark during winter.



## Stormwater Samaritan *Spotlight*

**Meet Gina Jarasitis! She's been busy this past year doing her part to reduce stormwater pollution.**

In the spring of 2015, Gina decided to try a new approach to lawn care. Unhappy with the results she was getting from traditional lawn care practices, Gina made the switch to natural lawn care with help from the Go Green Natural Lawn Care Program. Here's why she made the switch to natural lawn care and why she recommends it to everyone!

**Q: Why did you sign up for Go Green?**

**Gina:** I enjoy working outside, and I like my yard to look nice. Over the years, I've spent countless hours weeding, mowing and edging, but I could see that the health of my lawn was going downhill. The moss was thicker than ever and all the places I had weeded were filling with weeds again. It's a problem that so many of us face, and we don't want to "put a bunch of chemicals on it" to fix the problem. The problem wasn't really with the moss or the weeds anyway; it was that I didn't understand my lawn at all. When I read about the Go Green program, I jumped at the chance to get some professional advice.

**Q: What was your favorite part of the program?**

**Gina:** My favorite part of the program was how it changed my relationship with my lawn. It was like having a rambunctious, out-of-control dog and taking it to obedience school. Eventually, instead of a nuisance, the dog is a joy. As I came to understand what my lawn needed and how to provide it, the moss and weeds went away, and the grass filled in. I put in a lot of work, and all of the work paid off! I was happy with my lawn, and my lawn was happy too!

It was extremely helpful that the program provided the guidelines for me to follow. It wasn't just a list of what to do; it was the interaction with experts and having them explain it in person so I could ask questions.

**Q: How has what you learned also helped your neighbors?**

**Gina:** Next door neighbors, neighbors across the alley and people walking past have gotten lawn tips from me since I started the Go Green program! In general, it probably just sounded like a long list of do this, then this, then this... but I think that a few very important key words will come to mind when they go to work on their lawns this spring:

One is slow-release fertilizer. Most of us have never heard of it before. I learned that it is integral to giving the lawn the nutrients it needs while preventing extra nutrients from washing into Budd Inlet and feeding the algae blooms.

Another key word is aeration. Aeration is when holes are punched in your lawn, and plugs of soil are removed. It allows air, water and nutrients to enter the soil, and it reduces compaction. The lawn loves it.

I also expect that some of my neighbors will be "mowing high and letting it lie"

(2" to 3" high and mulch mowing), and checking to be sure their mower blades are sharp. Mowing is something we all have to do anyway, and there is a correct way to do it for a healthy lawn... so, why not?

**Q: Why would you recommend natural lawn care to others?**

**Gina:** There are two reasons. First of all, if you want a beautiful, healthy and green lawn, natural lawn care works! It's a holistic approach that involves understanding the ecosystem of the lawn. This gives you the power to work with nature, instead of fighting against it. Second, while lawns belong to individuals, the water that flows through them affects the environment that belongs to everyone. Natural lawn care can turn a lawn into a filter that absorbs and disperses clean water slowly.

**In addition to participating in the pilot lawn care program, Gina volunteered three days of her time to film a 7-part Natural Lawn Care "how to" video series.**

**Q: Why was it important to you to help out with making the videos?**

**Gina:** I was very fortunate to participate in the Go Green program. It was empowering, and now I have the healthy lawn I always wanted. But what about the thousands of other interested people who haven't had the time or the opportunity to take part in a program? Natural lawn care know-how should be available to everyone! That is what I was thinking when I agreed to participate in a wonderful series of videos that covers the steps of natural lawn care for our region.

I am new to both natural lawn care and performing in front of a camera, but I discovered some very dedicated people behind the scenes working hard to benefit Puget Sound. These videos are the result of their vision and talents.

*...continued on page 13*

## *Go Green* Natural Lawn Care Program a Success!

Over 300 Thurston County households made the switch to natural lawn care with the Go Green Natural Lawn Care Program in 2014–2015! The grant-funded pilot project administration is complete, and evaluation of the project is underway. Thurston County jurisdictions will use the information gleaned from participant survey responses (taken before, during and after the program) to determine future options for natural lawn and yard care education programs.

In the meantime, if you are interested in learning more about natural lawn care, check out the Go Green Natural Lawn Care "How To" video series and watch Gina in action! To view the video series go to: [www.streamteam.info/actions/lawncafe/](http://www.streamteam.info/actions/lawncafe/)



## Clean Cars, Clean Streams!

Contrary to popular belief, a Pacific Northwest rain shower is no substitute for a car wash. In fact, rain can wash potentially harmful pollutants, like oil, off of your car and into local streams and Puget Sound.

The best way to protect our local waterways while cleaning your car is to take your car to a commercial car wash, where the water is cleaned and recycled on-site and the grime is sent (in most parts of Thurston County) to the LOTT wastewater treatment plant.

The next best option is to wash your car on the lawn or graveled area (not over a drinking well or septic system), so the wash water can soak into the ground and not run off into a storm drain or roadside conveyance ditch.

If you are planning on holding a car wash fundraiser, contact your local Stream Team Coordinator (see page 2) to find an approved Clean Cars, Clean Streams car wash location. Stream Team can provide you with a Clean Cars, Clean Streams car wash kit, which includes buckets, sponges, spray nozzles and eco-friendly car wash solution.



### Planning on holding a car wash fund raiser?

Raise money by selling car wash tickets and help keep local streams clean! Car wash tickets can be ordered with your organization's name printed on them and can be sold rain or shine!

For more information go to [www.CharityCarWash.org](http://www.CharityCarWash.org)



## Stormwater Samaritan Spotlight ...continued from page 12

### Q: Why will the videos be helpful to folks?

**Gina:** The thing that will make these videos helpful is the same thing that made the Go Green program helpful: a professional to provide information and a homeowner to ask questions. In the videos, Ladd, a real life lawn care professional, walks me through the steps of natural lawn care. As we go step by step, I ask the same questions that actually arose for me as I went through the Go Green program. In this way, we provide the viewer with a better understanding of their lawn as well as the know-how to try natural lawn care for themselves.

**As if this wasn't enough to keep her busy, Gina also installed a rain garden in 2015, to reduce stormwater runoff from her property.**

### Q: Why did you install a rain garden on your property?

**Gina:** Building a rain garden in my yard was genius! I love the rain, but, when it is torrential, I start worrying about my basement flooding. My rain garden is beautiful and functional, drawing away all the excess water from my lawn, driveway and roof. With all the rain we've had recently, I've had peace of mind knowing that the water is taken care of. At the same time, the rain garden is filtering out the oil and chemicals that are running off impervious surfaces.

When I first considered putting in a rain garden, I was a little overwhelmed by the technical aspects. For those who enjoy measuring and planning, it may be no problem. For the more hands-on person, it is possible to minimize the technical aspects and use intuition and common sense. So, whatever your approach, if your yard has an appropriate spot for a rain garden, give it a try! There are so many benefits. Not only will you reduce the problems of excess stormwater and filter it for a healthier environment, there are so many wonderful plants to choose from, the birds and animals love it, and it can replace a part of your lawn that isn't doing well.

# Kids' CORNER

## Spring Puzzle



### Directions:

Use the words scattered around the page to complete this spring Stream Team-inspired crossword puzzle!

#### Across

1. Common metal used in car brakes
7. Type of salmon in the Deschutes River
8. Pet waste, fertilizer and cars contribute to \_\_\_\_\_ in Puget Sound
10. Iconic Northwest fish
11. Lime, potassium and nitrogen are all \_\_\_\_\_ that are found in soil
13. Rain or water that runs off of hard surfaces
16. A bird's home

#### Down

2. Blooms in Budd Inlet; can produce harmful biotoxins
3. Nutrient banned in local fertilizers
4. Purple martins are aerial \_\_\_\_\_
5. Rodents that cause damage to gardens
6. Season for cleaning and gardening
9. Use this to increase soil pH
12. River protected by Tumwater E Street project
14. Plant that flourishes in lawns with acidic soil
15. Always clean up after your \_\_\_\_\_

acrobats

pollution

nutrients

lime

moSS

nest

stormwater

salmon

Deschutes

phosphorus

copper

pets

spring

plankton

Chinook

voles



CREATED ON THE TEACHER'S CORNER.NET CROSSWORD MAKER





# Stream Team *Events*

For additional events, event details or to register, please visit our website and click on "Calendar" or "Register": [www.streamteam.info](http://www.streamteam.info)

For maps and directions to any of these events, go to: [streamteam.info/getinvolved/directions/](http://streamteam.info/getinvolved/directions/)

## MARCH

### Forage Fish Surveys

**Mon., March 7 • 9 a.m.**

Priest Point Park

Survey various local beaches for surf smelt and sand lance eggs. Lab analysis of samples to follow. Surveys are tide dependent, so survey times may vary. Trained and untrained volunteers welcome! Carpooling available. For more info., contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us). Register online.

### Amphibian Egg Mass Surveys

**Saturdays, March 5, 12, 19, 26**   
**10 a.m. – 1 p.m.**

Looking for trained volunteers to join in the fun and survey for frog and salamander eggs in local ponds. Not trained, but want to participate? Contact Michelle Stevie at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us). Register online.

### Percival Creek Revegetation Project

**Sat., Mar. 19 • 10 a.m. – Noon**

Percival Creek at Sapp Rd  
2352 Sapp Rd SW, Tumwater

Volunteers needed to help with the habitat enhancement project. For more info., contact Debbie at [dmsmith@ci.tumwater.wa.us](mailto:dmsmith@ci.tumwater.wa.us) or 360-754-4148.

## HOW TO REGISTER FOR EVENTS



Visit: [www.streamteam.info](http://www.streamteam.info) and click on "Register"



Select the event for which you plan to register



Click on the register button near the bottom of the "Event Detail"



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

## APRIL

### Make Batiks for Earth Day!

**Sat., Apr. 2 • 10 a.m. – Noon OR 1 – 3 p.m.**

Procession of the Species Art Studio  
604 Water St, Olympia

Join Stream Team for a fun, family-friendly workshop. Batik your favorite ecosystem and turn it into a small windsock! Register for one session. For more info., contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us)

### Forage Fish Surveys

**Mon., April 4 • 9 a.m.**

West Bay Park

For more info., contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us) Register online.

### Purple Martin Monitoring

**TRAINING DATES:**

**Mon., April 11 OR April 18 • 5 – 6 p.m.**

No experience necessary!

Monitor the nest boxes at East Bay in downtown Olympia from April to September. See page 2 for details. For more info., contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us). Select one date and register online.

### McLane Creek Nature Trail Work Party


**Wed., April 20 • 3 – 6 p.m.**

McLane Creek Nature Trail, Delphi Road

Help prune encroaching vegetation along the margins of the nature trail. Volunteers will be issued a temporary Discover Parking Pass, if needed. For more info., contact Chris Maun at [maunc@co.thurston.wa.us](mailto:maunc@co.thurston.wa.us) or 754-3355 x6377. Register online.

## EARN YOUR FREE "P.S. I LOVE YOU" BAG

by participating in four types of Stream Team events:

-  1. Macro, Amphibian, or Forage Fish Monitoring
2. Salmon or Sound Stewarding
3. Tree Planting or Maintenance
4. Educational Workshop

Look for the "P.S. I Love You" stamp next to the events in our calendar for qualifying events.

## MAY

### Forage Fish Surveys

**Mon., May 2 • 9 a.m.**

The Evergreen State College

For more info., contact Michelle at [mstevie@ci.olympia.wa.us](mailto:mstevie@ci.olympia.wa.us). Register online.

## COMMUNITY EVENTS

### Lacey Arbor Day Seedling Giveaway

**Sat., April 16 • 10 a.m. – 1 p.m.**

Huntamer Park

618 Woodland Square Loop SE, Lacey

Visit the Stream Team booth, and take home one free seedling per person!

### How to Maintain Your Stormwater Pond Workshop

**Sat., Apr. 16 • 9 a.m. – Noon**

Learn how to inspect and maintain your neighborhood stormwater pond and other stormwater facilities in this free workshop. To register, contact Cathe at [linnca@co.thurston.wa.us](mailto:linnca@co.thurston.wa.us) or 360-867-2095.

### Lacey STEM Fair

**Sat., May 7 • 10 a.m. – 3 p.m.**

Huntamer Park

618 Woodland Square Loop SE, Lacey

Visit the Lacey Water Resources booth!

### Lacey Fun Fair

**Sat., May 21 • 10 a.m. – 6 p.m.**

**Sun., May 22 • 11 a.m. – 5 p.m.**

Saint Martin's University  
5000 Abbey Way SE, Lacey

Visit the Stream Team booth!

### To Register a Group

go to: <http://streamteam.info/getinvolved/calendar/register-steps.php>



Check online at [www.streamteam.info/getinvolved/calendar/](http://www.streamteam.info/getinvolved/calendar/) for up-to-date events, including additional tree planting events.



# Stream Team

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

2000 Lakeridge Dr SW  
Bldg 4 #100  
Olympia, WA 98502  
[www.streamteam.info](http://www.streamteam.info)

## *It's a Win-Win Situation!*

### Non-Profit Youth Groups Earn Grants While Providing Community Service

#### City of Lacey Work Involvement Now (WIN!)

The Lacey Youth Groups WIN! Program has been in place since 1994. The Lacey City Council authorized this program to encourage youth groups to participate in projects that foster community pride, enhance and beautify neighborhoods and business districts, improve public safety, and increase youth involvement in our community. The City Council is interested in supporting a wide variety of youth groups and welcomes applications from groups that have not received a WIN! grant in the past.

Lacey area non-profit youth groups (high school clubs, sports teams, youth groups, classrooms, etc.) are eligible to apply for the City of Lacey's WIN! Program. The majority of participants receiving a Lacey WIN! grant must live in the City of Lacey and/or the North Thurston School District boundaries. Through the WIN! Program, youth groups contribute a total of 40 hours of community service and are eligible to receive a grant award of up to \$300. Groups must have a minimum of eight youth participants, ages 10 to 18. Youth may participate in one WIN! project per funding cycle.

Applications are accepted during a two week period in early spring. Please visit the City of Lacey website at [www.ci.lacey.wa.us](http://www.ci.lacey.wa.us) in early March to check on application availability. For further information, contact Jenny Bauersfeld at 360-491-3214.

**WIN! is a great alternative to parking lot carwash fundraisers! Tools and supplies are provided. Weekend projects are available. Limited number of projects offered.**

#### Thurston County Work Involvement Now (WIN!)

Thurston County Water Resources will also be looking for area youth groups to do WIN! projects in 2016. Thurston County youth groups can apply for an opportunity to complete a service project and earn a \$300 grant. Groups must have a minimum of 10 youth participants, ages 10 to 18 with sufficient adult leadership to be eligible to apply.

The Thurston County WIN! Program engages youth groups in helping to protect local water resources, including area creeks, streams, parks and Puget Sound. Typical projects will involve trail maintenance and pruning, spreading wood chips, removing invasive weeds, and planting native trees and shrubs.

Thurston County WIN! applications are due by 5:00 p.m. on March 30, 2016. To obtain an application, go to [www.co.thurston.wa.us/waterresources/](http://www.co.thurston.wa.us/waterresources/) or contact Chris at [maunc@co.thurston.wa.us](mailto:maunc@co.thurston.wa.us) or 360-754-3355 ext.6377.

